



**METRO WASTEWATER
RECLAMATION DISTRICT**

SECOND CREEK INTERCEPTOR AND SAND CREEK INTERCEPTOR SYSTEM IMPROVEMENTS

CITY OF COMMERCE CITY CONDITIONAL USE PERMIT APPLICATION:

Project Number: CU-123-19

Resubmittal 2

Response to Commerce City Development Review Team

Comments Received January 27, 2020

Prepared for:

City of Commerce City

7887 East 60th Avenue

Commerce City, Colorado 80022

Prepared by:

Metro Wastewater

Reclamation District

6450 York Street

Denver, Colorado 80229



Resubmittal 2: May 2020

Resubmittal 1: December 2019

Original Application: May 2019



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TABLE OF CONTENTS

	Page No.
Abbreviations and Acronyms	I
1.0 Introduction.....	1-1
1.1 Land Use Planning Requirements	1-2
1.2 Background	1-2
1.3 Project Summary	1-5
1.3.1 Second Creek Interceptor	1-5
1.3.2 Sand Creek Interceptor Improvements	1-9
1.3.3 Overall Project Benefits	1-9
1.4 Stakeholder and Community Outreach	1-9
1.5 Environmental Assessments.....	1-11
1.6 High Importance Areas to City.....	1-11
1.6.1 Future Second Creek Park and City's Master-planned Trail System.....	1-11
1.6.2 Impacts to Chambers Road	1-12
1.6.3 Future Development Plans	1-12
1.7 Considerations	1-19
1.8 Project Schedule	1-20
2.0 Second Creek Interceptor Alternatives Analysis	2-1
2.1 Second Creek Interceptor Evaluation.....	2-1
2.2 Second Creek Interceptor Refinement Based on Stakeholder Coordination	2-2
2.3 Recommended Second Creek Alignment.....	2-3
3.0 Parcel Impacts and Easements	3-1
3.1 Impacted Parcels.....	3-1
3.2 Proof of Ownership.....	3-1
3.3 Temporary and Permanent Easements	3-1
3.3.1 Easement Status.....	3-2
4.0 Compliance with Commerce City Comprehensive Plan.....	4-1
4.1 3 Cs of Sustainability.....	4-1
4.2 Land Use and Growth.....	4-2
4.3 Economic Development	4-8
4.4 Fiscal Stability.....	4-8
4.5 Housing and Neighborhoods	4-8
4.6 Redevelopment and Reinvestment.....	4-9
4.7 Transportation	4-9
4.8 Safety and Wellness	4-9
4.9 Parks, Open Space, and Recreation.....	4-11
4.10 Public Facilities and Infrastructure.....	4-13
4.11 Stormwater Collection System Considerations.....	4-14
4.11.1 Stormwater	4-14
4.11.2 Floodplains	4-15
4.11.3 Water Quality	4-15
5.0 Community Considerations	5-1
5.1 Harmony with the Character of the Neighborhood.....	5-1

5.2	Compatibility with Surrounding Area	5-2
5.3	Community Need for the Proposed Project	5-2
5.4	Effects on Adjacent Properties	5-2
5.5	Effects on Public Improvements and City Services	5-3
5.6	Site Characteristics.....	5-3
5.7	Landscaping and Screening that Ensure Harmony with Adjacent Uses	5-3
5.8	Visual Impacts.....	5-3
5.9	Noise, Dust, Vibrations, Odor, and Other Nuisances	5-5
6.0	Statement of Operations.....	6-1
6.1	Hours and Days of Operations	6-1
6.2	Number of Employees	6-1
6.3	Number of Required Parking Spaces	6-1
6.4	Average Daily Peak Trips Generated	6-1
6.5	Types of Equipment and Processes Used	6-2
6.6	Safety and Maintenance Procedures	6-4
6.7	Description, Location, and Quantity of Hazardous Materials	6-4
6.8	Onsite Wastewater Treatment Systems Conflict Evaluation	6-8
6.9	List of Regulatory Agencies, Contact Names, Phone Numbers, and Inspection Frequency	6-8
6.10	Severed Mineral Rights	6-8
6.11	Development Plan.....	6-9
7.0	Sand Creek Interceptor System Evaluation	7-1
7.1	Sand Creek Interceptor System Recommended Alignment	7-1
7.2	Land Use and Growth	7-4
7.3	Description, Location, and Quantity of Hazardous Materials	7-4
7.4	Parks, Open Space, and Recreation.....	7-7
7.5	Community Considerations	7-7
7.6	Parcel Impacts.....	7-9
8.0	Conclusion	8-1
9.0	References	9-1

APPENDICES

Appendix A:	Trenchless Crossings
Appendix B:	Alternatives Analysis
Appendix C:	Flammable Gas Investigation Plan
Appendix D:	2017 Annual Operating Report and Transmission Emergency Response Schedule and Procedure
Appendix E:	Landfills in the Project Area
Appendix F:	Permit and Agency Contact List

TABLES

Page No.

Table 1-1: Annual Average Flow Projections by Agency.....	1-8
Table 2-1: Recommended SD Interceptor Alignment Parameters for Commerce City Project Areas	2-2
Table 2-2: SD Interceptor Alignment Adjustments Based on Stakeholder Coordination.....	2-2
Table 3-1: Ownership and Future Land Use of Impacted Parcels	3-7
Table 4-1: Anticipated Transportation Crossings in Commerce City	4-10
Table 6-1: Construction Activity and Equipment	6-2
Table 6-2: Recommended Hazardous Materials Control Measures during Construction	6-7
Table 6-3: OWTS Adjacent to SD Interceptor Construction Corridor.....	6-8
Table 7-1: Updated 2065 Peak Wet Weather Flow Projection.....	7-4
Table 7-2: SCIS Phase 3 Community Considerations.....	7-9
Table 8-1: Commerce City Submittal Requirements.....	8-1

FIGURES

Figure 1-1: Metro District Buildout Service Area.....	1-3
Figure 1-2: Metro District Northeastern Area Regional System	1-4
Figure 1-3: Lift Stations for Potential Decommissioning	1-6
Figure 1-4: SD Interceptor and SCIS Alignment Overview	1-7
Figure 1-5: SCIS Improvements.....	1-10
Figure 1-6: Little Pub (State House) Alternative Alignments	1-14
Figure 1-7: Proposed Reunion Village Alternative Alignment by JR Engineering	1-17
Figure 1-8: Final Reunion 8 Village Alignment.....	1-18
Figure 2-1: Recommended SD Interceptor Alignment	2-4
Figure 3-1: Second Creek Parcels in Commerce City – Sheet 1 of 4	3-3
Figure 3-2: Second Creek Parcels in Commerce City – Sheet 2 of 4	3-4
Figure 3-3: Second Creek Parcels in Commerce City – Sheet 3 of 4	3-5
Figure 3-4: Second Creek Parcels in Commerce City – Sheet 4 of 4	3-6
Figure 4-1: Proposed Gravel Access Routes – Sheet 1 of 3	4-3
Figure 4-2: Proposed Gravel Access Routes – Sheet 2 of 3	4-4
Figure 4-3: Proposed Gravel Access Routes – Sheet 3 of 3	4-5
Figure 4-4: Current Land Use near SD Interceptor within Commerce City.....	4-7
Figure 4-5: Example of Trenchless Construction Methods.....	4-10
Figure 4-6: Parks, Open Spaces, and Trails within the SD Interceptor Project Corridor.....	4-12
Figure 4-7: Example of Open-cut Construction Methods.....	4-13
Figure 5-1: Example of Metering Facility	5-1
Figure 5-2: Example of Open-cut Pipe Installation and Trench Shoring.....	5-4
Figure 5-3: Example of Tunneling Pit for Trenchless Construction.....	5-6
Figure 6-1: Additional Records Map for the SD Interceptor	6-6
Figure 7-1: Sand Creek Interceptor Improvements – Phase 3 – Sheet 1 of 2	7-2
Figure 7-2: Sand Creek Interceptor Improvements – Phase 3 – Sheet 2 of 2	7-3
Figure 7-3: Current Land Use near SCIS Improvements within Commerce City	7-5
Figure 7-4: Additional Records Map for the SCIS Improvements	7-6
Figure 7-5: Parks, Open Spaces, and Trails within the SCIS Improvements Corridor	7-8
Figure 7-6: Sand Creek Interceptor Parcels in Commerce City	7-10

ABBREVIATIONS AND ACRONYMS

Abbreviation or Acronym	Definition
Aurora	City of Aurora
BNSF	Burlington Northern Santa Fe
CCTV	closed-circuit television
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
City	City of Commerce City
Commerce City	City of Commerce City
County	Adams County
CPW	Colorado Parks and Wildlife
CUP	Conditional Use Permit
DEN	Denver International Airport
Denver	City and County of Denver
District	Metro Wastewater Reclamation District
EDR	Environmental Data Resources
FIP	Facility Inspection Program
FRP	fiberglass-reinforced plastic
I	Interstate
Metro District	Metro Wastewater Reclamation District
mgd	million gallons per day
MHFD	Mile High Flood District
NTP	Northern Treatment Plant
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
OWTS	Onsite Wastewater Treatment Systems
Project	Second Creek Interceptor and Sand Creek Interceptor System Improvements Project
REC	recognized environmental conditions
ROW	right-of-way
RMP	Regional Master Plan
RTD	Regional Transportation District
RWHTF	Robert W. Hite Treatment Facility
SACWSD	South Adams County Water & Sanitation District
SCIS	Sand Creek Interceptor System
SD Interceptor	Second Creek Interceptor
SPCC	Spill Prevention, Control, and Countermeasure

Abbreviation or Acronym	Definition
SPI	South Platte Interceptor
Suncor	Suncor Energy USA
TCHD	Tri-County Health Department
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant

1.0 INTRODUCTION

The Metro Wastewater Reclamation District (Metro District or District) is completing final design on its Second Creek Interceptor (SD Interceptor), a pipeline that will provide a regional solution to conveyance of wastewater in the northeastern portion of the District's service area. In addition to the SD Interceptor, the Metro District is designing improvements to portions of its existing Sand Creek Interceptor System (SCIS) to alleviate capacity constraints in the system.

The Metro District was created by the Colorado Legislature in 1961 to promote regional cooperation and is nationally recognized for cost-effectively protecting public health and the environment. The District operates two wastewater treatment facilities: the Robert W. Hite Treatment Facility (RWHTF) and the Northern Treatment Plant (NTP). The RWHTF, which serves as the Upper South Platte regional facility, is the largest wastewater treatment facility in the Rocky Mountain West, with a capacity of 220 million gallons per day (mgd). The NTP, which serves as the Lower South Platte regional facility, became operational in 2016 and has a current capacity of 28.8 mgd. With a projected buildout capacity of 60 mgd, the NTP could be expanded to accommodate regional growth for an estimated 50 years.

The SD Interceptor and SCIS Improvements Project (Project) includes design and construction of the Metro District's proposed 17.5-mile-long SD Interceptor, extending from the City of Aurora (Aurora) to Adams County (County), as well as improvements to approximately 0.8 mile of the existing SCIS. The SCIS improvements include the approximately 0.5-mile Phase 1 segment on the RWHTF property and the approximately 0.29-mile Phase 3 segment on the adjacent Suncor Energy USA (Suncor) Refinery property. The Phase 1 segment was approved by the City of Commerce City (Commerce City or City) under Conditional Use Permit Case Number CU-37-93-10 on August 10, 2010. The Phase 3 segment is being submitted for the City's approval with this Conditional Use Permit Application (CUP Application).

Collaborative efforts between and Project benefits for Commerce City and the South Adams County Water & Sanitation District (SACWSD) discussed during the planning and design phases of the SD Interceptor project are as follows:

- Accommodates the Little Pub (State House) in Second Creek Village by providing alignment options to minimize impacts on operations
- Coordinates with parcels planned for single-family residential development of Reunion Village 8 at Chambers Road north to East 112th Avenue on the west side of Second Creek.
- Preserves an area for the City's future Second Creek Park site near the Bison Ridge Recreation Center
- Minimizes impacts on parcels planned for dense commercial development at the DIA Tech Center/Nexus west of Tower Road between East 81st Avenue and East 88th Avenue
- Provides new gravel access roads that integrate with the City's master-planned trail system
- Avoids a planned Mile High Flood District (MHFD) detention pond at the northeastern corner of Buckley Road and East 88th Avenue

- Evaluates the possibility of potential concurrent construction of the City’s pedestrian culvert underpass at the corner of Chambers Road and a future East 106th Avenue with the SD Interceptor to minimize public and roadway impacts

The benefits are discussed in detail in throughout the Application.

1.1 Land Use Planning Requirements

A Conditional Use Permit is required for uses that have the potential to impact the environment, surrounding properties, or the general public. This Conditional Use Permit Application provides information on the location, design, and potential impacts of the proposed Project on the surrounding areas. This Application was developed in accordance with the following:

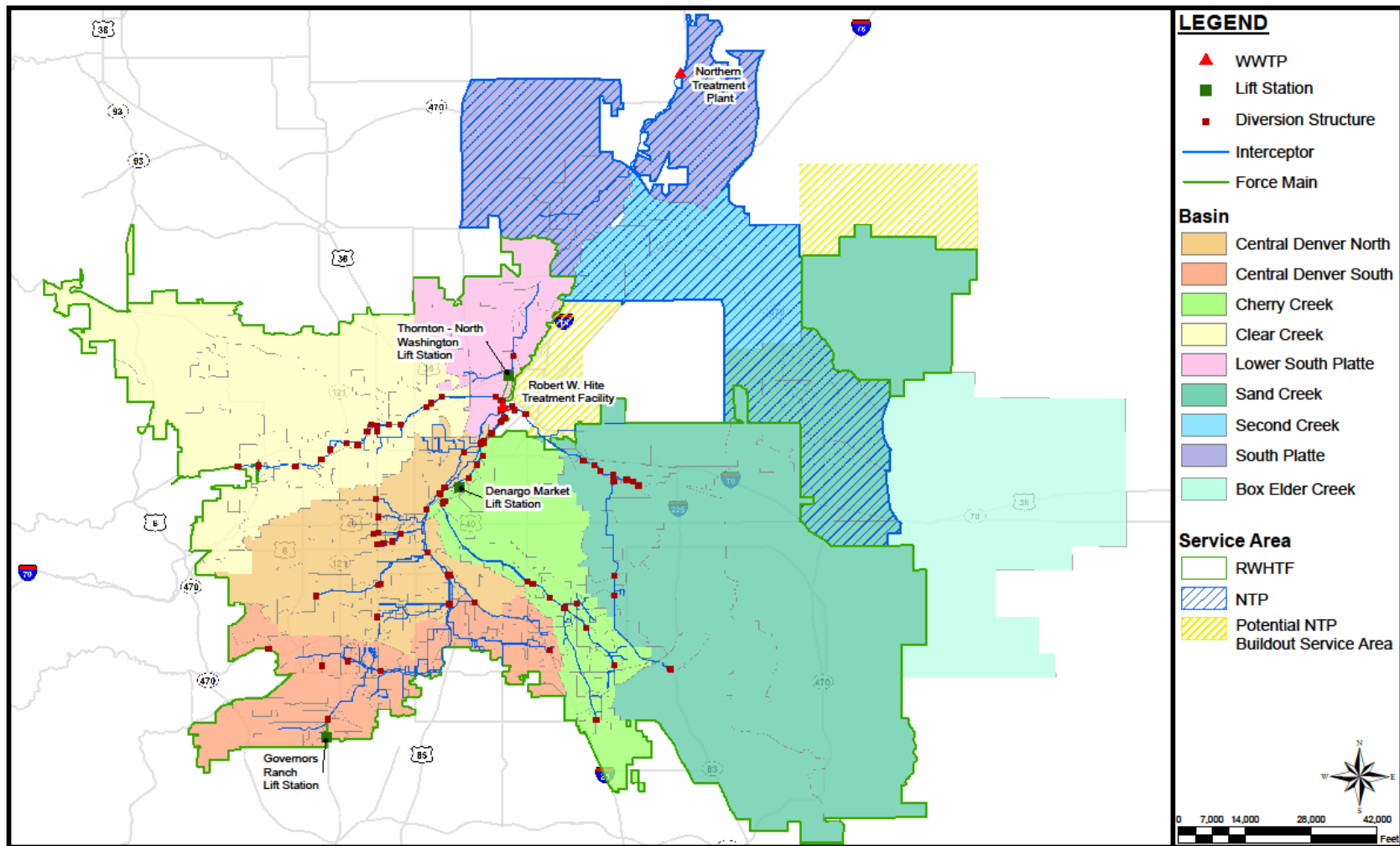
- Requirements outlined in Commerce City Land Development Code (2018), Article III, Division 2 Review; C: Applications Requiring City Council Approval, Section 21-3230 Conditional Use Permits, the Conditional Use Permit Checklist (May 2016)
- Submittal criteria as defined in the Commerce City Development Review Team pre-application meeting on May 10, 2018
- Commerce City Comprehensive Plan (May 1, 2010)
- Comments from the City and stakeholders as part of the Conditional Use Permit application review process (January 27, 2020).

In addition, this Conditional Use Permit Application incorporates City staff input from various coordination meetings held on July 12, 2018, August 27, 2018, October 23, 2018, December 11 2018, February 5, 2019, April 11, 2019, July 1, 2019, December 18, 2019, February 19, 2020, March 9, 2020, and March 31, 2020. This Application is organized to address the requirements of (1) the City’s *Facts to Know for Conditional Use Permit* (Commerce City 2009) submittal requirements, and (2) additional required information as outlined in the pre-application meeting and other meetings referenced above.

1.2 Background

The Metro District is one of the largest water public utility service providers in the United States (U.S.). The District serves approximately 1.8 million people in the Denver metropolitan area, including the City and County of Denver (Denver) and portions of Adams, Weld, Arapahoe, Douglas, and Jefferson Counties. The District provides wastewater transmission and treatment services to 22 Member Municipalities and 26 Special Connectors over the 715-square-mile area shown on Figure 1-1. The District conveys, treats, and recovers approximately 130 mgd of water. With a mission to protect the region’s health and environment by cleaning water and recovering resources, the District is one of the leading public agencies in innovation and resource recovery stewardship.

The Metro District’s NTP, located in the City of Brighton (Brighton), Colorado, provides treatment to the District’s northeastern service area. The District’s 6.8-mile South Platte Interceptor (SPI) was constructed in 2015 to convey wastewater flows from several contributing agencies to the NTP for treatment. The SD Interceptor will convey flows to the SPI and ultimately to the NTP. The regional system for the service area is shown on Figure 1-2.



Source: Metro District 2018

Figure 1-1: Metro District Buildout Service Area

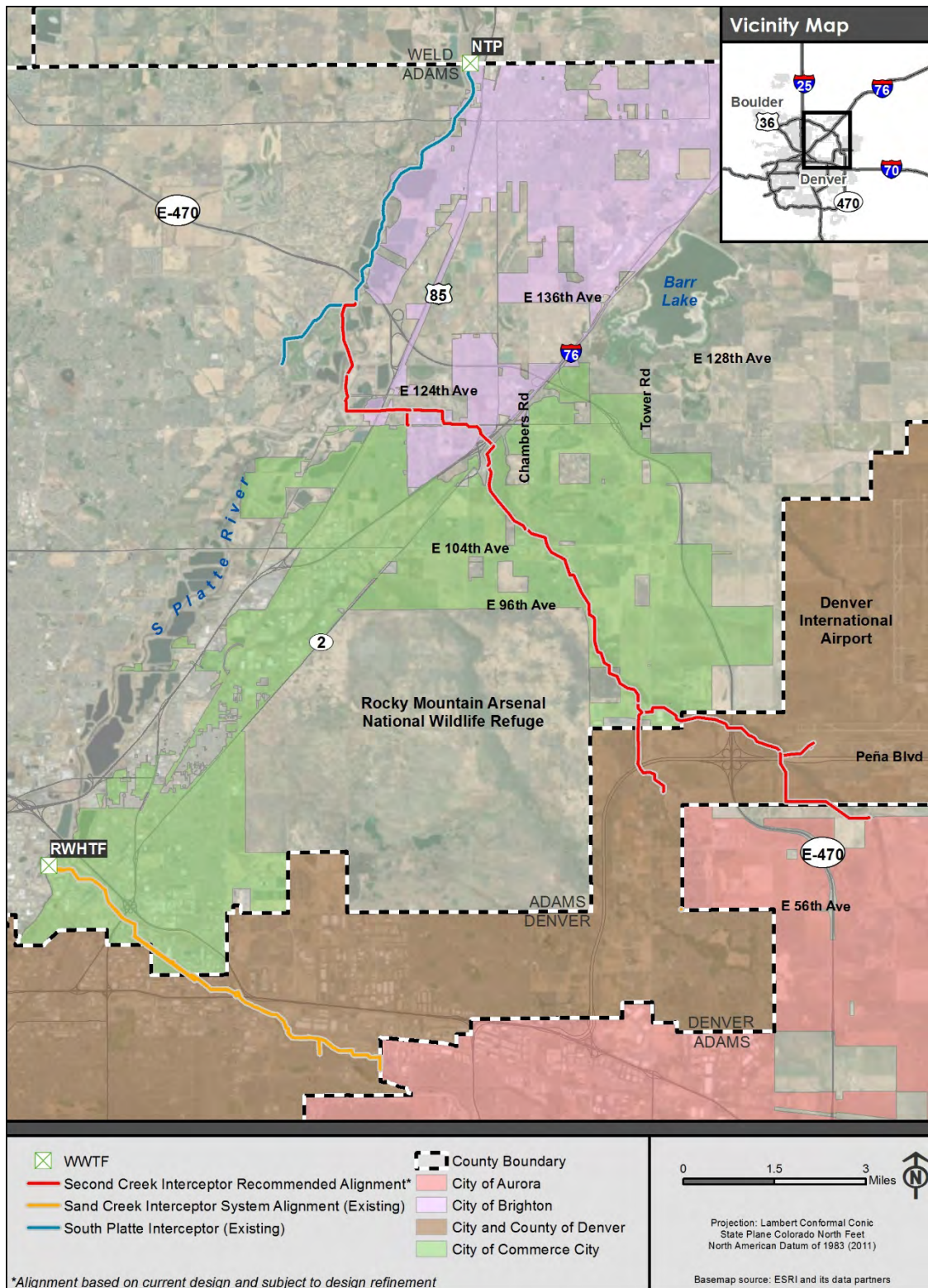


Figure 1-2: Metro District Northeastern Area Regional System

As part of the evolution of regional planning for the NTP, the *Sand Creek and Second Creek Basins Regional Master Plan* (RMP) was completed (Carollo and Jacobs 2017) to identify the optimal regional solution for providing cost-effective, long-term wastewater conveyance for its Member Municipalities and Special Connectors. The RMP was developed through the collaborative efforts of Aurora, Brighton, Denver, Denver International Airport (DEN), and SACWSD, the wastewater treatment service provider for Commerce City. Of all alternatives evaluated, it was determined that construction of the SD Interceptor will provide the greatest long-term economic benefit by collecting the most flows in the upper and lower Second Creek Basin and conveying them by gravity to the SPI and NTP.

The SD Interceptor will allow for decommissioning of six existing lift stations immediately, which are shown on Figure 1-3, and up to three additional existing lift stations in the future, provided necessary local infrastructure is constructed by contributing agencies to the SD Interceptor. In addition, the SD Interceptor will preserve capacity at the RWHTF to support growth in its existing service area.

The SD Interceptor also will divert a portion of the flow from the lower Sand Creek Basin, which will limit the SCIS improvements to the phased upsizing or parallel installation of existing segments to alleviate capacity bottlenecks in the system. The SCIS improvements include the Phase 1 segment on the RWHTF property, which was previously approved by the City under a Conditional Use Permit, and the Phase 3 segment on the adjacent Suncor Refinery, which is being submitted for the City's approval with this Conditional Use Permit Application.

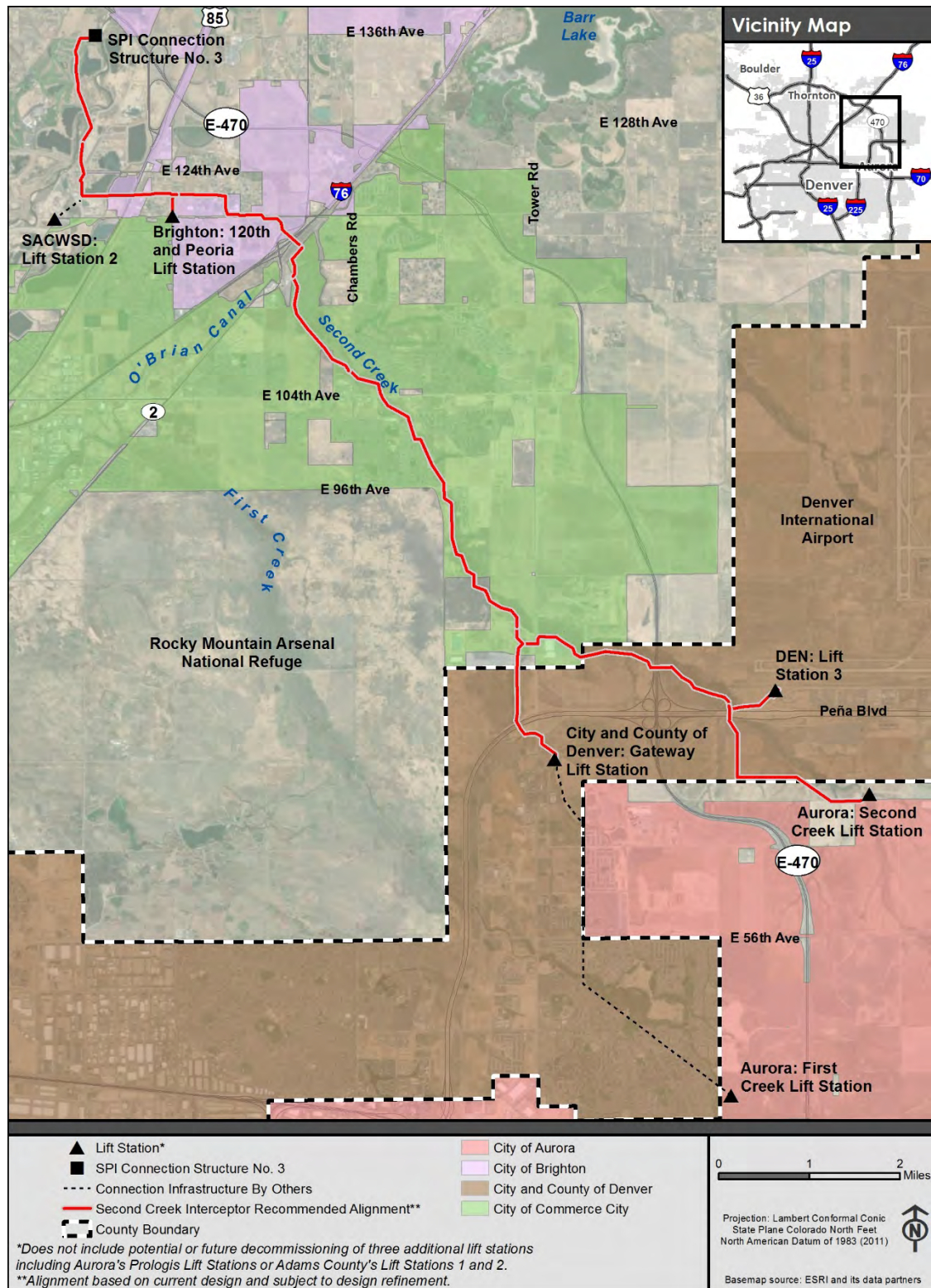
The RMP alignment for the SD Interceptor was determined based on aerial imagery, topography, site observations, identified wetlands, discussions with stakeholders, and potential connectors. Since the RMP was issued, some of the areas surrounding the RMP alignment have experienced rapid development, and portions of the alignment are no longer viable. This information, combined with environmental and technical data, as well as stakeholder input collected during the preliminary design phase, provides the basis for the alternative alignments analysis in Section 2.0.

1.3 Project Summary

The SD Interceptor and SCIS Phases 1 and 3 improvements have their basis in the RMP, with modifications made during the preliminary design phase to account for a variety of factors as discussed in Sections 1.3.1 and 1.3.2. These alignments are shown on Figure 1-4.

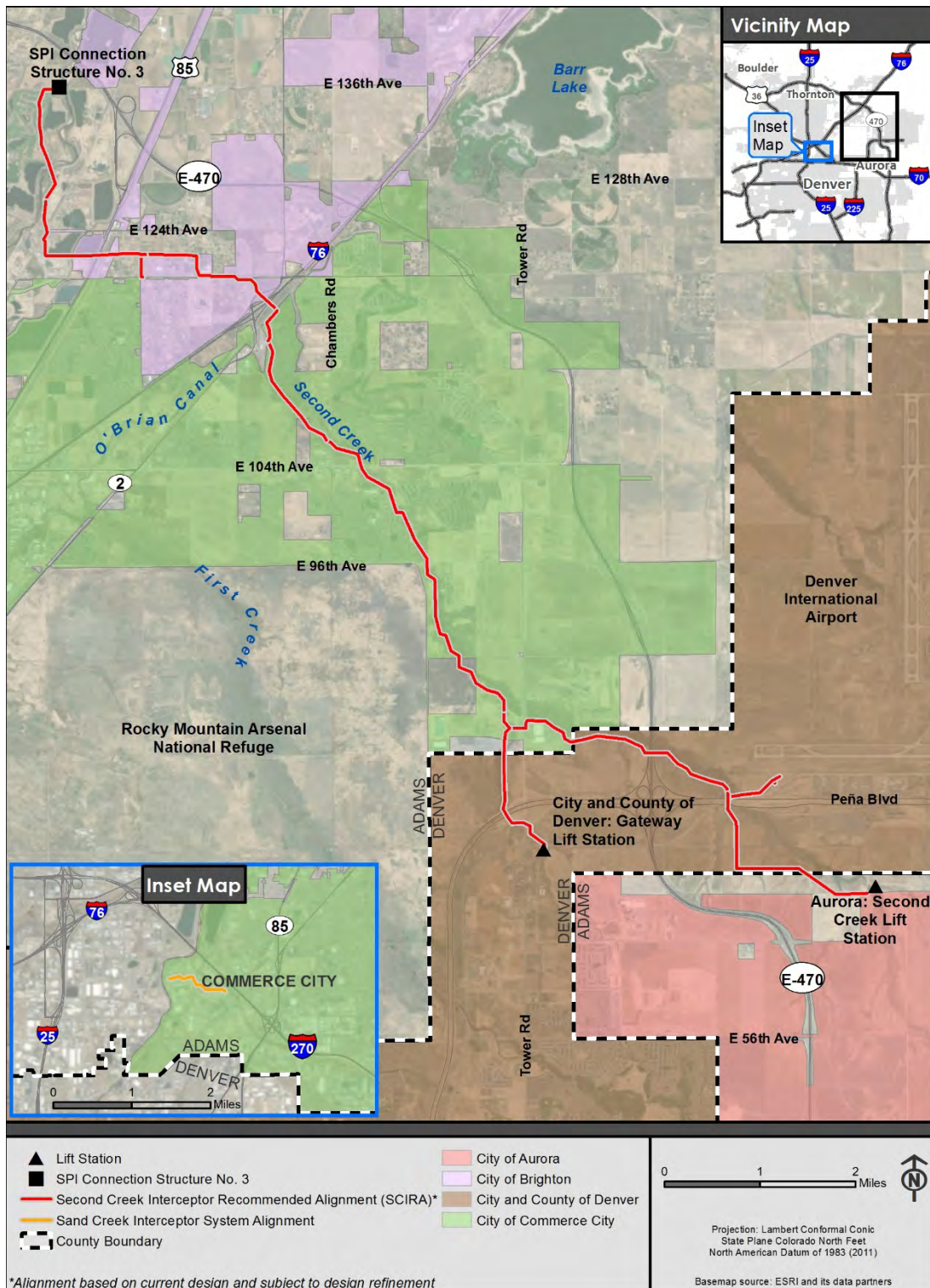
1.3.1 Second Creek Interceptor

The proposed 17.5-mile SD Interceptor alignment spans multiple cities and counties along the northeastern part of the Denver metropolitan area. The interceptor will begin at Aurora's Second Creek Lift Station located roughly 0.5 mile south of East 75th Avenue and Gun Club Road and end at an existing Metro District SPI connection structure located at 136th Avenue immediately west of the South Platte River. The pipe diameter ranges from 36 to 60 inches. Approximately 6.4 miles of the proposed SD Interceptor is located in Commerce City, which includes a combination of open-cut installation and three trenchless crossings (Appendix A) of critical roadways, rail tracks,



(Updated figure based on 75% design)

Figure 1-3: Lift Stations for Potential Decommissioning



(Updated figure based on 75% design)

Figure 1-4: SD Interceptor and SCIS Alignment Overview

and canals/ditches. The Project will be executed using a Construction Management-at-Risk delivery model, which involves the contractor providing constructability input throughout the final design phase of the Project.

Flows will be directed from Aurora's Second Creek Lift Station and Denver's Gateway Lift Station to the SD Interceptor, as shown on Figure 1-4. The first branch of the interceptor will collect flows from Aurora's Second Creek Lift Station. The second branch will convey flows from Denver's Gateway Lift Station and upstream flows from the First Creek Basin. These two branches will meet at a junction point at approximately East 81st Avenue and North Tower Road. The remainder of the SD Interceptor extends from the junction point to its ending location at the SPI connection structure. The segments upstream from Denver's Gateway Lift Station identified in the RMP are not included in this Project and will be part of separate projects.

The SD Interceptor recommended alignment will be constructed primarily within temporary and permanent easements across private parcels with limited construction in public rights-of-way (ROWs). This is required to accommodate construction widths of 120 feet or more depending on depth, which eliminates most ROW corridors from consideration because of existing utilities. There are 41 parcels within the limits of Commerce City that will be affected by construction, operation, and long-term maintenance of the SD Interceptor. The parcel impacts will affect 19 owners. The largest affected parcel owner is Commerce City, which owns 10 of the impacted parcels.

Six agencies will be capable of contributing flows to the SD Interceptor, including SACWSD (which includes the City), Aurora, Brighton, Denver, DEN, and the County. Population and flow projections were determined using a 50-year planning period (2015 to 2065) and a system-wide per capita dry weather flow factor of 80 gallons per capita per day. These data, coupled with the preliminary flow projections from each contributing agency listed in Table 1-1, were used to determine preliminary pipe diameter sizes for the SD Interceptor.

Table 1-1: Annual Average Flow Projections by Agency

Agency Flow Projections by Segment	2025 mgd	2030 mgd	2035 mgd	2065 mgd
Aurora ^a	3.63	7.52	11.67	17.40
Brighton	0.64	0.74	0.85	1.59
Denver ^b	0.68	0.85	1.02	2.06
SACWSD ^c	2.57	3.20	3.83	10.21
Total^d	7.52	12.31	17.37	31.25

^a Aurora flows are based on updates provided by the City of Aurora on May 23, 2019.

^b DEN flow contributions are accounted for in the Denver flow values because DEN is within Denver's jurisdictional boundary.

^c SACWSD flows are based on updates provided to HDR by SACWSD on October 22, 2018.

^d Adams County flows are not included at this time. The County could construct infrastructure to connect to the SD Interceptor in the future, which would eliminate their Lift Station 2 and possibly Lift Station 1. Values in Total row may differ slightly from sum of corresponding agency values due to rounding.

The SD Interceptor reflects the most feasible solution to adding the necessary conveyance capability to accommodate growth in the service area. Furthermore, the SD Interceptor is consistent with Colorado Department of Public Health and Environment (CDPHE) and Adams County Water Quality Association policies that encourage regionalization of wastewater facilities.

1.3.2 Sand Creek Interceptor Improvements

The SCIS improvements include the approximately 0.5-mile Phase 1 segment on the RWHTF property and the approximately 0.29-mile Phase 3 segment on the adjacent Suncor Refinery property to alleviate capacity constraints in the system. The Phase 3 segment is being submitted for the City's approval with this Conditional Use Permit Application.

The alignment for the SCIS Phase 3 improvements will follow the existing SCIS on the Suncor Refinery property with an address of 5801 Brighton Boulevard in Commerce City, Adams County, Colorado, situated immediately east of the Metro District's RWHTF. The existing 42-inch interceptor will be removed and replaced with a larger 66-inch interceptor in the same alignment. The SCIS Phase 3 improvements are within Commerce City as shown on Figure 1-5. **Because of several large construction projects at the District's RWHTF, the anticipated start for the construction of the SCIS improvements is unknown and will be determined later in 2020. As such, the District requests that the City allow flexibility on the timing of construction in CUP conditions of approval without permit expiration or extension request.**

1.3.3 Overall Project Benefits

The Project provides the following overall benefits:

- Allows for the closure of six existing lift stations initially and potentially three more in the future
- Reduces energy use and carbon footprint
- Decreases long-term operations and maintenance (O&M) costs
- Balances and preserves treatment capacity at regional water reclamation facilities
- Supports community growth and economic development projected for the next 50 years
- Preserves the natural character and landscape of the surrounding community
- Strengthens the Metro District's more than 50-year legacy of environmental stewardship

1.4 Stakeholder and Community Outreach

The District is working with its Member Municipalities, Special Connectors, and partnering agencies to initiate a robust, coordinated, and well-planned public involvement process for the Project. The District strives to fully inform and involve the many stakeholders along the SD Interceptor alignment and fulfill a public involvement process consistent with the overarching goals and objectives of the Project. As part of this process, the District provided notifications and conducted two neighborhood meetings in accordance with the City's Conditional Use Permit guidelines.

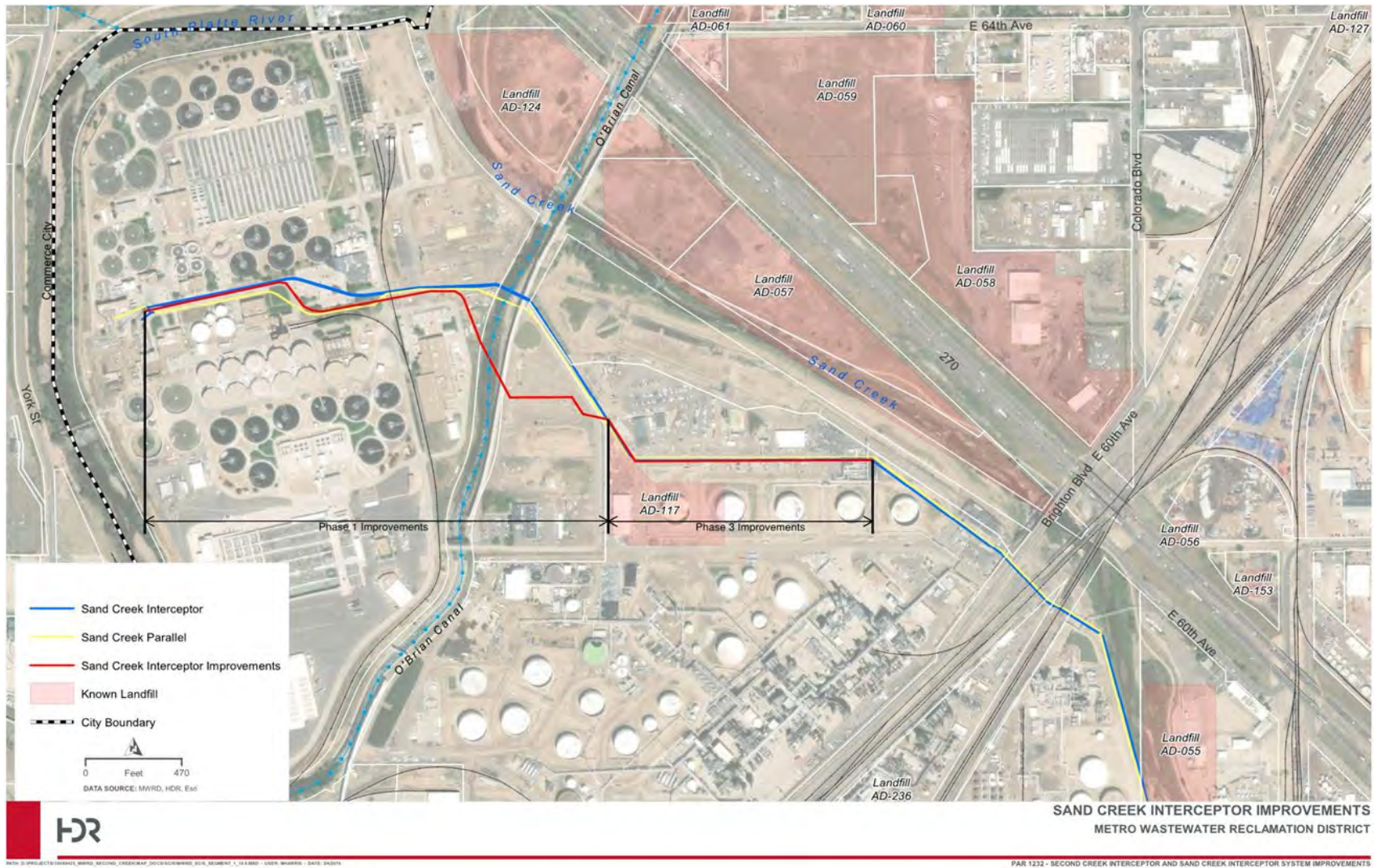


Figure 1-5: SCIS Improvements

1.5 Environmental Assessments

In addition to developing an approach and process to acquire necessary Project permits, the Metro District is performing environmental assessments during the design phase, including hazardous material assessments, historical/archaeological field surveys in accordance with Section 106 of the National Historic Preservation Act, wetlands and waters of the U.S. surveys and delineation, habitat and presence/absence surveys for threatened and endangered species, and a raptor nest survey and tree surveys. These assessments will be used in conjunction with other design information to optimize the interceptor alignments and provide supporting information for permit applications.

1.6 High Importance Areas to City

The Project Team has coordinated with the City throughout the selection of the recommended alignment corridor for the SD Interceptor. Key coordination items include preserving sufficient area for the City's future Second Creek Park site near the Bison Ridge Recreation Center, installing gravel access roads that integrate with the City's master-planned trail system, collaborating the siting of a planned MHFD detention pond, and coordinating on future developments throughout the City.

1.6.1 Future Second Creek Park and City's Master-planned Trail System

The site of the City's future Second Creek Park is located southeast of Interstate (I)-76 and north of East 112th Avenue near the City's Bison Ridge Recreation Center. Future use of this site includes recreation and community lawns, natural areas, and wetlands. In addition, the City plans to re-route Second Creek to create a new pond within the park site. The western edge of the park is planned for a future roadway and the start of the City's master-planned trail system. The Project Team is proposing an SD Interceptor alignment corridor that follows this future trail system and roadway along the western edge of the parcel. The recommended alignment in this location provides the best solution and least number of impacts on the future park site.

The District plans to construct approximately 3.5 miles of gravel access roads in the City along the SD Interceptor alignment for maintenance of the interceptor. The location and alignment of the gravel access roads were coordinated with the City and, overall, integrate with the City's master-planned trail system. The proposed locations of planned gravel access roads along the SD Interceptor recommended alignment are discussed in Section 4.1. It is anticipated that the District will allow public use of the District-constructed gravel access roads for trails. As such, the District will coordinate with Commerce City Parks and Recreation to construct the dual use gravel access roads to meet minimum City specifications.

The alignment for the remainder of the City's master-planned trail system and the SD Interceptor has been planned to parallel Second Creek from the future Second Creek Park site at the northern end to the intersection of East 81st Avenue and Tower Road at the southern end. For a majority of this length, the proposed SD Interceptor alignment corridor is on the same side of the creek as the City's trail system to facilitate overlap between future trails and the District's gravel access road. The City has indicated a preference for constructing the trail system on the eastern side of Second Creek for the segment between East 96th Avenue and East 88th Avenue. The SD Interceptor cannot be

constructed on the eastern side of the creek for this segment because of space constraints between the creek, existing utilities, and development to the east. However, the City and Project Team have worked to identify existing, nearby pedestrian bridges that will allow the trail system to tie into the SD Interceptor's gravel access road on the western side of the creek.

The City completed a design for a planned pedestrian culvert underpass at the corner of Chambers Road and a future East 106th Avenue in 2012. Initial discussions with the City strived to incorporate the construction of the pedestrian underpass with the District's SD Interceptor to minimize public and roadway impacts. However, the City indicated that it plans to combine the Pedestrian Culvert Project with its future bridge project. Therefore, construction of the City's Pedestrian Culvert Project will not be combined with the Metro District's SD Interceptor Project. MHFD's most recent master plan includes construction of a detention pond at the northeastern corner of Buckley Road and East 88th Avenue in anticipation of future developments in the area. The City and RESPEC Engineering are currently working through the 30 percent design of this "Parcel K" pond. The Project Team has coordinated with RESPEC and the City regarding the location of the pond. The City and the Project Team have proposed that the SD Interceptor, gravel access road, and future trail system be constructed to the east of the Parcel K pond, between the pond and Second Creek. A 100-foot buffer will be required between the creek centerline and the top of the pond contours to facilitate construction of the SD Interceptor and gravel access roads.

1.6.2 Impacts to Chambers Road

The Metro District understands a full closure of Chambers Road will not be permitted to install the SD Interceptor across Chambers Road. On February 19, 2020 and March 9, 2020, the Metro District and Commerce City met to discuss impacts to Chambers Road associated with construction of the Second Creek Interceptor. For construction of the SD Interceptor's open cut crossing of Chambers Road north of 104th, the District will construct a shoo-fly to avoid full closure of Chambers Road. A preliminary layout directing both lanes of traffic to the east was discussed with the City. The anticipated configuration, location, and 25 mph speed limit was acceptable to the City. Alternatively, the Project Team is evaluating the viability of trenchless construction for the crossing, which will further limit commuter impacts. At this time, it is expected that the SD Interceptor crossing of Chambers Road will be constructed via open cut methods.

1.6.3 Future Development Plans

The Project Team has been coordinating closely with developers and considering future development plans along the SD Interceptor alignment corridor. Major developments along the corridor include the DIA Tech Center/Nexus development at the northwestern corner of East 81st Avenue and Tower Road, Second Creek Village at the northeastern corner of East 104th Avenue and Chambers Road, and the Reunion Village 8 development south of East 112th Avenue.

DIA Tech Center/Nexus Development

The parcels within the DIA Tech Center/Nexus development are planned for dense commercial development and span west of Tower Road between East 88th Avenue and East 81st Avenue. The Project Team has been working closely with the developer and their engineer to coordinate the alignment of the SD Interceptor to coincide with their planned buildings, detention ponds, utilities,

and roadways. To date, an established route has been identified that is acceptable to both parties, which is shown on the SD Interceptor recommended alignment. Recent coordination has been conducted to further identify utility crossing elevations, future grades, timing of construction, and acceptable working areas. Easement negotiations between the Metro District and property owners are currently in progress.

Second Creek Village (Marketplace)

Development plans for the Second Creek Village are currently underway, which included construction of the Little Pub (State House) in the northeastern corner of the parcel. The Project Team evaluated several alignments through this area during the preliminary design phase of the Project. Figure 1-6 shows the recommended alignment (Alternative 1), which includes a tunneled, diagonal crossing of East 104th Avenue, and open-cut construction along the northeastern perimeter of the undeveloped parcel between the existing Learning Experience daycare and Little Pub (State House). The tunnel length is approximately 230 feet. The interceptor is then routed to the western side of Little Pub (State House), crossing the proposed parking lot, and continuing northwest onto the City's property. This alignment was recommended based on the following criteria:

- The proximity of the alignment to Second Creek allows for a shallow bury depth, which results in an increased speed of construction through the area, thus reducing impacts and cost.
- Utility conflicts are minimized by remaining on the western side of both Second Creek and the existing SACWSD sewer.
- The corridor between the existing SACWSD sewer and Second Creek is too narrow for the SD Interceptor to be protected from creek bed erosion and scour during storm events.
- Remaining on the western side of the creek is advantageous because downstream contributors will be connecting to the SD Interceptor from the west.

The City has designated Little Pub (State House) as a high-profile project and indicated that construction of the Little Pub is important to economic development. Little Pub (State House) is currently operational, and its location is shown on Figure 1-6. Given the preliminary construction schedule for the SD Interceptor, construction in the location of East 104th Avenue and Chambers Road will occur toward the end of 2021, after the pub has been in operation for almost two years.

Based on discussions with the City, and to address concerns of impacts on and operation of the Little Pub (State House) and other businesses, the Project Team has evaluated alternative alignments. The District is committed to limiting impacts on businesses and plans to closely coordinate access for employees and patrons. Temporary flagging, traffic control, access roads, and parking can be provided to facilitate speedy construction, maintain access to businesses, and promote a safe working environment.

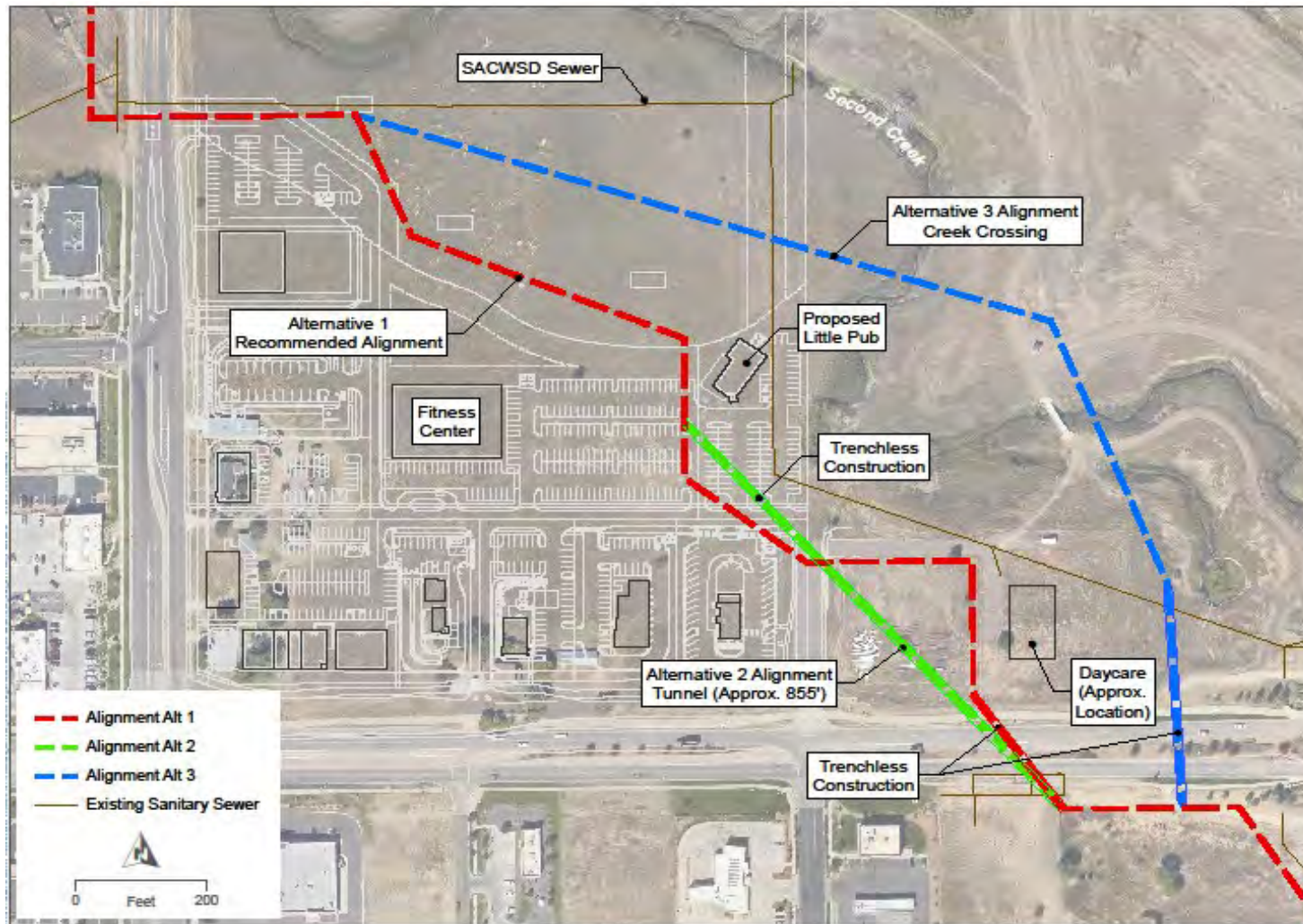


Figure 1-6: Little Pub (State House) Alternative Alignments

Figure 1-6 shows two alignment alternatives that have been evaluated by the District. The Alternative 2 alignment will extend the proposed tunneled portion of the SD Interceptor alignment from the southern side of East 104th Avenue to the western side of Little Pub (State House). The tunnel length will total 850 feet, which increases project risk, cost, and duration of construction. A large amount of land for the staging area will be required for Alternative 2, with staging areas at both ends of the tunneled segment for tunnel shafts, which are needed to construct this alternative. The staging area on the northern side of East 104th Avenue could be located in a way that does not impact access to or parking for the pub.

As shown on Figure 1-6, the Alternative 3 alignment will include a perpendicular, tunneled crossing of East 104th Avenue. The tunnel length is approximately 350 feet. The Alternative 3 alignment will continue north on the eastern side of the Learning Experience daycare and cross existing utilities, including a large storm sewer extending from East 104th Avenue and a SACWSD sewer. An open-cut crossing of Second Creek and a manhole on the northern side of the creek will be required. From there, the alignment will turn west and cross the SACWSD sewer and Second Creek a second time to remain north of the proposed site of the Little Pub (State House) and on City property. This alternative will require that the interceptor be below the SACWSD sewer line and storm infrastructure and will necessitate concrete encasement of the interceptor at the creek crossings for erosion protection.

The Project Team performed field utility surveys, potholing, and environmental investigations to determine the viability of the alternatives. All three alternatives shown in Figure 1-6 were determined to be viable from an engineering and utility conflict perspective. The recommended alignment (Alternative 1) showed to be the most cost-effective solution for the District and its Member Municipalities and Special Connectors. However, the City prefers Alternative 3 to minimize potential impacts to Little Pub (State House) and nearby existing and future developments. Although the capital and long-term O&M costs are higher, the Metro District is proceeding with Alternative 3 in the final design at the request of the City. As a result, and on December 18, 2019, the District and the City discussed no costs for easements for the Second Creek Interceptor alignment proposed on City property to offset the additional capital cost to the District and the City's rate payers associated with Alternative 3.

Reunion Village 8

The Reunion Village 8 development is a planned single-family residential development from Chambers Road north to East 112th Avenue on the west side of Second Creek. JR Engineering, LLC was hired by Fulenwider and Oakwood Homes to produce conceptual layouts for the housing development. The development proposal includes a realignment of Second Creek, East 112th Avenue, and the O'Brian Canal. The plans for the Reunion Village 8 development also indicate removal of established wetlands for a detention pond, housing located inside established buffers for an existing Bald Eagle nest, and housing located in the current and future 100-year floodplain limits. The Metro District anticipates approvals for the Reunion Village 8 development will include an extensive multi-year and multi-jurisdictional permitting process for environmental clearances prior to construction.

Figure 1-7 shows the conceptual development lot lines for Reunion Village 8, the SD Interceptor alignment (red), and an alternative alignment for the SD Interceptor proposed by JR Engineering (blue). The District's SD Interceptor alignment follows the existing utility corridor, maximizes avoidance of the wetland south of East 112th Avenue, and locates the interceptor within the floodplain to minimize impacts to future developable land. The alternative alignment proposed by JR Engineering would require substantial impacts to the wetland and an extended casing pipe for the future relocation of the O'Brian Canal. ***The SD Interceptor alignment shown in Figure 1-8 is the culmination of the collaborative efforts between the Metro District, City, Fulenwider, Oakwood Homes, and JR Engineering to achieve consensus on an alignment that accommodates the interests of all stakeholders. See Summary section for additional information.***

Wetlands Impacts

Based on a review of historical aerial imagery of the wetland, the Project Team has determined that the wetland is a persistent feature in the historical floodplain of Second Creek that, among other things, likely affects the quality of Waters of the United States. Therefore, this wetland will likely be determined to be jurisdictional by the U.S. Army Corps of Engineers (USACE). Following coordination with the USACE, the District plans to permit wetland impacts under a Nationwide Permit. A statutory requirement of Nationwide Permits is to minimize permanent impacts to wetlands and other waters. These permanent impacts to jurisdictional wetlands are not desired, would delay schedule, may substantially increase cost due to required mitigation, and because the Project can reasonably avoid them, do not meet the statutory requirements of the Nationwide Permits. Long-term access to manholes for maintenance, infiltration, and pipe settlement are also concerns associated with the location of the alternative alignment proposed by JR Engineering. ***The SD Interceptor alignment shown in Figure 1-8 is the culmination of the collaborative efforts between the Metro District, City, Fulenwider, Oakwood Homes, and JR Engineering to achieve consensus on an alignment that addresses the District's wetland concerns. See Summary section for additional information.***

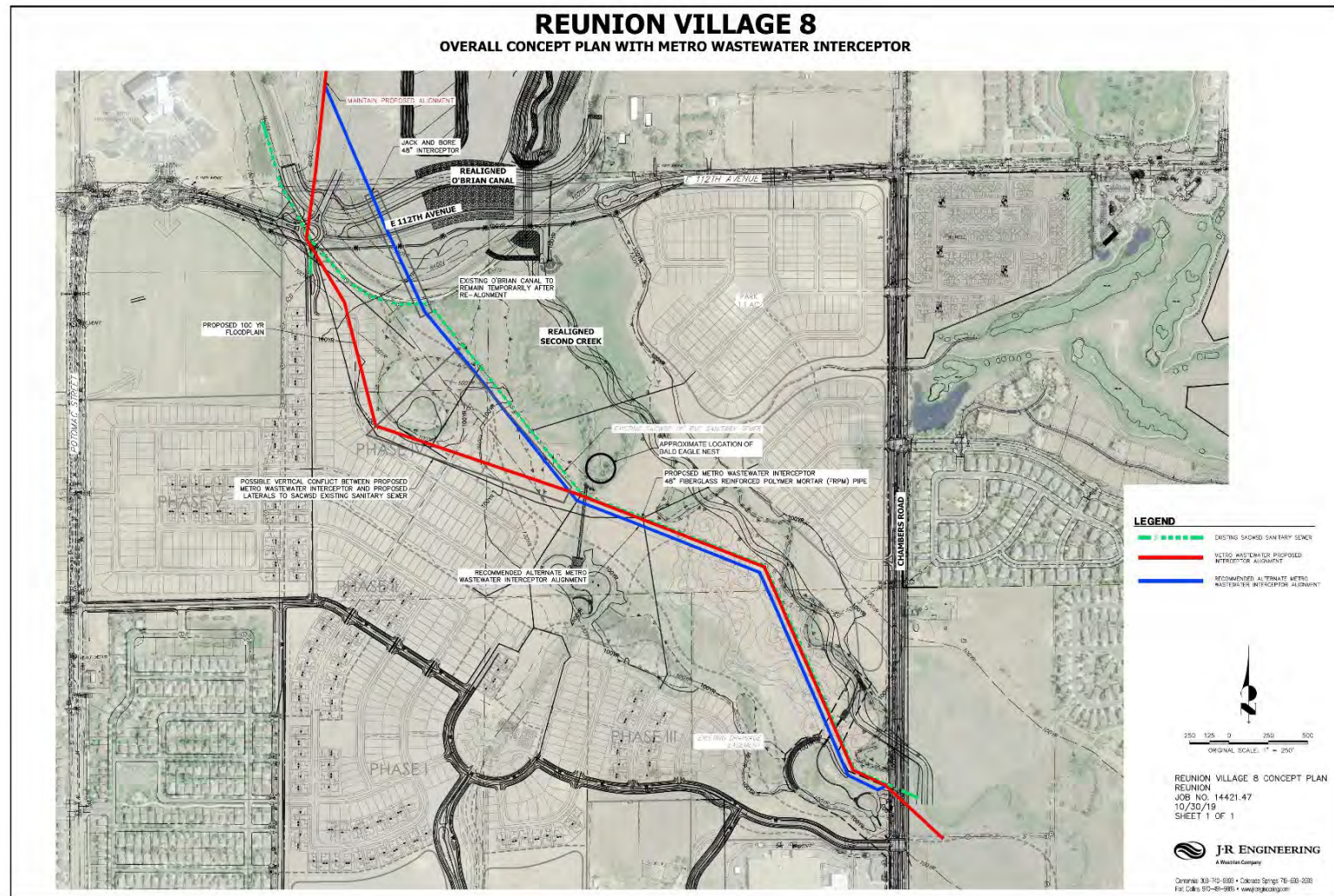


Figure 1-7: Proposed Reunion Village Alternative Alignment by JR Engineering

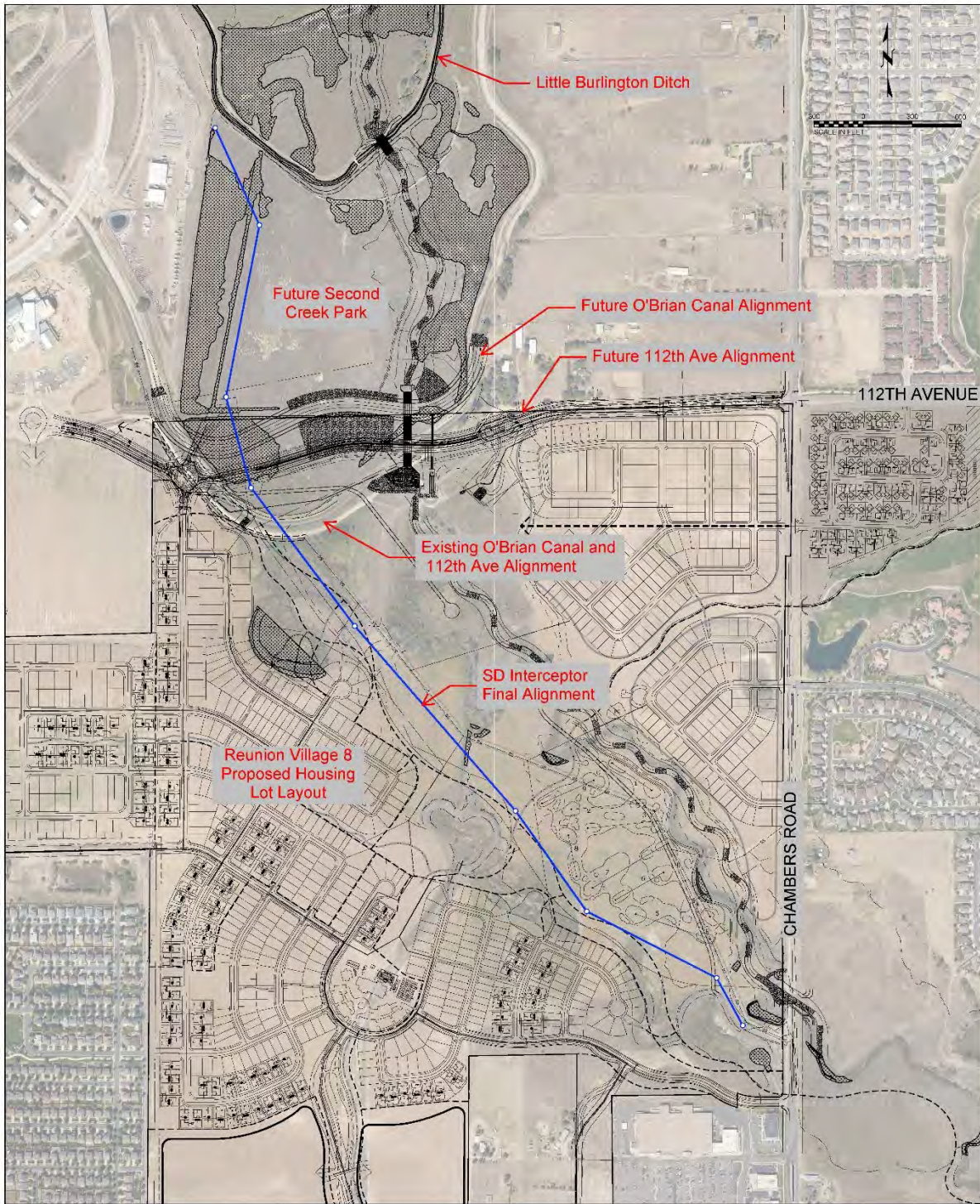


Figure 1-8: Final Reunion 8 Village Alignment

Raptor Buffers

Per Colorado Parks and Wildlife (CPW) raptor guidelines, there is to be no ground disturbance within a 1/4-mile radius of the existing Bald Eagle nest. A Site Specific Relocation may allow for some development within this radius while protecting the nest. Permanent infrastructure for the SD Interceptor and presumably the alternative alignment proposed by JR Engineering will be entirely below grade near the nest with the exception of an above-grade manhole for each alignment that will be located approximately 200 feet from the nest. In addition, there are multiple proposed Reunion Village 8 housing lots that are not viable because they are located within the 1/4-mile radius of the existing Bald Eagle nest shown on Figure 1-7. The CPW raptor guidelines also state that there is to be no permitted or authorized human activities during the restricted season within a 1/2-mile radius of the Bald Eagle nest. The restricted season includes December 1 through July 31. The SD Interceptor construction will be timed to occur outside of this window. However, these restrictions, in combination with the Bald and Golden Eagle Protection Act, may preclude the District from performing maintenance or repairs during the restricted season. ***The SD Interceptor alignment shown in Figure 1-8 is the culmination of the collaborative efforts between the Metro District, City, Fulenwider, Oakwood Homes, and JR Engineering to achieve consensus on an alignment that addresses the District's maintenance access concerns. See Summary section for additional information.***

O'Brian Canal and East 112th Realignment

The originally proposed SD Interceptor alignment will not require additional infrastructure to implement the future changes to the O'Brian Canal and East 112th Avenue. Installing an extended casing pipe to accommodate conceptual plans that may not materialize for a number of years adds unnecessary project costs for the District and its Member Municipalities and Special Connectors. ***The SD Interceptor alignment shown in Figure 1-8 is the culmination of the collaborative efforts between the Metro District, City, Fulenwider, Oakwood Homes, and JR Engineering to achieve consensus on an alignment that allows for the future O'Brian Canal realignment. See Summary section for additional information.***

Summary

The Metro District determined that the alternative alignment proposed by JR Engineering in Figure 1-7 is not viable primarily from an environmental impacts standpoint. As a result, a series of coordination meetings were held from February 2020 to April 2020 between the City, Metro District, and Reunion Village 8 representatives to identify an alignment amenable to all parties. The focus of the meetings was to identify an alignment that limits environmental impacts, provides interim and long-term District access, and minimizes encumbrances to future developable land. The result of the coordination meetings was the mutually agreed to alignment shown in Figure 1-8. The Metro District is currently working with the property owner on easement acquisitions for the alignment shown.

1.7 Considerations

Temporary construction impacts will include nuisance effects such as noise, vibration, and traffic, and direct effects will be caused by landscaping disturbances and restoration, as well as interceptor

installation. These impacts will be localized because of the use of a phased construction approach that entails completing work on a given segment before proceeding to the next. After construction and during the first available planting season, restoration of disturbed areas will be initiated to begin the process of returning the areas to the pre-construction or improved conditions.

Permanent aboveground impacts will be limited to manhole covers, connection structure covers, a metering facility, and gravel access roads as needed for maintenance and operation of the SD Interceptor. The roads are expected to experience limited use for maintenance during the life of the interceptor. Long-term noise and vibration impacts from the permanent operation of the interceptor are not anticipated because flows in the SD Interceptor will be via gravity.

Odor generation could occur at locations along the alignment where flows mix, such as at connection structures and where potential pressurization may occur. At these locations, the interceptor will be designed to maintain negative pressure and draw odorous gases downstream to an odor control facility located outside of Commerce City.

1.8 Project Schedule

Preliminary design of the SD Interceptor was completed in the second quarter of 2019, and the final design is expected to be complete in summer 2020. Final design approval with CDPHE is anticipated just prior to the estimated construction start in fall 2020, with construction completion expected in early 2024.

Because of several large construction projects at the District's RWHTF, the anticipated start for the construction of the SCIS improvements will be determined later in 2020. As such, the District requests the City to allow flexibility on the timing of construction in CUP approval without permit expiration or extension request. To reduce impacts on RWHTF operations, a phased construction approach will be used for connections to each of the critical structures to allow for continuous flow in the SCIS system.

2.0 SECOND CREEK INTERCEPTOR ALTERNATIVES ANALYSIS

Although the RMP established a basis of design for the SD Interceptor, new information has been received from the District's ongoing facility planning and preliminary design efforts that warrants refining the alignments. This information, which includes environmental and technical data as well as stakeholder input, provides the basis for the alternative alignments analysis presented in this section.

2.1 Second Creek Interceptor Evaluation

Several interceptor alignment alternatives were developed and evaluated to determine the recommended SD Interceptor alignment. The Metro District considered many constraints in the development of the alignment alternatives, including topography, environmental resources, costs, utility and traffic conflicts, design considerations (length and depth), land acquisitions, business disruptions, and economic and non-economic factors. The District also took into account minimizing impacts on sensitive areas and maximizing the possibility of shared corridors or resources for future maintenance, and input from potentially affected stakeholders.

Other constraints considered included the City's Bison Ridge Recreation Center, Riverdale golf courses (Knolls and Dunes), the County Regional Park and Fairgrounds, active and inactive landfills, gravel quarry operations, and DEN. Finally, the Metro District considered how to avoid disruptions to utilities, businesses, schools, and traffic in the urbanized portion of Commerce City and other jurisdictions. While accounting for these many constraints and in developing alignment alternatives, the primary objective was to maintain gravity flow for the entire length of the interceptor.

During the preliminary design phase, the District's Project Team collaborated with Commerce City staff to optimize the SD Interceptor alignment on the eastern side of the City's Bison Ridge Recreation Center at East 112th Avenue. Several alignment alternatives were evaluated to achieve a balance between limiting disruptions to the recreation center during construction and minimizing the permanent impacts on the adjacent wetlands area. Access for future O&M activities was also considered in determining the alignment.

Taking into account the considered constraints, the team established a corridor through which potential alignments could be developed. Conveying wastewater from the southern portion of the service area near DEN to the existing SPI connection structure located to the immediate north of the Riverdale golf courses (Knolls and Dunes) can be accomplished solely by gravity because the corridor generally follows the topographic profile of Second Creek and the South Platte River.

To aid in the comparative analysis of alternative alignments to those in the RMP, the SD Interceptor project was divided into six project areas based on geographic boundaries. Four of the six project areas are in Commerce City and are described in Table 2-1.

The alternatives analysis for the SD Interceptor, including sub-alignments in Project Areas 3 through 6 are provided in Appendix B.

Table 2-1: Recommended SD Interceptor Alignment Parameters for Commerce City Project Areas

Project Area	Project Area Extent	Average Depth (feet)	Number of Trenchless Crossings	Pipe Diameter (inch)	Approx. Length – Total/Commerce City (mile)
3	I-76 and BNSF Railroad Crossing	13	6	48	2.8/0.9
4	Commerce City Bison Ridge Recreation Center to East 96th Avenue	12	2	48	3.0/2.9
5	East 96th Avenue to Gateway Lift Station	12	3	36	3.6/1.8
6	First Creek Interceptor Junction Point to Second Creek Lift Station	17	3	36	5.0/0.8

Note: BNSF = Burlington Northern and Santa Fe

2.2 Second Creek Interceptor Refinement Based on Stakeholder Coordination

Coordination efforts with private parcel owners, developers, and other stakeholders have taken place since the original alignment was recommended. The alignment corridor has been shifted slightly in areas to coordinate with these individual stakeholders and accommodate future development and land use planning (see Section 1.6). Table 2-2 lists the major adjustments that occurred with the City based on stakeholder coordination.

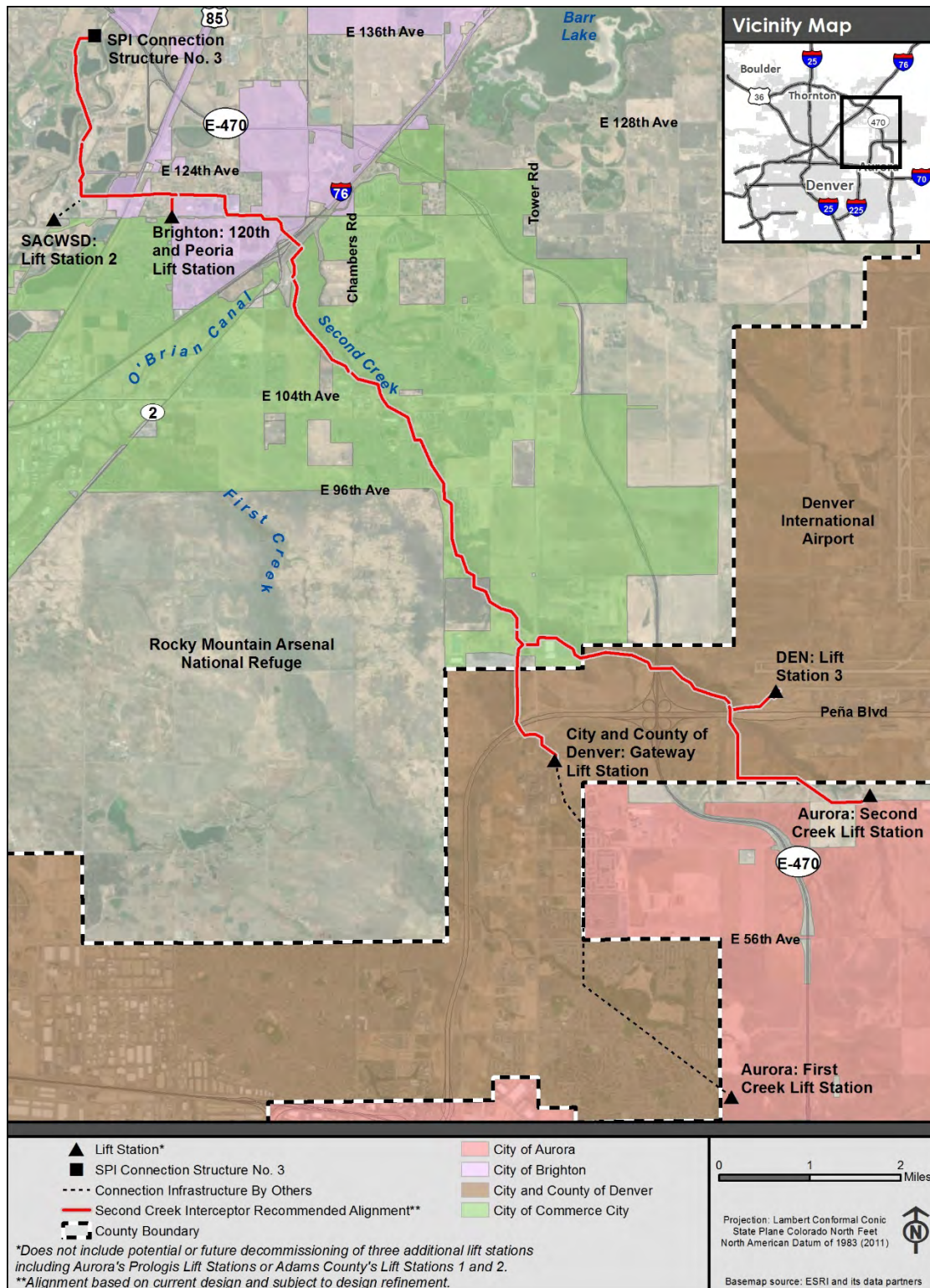
Table 2-2: SD Interceptor Alignment Adjustments Based on Stakeholder Coordination

Project Area	Adjustment Area	Stakeholder	Description
4	E. 112 th Ave to Chambers Road	Developer, Parcel SD-214 and SD 219	Alignment adjustments made to avoid residential development impacts (Reunion Village 8).
4	East of Chambers Road	Developer, Parcel SD-218	The original perpendicular crossing of this parcel was adjusted to a diagonal crossing to coordinate with future development plans.
4	North of E. 104 th Avenue	Developer, Parcel SD-223	Alignment adjustments made to avoid commercial development impacts (Little Pub [State House]).
5	North of E. 88 th Avenue	MHFD, Parcel SD-269	MHFD's planned "Parcel K" detention pond required slight adjustments to the alignment corridor on this parcel to accommodate development in the area.
5	E. 88 th Avenue to E. 81 st Avenue	DIA Tech Center/ Nexus; Developer, Parcels SD-272 to SD-280	The parcels in the DIA Tech Center/Nexus development area are planned for dense commercial development. The alignment corridor was adjusted slightly through these parcels to coordinate with future buildings, detention ponds, utilities, and roadways.
6	Tower Road North of E. 81 st Avenue	Landfill AD-072; Parcel SD-271	The alignment corridor was adjusted from the southern side to the northern side of the existing parking lot on this parcel. Future grading plans to the south of the parking lot conflicted with the grade of the interceptor.

2.3 Recommended Second Creek Alignment

Figure 2-1 presents the recommended alignment for the SD Interceptor based on the alternatives evaluation and City and stakeholder review comments and coordination. The total length of the SD Interceptor is approximately 17.5 miles, which includes approximately 6.4 miles in Commerce City corresponding to Project Areas 3 through 6 described in Table 2-1.

The plans associated with this Application show the initial profile of the recommended SD Interceptor alignment based on the selected alternatives and stakeholder coordination efforts. The profile has been refined with utility data, and connection elevations were confirmed with field survey information. Moving forward, field investigations will continue along the entire recommended alignment corridor. These investigations include environmental permitting fieldwork and easement acquisition. Minor refinement of the recommended alignment may occur during final design but will not be significantly impacted by the results of the field investigations.



(Updated figure based on 75% design)

Figure 2-1: Recommended SD Interceptor Alignment

3.0 PARCEL IMPACTS AND EASEMENTS

Public ROWs will generally be impractical for construction of the SD Interceptor given the width of excavation required because of pipe diameter and depth. The width required for permanent access and maintenance for the SD Interceptor will be about 40 feet, with construction widths of 120 feet or more depending upon depth. The temporary easement widths vary along the alignment to achieve a balance between providing the necessary space for cost effective construction of the interceptor and minimizing impacts to businesses, landowners, and the surrounding environment. This space requirement will eliminate most public ROW corridors from consideration as constructible corridors because other utilities are present. Moreover, obtaining a permanent easement width of 40 feet will be impractical from a cost and public impact perspective because it will require multiple utility relocations and potential outages. Also, public ROWs generally are set up in a grid formation, which, for the SD Interceptor, will require multiple sharp bends and disruptions to wastewater flow between points of commencement and terminus. This configuration will lead to excessive turbulence in flow, which, in turn, will create the potential for increased off-gassing and odor impacts along the alignment, which will affect the public.

As a result of these impacts, permanent and temporary easements across private parcels are required for the SD Interceptor. This chapter discusses parcel impacts and easements for the SD Interceptor.

3.1 Impacted Parcels

Preliminary title investigation and property records research have identified 41 parcels (see Figure 3-1 through Figure 3-4) within the limits of Commerce City that will be affected by construction or long-term maintenance of the SD Interceptor. The parcel impacts will affect 19 owners. The largest affected parcel owner is Commerce City, which owns 10 of the impacted parcels.

The impacted parcels are primarily used for parks and open space along Second Creek. The interceptor alignment has been designed to minimize impacts on existing and future development to the extent practical by siting the interceptor within the floodway of Second Creek, thereby reducing the impact on developable land. However, the selected SD Interceptor alignment will affect some developed private parcels and vacant commercial parcels with planned development activity. Table 3-1 lists impacted parcels, ownership, zoning, and future land use. The SD Interceptor will cross the open space portions of several planned unit developments. The Project Team has coordinated with the City and developers on future development plans along the corridor.

3.2 Proof of Ownership

Prior to initiating easement acquisition activities on each parcel, preliminary title work was conducted to verify the legal ownership of each parcel to negotiate a land rights transfer.

3.3 Temporary and Permanent Easements

The types of land rights that will be acquired within the City limits will be permanent easements and temporary construction easements for all parcels impacted by the recommended alignment listed in

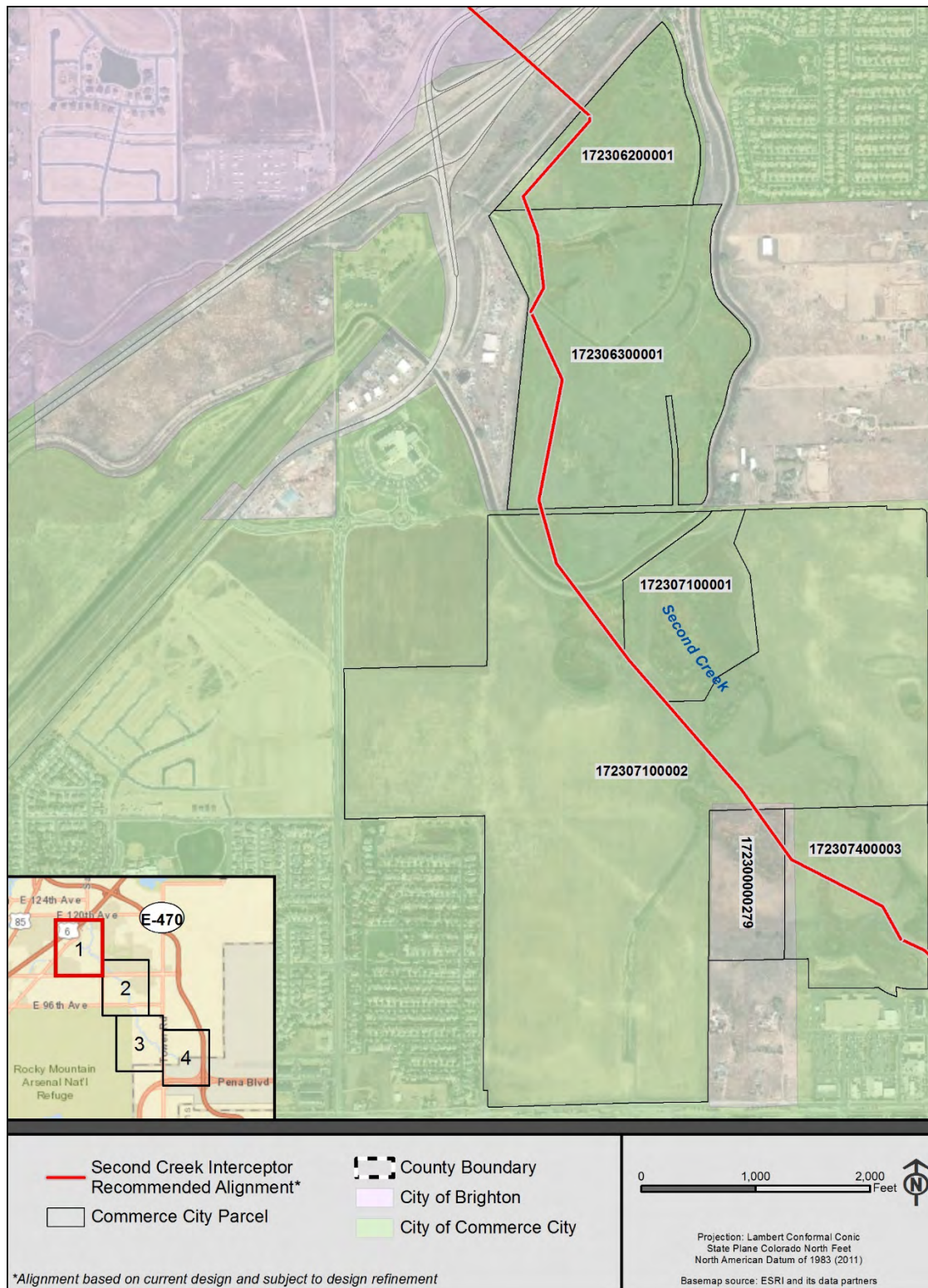
Table 3-1. Parcel 0172300000066 only requires a temporary easement, and parcels 0172308306064 and 0172308306066 only require access easements.

Permanent easements will be acquired to allow for the perpetual occupation of the land with the SD Interceptor and access road, and to provide access rights to operate and maintain the line. Temporary construction leases will be acquired to provide additional areas for construction and material staging. Temporary construction leases are anticipated to vary in duration depending upon the construction phasing and complexity; nevertheless, they will be obtained for an initial timeframe of 6 months (anticipated), with additional options to extend.

As previously discussed within this document, the Metro District is proceeding with Alternative 3 in the final design at the request of the City in order to minimize impacts to Little Pub (State House). Because the capital and long-term O&M costs are higher for this alternative, the District and the City met on December 18, 2019 and discussed easements at no cost for the SD Interceptor alignment proposed on City property to offset the additional capital cost to the District and the City's rate payers associated with Alternative 3.

3.3.1 Easement Status

Acquisition of easements is ongoing, concurrent with this Conditional Use Permit Application. In order to illustrate the required land rights for the SD Interceptor project, the District will prepare a supplementary submittal for Commerce City showing a legal land right for portions of the SD Interceptor across parcels outside of the public ROW. Because of the potential for multiple phases of construction, the District may phase its submittals of land rights documentation. As discussed with the City at the Development Review Team pre-application meeting on May 10, 2018, the City's approval of the Application will be conditional based on the District submitting this documentation prior to commencing construction across private parcels.



(Updated figure based on 75% design)

Figure 3-1: Second Creek Parcels in Commerce City – Sheet 1 of 4

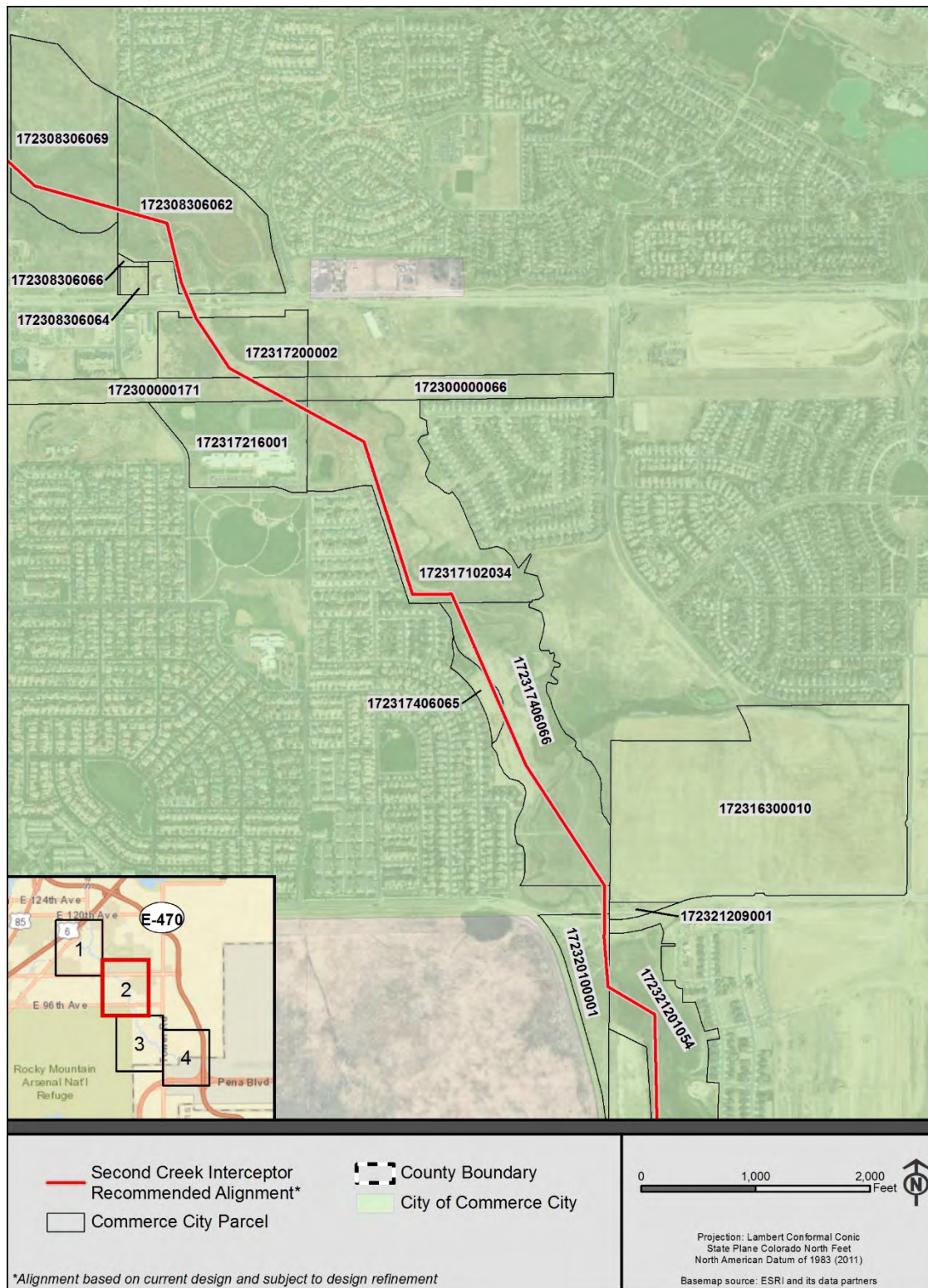
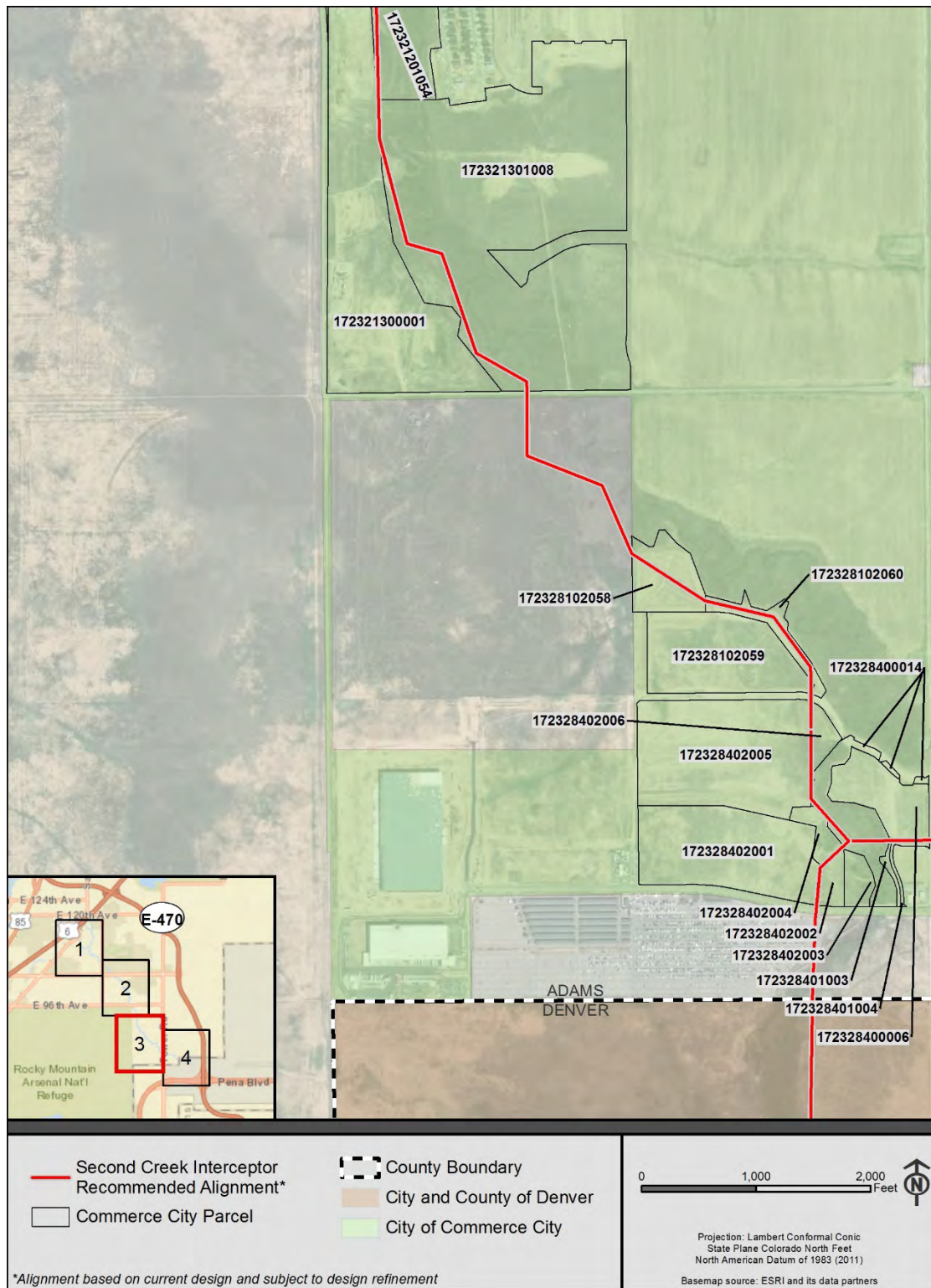


Figure 3-2: Second Creek Parcels in Commerce City – Sheet 2 of 4



(Updated figure based on 75% design)

Figure 3-3: Second Creek Parcels in Commerce City – Sheet 3 of 4

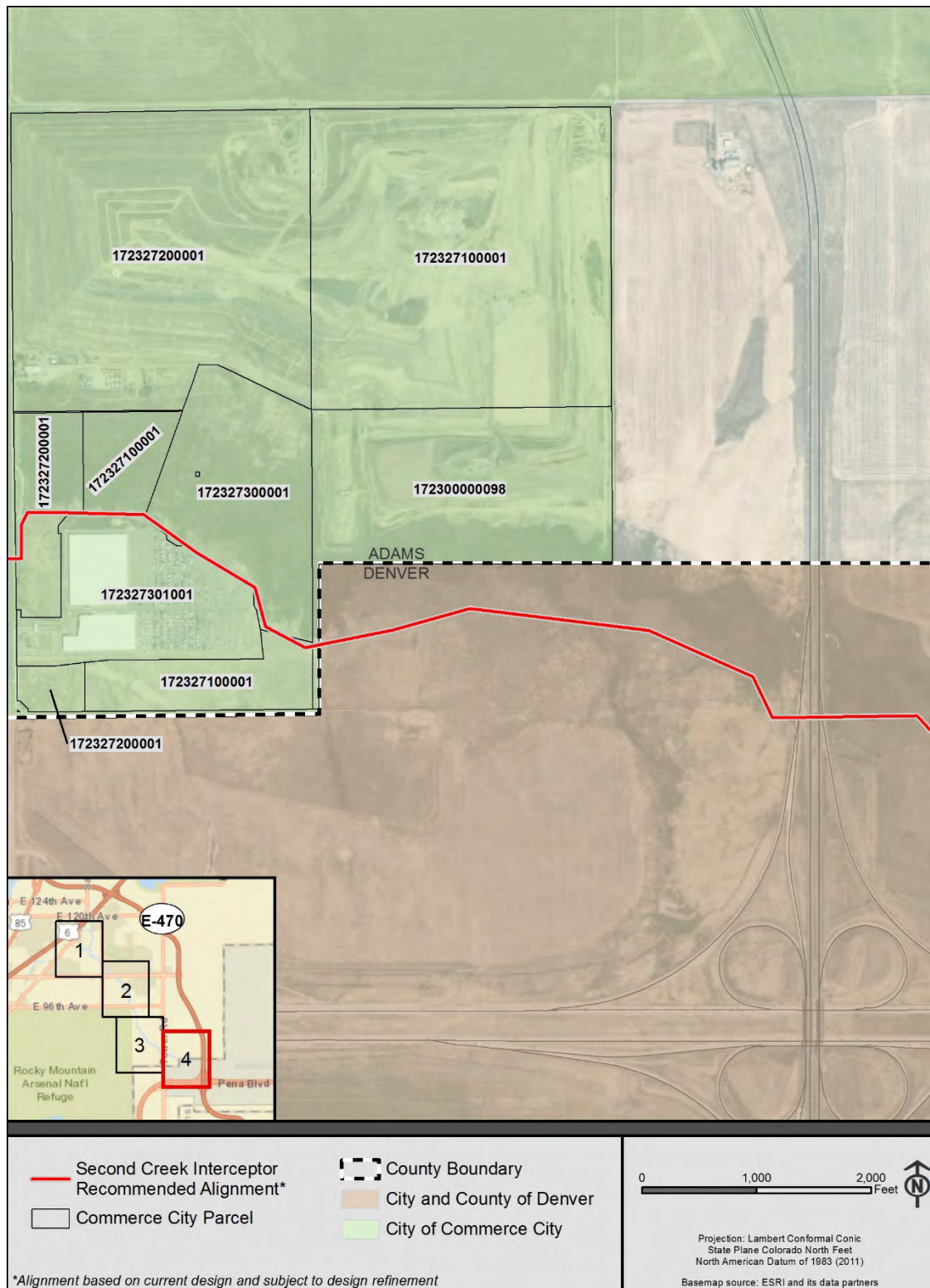


Figure 3-4: Second Creek Parcels in Commerce City – Sheet 4 of 4

Table 3-1: Ownership and Future Land Use of Impacted Parcels

Parcel No.	Owner	Zoning District	Future Land Use
0172306200001	Commerce City	Public	Park
0172306300001	Commerce City	Public	Park
0172307100002	DIBC Buffalo Hills Ranch LLC UND 96% FFP-DIA LLC UND 4% INT/% Fulewider	Planned Unit Development	Open Space
0172307100001	Reunion Metropolitan District C/O Clifton Larson Allen LLP	Planned Unit Development	Open Space
0172300000279	Clayton Properties Group II Inc	Planned Unit Development	Residential Medium
0172307400003	DIBC Buffalo Hills Ranch LLC UND 96% FFP-DIA LLC UND 4% INT/% Fulewider	Planned Unit Development	Open Space
0172308306069	Commerce City	Planned Unit Development	Open Space
0172308306062	Commerce City	Planned Unit Development	Open Space
0172308306064	Buffalo Run Commercial LLC	Planned Unit Development	Community Commercial Center
0172308306066	Buffalo Run Commercial LLC	Planned Unit Development	Community Commercial Center
0172317200002	Nguyen Van Mien and Nguyen Nguyet T Pham	Agricultural	Open Space
0172300000171	Public Service CO of Colorado C/O Property and Local Taxes	Agricultural	Utility
0172300000066	Public Service CO of Colorado C/O Property and Local Taxes	Agricultural	Utility
0172317216001	School District No. 27J	Public	Public
0172317102034	Commerce City	Planned Unit Development	Open Space
0172317406066	Commerce City	Planned Unit Development	Open Space
0172317406065	Fronterra Village Metropolitan No 2 c/o McGeady Becher P.C.	Planned Unit Development	Residential Medium
0172316300010	DIBC Buffalo Hills Ranch LLC UND 96% FFP-DIA LLC UND 4% INT/% Fulewider	Planned Unit Development	Park
0172321209001	Commerce City	Planned Unit Development	Open Space
0172320100001	Commerce City	Planned Unit Development	Open Space
0172321201054	Commerce City	Planned Unit Development	Open Space
0172321300001	Commerce City	Planned Unit Development	Open Space
0172321301008	Buffalo Highlands Metropolitan District	Planned Unit Development	Residential Medium
0172328102058	DIA Tech Center LLC	Planned Unit Development	DIA Technology
0172328102060	DIA Tech Center LLC	Planned Unit Development	DIA Technology

Table 3-1: Ownership and Future Land Use of Impacted Parcels

Parcel No.	Owner	Zoning District	Future Land Use
0172328102059	84th Avenue Colorado Becknell Investors LLC	Planned Unit Development	DIA Technology
0172328402005	CH Realty VIII-LPC I Denver 84th Telluride LLC	Planned Unit Development	DIA Technology
0172328402006	DIA Tech Center LLC	Planned Unit Development	DIA Technology
0172328400014	DIA Tech Center LLC	Planned Unit Development	DIA Technology
0172328401003	DIATC Metropolitan District	Planned Unit Development	DIA Technology
0172328401004	DIATC Metropolitan District	Planned Unit Development	DIA Technology
0172328400006	DIA Tech Center LLC	Planned Unit Development	Commercial
0172328402004	DIATC Metropolitan District	Planned Unit Development	DIA Technology
0172328402003	DIA One Pearl LLC	Planned Unit Development	DIA Technology
0172328402002	SBRM Hotels	Planned Unit Development	DIA Technology
0172328402001	Park n Fly LLC	Planned Unit Development	DIA Technology
0172321200001	Allied Waste Systems of Colorado C/O Property Tax Department	Planned Unit Development	Residential Medium
0172327100001	Allied Waste Systems of Colorado C/O Property Tax Department	Planned Unit Development	Residential Medium
0172327300001	Allied Waste Systems of Colorado C/O Property Tax Department	Planned Unit Development	Residential Medium
0172327301001	Allied Waste Systems of Colorado C/O Property Tax Department	Planned Unit Development	Residential Medium
0172300000098	Allied Waste Systems of Colorado C/O Property Tax Department	Planned Unit Development	Residential Medium

4.0 COMPLIANCE WITH COMMERCE CITY COMPREHENSIVE PLAN

This section explains how the SD Interceptor project will comply with the Commerce City Comprehensive Plan. Guiding principle excerpts from the plan, where available, are provided at the beginning of each section.

4.1 3 Cs of Sustainability

1. **Commerce and Economy:** *Vital economic development and fiscal stability, focusing on retaining existing businesses and attracting new businesses that fit with the goals of the community.*

The SD Interceptor is a collaborative solution that will support economic and commercial development within Commerce City by creating additional capacity in the infrastructure network within the City. SACWSD, which provides sanitary sewer service to Commerce City, is one of the agencies contributing flow to the pipeline. By diverting portions of its flow into the SD Interceptor, SACWSD will have additional capacity within its existing sanitary sewer collection and treatment network within the City. In addition, the SD Interceptor is a long-term infrastructure solution to balance and preserve treatment capacity at regional water reclamation facilities.

Throughout the design process, the Project Team has discussed alignment alternatives for the interceptor to help minimize impacts on existing and future businesses and developable land. Specifically, the City cited concerns with the Second Creek Village marketplace located north of East 104th Avenue at Chambers Road, and the future Reunion Village 8 development located between Chambers Road and East 112th Avenue on the west side of Second Creek. After further evaluation, the District was able to reroute the alignments to protect business and development interests in the areas.

2. **Context and Environment:** *Orderly growth and development that leads to a balanced City with great neighborhoods and commerce, a sufficient number of unfractured, connected parks and open space, and a positive appearance and image.*

The alignment will be placed such that the SD Interceptor will be constructed within an open space corridor where possible. This corridor has been established as a sanitary sewer corridor with SACWSD's Second Creek Interceptor, which the District's SD Interceptor will parallel through most of the corridor. Additionally, the District will seek to use existing access paths or roads to maintain this infrastructure across the open space. Gravel access roads (see Figure 4-1 through Figure 4-3) will be constructed, as necessary, and coordinated with the City's master planned trail system to provide the required access for the District's maintenance vehicles and equipment, taking into consideration public safety, environmental considerations, and land use, among others, to preserve the overall character of the area. The District will coordinate with Commerce City Parks and Recreation to construct the dual-use gravel access roads to meet minimum City specifications. The overall construction approach strengthens the Metro District's 50-year legacy of environmental stewardship.

- 3. Community and Social Well-being:** *Community and social facilities that provide safety, health, and well-being for residents and promote efficient and wise use of resources, ensuring that future generations have opportunities for meaningful livelihoods.*

The SD Interceptor project will preserve capacity within the existing sanitary sewer collection and treatment network, which would promote an effective use of resources. No major rehabilitation of the SD Interceptor is anticipated within the 50-year design service life because of the use of corrosion-resistant materials such as fiberglass-reinforced plastic (FRP) pipe material and epoxy-lined precast concrete, polymer concrete, and FRP manholes. Construction of the SD Interceptor project also provides the benefit of decommissioning of six existing lift stations immediately and up to three additional existing lift stations in the future. The combination of corrosion resistant materials and the ability to decommission existing lift stations decreases long-term O&M costs and reduces the system's carbon footprint. Also, by using an established sanitary sewer corridor, land resources are used efficiently, and public ROWs are reserved for future use by other utilities.

4.2 Land Use and Growth

Grow Commerce City in a balanced and compact pattern of neighborhoods and commerce centers, where residents have access to employment, services, and shopping. Promote infill and phase new growth to avoid inefficient and costly leapfrog development.

Land use surrounding the SD Interceptor project area primarily consists of agricultural and open space north and south of East 104th Avenue, respectively, but also includes public, commercial, and residential land as shown on Figure 4-4.

The existing development adjacent to the alignment corridor will experience some disruption during construction, including highway lane closures and typical nuisance impacts associated with construction (see Section 5.9). Acquisition of permanent easements, discussed in Section 3.3, will prohibit development of permanent structures or buildings directly on top of the SD Interceptor. However, because of the small scale of these acquisitions and alignment location, this limitation should not impact the City's overall growth opportunities or land use planning.

The Commerce City Comprehensive Plan calls for long-range growth to be coordinated with utilities and other infrastructure to avoid sprawl and foster smart growth (Commerce City 2010). The SD Interceptor project supports the City's orderly growth by preserving capacity in the existing infrastructure network within the City (see Section 5.3).

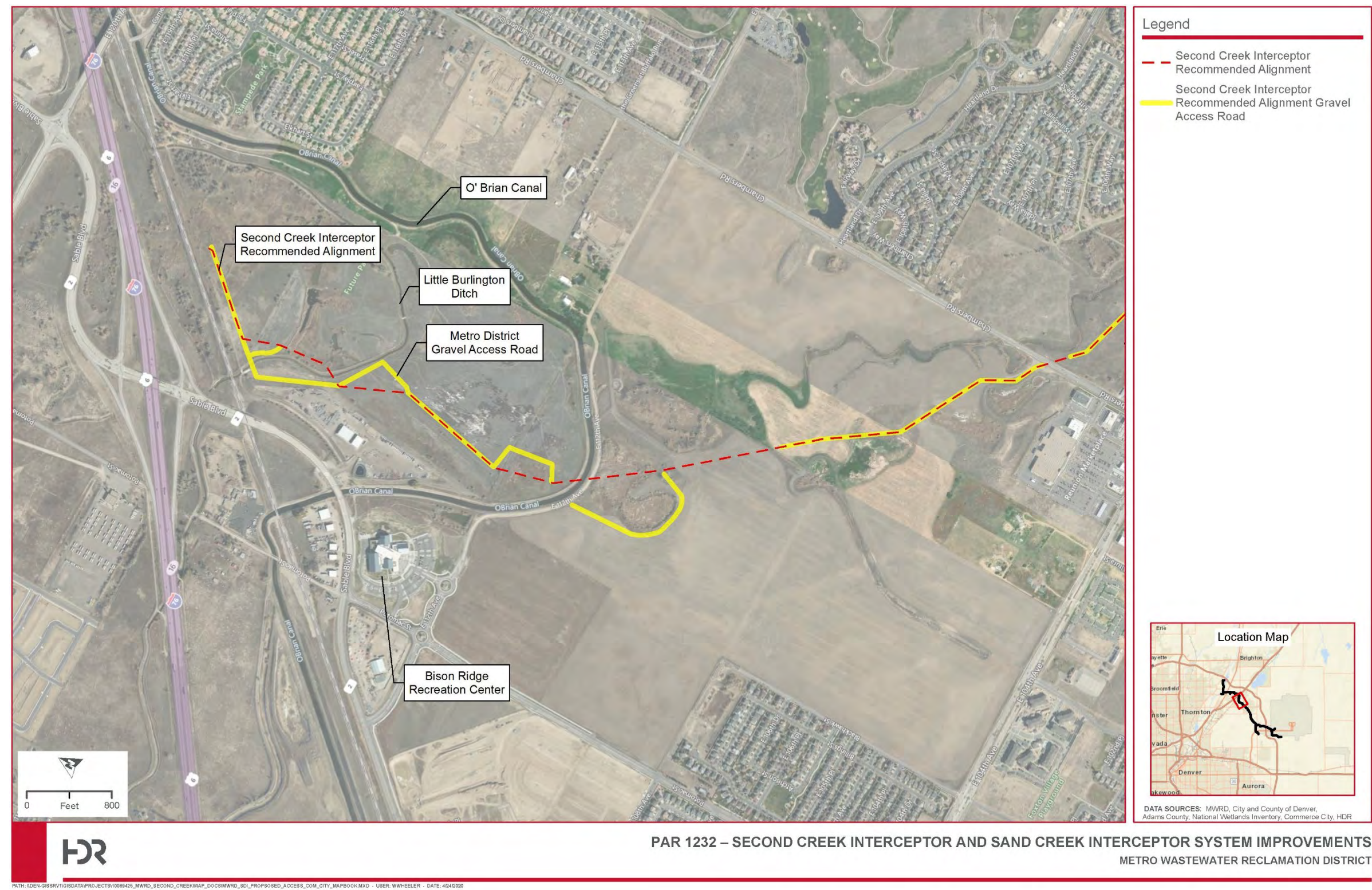




Figure 4-2: Proposed Gravel Access Routes – Sheet 2 of 3



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(Updated figure based on 75% design)

Figure 4-3: Proposed Gravel Access Routes – Sheet 3 of 3

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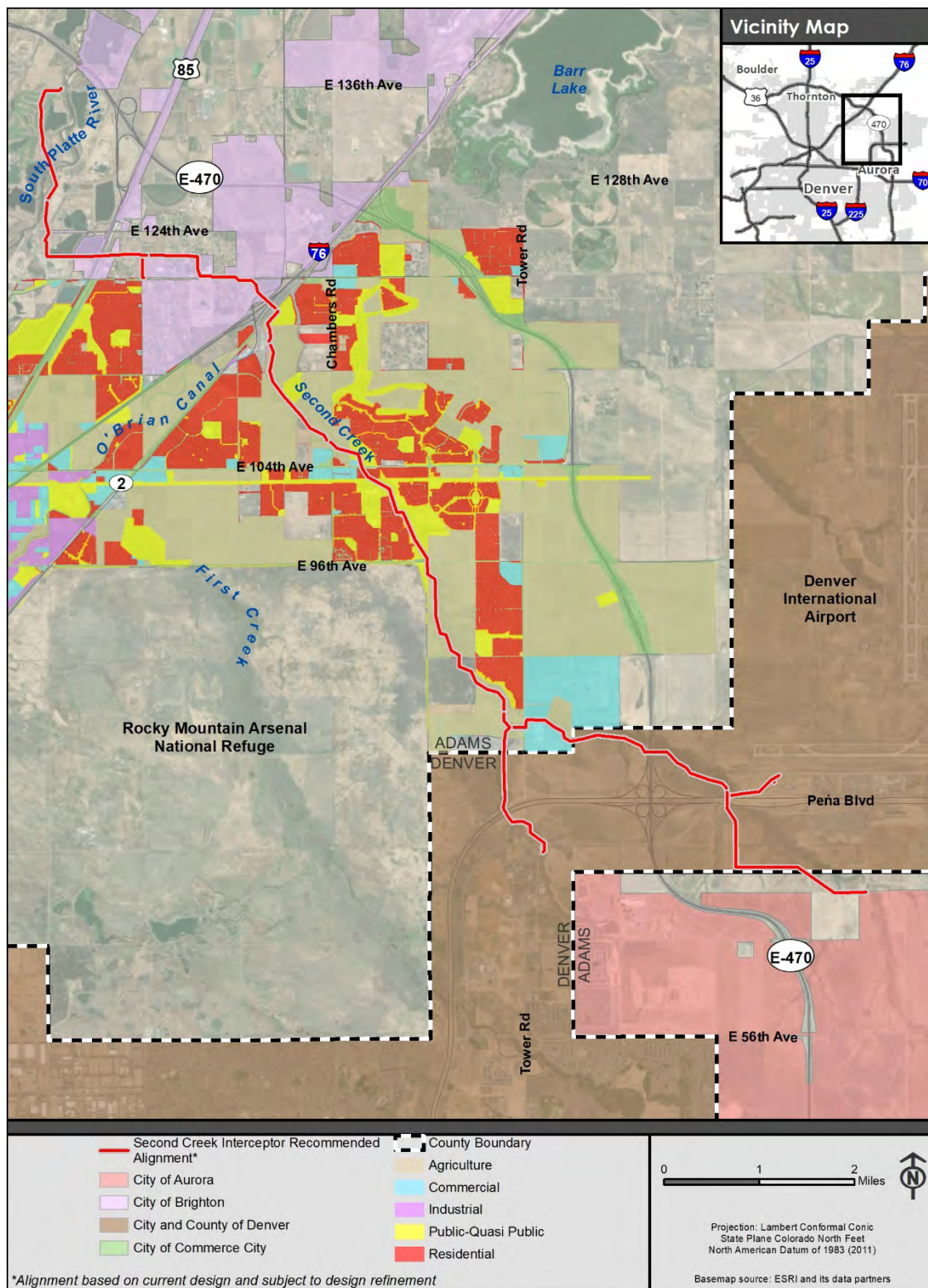


Figure 4-4: Current Land Use near SD Interceptor within Commerce City

4.3 Economic Development

Maintain a strong employment base; help create a jobs/housing balance; define appropriate locations for a range of industry and businesses (including green businesses); and be a home for major corporations.

Because this SD Interceptor project is a proposed underground utility, it will have a negligible impact on the City's economic diversification, employment base, retailers, and land reserve. Moreover, the project should not adversely impact future planned uses within the City's urban growth areas. In addition, the SD Interceptor project should not notably affect existing businesses and job employment. Some temporary disruption of area businesses will occur because of construction activities, but the Metro District will work with business owners to minimize these disruptions. The project will provide construction employment opportunities that may benefit workers within the City. Further, construction activities may result in indirect, spin-off economic benefits to local retail businesses such as a temporary increase in revenue from spending by construction personnel. This increase is expected to be negligible with no net permanent effect on income potential.

4.4 Fiscal Stability

Continue as a fiscally stable city by fortifying revenues and efficiently maintaining and providing services and infrastructure.

City funding is not required for construction, operation, or maintenance of the SD Interceptor project. The financing for this project will come from the Metro District's Capital Improvement Funds, supported primarily by annual service charges. The project will preserve capacity within the Metro District's and SACWSD's transmission and collection systems and provide the opportunity for additional revenue for the District through annual charges. The SD Interceptor allows for the decommissioning of six existing lift stations immediately and up to three additional existing lift stations in the future, resulting in a reduction in O&M costs for SACWSD, Aurora, Brighton, and Denver. Maintenance of the interceptor will occur through the existing transmission system maintenance team, and additional employees will not be required for system maintenance. No major rehabilitation is anticipated within the 50-year design service life because of the use of corrosion resistant materials.

4.5 Housing and Neighborhoods

Provide multiple types of housing serving a range of current and future residents in vibrant neighborhoods where people want to live.

The SD Interceptor will not create housing; however, the alignment of the interceptor was selected to minimize impacts on residential development parcels. Further, the preservation of capacity in the existing systems will allow for additional residential units to be served.

4.6 Redevelopment and Reinvestment

Promote new centers while maintaining the integrity of existing districts by continually renewing and reinvesting in them.

The SD Interceptor project will preserve capacity within SACWSD's existing collection system and provide the potential opportunity for additional flows or new connectors to the system, thereby supporting growth in the community. In addition, the SD Interceptor will allow for the decommissioning of six wastewater lift stations throughout the District's service area, resulting in an overall improvement to the reliability of the District's transmission system and its Member Municipalities and Special Connectors collection systems. During the estimated 3-year construction period, construction workers are likely to spend money in Commerce City for food, gas, and other services that will provide economic benefits to local businesses and, in turn, the City.

4.7 Transportation

Ensure a quality community by providing efficient, effective, and varied modes of transportation that integrate and connect neighborhoods, the community, and the region.

The SD Interceptor will not provide transportation improvements or modes to the City. The District will implement construction methods to minimize disruptions to existing traffic, such as tunneling across major highway ROWs. Prior to commencing interceptor construction within the City, the District will obtain an approved traffic control plan from the City and approved permits from E-470 and Colorado Department of Transportation (CDOT) for those sections of the interceptor within the City. In addition, construction activities will be coordinated with Commerce City Parks and Recreation to ensure that proper notice, signage, and alternative trail routes are established, if necessary, near existing trails.

4.8 Safety and Wellness

Increase the health and well-being of residents through healthy living, access to medical facilities, and public safety and hazard planning.

The SD Interceptor project will preserve capacity within the existing sanitary sewer network, which promotes safety and public health. Safety is the top priority for all Metro District projects, and the District has a long history with and confidence in the selected contractor. Comprehensive safety protocols, including daily audits, compliance, and more, will be in place over the course of the entire project during all phases of construction and for all construction methods, including open cut and trenchless. In addition, the sustainable gravity flow design is the safest and most environmentally friendly solution.

The Metro District will use trenchless methods (tunneling) where the SD Interceptor crosses some major roadways within the City, which will minimize disruptions to traffic and promote worker and community safety. An example of a tunneling shaft used in trenchless construction is shown on Figure 4-5. These crossings should not require lane closures. Table 4-1 provides a list of the major trenchless crossings, as well as open-cut crossings.



Figure 4-5: Example of Trenchless Construction Methods

Table 4-1: Anticipated Transportation Crossings in Commerce City

Road/Railroad	Jurisdiction	Construction Method	Section	Town	Range	Min. Depth of Cover (feet)
East 96th Avenue	Commerce City	Tunnel	16, 17, 20, 21	2S	66W	5
East 112th Avenue	Commerce City	Tunnel	7	2S	66W	5
East 104th Avenue	Commerce City	Tunnel	8, 17	2S	66W	5
East 120th Avenue	Commerce City	Tunnel	1	2S	67W	5
Chambers Road	Commerce City	Open Cut ¹	7, 8	2S	66W	5
East 88th Avenue	Commerce City	Open Cut	21, 28	2S	66W	5
Tower Road	Commerce City	Tunnel	27, 28	2S	66W	5
East 81st Avenue	Commerce City	Open Cut	28	2S	66W	5
US Highway 6/ BNSF Railroad	BNSF	Tunnel	12	3S	68W	5
N-Line	RTD ²	Tunnel	36	2S	66W	5

Note:

¹ Potential tunnel

² RTD = Regional Transportation District

The Metro District will provide the proposed locations of storage areas designated for equipment, fuel, lubricants, and chemical and waste materials once the design and construction plans are complete. Control measures will be implemented during construction in accordance with a Spill Prevention, Control, and Countermeasure (SPCC) Plan and the guidance document, *Environmental Spill Reporting* (CDPHE 2018). Environmental releases will be reported to the appropriate authorities in a timely manner to provide protection of human health and the environment. In addition, a Health and Safety Plan and a Materials Management Plan will be prepared to address contamination encountered during construction. The plans will be prepared in accordance with Occupational Safety and Health Administration (OSHA) requirements for construction. A separate Flammable Gas Investigation Plan (see Appendix C) has been prepared for and approved by Tri-County Health Department (TCHD) that outlines the requirements for monitoring methane gas near active and historical landfills during the design and construction phases. The Metro District will provide the results of the pre-construction flammable gas monitoring program for the Second Creek Interceptor to TCHD and CDPHE for review and approval following its anticipated completion in spring 2020. The District will provide to TCHD and CDPHE the Materials Management Plan for review and approval prior to the start of construction and the Construction Completion Report following construction.

4.9 Parks, Open Space, and Recreation

Provide ample and well-distributed parks and recreation facilities, and a connected system of trails and open space, to provide for outdoor recreation, relaxation, and rejuvenation, and to protect views.

The SD Interceptor alignment corridor includes open space near Chambers Road and East 104th Avenue, as well as future parks/open spaces near Potomac Road and East 112th Avenue, and Landmark Drive and East 96th Avenue (see Figure 4-6). Construction of the SD Interceptor is expected to be completed by early 2024. Therefore, if future recreation areas are not developed before then, no impacts on these facilities will occur.

The SD Interceptor project will also cross two existing trails, the East 104th Avenue Trail in one location and the Second Creek Trail in multiple locations. It will also cross one future trail near Chambers Road and East 106th Avenue. The Metro District will keep trails open and provide trail detours or alternative routes and maintain safety barriers for the Second Creek Interceptor construction activities and equipment. The District will submit a trail detour plan for Commerce City Parks and Recreation review and approval prior to construction. The District will continue to coordinate with City Parks and Recreation to ensure that proper notice, signage, and alternative trail routes are established, if necessary, during construction near existing trails.

The alignment east of the City's Bison Ridge Recreation Center was coordinated with City staff to accommodate the City's future park and wetland complex. Impacts on these parks, trails, and recreational facilities will be temporary and will occur during the construction phase. Users of these amenities may be temporarily affected by noise and dust during SD Interceptor construction. However, the Metro District will implement control measures to minimize these nuisances. After construction, parks and trails will be restored to pre-construction or improved conditions.

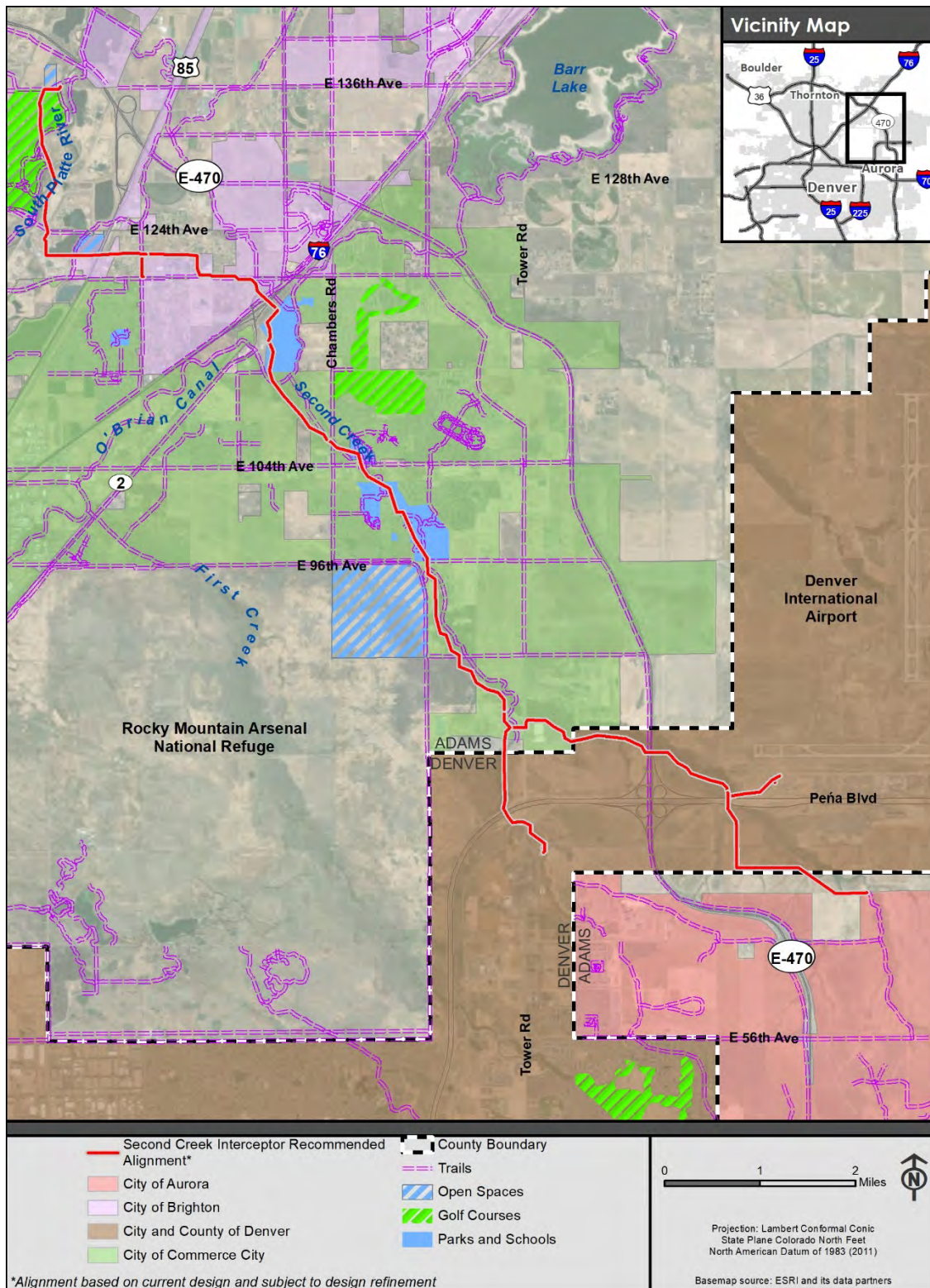


Figure 4-6: Parks, Open Spaces, and Trails within the SD Interceptor Project Corridor

Overall, the SD Interceptor project should not have lasting adverse impacts on parks, open space, or recreation within the City.

4.10 Public Facilities and Infrastructure

Ensure adequate and efficient public facilities and infrastructure for current and future residents and businesses.

During SD Interceptor project construction, temporary effects on existing transportation networks are anticipated from the increased commuting traffic from construction workers and as a result of construction equipment and materials being transported both onsite and offsite. Also, construction in areas where the pipelines run adjacent to or across existing roads likely will require lane closures. These temporary effects will be coordinated with the City to minimize disruption. To construct this SD Interceptor project, a typical permanent easement width of 40 feet, centered along the interceptor, is anticipated with an average temporary disturbance width of 120 feet. This width may increase in areas that require deep pipeline installation or atypical construction methods.

The SD Interceptor project allows for decommissioning of six existing lift stations immediately and up to three additional existing lift stations in the future, which will reduce maintenance and traffic to the facilities over the long term. It also supports commercial development within the City by preserving capacity in the existing infrastructure network of the City.

To support construction, the Metro District will develop traffic control plans and coordinate these with the City and CDOT for the impacted transportation network. Minor roadways, including Potomac Street, East 88th Avenue, and East 81st Avenue, will be open cut using a road closure and detours, or, if appropriate, maintaining at least one lane of traffic in each direction depending on the existing roadway width (see Figure 4-7). The City will not allow full closure of Chambers Road to install the SD Interceptor across Chambers Road. For an open cut installation, the District will construct a temporary asphalt road (shoo-fly) to route traffic around the construction area to maintain two-way traffic on Chambers Road to avoid a full road closure. . If pipeline trenching occurs under the existing pavement, the District will coordinate with the City or the local agency with jurisdiction to determine the proper resurfacing treatment, depending on the field conditions.



Figure 4-7: Example of Open-cut Construction Methods

Major roadways, including Tower Road, East 120th Avenue, and East 104th Avenue, will be tunneled to reduce impacts on traffic. In addition, crossings of the BNSF Railroad and the RTD A-Line will be completed with trenchless methods of construction. Because trenchless construction methods minimize aboveground disturbance, traffic disruptions are not expected along major traffic corridors where these methods are employed. Although impacts on traffic are not anticipated, minor diversions to protect workers on the shoulder of the road may be implemented.

The trenchless techniques will comply with Commerce City's Department of Public Works *Engineering Construction Standards and Specifications*, as outlined in Section 7.03 of that document (Commerce City 2012). In addition, construction methods and bore diameter will be approved by the City as necessary as part of the plan review and ROW permit process. Because of rolling terrain and the existing elevation connection points, the depth of cover will vary between 5 and 50 feet, which exceeds the City's requirement for a minimum of 30 inches of cover. Road crossings within the City will be coordinated and will comply with applicable City Construction Standards. Highways and rail lines in the City crossed by the SD Interceptor are detailed in Table 4-1.

Construction parallel to the roadway will be minimized through alignment optimization. If construction near and parallel to roadways is required, construction will occur outside of the existing pavement and will be limited to the shoulder or with one traffic lane disrupted, with a traffic control plan to maintain traffic in one lane. Also, the Metro District will continue to provide public outreach and information to citizens as needed regarding the construction and will respond to their concerns regarding the SD Interceptor project.

Construction will comply with applicable federal, state, and local requirements to minimize adverse effects on traffic safety and operation, maintenance and aesthetic qualities of Commerce City, county roads, and state highway systems. After construction, there will be no lingering effects on the City's existing roadway network.

4.11 Stormwater Collection System Considerations

This section provides information on the SD Interceptor in connection with stormwater, floodplains, and water quality.

4.11.1 Stormwater

The SD Interceptor will cross through several jurisdictions. The City has invested in drainage master planning with regional coordination, focusing on maintaining historical and natural drainageways. Without proper planning, the installation of the SD Interceptor could negatively impact these natural drainageways, as well as associated stormwater infrastructure, floodplains, and water quality. However, in its alternatives analysis process, the Metro District aligned the SD Interceptor to minimize conflict with regional stormwater infrastructure and avoid critical grade breaks. Existing outfall culverts will be avoided to the extent practical, and impacted outfalls will be restored to their existing conditions. The topography in the SD Interceptor limits of construction will be restored to pre-construction grades. Furthermore, proposed access roads for maintenance will be constructed using permeable materials (gravel). Therefore, effects on the City's stormwater collection systems are not anticipated.

4.11.2 Floodplains

The SD Interceptor will flow by gravity and generally follow the topographic profile of Second Creek and the South Platte River. Following this topographic profile requires that portions of the SD Interceptor cross the 100-year floodplain. When constructing in the floodplain and floodway, the design will adhere to the City's floodplain ordinance. However, the Metro District will adhere to design and construction standards to avoid or minimize increases in the floodplain elevation. For example, disturbed areas will be restored to pre-construction conditions to maintain existing floodplain extents. Manholes located within the floodplain will be watertight.

4.11.3 Water Quality

The District will implement erosion and sedimentation control measures during and after construction activities to avoid and minimize adverse water quality effects. Final erosion control measures will be inspected and maintained until disturbed areas are revegetated to the coverage required by applicable permits.

5.0 COMMUNITY CONSIDERATIONS

The Metro District will continue to work with the City, stakeholders, and the community regarding the SD Interceptor project's compatibility with surrounding land uses, and to minimize and avoid, where possible, adverse impacts during the construction phase. This chapter discusses these potential impacts.

5.1 Harmony with the Character of the Neighborhood

The SD Interceptor project will preserve the character of the City's neighborhoods because most of the alignment will be located on undeveloped land along Second Creek, therefore minimizing disruption to neighborhoods. The interceptor will be installed underground, resulting in minor visual impacts on the surrounding area (see Section 5.8). The Metro District has coordinated with the DIA/Nexus North development regarding the proposed location of the SD Interceptor metering facility south of East 88th Avenue. It is primarily a below-grade structure with a small, above-grade control panel that is compatible with the commercial development in the area (see Figure 5-1). As discussed with DIA/Nexus North, screening is not planned or anticipated for the metering facility.



Figure 5-1: Example of Metering Facility

Multipurpose gravel access roads that will be installed for maintenance along Second Creek could serve as community trails. Access roads are needed for maintenance of proposed manholes along the alignment. After construction, disturbed areas will be returned to pre-construction conditions, thereby retaining harmony with the character of the neighborhood. In developed areas, minor, temporary impacts from construction activities will result in noise, dust, and traffic. Once construction is

complete, aboveground facilities will be few, and there will be only occasional maintenance activities along the alignment.

5.2 Compatibility with Surrounding Area

The SD Interceptor will be compatible with adjacent land uses because no above-grade pipeline is proposed. Permanent gravel access roads will match surrounding conditions. Temporary access roads will be removed and the areas will be restored to pre-construction conditions upon completion of the interceptor installation. Disturbed soil from construction will be graded to match previous conditions and seeded with native grasses, where required. Infrastructure, including manholes and metering facility vaults, will be at or below grade with access hatches at final grade. Electrical panels and telemetry infrastructure will remain above grade. After construction, visual impacts will be minor (see Section 5.8).

5.3 Community Need for the Proposed Project

The SD Interceptor will support economic and commercial development within the City by preserving capacity in the existing infrastructure network of the City and SACWSD. The SD Interceptor will provide a regional wastewater conveyance solution to serve development within the Second Creek Basin. It will provide options for SACWSD to divert flow from existing conveyance and treatment infrastructure into the SD Interceptor, allowing for increased service capacity over the existing condition. This increased service capacity is needed as development occurs in the future.

The community will benefit from the SD Interceptor project through a temporary increase in available construction jobs in the area. Additionally, construction workers are likely to support local businesses during construction.

5.4 Effects on Adjacent Properties

Some adjacent properties will experience nuisance effects during the construction period, when additional construction noise, vibration, and traffic will occur. Some properties adjacent to the SD Interceptor project will also experience more direct effects caused by installation of improvements within construction areas. These impacts generally will be temporary. Aboveground impacts are limited to manhole covers, a metering facility, connection structure covers, and an access road as needed. Other disturbed areas will be restored to existing or improved conditions.

Through the design process and alternatives analysis, impacts on developed land have been minimized and avoided where possible. Open-cut construction will be used where possible to reduce the duration of construction. It is industry standard to install interceptors across water bodies similar to Second Creek by open-cut construction. The Metro District and the USACE discussed the crossing approach for the Second Creek Interceptor, which is expected to be permitted under a Section 404 Nationwide Permit. The District will restore the portions of the Second Creek channel impacted by construction to preconstruction conditions following construction completion. Public access will be maintained as required for open-cut interceptor crossings of minor roadways with low traffic volume. In areas where open cut will not be feasible, trenchless methods will be used to reduce impacts on properties and traffic delays. In some cases, longer-term impacts may occur, including the inability for parcel owners to place trees or permanent structures within permanent

easement boundaries. Landowners will be compensated for these permanent easements through the easement negotiation and purchase process.

5.5 Effects on Public Improvements and City Services

Public improvements and City services may be subjected to minor construction impacts, including minor road closures or detours, increased truck traffic near construction areas, and trail closures. Construction impacts will be temporary, and public spaces will be restored. The Metro District will avoid, minimize, and mitigate these effects where practical. Tunneling methods will be used to construct the interceptor below major streets and canals/ditches, where appropriate.

5.6 Site Characteristics

The SD Interceptor will be buried underground and result in minimal visual impacts (see Section 5.8). After the SD Interceptor is installed, disturbed areas will be returned to pre-construction grades.

5.7 Landscaping and Screening that Ensure Harmony with Adjacent Uses

The SD Interceptor will be buried underground and result in no permanent visual impacts, with the exception of a metering facility, manhole covers, connection structure covers, and gravel access roads. Most of the SD Interceptor construction in the City will occur in sparsely developed areas consisting of scattered rural residential, farm, and commercial uses, and undeveloped land. The following measures will be employed to minimize and mitigate visual impacts during and after construction and to encourage harmony with adjacent uses:

- Preserve existing trees and vegetation to the extent practicable.
- Revegetate disturbed areas with native trees and vegetation as soon as practicable after construction is completed.

As discussed in Section 5.1, screening is not planned or anticipated for the interceptor metering facility that will be installed south of East 88th Avenue.

5.8 Visual Impacts

During construction, temporary visual impacts will affect residences, farms, businesses, and other stakeholders within view of the interceptor alignment and in the immediate vicinity of the interceptor construction sites. Areas where open-cut construction is employed will experience more temporary visual impacts than areas where trenchless construction is used, but the duration of open-cut construction will be shorter. For open-cut construction, the interceptor is expected to be constructed in 200- to 400-foot segments (depending on pipe diameter). Estimated time from excavation to backfill is 1 to 2 weeks per segment. Figure 5-2 shows a representative photograph of open-cut construction activities.



Figure 5-2: Example of Open-cut Pipe Installation and Trench Shoring

Temporary visual impacts will include the following:

- Construction equipment
- Chain link fencing around staging areas and safety fencing around work areas
- Traffic control devices
- Pipe and manhole stockpiles at each segment
- Trench excavation (where open-cut construction is used)
- Tunneling pits (where trenchless construction is used)
- Excavated soil stockpiles
- Dust from construction activities
- Control measures for stormwater management/erosion control/restoration
- Temporary construction access roads (in undeveloped areas)
- Removal of existing vegetation in immediate vicinity of interceptor installation
- Trench compaction/disturbed soil

Permanent visual impacts will result from construction of aboveground facilities, such as one metering station that has a relatively low aboveground impact, consisting of access provisions to an underground vault and above-grade electrical panel. In addition, ongoing but minimal monitoring and maintenance activities will be visible to individuals in areas within view of the interceptor alignment.

The following measures will be employed to minimize and mitigate visual impacts during and after construction:

- Preserve existing trees and vegetation to the extent practicable.
- Employ dust suppression techniques during construction, such as broadcast spraying of gravel and dirt roads and work areas with a water truck.
- Revegetate disturbed areas with native trees and vegetation as soon as practicable after construction is completed.

5.9 Noise, Dust, Vibrations, Odor, and Other Nuisances

During construction, the SD Interceptor project will result in temporary nuisances, including increased noise, dust, traffic, and vibration that are typical of construction activities. These nuisances are expected to be localized to the area of activity and are not expected to have long-term impacts.

The SD Interceptor project is proposed as a fully underground gravity sewer interceptor with manholes that are vented to the atmosphere. Nuisance odors in sewers are often the result of the buildup and off-gassing of hydrogen sulfide, which often occurs when dissolved hydrogen sulfide is released from solution during turbulent flows. To prevent turbulent flows and excessive off-gassing, the project is designed to maintain sub-critical, laminar flow throughout the pipeline. Locations where flows mix, such as at connection structures and where potential pressurization may occur, are designed to maintain negative pressure and draw odorous gases downstream to an odor control facility outside of Commerce City.

Because flows in the SD Interceptor will be via gravity, noise and vibration impacts from the permanent operation of the interceptor are not anticipated.

Permanent gravel access roads used for maintenance of the SD Interceptor will be designed to reduce dust generation. The roads are expected to experience limited use for maintenance during the life of the interceptor.

Aboveground and belowground structures are designed to eliminate access to the sewer by rodents or other animals. The connection structures and metering facility will be equipped with vents and small openings that will be fitted with screens to keep rodents and insects out of the sewer.

Where trenchless construction is employed, surface disturbance will be limited to tunneling shafts at regular intervals (see Figure 5-3), with associated equipment at the launch shaft, resulting in fewer visual impacts than with open-cut construction. The estimated time from access pit excavation to backfill is 6 to 8 weeks, depending on geology and the length of pipeline between access pits. Pipeline construction for the SD Interceptor is expected to be completed in 3 years.



Figure 5-3: Example of Tunneling Pit for Trenchless Construction

6.0 STATEMENT OF OPERATIONS

This section presents specifics on construction operations associated with construction of the SD Interceptor.

6.1 Hours and Days of Operations

Construction of the SD Interceptor is scheduled to begin in the fall of 2020 and expected to be completed by early 2024. Construction is anticipated to be phased such that the interceptor is constructed in segments to avoid lengthy construction impacts on localized areas. Restoration of disturbed vegetation within the work corridor will be initiated during the first available planting season.

Construction work hours will vary based on activity and season but will generally occur from 7:00 AM to 7:00 PM, Monday through Saturday. The Metro District requests approval of the proposed work hours in the CUP conditions. Requests for work hours on Sundays, holidays, or outside of the normal construction hours will be coordinated with the City. Chapter 10 of the Commerce City Municipal Code will govern work hours within the ROW. Once the SD Interceptor is in service, it will operate 24/7 and will require periodic maintenance.

6.2 Number of Employees

The number of employees actively engaged in construction will vary depending on the construction stage of the SD Interceptor, season, and number of crews involved. During construction, an average of 5 to 30 employees are estimated to be working in a given area. There will be no permanent personnel or activities at the site once the interceptor is in service.

6.3 Number of Required Parking Spaces

Parking and vehicle storage for construction employees is anticipated to be in designated staging areas on private parcels within temporary construction easement areas. At the peak of construction, designated staging areas will have sufficient parking for employees, equipment, and materials.

6.4 Average Daily Peak Trips Generated

During the construction phase, daily trips will include the delivery of materials and equipment to the approved staging areas, personal commuting associated with construction activities, and restoration of disturbed areas, among other activities. Construction traffic impacts will be temporary and vary from day to day.

Based on a conceptual construction plan, the estimated number of average trips per week needed for construction of the SD Interceptor includes the following:

- Pickup trucks: 150 per week
- Lowboy transport trailers: 5 per week

- Earth-hauling trucks: 50 per week
- Inspection trucks: 50 per week
- Water trucks: 10 per week
- Pipe trucks: 15 to 40 per week
- Pipe bedding trucks: 138 per week

These impacts generally will be localized around the construction area and will not occur across the entire alignment for the duration of construction.

6.5 Types of Equipment and Processes Used

Table 6-1 lists anticipated construction activities and associated equipment.

Table 6-1: Construction Activity and Equipment

Construction Activity and Sequence	Construction Equipment
Open Cut – Clearing/Grubbing/Demolition	Bulldozer, loader, jackhammers, backhoe
Open Cut – Excavation	Tracked excavator, wheeled excavator, backhoe
Open Cut – Pipe Installation and Backfill	Tracked excavator, wheeled excavator, bulldozer, grader, wheel loader, dump truck
Open Cut – Compaction	Sheepsfoot roller, vibratory roller
Tunneling – Shaft Construction	Crane, sheet pile driver, tracked excavator, bobcat
Tunneling – Boring	Tunneling machine, generator, slurry separation plant, crane
Tunneling – Grouting	Concrete mixer, concrete pump
General	Forklift, generator, survey truck, water truck, pickup truck, equipment service truck
General – Concrete	Concrete mixer, concrete pump
Restoration – Grading	Bulldozer, grader, land planer
Restoration – Seeding	Hydroseeder, mulcher, tiller
Restoration – Paving	Paver, roller

The Metro District performed fieldwork during the design phase that included topographic surveys, geotechnical borings, utility potholing, pumping tests, wetland delineations, historical and archaeological surveys, raptor nest surveys, tree surveys, and habitat and presence/absence surveys for threatened and endangered species. Field surveys will be performed throughout the construction phase to identify any new improvements prior to the start of construction, establish interceptor elevations, and record as-built conditions. Utility locates will be conducted to identify any new utilities installed after the design phase investigation and before work begins. The District will perform environmental field surveys prior to construction of interceptor segments to confirm that construction may commence, and will conduct environmental monitoring during construction activities to confirm compliance as required by permit, regulatory guidance, and applicable industry good practice. The environmental surveys and monitoring will include wetlands, trees, weeds, raptor nests, migratory bird nests, and protected species habitat.

The expected construction sequence for the open-cut sections of the SD Interceptor project is as follows:

1. Document the existing condition of the alignment and install temporary erosion control measures in accordance with the Grading, Erosion, and Sediment Control Plans and Grading Permit. Also obtain a Floodplain Permit for work in the 100-year floodplain.
2. Prepare the construction area and commence construction, including clearing and grubbing, and implement traffic control measures.
3. Survey the location of the improvements to finalize spatial location.
4. Use the approved materials and methodologies from the utility owners to complete utility relocations necessary to accommodate the SD Interceptor.
5. Excavate the trench and haul off or stockpile soil. The depth of trench will vary greatly depending upon existing topographical conditions.
6. Prepare the excavation and install the pipe, metering facility, and manholes. The as-built conditions will be recorded.
7. Backfill the trench and compact it.
8. Perform surface finish work, including installation of manhole covers and collars, connection structure covers and collars, access road construction, and pipeline marking.
9. Restore the site to existing or improved conditions.

Trenchless construction operations will follow a similar sequence; however, with tunneling, the surface disruption will be minimized:

1. Document the existing condition of the alignment and install temporary erosion control measures in accordance with the Grading, Erosion, and Sediment Control Plans and Grading Permit. Also obtain a Floodplain Permit for work in the 100-year floodplain.
2. Begin preparation of the construction area in the area of the tunnel shafts.
3. Survey the location of the improvements to finalize spatial location.
4. Use the approved materials and methodologies from the utility owner to complete utility relocations necessary to accommodate the SD Interceptor.
5. Excavate tunnel shafts and install shoring. Perform preparatory activities, including slurry plant construction and equipment mobilization.
6. Install the tunnel casing pipe between the two shafts. Frequently monitor the area above the tunnel via visual monitoring and survey activities.
7. Install the carrier pipe and grout the annular space.
8. Install manholes within the tunneling shafts and backfill the shafts.
9. Perform surface finish work, including installation of manhole covers and collars, connection structure covers and collars, access road construction, and pipeline marking.
10. Restore the site to existing or improved conditions.

6.6 Safety and Maintenance Procedures

The District's Transmission Division is responsible for operating and maintaining its transmission facilities, which includes approximately 238 miles of interceptor sewers and force mains, including roughly 3,730 manholes, 30 siphons, 77 diversion structures, three lift stations, and three odor control systems. The group also maintains 99 metering facilities and the sampling program used for the District's annual charges and industrial waste pretreatment monitoring.

The Metro District has several programs in place as part of its Facility Inspection Program (FIP). The overall objectives of the FIP are to minimize risks to human health and the environment that might result from wastewater releases from the District's interceptor system, continually document the condition of the overall transmission system, and respond as necessary to sanitary sewer overflows and events within the served area of the District. The FIP includes manhole and structure surface inspections, line cleaning, and interceptor closed circuit television (CCTV) inspections. The Interceptor Infrastructure System Database is used extensively to schedule future work, track progress of performed work, document facility condition assessments, and archive data. The general goals of the FIP are as follows:

- Identify and remove debris accumulations that reduce hydraulic capacity.
- Identify recurring problem areas within the interceptor system from accumulations of grease, grit, roots, debris, or other hydraulic gradient anomalies.
- Assess structural integrity of interceptor components.
- Compile overall condition assessments to assist in interceptor system operation.
- Provide maintenance and capital improvement planning.
- Visually inspect, via CCTV, at least 10 percent of the interceptor (pipe) system each year.
- Visually inspect manholes in the field at least every 3 years.

These activities are summarized in the 2017 Annual Operating Report (see Appendix D) and describe the Metro District's approach to reducing the risk of sanitary sewer overflows through management, inspection, and maintenance. These activities apply to all Metro District systems, including the proposed SD Interceptor. In addition to the 2017 Annual Operating Report, the Transmission Emergency Response Schedule and Procedure is included in Appendix D.

6.7 Description, Location, and Quantity of Hazardous Materials

Hazardous materials could be encountered during construction. Therefore, properties need to be identified that may contain contamination prior to ROW acquisition and construction. Hazardous materials are defined as any waste product that is considered flammable, corrosive, reactive, or toxic. Hazardous materials can be found in various forms and can originate from a variety of sources. Examples of potential sites that may contain hazardous waste include landfills, service stations, industrial areas, railroad corridors, and mine sites.

A Hazardous Material Assessment was performed to screen the SD Interceptor project area for sites with known or suspected recognized environmental conditions (RECs) (Jacobs 2019). RECs indicate the presence or likely presence of hazardous substances or petroleum products in, on, or at a property because of a release to the environment, or under conditions indicative of a release to the environment, or under conditions that pose a material threat of a future release to the environment (ASTM International 2013). The term REC is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally will not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

A search of selected government databases was conducted using Environmental Data Resources (EDR). According to the EDR corridor report for the SD Interceptor alignment, approximately 25 listed sites are within 0.5 mile of the subject property that may or may not pose a risk to the project. However, after further review, these sites are not considered REC sites and are not anticipated to impact the proposed SD Interceptor project within Commerce City. In addition, based on information reviewed for the Rocky Mountain Arsenal site and the Tomahawk Truck Stop, it is concluded that RECs associated with these sites are not likely to impact the project. The EDR report depicts the locations of listed sites and can be found in the *Hazardous Materials Assessment Report* (Jacobs 2019).

Additional records were reviewed for the SD Interceptor project: the on-line Colorado Storage Tank Information System (Colorado Department of Labor and Employment 2000), Hazardous Materials and Waste Management Division on-line mapping (CDPHE 2019a), and the Tri-County Health Department historic landfill database (Tri-County Health Department 2019). Based on review of these records, approximately six listed sites were identified within 0.5 mile of the SD Interceptor (see Figure 6-1). However, these sites are not considered REC sites and are not anticipated to impact the SD Interceptor project improvements within Commerce City. Additional information on the records review can be found in the *Hazardous Materials Assessment Report* (Jacobs 2019). Background information and a figure showing the locations of the historic landfills in Commerce City near the SD Interceptor are provided in Appendix E.

Temporary and permanent easements are anticipated at approximately 94 and 93 properties, respectively. Of these properties, four are anticipated to have easements on or near listed sites identified in the regulatory databases and records as discussed above.

Because of anticipated easements and historical and unknown potential contamination adjacent to the SD Interceptor project, it is required that the contractor have a Health and Safety Plan and Hazardous Materials Management Plan in place in accordance with CDPHE Solid Waste Guidance and Policy to respond to hazardous materials or waste that may be encountered (CDPHE 2019b). These plans will be prepared by the contractor and will include assessment of the extent of potential construction debris disposal areas to characterize the soil for worker, public, and environmental protection and to determine appropriate and necessary waste management and disposal

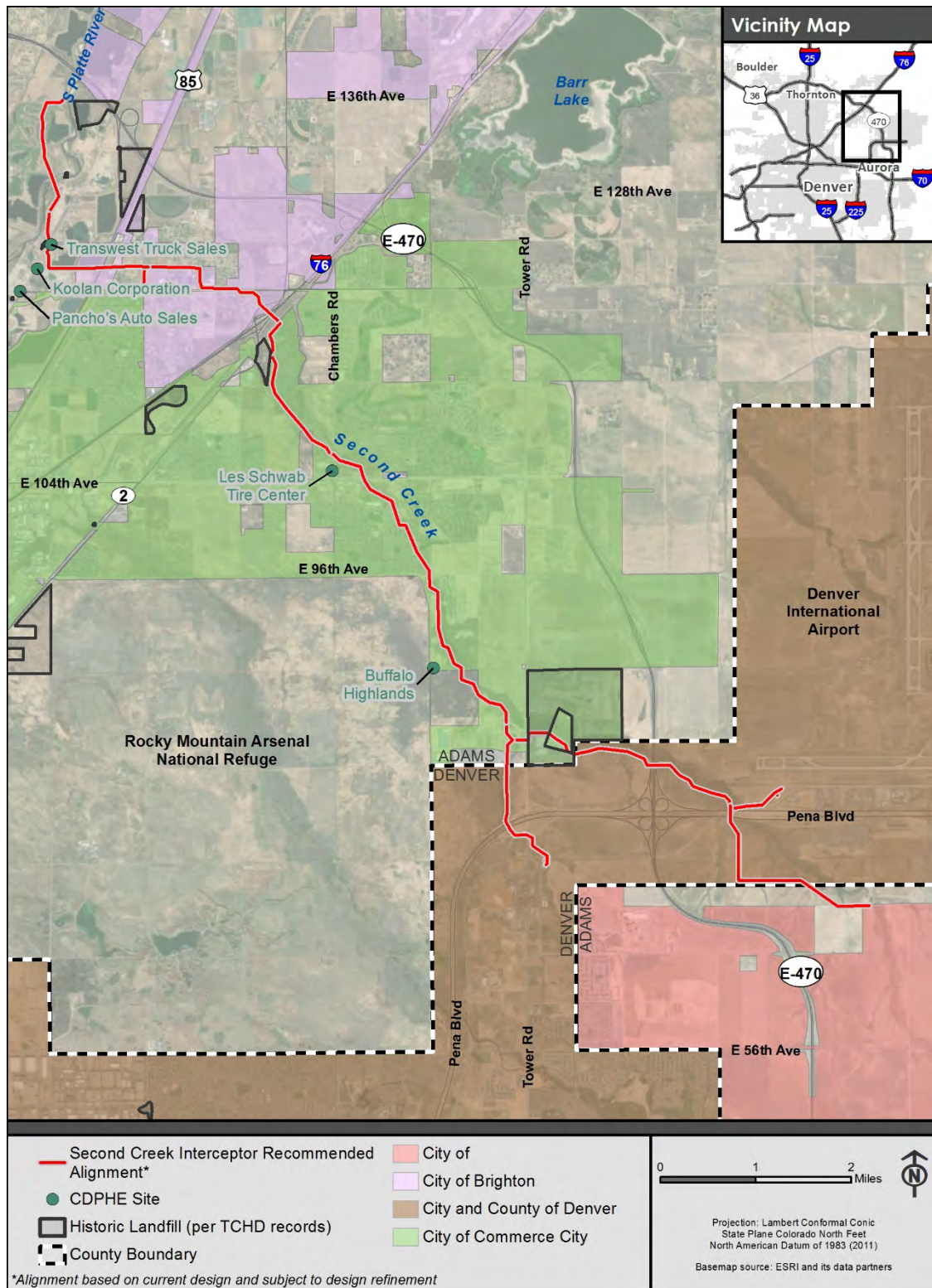


Figure 6-1: Additional Records Map for the SD Interceptor

requirements. The plans will be prepared in accordance with OSHA: 29 CFR Part 1910 (OSHA 2019a), *Safety Standards for General Industry*; and 29 CFR Part 1926, *Safety and Health Regulations for Construction* (OSHA 2019b). The District will provide to TCHD and CDPHE the Materials Management Plan for review and approval prior to the start of construction.

In addition, it is required that the Hazardous Materials Management Plan include procedures for management of asbestos-containing building material in accordance with CDPHE Regulation 8 (CDPHE 2019b), and regulated asbestos-containing soil in accordance with CDPHE 6, Code of Colorado Regulations 1007-2 Part 1 Section 5 (CDPHE 2019c). These procedures will be used in areas where asbestos-containing materials may be encountered during construction, including landfill areas. Construction personnel will be trained to recognize signs of possible contamination in soil, such as odors and staining. The Hazardous Materials Management Plan will include a stop work provision for the contractor in the event that asbestos-containing material is encountered so it can be properly abated.

Full property acquisitions and demolition of structures are not anticipated. If property acquisition or structure demolition is needed, additional investigations are recommended that include, but are not limited to, inspections for the possible presence of asbestos-containing building materials, lead-based paint, polychlorinated biphenyl waste (light ballasts, transformers, etc.), heavy metals (mercury switches), fire suppression system contents, or petroleum hydrocarbons in soil.

The guidance, *Reporting Environmental Releases in Colorado* (CDPHE 2009), and an SPCC plan will be developed during construction.

Control measures that are recommended during construction are summarized in Table 6-2.

Table 6-2: Recommended Hazardous Materials Control Measures during Construction

Impact	Impact Type	Mitigation Measures
Existing Hazardous Materials Sites Adjacent to Areas of Proposed Excavation and Acquisition of Property	Construction (Temporary)	• Prepare a Health and Safety Plan and a Hazardous Materials Management Plan to address contamination as described in this assessment and others that may follow, in accordance with CDPHE Environmental Spill Reporting. • Conduct appropriate asbestos surveys and abatement prior to demolition of buildings (if any), per applicable state and federal regulations. • Evaluate whether any landfill material proposed for construction contains asbestos-containing material, in accordance with CDPHE Solid Waste Regulations. Determine necessary engineering controls to minimize exposure to contaminated materials. • Determine cost recovery of hazardous material sites where removal actions and long-term maintenance are required.

Table 6-2: Recommended Hazardous Materials Control Measures during Construction

Impact	Impact Type	Mitigation Measures
Water Quality Protection	Construction (Temporary)	Implement construction control measures in accordance with an SPCC plan. The CDPHE may include secondary containment areas for refueling construction equipment, berms or ponds to control runoff, and monitoring to test stormwater runoff for contaminants prior to discharge from the construction site.
Protection of Construction Workers	Construction (Temporary)	Compliance with OSHA requirements for construction workers who may be exposed to hazardous materials, including completion of and adherence to the Health and Safety Plan, performing applicable air monitoring, and provision of personal protective equipment.

6.8 Onsite Wastewater Treatment Systems Conflict Evaluation

The SD Interceptor construction corridor also was evaluated for potential conflicts with Onsite Wastewater Treatment Systems (OWTS). Based on a review of the records available on the TCHD website, an OWTS was identified on one property in Commerce City listed in Table 6-3. The property is categorized as low risk of potential conflict with the SD Interceptor construction corridor. The actual location of the OWTS is outside the working area for the SD Interceptor installation and will not be impacted by construction activities.

Table 6-3: OWTS Adjacent to SD Interceptor Construction Corridor

Address	Owner	Risk of Potential Conflict with OWTS	Description
15700 E. 104th Ave.	Nguyen Van Mien and Nguyen Nguyet T Pham	None	The SD Interceptor will be installed parallel to and slightly west of the Second Creek Trail on this property and will avoid the OWTS that is located approximately 175 feet east of the residence.

References:

1. Adams County GIS database: <https://gis-dougco.opendata.arcgis.com/datasets/TCHDGIS::owst-geocodeapplication-05302019/geoservice?geometry=-105.193%2C39.784%2C-104.325%2C39.969>
2. Tri-County Health Department septic system database: <http://www.tchd.org/269/Septic-Systems>

6.9 List of Regulatory Agencies, Contact Names, Phone Numbers, and Inspection Frequency

Appendix F lists regulatory agencies that have been or will be notified or involved in the SD Interceptor project along with anticipated permit requirements. Inspection requirements for each regulatory agency have not been determined at this time.

6.10 Severed Mineral Rights

Examination of severed mineral rights and notification is not required because the SD Interceptor alignment will be located within public right-of-way or on private parcels within easements obtained

by the Metro District. No property acquisition will occur as part of the Project. In addition, the SD Interceptor will not have new surface development, except for the addition of permanent gravel access roads along the alignment for maintenance, a metering facility, manholes, and connection structure covers.

6.11 Development Plan

During the pre-submittal meeting, the City staff waived the Development Plan requirement for the proposed SD Interceptor project. Disturbed areas will be restored to existing conditions, except for the permanent gravel access roads that will be added along the SD Interceptor alignment, a new metering facility, manholes, and connection structure covers.

7.0 SAND CREEK INTERCEPTOR SYSTEM EVALUATION

This section provides an evaluation of the Sand Creek Interceptor System in terms of the alignment and parcel impacts, land use, parks and recreation, community considerations, and hazardous materials.

7.1 Sand Creek Interceptor System Recommended Alignment

In 1993, the City issued a CUP to the Metro District for its RWHTF (Case Number: CU-37-93). In April 2010, the District submitted an application to amend the CUP, and the City issued an amended CUP on August 9, 2010 (Case Number: CU-37-93-10). The April 2010 CUP application presented information describing the existing facility, long-range planning information, and associated proposed projects and improvements. In addition, the 2010 CUP was supplemented with updated information from the District's 2013 RWHTF Facility Plan (HDR and Tetra Tech 2014). The need for SCIS improvements to preserve capacity was first identified in this plan. The District submitted its 2018 Facility Plan to the City on December 26, 2019, to update and amend the CUP for the RWHTF, as well as to support the need for SCIS Improvements. The Facility Plan describes long-range planning and proposed projects and improvements, including Phases 1 and 3 of the SCIS Improvements.

The SCIS Phase 1 improvements include the approximately 0.5-mile segment on the RWHTF property. The Phase 1 segment was approved by the City under the April 2010 CUP as noted above.

The SCIS Phase 3 improvements will consist of removing the existing 42-inch SCIS and replacing it with a larger 66-inch interceptor pipe in the same alignment within the Metro District's easement, as shown on Figure 7-1 and Figure 7-2. The alignment was selected to take advantage of the existing easement and to minimize the disturbances to the area of known asbestos contamination and historical Landfill AD-117 within the Suncor property, as shown on Figure 7-1 and Figure 7-2.

A hydraulic model was used to evaluate the interceptor diameter required to accommodate the updated population and employment projections for Denver and Aurora for the area tributary to the SCIS for the 2065 planning period. A unit factor of 80 gallons per capita per day was used to calculate the average annual flow. Table 7-1 presents a summary of the updated 2065 peak wet weather flow projection. The assumption was made that the SD Interceptor will be constructed. Based on the hydraulic model results, the existing 42-inch interceptor will be removed and replaced with a 66-inch interceptor.

Because of several large construction projects at the District's RWHTF, the anticipated start for the construction of the SCIS improvements is unknown and will be determined later in 2020. As such, the District requests the City to allow flexibility on the timing of construction in the CUP conditions of approval without permit expiration or extension request.

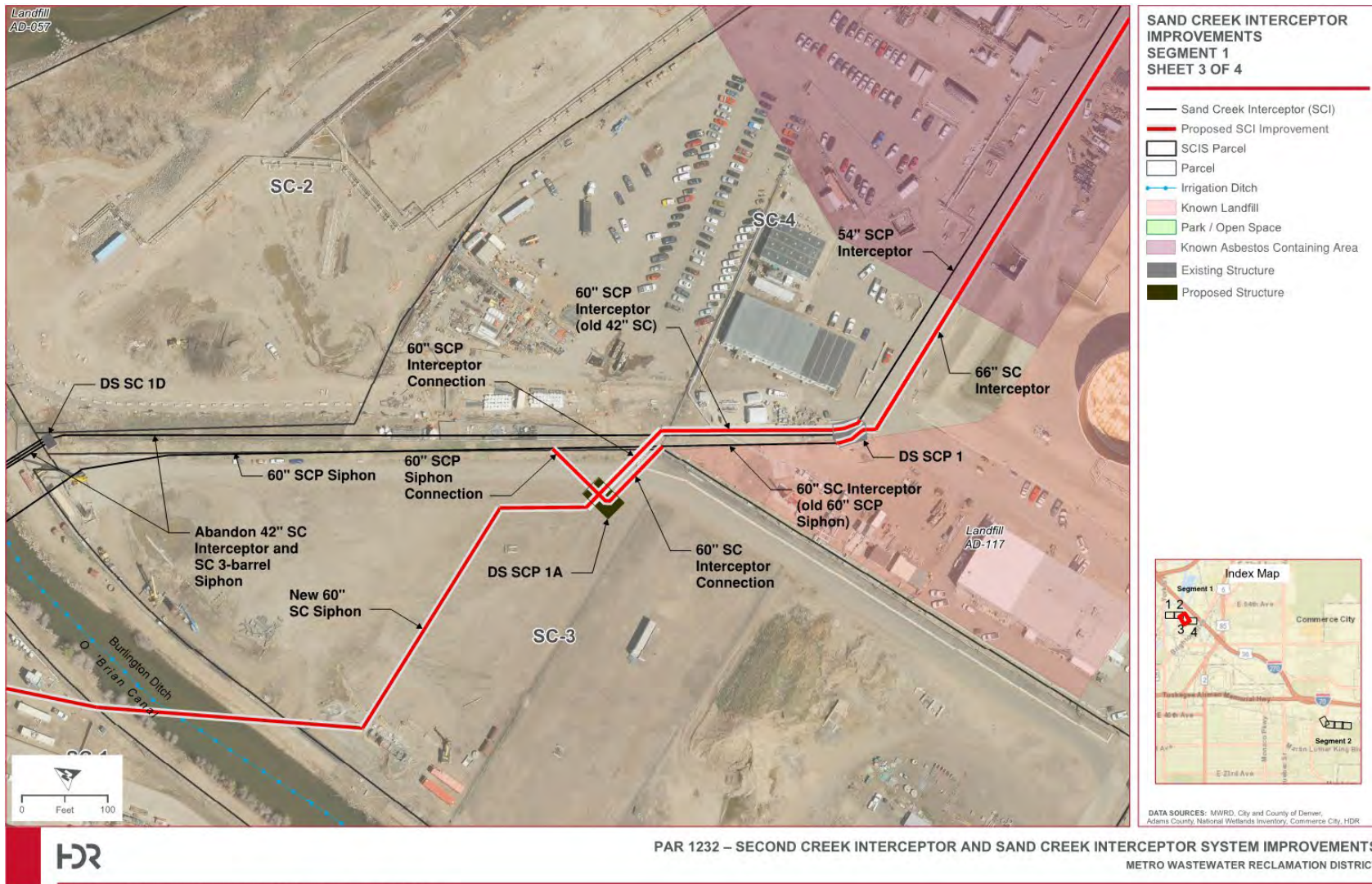


Figure 7-1: Sand Creek Interceptor Improvements – Phase 3 – Sheet 1 of 2

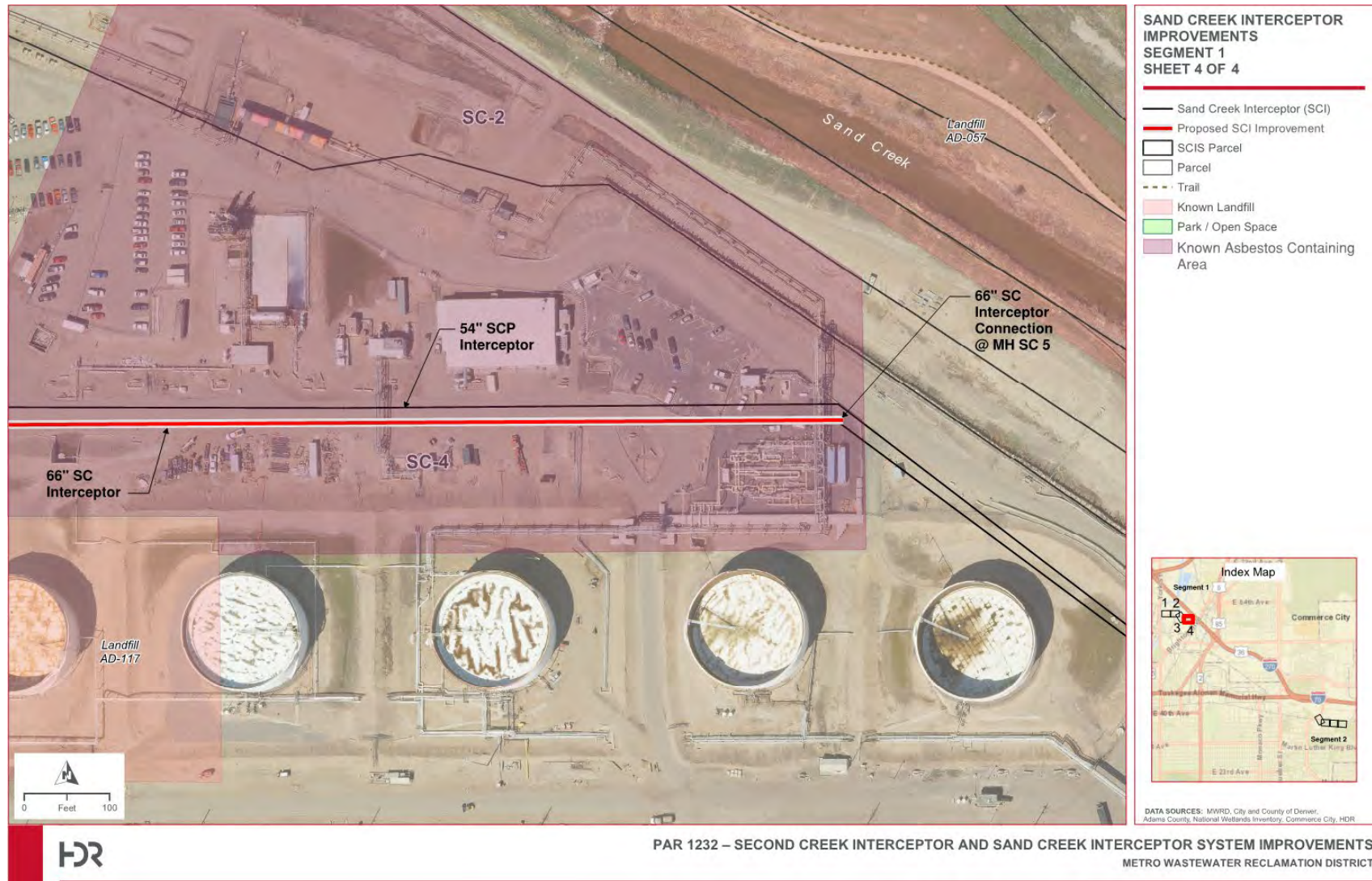


Figure 7-2: Sand Creek Interceptor Improvements – Phase 3 – Sheet 2 of 2

Table 7-1: Updated 2065 Peak Wet Weather Flow Projection

Planning Period	Population Equivalent Projection	Average Annual Flow (mgd)	Peaking Factor	Peak Wet Weather Flow (mgd)
2065	880,000	70.4	2.16	152.08

7.2 Land Use and Growth

Land use surrounding the SCIS Phase 3 improvements primarily consists of public and commercial but also includes limited residential land to the north of the SCIS alignment, as shown on Figure 7-3. The major adjacent facility to the west of the alignment is the Metro District's RWHTF. The alignment is within the District's existing easement on the Suncor property, as discussed in Section 7.1. Suncor's property will experience some disruption during construction, including construction traffic and typical nuisance impacts associated with construction (see Section 5.9). In addition, no disturbance to stormwater collection systems is anticipated.

7.3 Description, Location, and Quantity of Hazardous Materials

A search of selected government databases was conducted using EDR. According to the EDR radius report for the SCIS alignment, there are approximately 9 listed sites within 0.5 mile of the subject property that may or may not pose a risk to the SCIS project. However, after further review, these sites are not considered REC sites and are not anticipated to impact the proposed project within Commerce City. The EDR report depicts the locations of listed sites and can be found in the *Hazardous Materials Assessment Report* (Jacobs 2019).

Additional records were reviewed for the SCIS improvements: the on-line Colorado Storage Tank Information System (Colorado Department of Labor and Employment 2000), Hazardous Materials and Waste Management Division on-line mapping (CDPHE 2019a), and the Tri-County Health Department historic landfill database (Tri-County Health Department 2019). Based on review of these records, one listed site was identified within 0.5 mile of the SCIS alignment. Also, 15 historic landfills were identified within 0.5 mile of the SCIS alignment (see Figure 7-4). However, these sites are not considered REC sites and are not anticipated to impact the SCIS project improvements within Commerce City. Additional information on the records review can be found in the *Hazardous Materials Assessment Report* (Jacobs 2019). Background information and a figure showing the locations of the historic landfills in Commerce City near the SCIS Phase 3 improvements are provided in Appendix E.

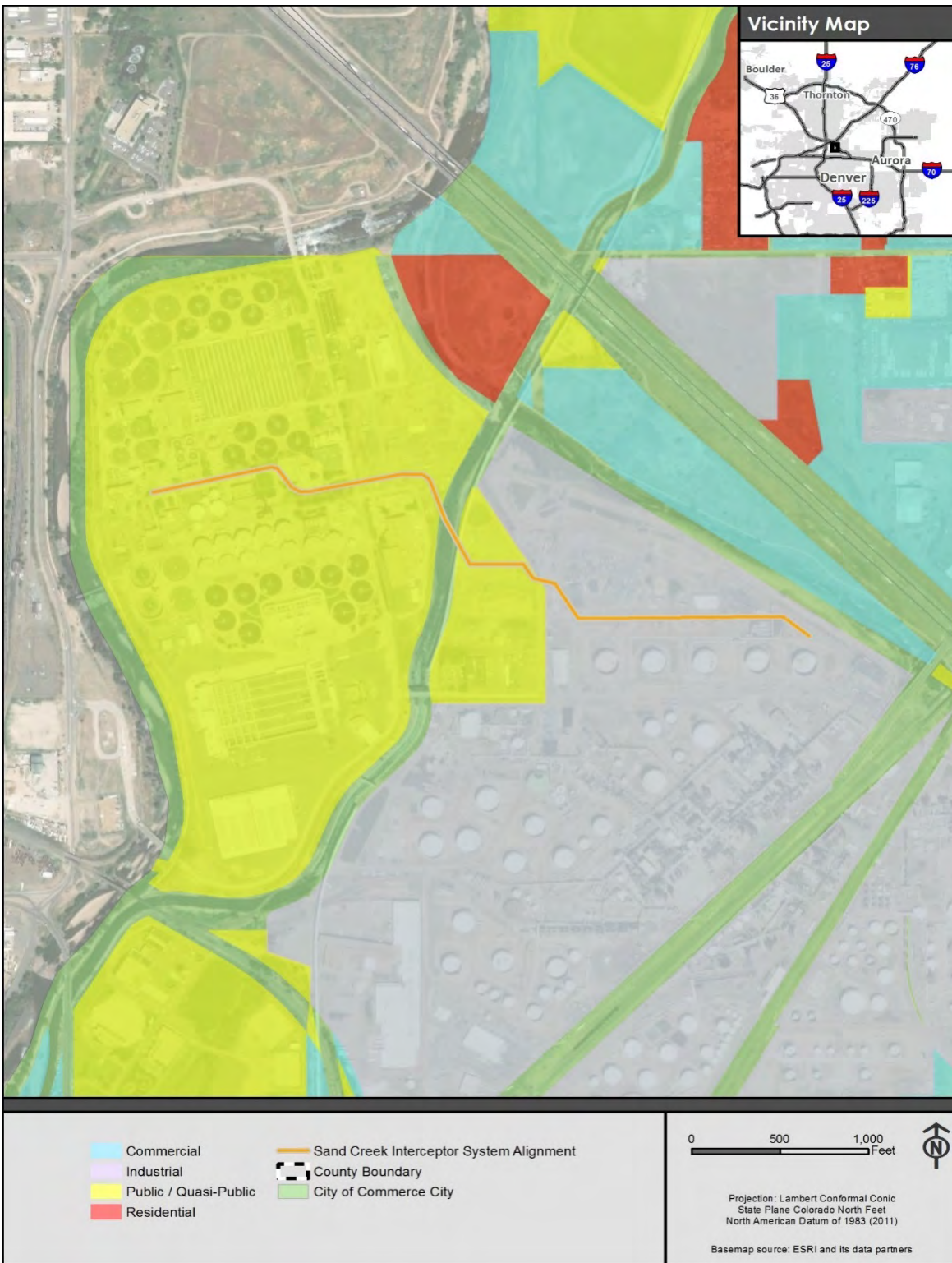


Figure 7-3: Current Land Use near SCIS Improvements within Commerce City

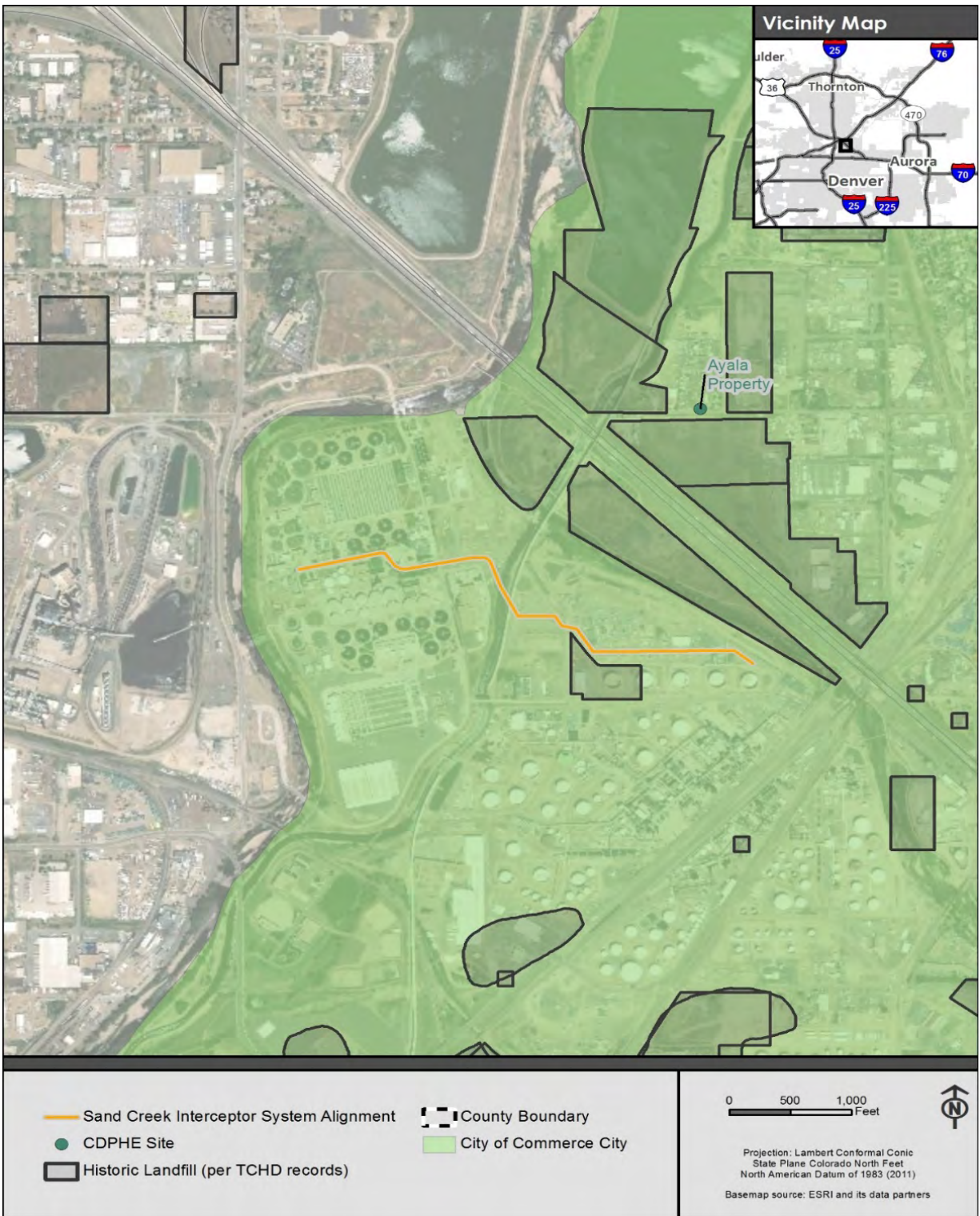


Figure 7-4: Additional Records Map for the SCIS Improvements

Landfill AD-117, shown on Figure 7-1 and Figure 7-2, has been identified as an abandoned historical landfill according to Tri-County Health Department records (Tri-County Health Department 2019), and the site is now owned and operated by Suncor. The landfill is included in the flammable gas investigation that is being conducted to determine whether methane gas is present (Appendix C). If methane is detected at concentrations above regulatory action levels, the construction methods will be discussed with the Tri-County Health Department. In addition, methane monitoring will be performed during construction to make certain that reliable, real-time data are being used as the basis for safety decisions.

There is the potential that contaminated soil and/or groundwater will be encountered during construction of the SCIS on Metro District and Suncor property. The depth of the proposed interceptor may be within the contaminated groundwater plume and soils and will need to be addressed during the construction of the new sewer line.

7.4 Parks, Open Space, and Recreation

The SCIS improvements corridor is limited to the Metro District's existing easement on Suncor property and does not impact the existing trails, as shown on Figure 7-5. There are no parks or open spaces located near the improvements.

7.5 Community Considerations

A summary of the community considerations for the SCIS Phase 3 improvements is provided in Table 7-2.

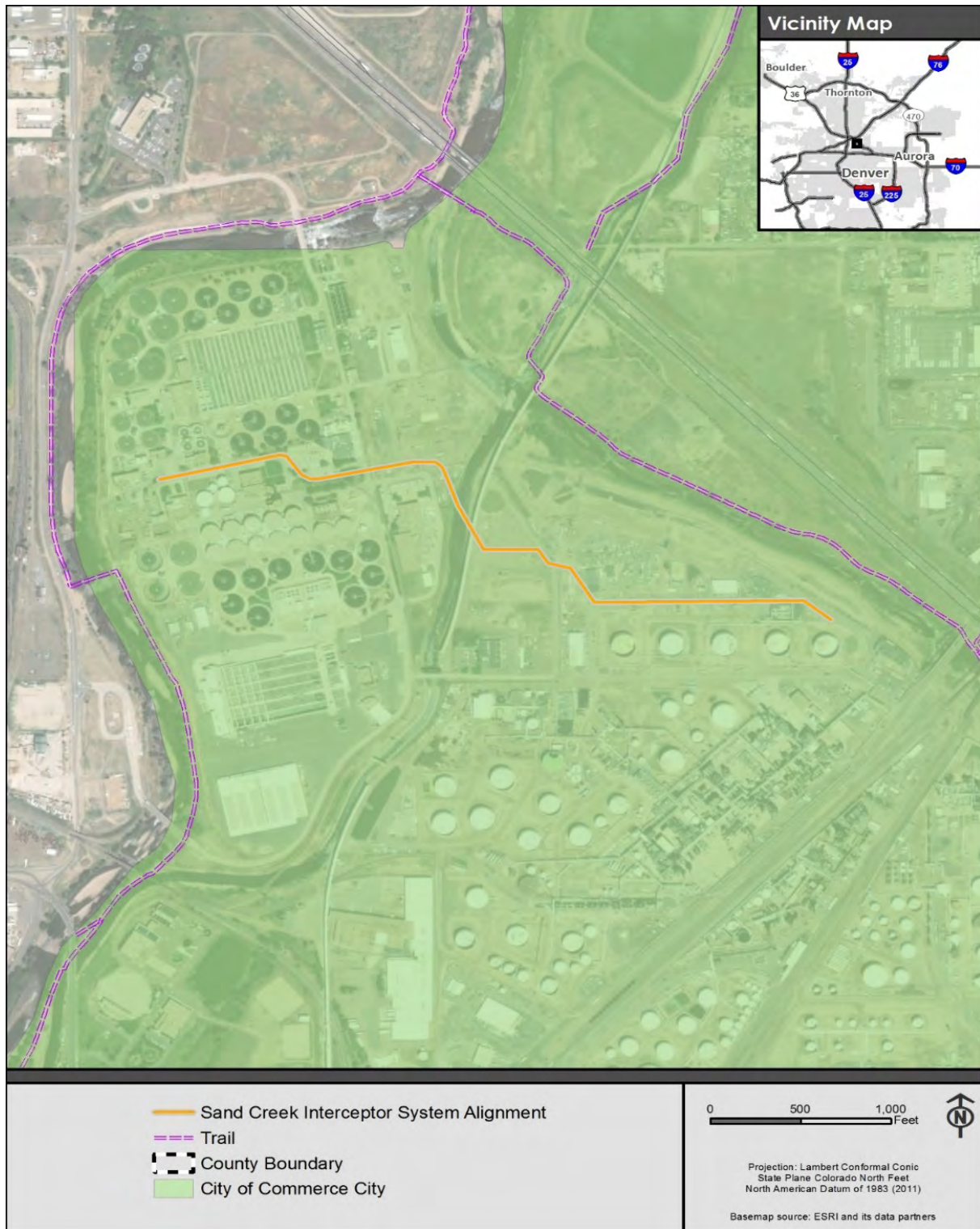


Figure 7-5: Parks, Open Spaces, and Trails within the SCIS Improvements Corridor

Table 7-2: SCIS Phase 3 Community Considerations

Criteria	Community Consideration
Harmony with the Character of the Neighborhood	Replacement of existing interceptor on existing developed commercial property.
Compatibility with Surrounding Area	Underground installation with minor aboveground visual impacts.
Community Need for the Proposed Project	Supports economic and commercial development within City by creating additional capacity in existing infrastructure network.
Effects on Adjacent Properties	Temporary nuisance effects during construction such as noise, dust, or traffic in existing commercial/industrial area. Permanent aboveground impacts limited to manhole covers.
Effects on Public Improvements and City Services	Increase in truck traffic on York Street near RWHTF.
Site Characteristics	Site will be restored to pre-existing condition. Permanent aboveground impacts limited to manhole covers.
Landscaping and Screening That Ensure Harmony with Adjacent Uses	Site will be restored to pre-existing condition.
Visual Impacts	Temporary visual impacts during construction primarily to Suncor Refinery personnel.
Noise, Dust, Vibrations, Odor, and Other Nuisances	Temporary nuisance effects during construction such as noise, dust, vibration, and traffic in existing commercial and industrial area. Noise impacts from the permanent operation of the interceptor are not anticipated because of gravity flow. Odors from the permanent operation will be conveyed downstream to the treatment facility via negative pressure.

7.6 Parcel Impacts

The SCIS Phase 3 improvements will only impact private Parcel No. 0182512102002, owned by Suncor in Commerce City, as shown on Figure 7-6. The parcel is zoned for planned unit development and a future land use of general industrial. The Metro District currently holds an easement on this property for the existing SCIS. The proposed impact on this parcel will be adjacent to the existing SCIS impact.

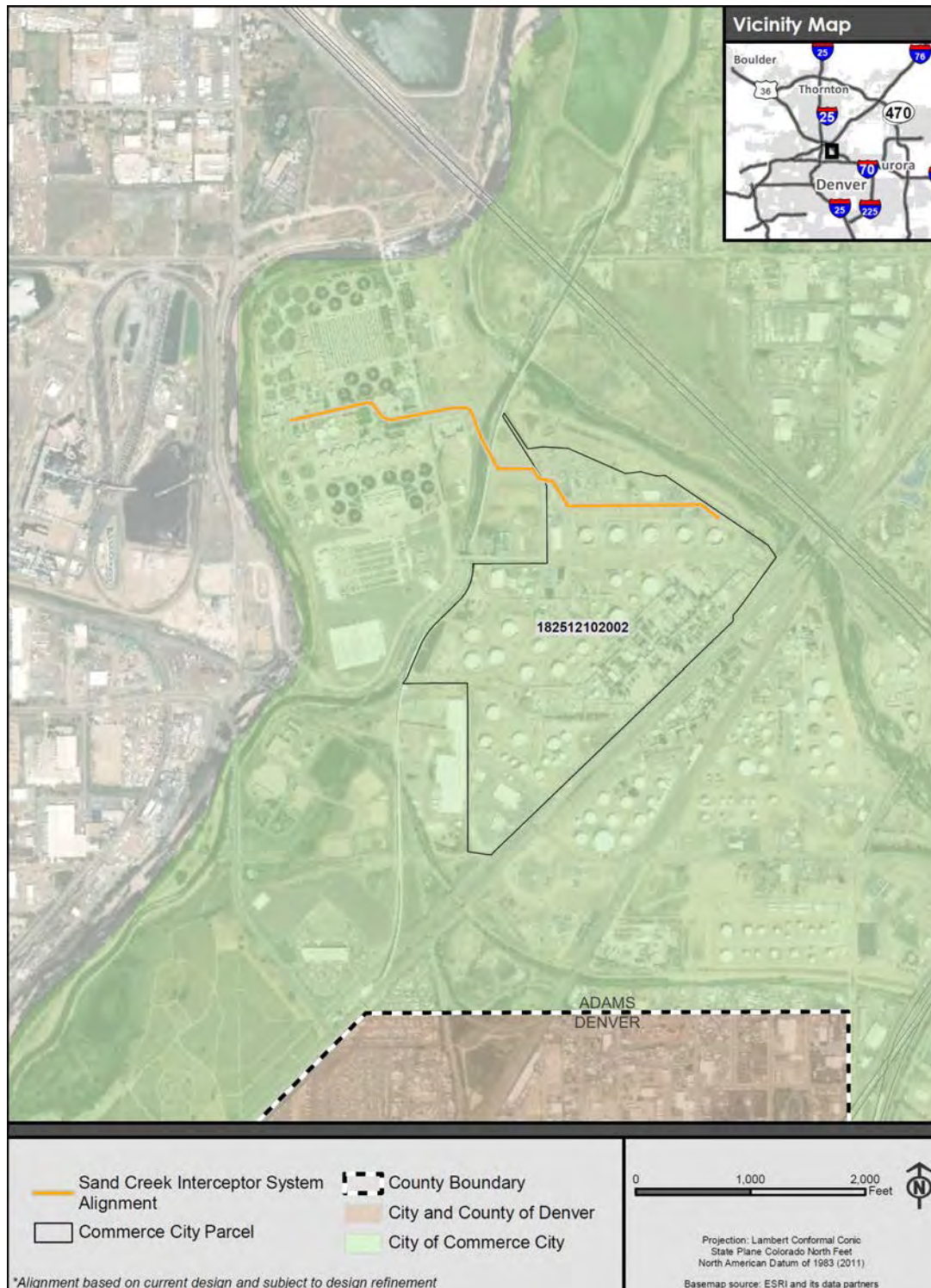


Figure 7-6: Sand Creek Interceptor Parcels in Commerce City

8.0 CONCLUSION

The Project meets the criteria discussed in the pre-application meeting, coordination meetings, and as described in the Commerce City Land Development Code for a Conditional Use Permit. The Metro District has responded to all stakeholder comments. Table 8-1 lists the Conditional Use Permit requirements and associated responses.

Table 8-1: Commerce City Submittal Requirements

Criteria	Response in This Application
Land Use Application with Fee	Submitted May 2019
General Warranty Deed with Legal Description (Exhibit A's)	Not applicable per City Planner
Certified Boundary Survey for Properties	Not applicable per City Planner; see attached Alignment Sheet
Narrative (15 copies): Compliance with the Purpose, Goals, and Objectives of the Comprehensive Plan	Included in May 2019 Application Ten (10) hard copies provided in Resubmittal 1 (December 18, 2019) Resubmittal 2 – electronic copy and file sharing via a cloud storage service
Statement of Operations (15 copies)	Included in May 2019 Application Ten (10) hard copies provided in Resubmittal 1 (December 18, 2019) Resubmittal 2 – electronic copy and file sharing via a cloud storage service
Severed Mineral Rights	Not required per City Planner
Development Plan	Not required per City Planner
Route Maps	Figure 1-4, SD Interceptor and SCIS Alignment Overview
Neighborhood Meetings (2)	Conducted on July 10 and 17, 2019
Planning Commission Hearing	To be scheduled after Application deemed complete, tentative hearing date is August 4, 2020
City Council Hearing	To be scheduled after Application deemed complete, tentative hearing date is September 21, 2020
Submittal Requirements - One electronic copy of all application-related documents, in PDF or JPG format, submitted on a flash drive - One hard copy of an unstapled, fully legible, reproducible 8.5- by 11-inch application, or 11- by 17-inch copy of the oversized plans	Attached in May 2019 and Resubmittal 1 (December 18, 2019). Electronic copy only for Resubmittal 2. The 75% design plans were transmitted to the City on March 31, 2020.

Table 8-1: Commerce City Submittal Requirements

Criteria	Response in This Application
Additional Information Required	Results of coordination with the City regarding impacts to Chambers Road for SD Interceptor construction and the City's Pedestrian Culvert Underpass Project are provided in Sections 1.6.1 and 1.6.2. Results of the Alternatives Evaluation near Second Creek Village are provided in Section 1.6.3. Results of coordination of the SD Interceptor Alignment proposed in Reunion Village 8 development are provided in Section 1.6.3.

9.0 REFERENCES

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Appendix A:

Trenchless Crossings

APPENDIX A: TRENCHLESS CROSSINGS

Sheet Number	Crossing	Station
01C123	East 120th Avenue	500-503
01C124-01C126	US Highway 6/BNSF Railroad	518-533
02C103	Little Burlington Ditch	801-803
02C105	East 112th Avenue/O'Brian Canal	900-904
02C113	East 104th Avenue	1000-1003
02C120	East 96th Avenue	1100-1104
04C101	Tower Road	1607-1609

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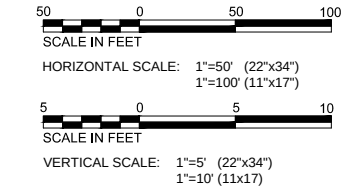
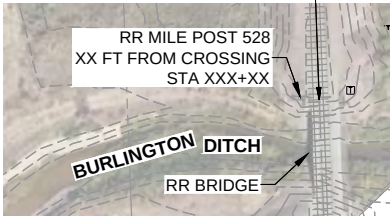
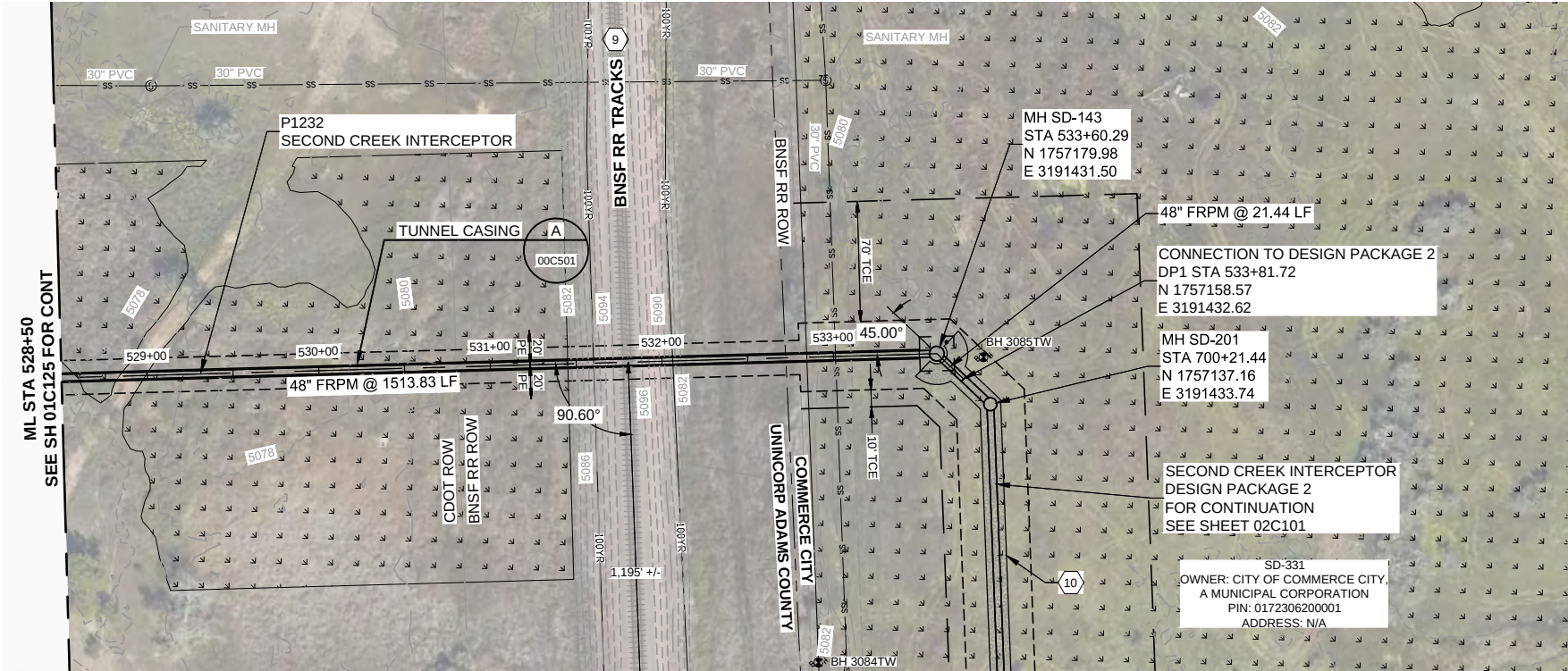
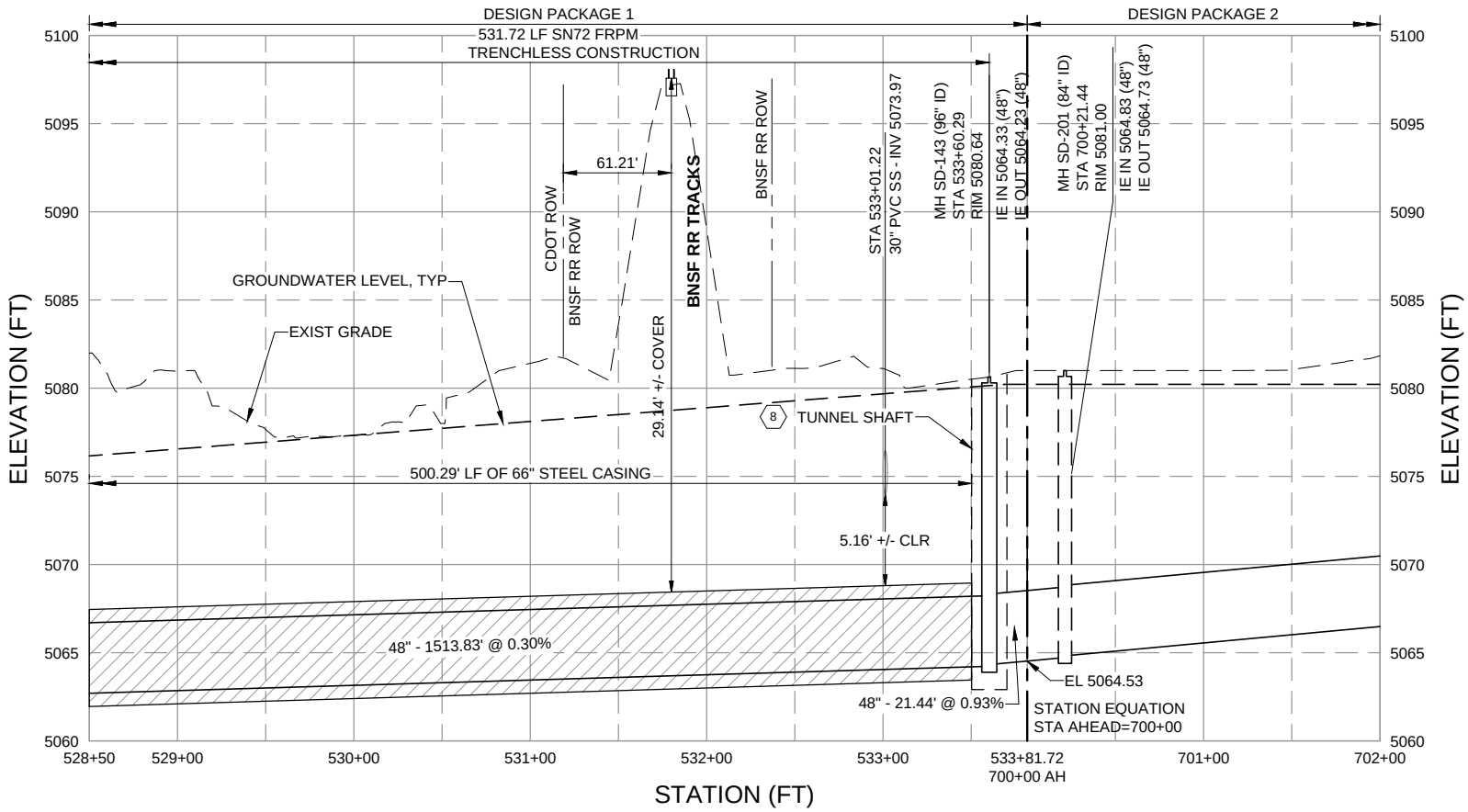
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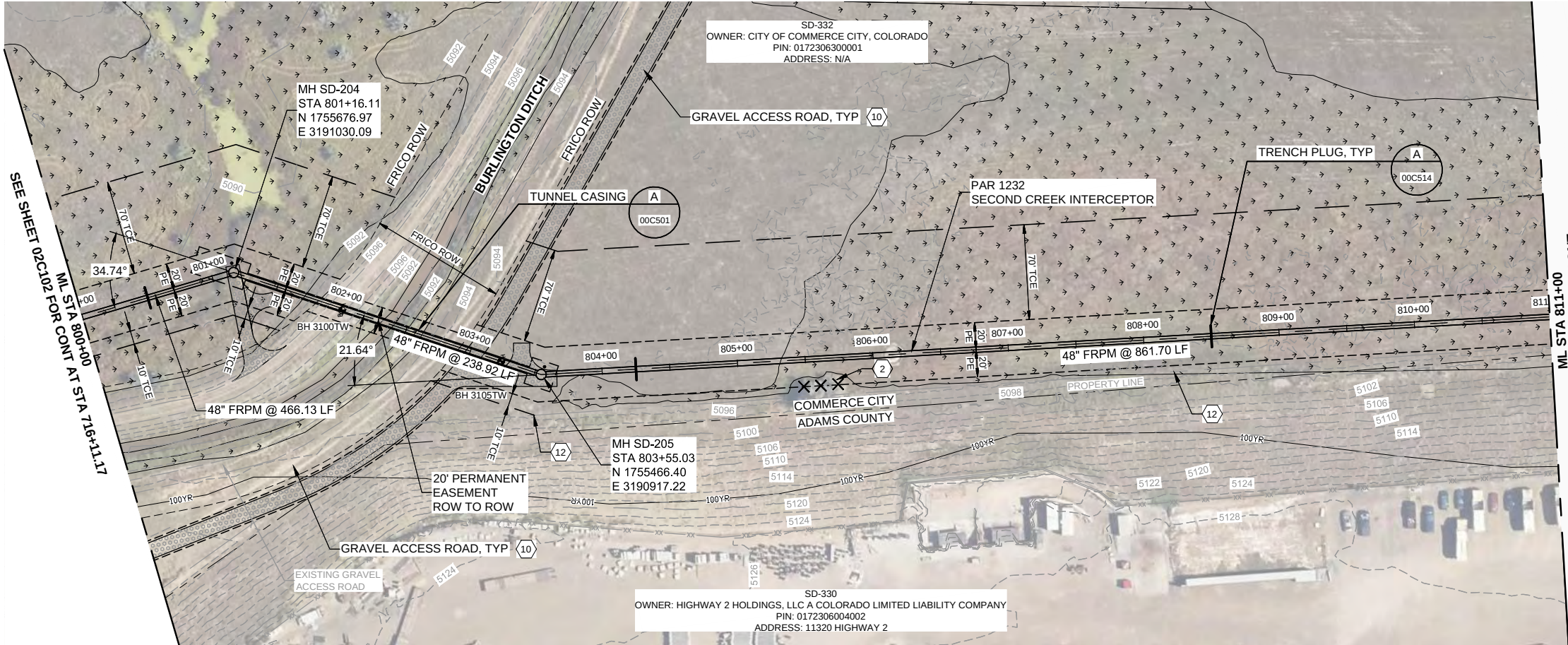
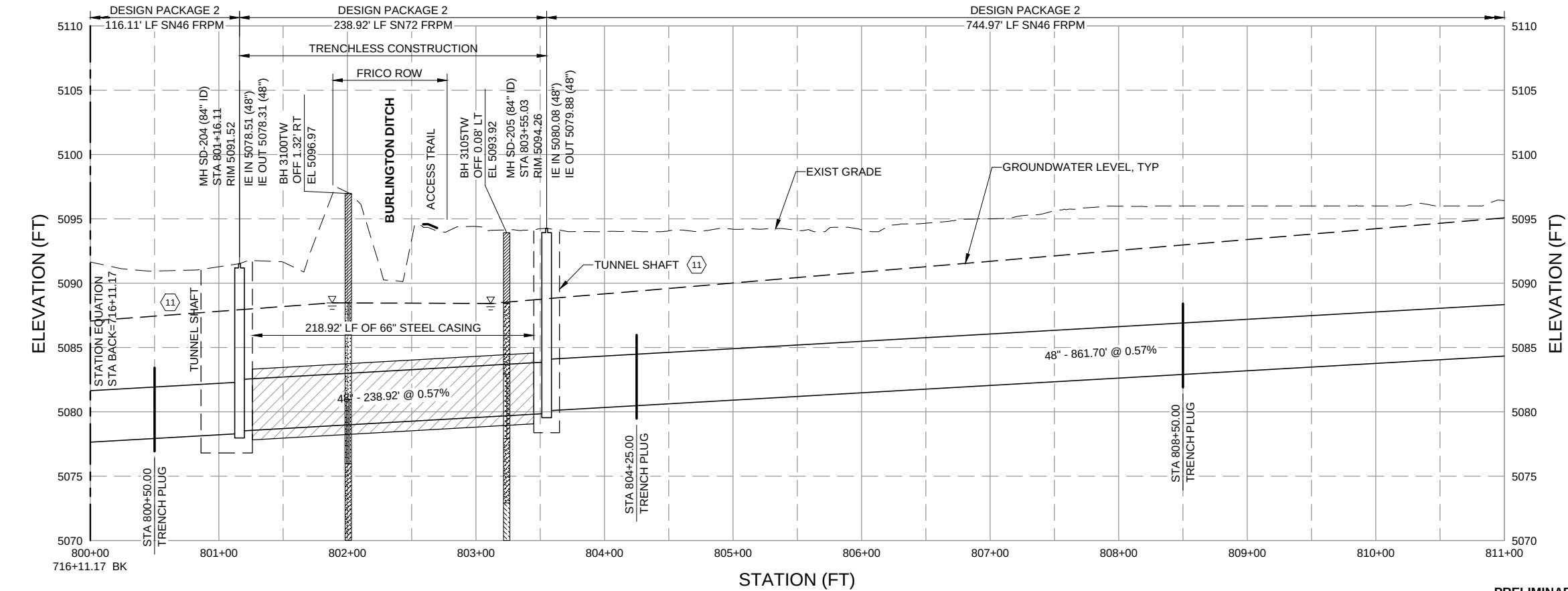
- 8 FLOWFILL BACKFILL REQUIRED IN FULL PIPE ZONE.
- 9 SEE SPECIFICATION SECTION 01 30 00 FOR SPECIAL REQUIREMENTS.
- 10 GRAVEL ACCESS ROAD. SEE DETAIL A/00C518.

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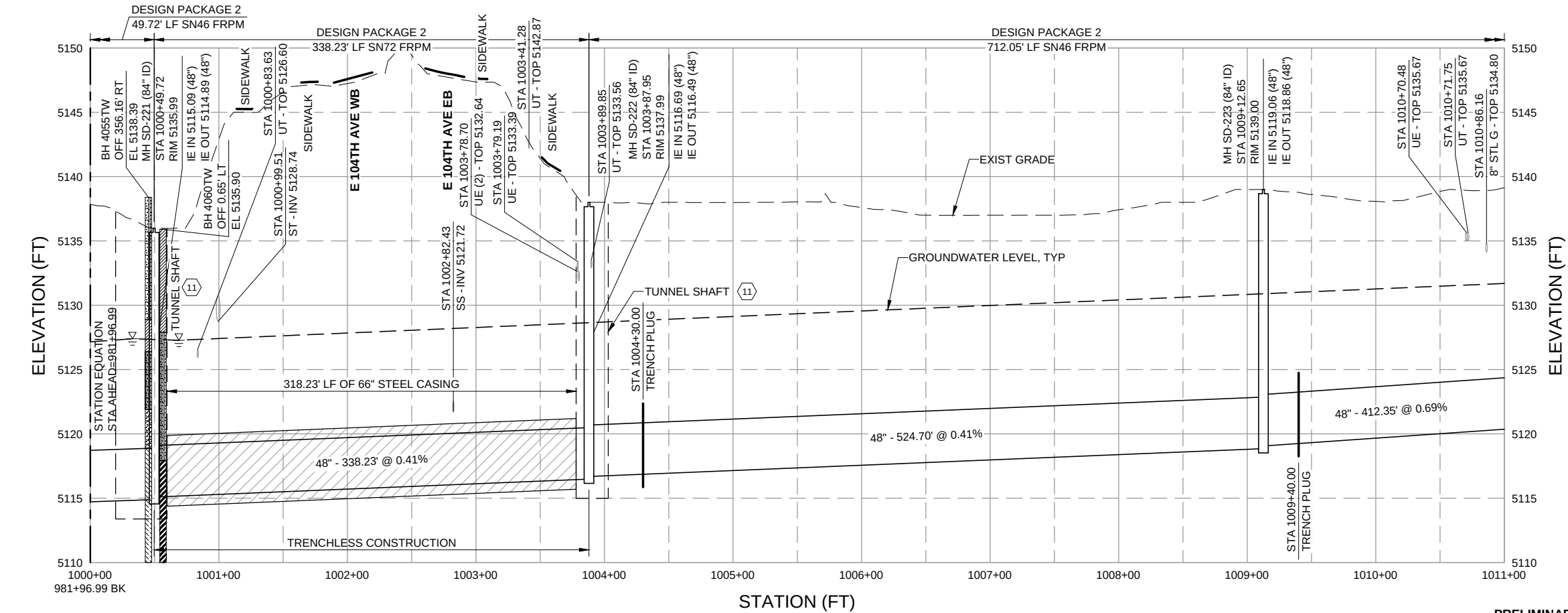
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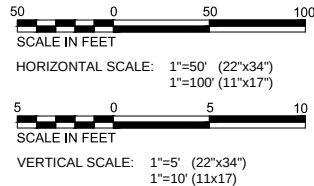
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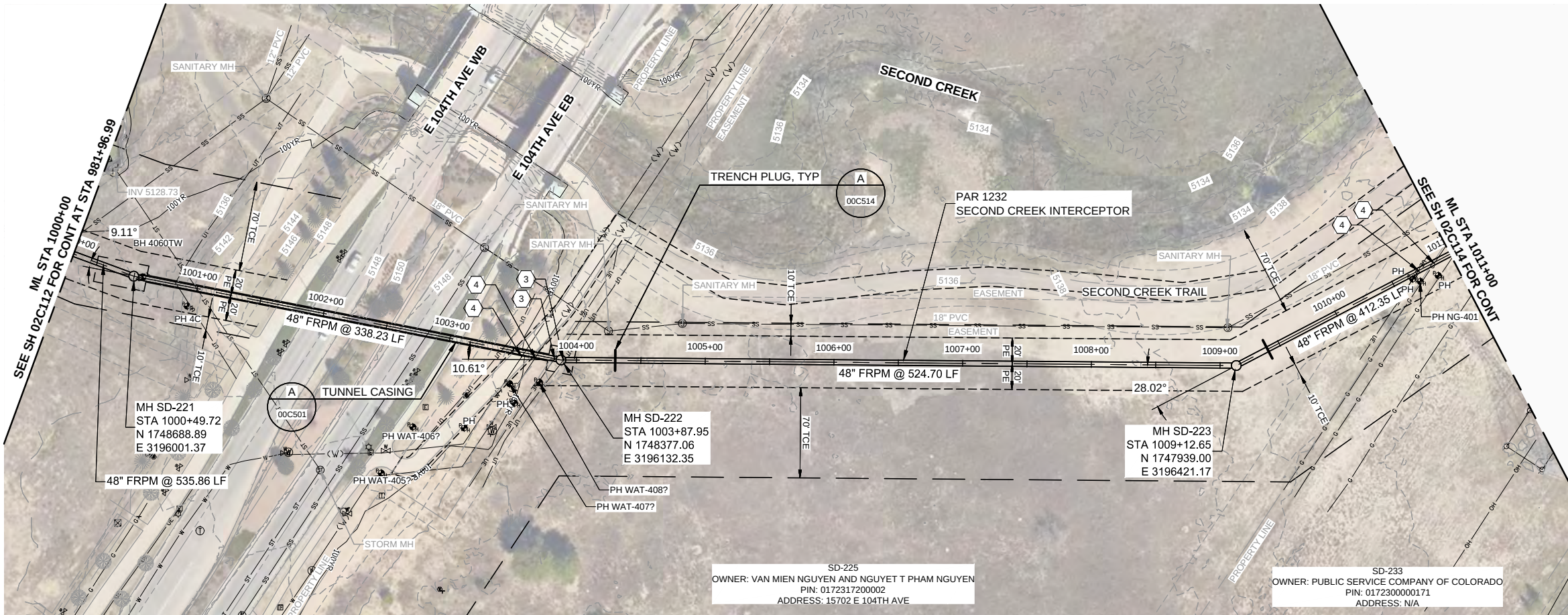
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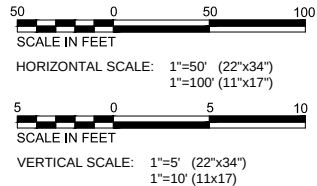
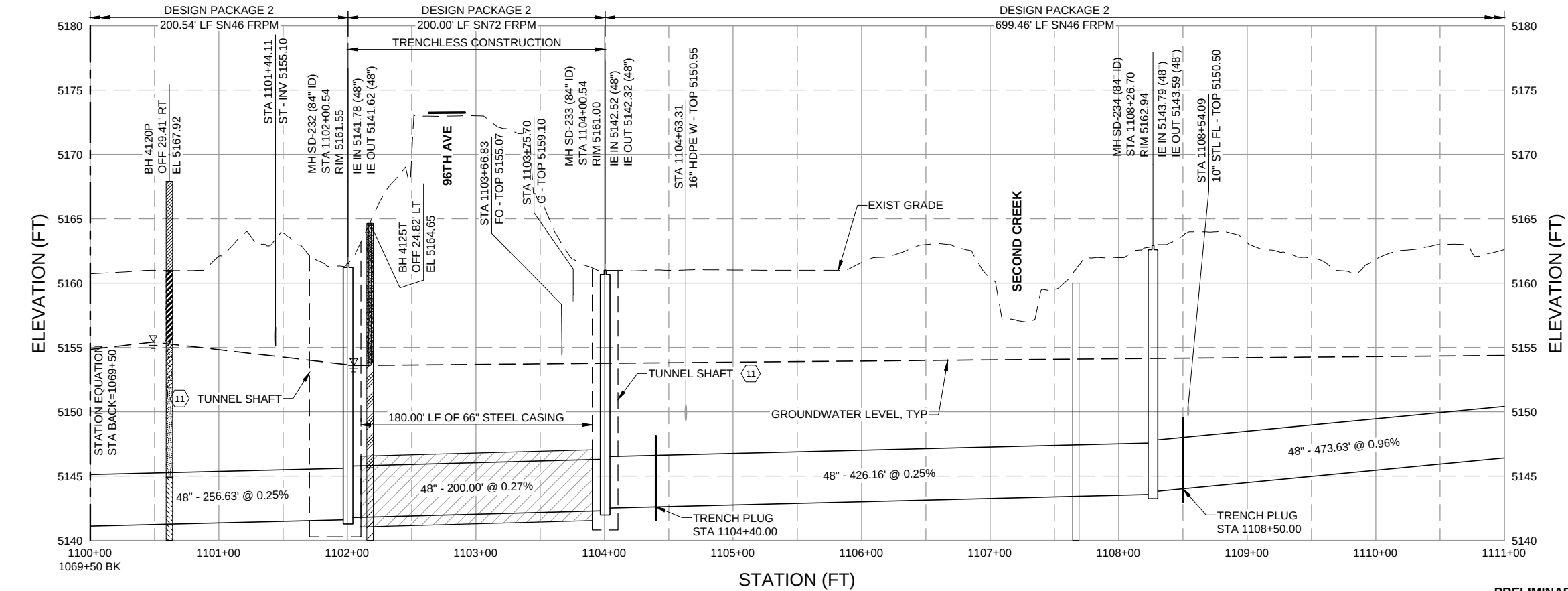
- A. MANHOLE DIAMETERS SHOWN ARE FOR CONCRETE AND POLYMER CONCRETE. SEE SHEET 00C507 FOR FRP MANHOLE DIAMETERS.

KEY NOTES:

- 3 RELOCATE OR REMOVE AND REPLACE EXISTING UTILITY AS REQUIRED FOR CONSTRUCTION.
- 4 FIELD LOCATE AND PROTECT EXISTING UTILITY IN PLACE.
- 11 FLOWFILL BACKFILL REQUIRED FROM BOTTOM OF TUNNEL SHAFT TO SPRINGLINE OF PIPE.



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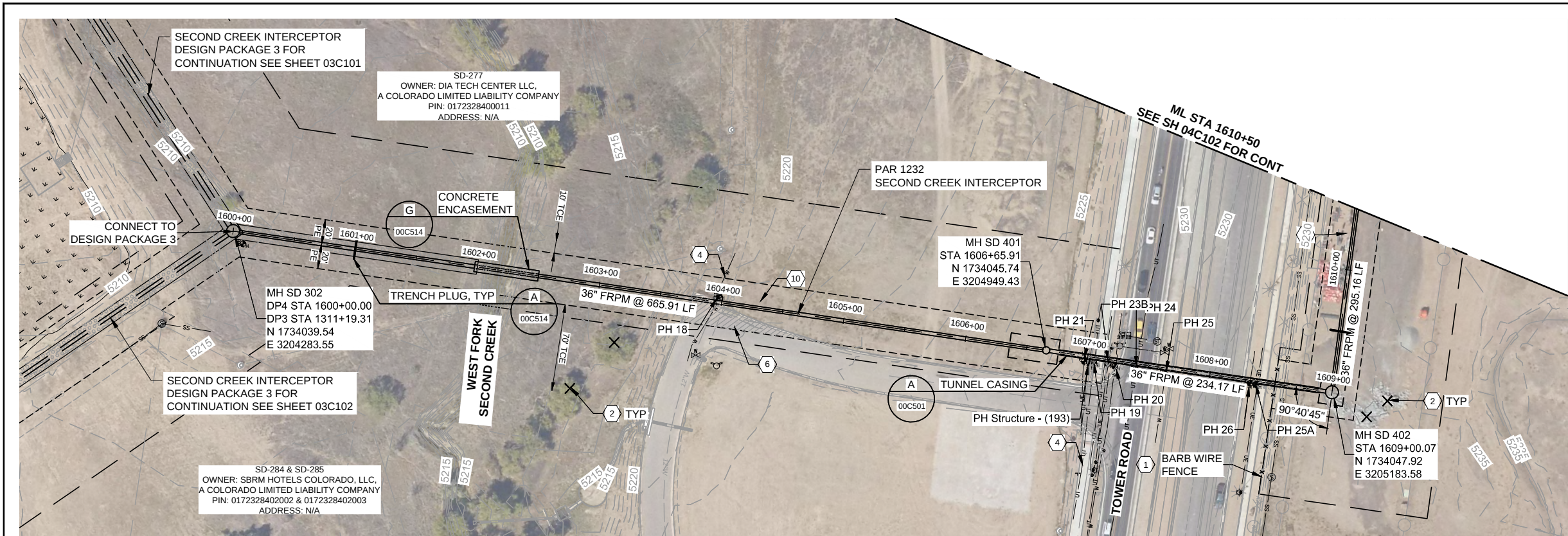
- A. MANHOLE DIAMETERS SHOWN ARE FOR CONCRETE AND POLYMER CONCRETE. SEE SHEET 00C507 FOR FRP MANHOLE DIAMETERS.

KEY NOTES:

- 2 REMOVE AND REPLACE EXISTING TREES AND SHRUBS AS REQUIRED FOR CONSTRUCTION.
- 3 RELOCATE OR REMOVE AND REPLACE EXISTING UTILITY AS REQUIRED FOR CONSTRUCTION.
- 4 FIELD LOCATE AND PROTECT EXISTING UTILITY IN PLACE.
- 5 REMOVE AND REPLACE EXISTING TRAIL AS REQUIRED FOR CONSTRUCTION OR DAMAGED BY CONSTRUCTION ACTIVITIES.
- 10 GRAVEL ACCESS ROAD. SEE DETAIL 01/00C518. SEE 00C012 FOR ACCESS ROAD OVERVIEW.
- 11 FLOWFILL BACKFILL REQUIRED FROM BOTTOM OF TUNNEL SHAFT TO SPRINGLINE OF PIPE.
- 12 INSTALL 4'x4' (MINIMUM) "TRAIL TEMPORARILY CLOSED - NO PUBLIC ACCESS" SIGNAGE AT EACH END OF PEDESTRIAN RAMP.

HDR HDR PROJECT NO. 10089425		CONSULTANT	
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		BY	
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		75% DESIGN REVIEW	
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CHECKED BY		MDG	
APPROVED BY		XX	
DATE		12/23	
ORIGINAL PAR NO.		1232	
PAR 1232		SECOND CREEK INTERCEPTOR	
		DESIGN PACKAGE 2	
		PLAN & PROFILE	
		STA 1100+00 TO STA 1111+00	
DWG NO.		02C120	
SHEET:		02C120	
METRO WASTEWATER RECLAMATION DISTRICT		ORIGINAL DWG NO:	

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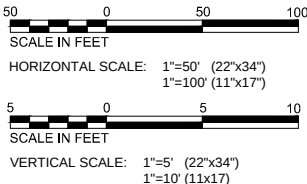
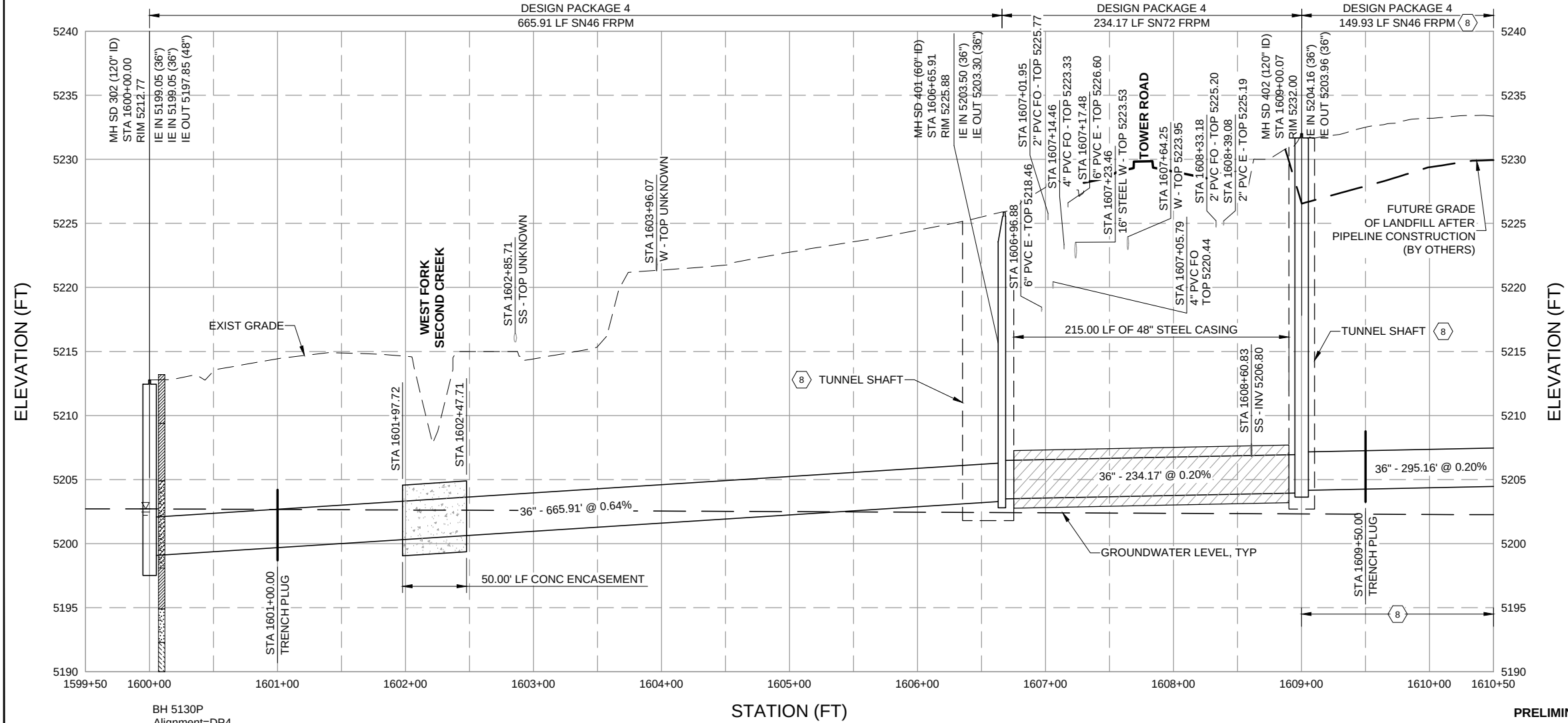


GENERAL NOTES:

- A. MANHOLE DIAMETERS SHOWN ARE FOR CONCRETE, SEE SHEET 00C511 FOR FRD DIAMETERS.

KEY NOTES:

1. REMOVE AND REPLACE EXISTING FENCE AS REQUIRED FOR CONSTRUCTION.
2. REMOVE AND REPLACE EXISTING TREES AND SHRUBS AS REQUIRED FOR CONSTRUCTION.
4. PROTECT EXISTING UTILITY IN PLACE.
6. REMOVE AND REPLACE EXISTING CONCRETE CURB, GUTTER, AND SIDEWALK AND/OR ASPHALT AS REQUIRED FOR CONSTRUCTION.
7. TIGHT SHORING REQUIRED.
8. FLOWFILL BACKFILL REQUIRED TO TOP OF PIPE ZONE.
10. GRAVEL ACCESS ROAD. SEE DETAIL A/00C516. FULL EXTENDS SHOWN ON CC0013.



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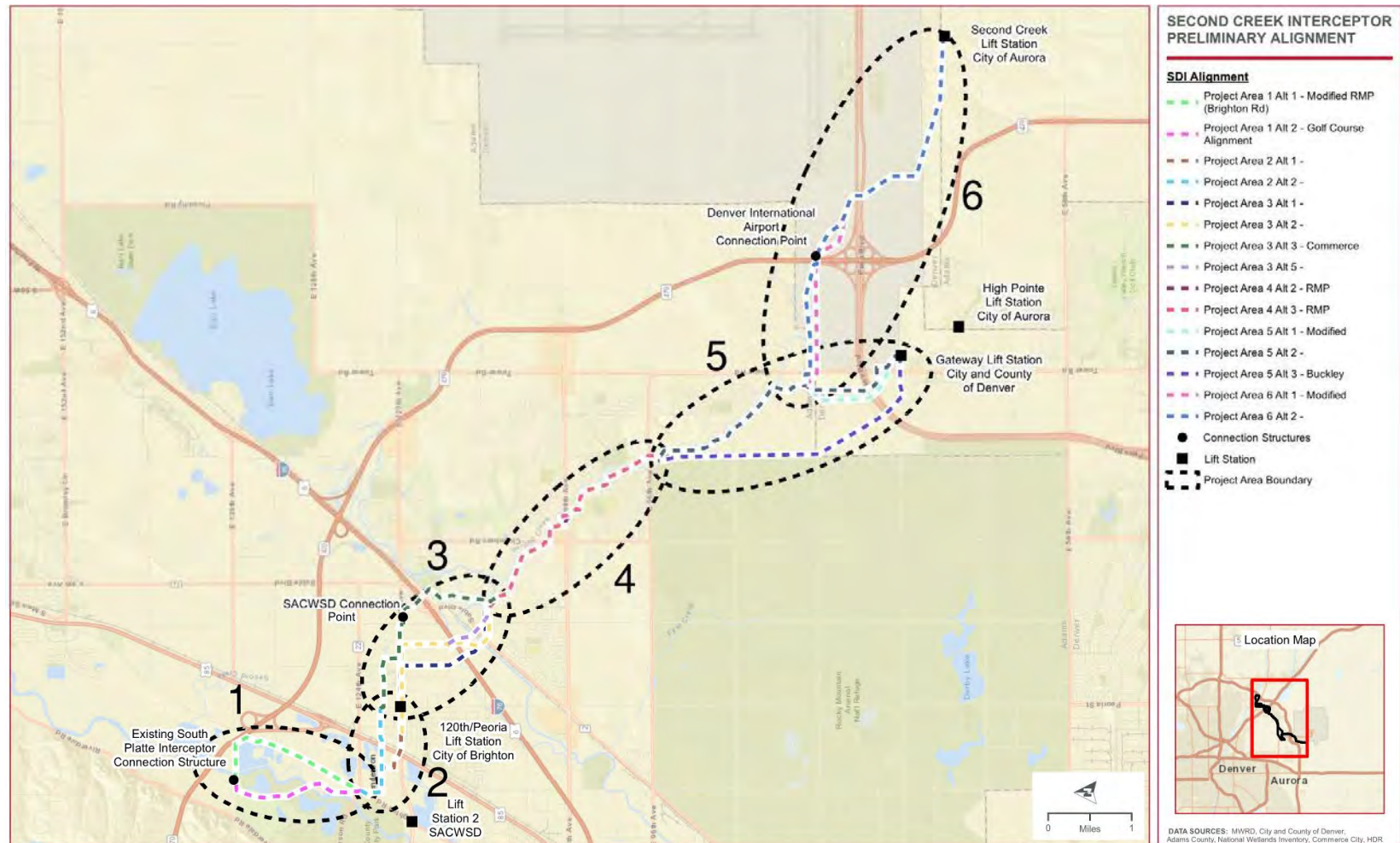
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PAR 1232		STA 1600+00 TO STA 1610+50	
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Appendix B:

Alternatives Analysis

APPENDIX B: ALTERNATIVES ANALYSIS

Figure B-1 shows a Project overview with the six project areas identified and the alternative alignments evaluated within each area. Portions of Project Areas 3 through 6 are within Commerce City, and as such, this report is specific to these areas. Table B-1 summarizes the key features for the project areas within Commerce City.



HDR

PAR 1232 – SECOND CREEK INTERCEPTOR AND SAND CREEK INTERCEPTOR SYSTEM IMPROVEMENTS
METRO WASTEWATER RECLAMATION DISTRICT

Figure B-1: Project Area Boundaries

Table B-1: Project Areas and Key Features

Project Area	Project Area Extent	Approximate Length of Interceptor ^a – Total/Commerce City (mile)	Pipe Size Range (inch)	Major Crossings	Contributing Agencies
3	I-76 and BNSF Railroad Crossing	2.9/0.9	48	• East 120th Avenue • I-76 • Burlington Ditch • BNSF Railroad Tracks • SH 2 • Burlington/O'Brian Canal	• SACWSD (includes flows from the City) • Brighton
4	Commerce City Bison Ridge Recreation Center to East 96th Avenue	2.9/2.9	48	• Chambers Road • East 104th Avenue • East 96th Avenue	• City
5	East 96th Avenue to Gateway Lift Station	3.6/1.8	48	• Second Creek • Peña Boulevard • A-Line Commuter Rail Tracks • Tower Road	• Denver • Aurora
6	Connection Structure to Second Creek Lift Station	5.6/0.8	42	• Tower Road • E-470 • Peña Boulevard • A-Line Commuter Rail Tracks	• Denver • Aurora

^a The approximate length of interceptor is calculated by taking the average length of all alignment alternatives within each project area.

Notes:

Aurora = City of Aurora

BNSF = Burlington Northern Santa Fe

Brighton = City of Brighton

City = City of Commerce City

Denver = City and County of Denver

I = Interstate

SACWSD = South Adams County Water and Sanitation District

SH = state highway

Based on evaluations conducted during the preliminary design phase, alternative sub-alignments were short-listed for further consideration in Project Areas 3 through 6. The alternative alignments are discussed in the following project area subsections. Additional alignments within each project area were considered but eliminated early in the evaluation process because of flaws, such as conflicts with existing utilities, right-of-way (ROW) encroachments, and excessive interceptor depths.

Table B-2 summarizes the key Project issues, or decision support criteria, that were used in developing and scoring the alternative alignments in the project areas.

Table B-2: Decision Support Criteria Summary and Definitions

Criteria		Definition
Public Impacts	Transportation Impacts	Impacts on transportation, including both roadway and rail, if open-cut construction is used. Opportunities to divert or detour traffic and trains is also considered.
	Private Property Value Impacts	Construction impacts on developed private property or permanent impacts that may affect the ability for future development of the property.
	Public Property Impacts	Impacts on agency-owned parks, trails, and other public use areas.
Operations and Maintenance	Maintenance Access	Ability for District crews to access the interceptor for maintenance, including the ability to accommodate large Vector trucks or other equipment required to perform maintenance activities.
	Operator Safety	Safety concerns for operators performing interceptor maintenance, including the ability for traffic diversion if the manhole/structure is located in the roadway.
Design Factors	Utility Conflicts and Relocations	Degree of existing utility conflicts that may require coordination with utility owners or relocations, or that increase design and construction risk.
	Wetland and Environmental Impacts	Impacts on known wetlands.
	Floodplains and Drainageways	Impacts from floodplain or drainageways on long-term interceptor operation or increased construction risk.
Project Schedule	Permitting and Third-party Coordination	Assessment of federal (USACE, USFWS), State (SHPO, CDPHE, etc.), regional (Urban Drainage and Flood Control District, BNSF, Union Pacific Railroad), or local permits and impacts on construction schedule. Assessment of third-party coordination requirements, including potential impact on construction schedule and impact by future third-party infrastructure.
	Land Acquisition	Permanent and temporary easements or other land acquisition required.
	Construction Access	Ability to accommodate construction equipment and movement of materials and the associated impact on schedule.
Construction Cost	Trenchless vs. Open-cut Construction	Construction risk related to trenchless methods versus traditional open-cut practices.
	Construction Dewatering	Extent of construction dewatering and risk of CDPHE dewatering discharge requirements as determined by the elevation of the water table relative to excavations.
	Depth and Length of Construction	Total interceptor length and maximum pipe depth.

Notes:

CDPHE = Colorado Department of Public Health and the Environment

SHPO = State Historic Preservation Office

USACE = U.S. Army Corps of Engineers

USFWS = U.S. Forest Service

Using the decision support criteria presented in Table B-2, the alignment evaluations are presented below.

Project Area 3

Figure B-2 shows the Project Area 3 extents with three alternative alignments between the intersection of East 120th Avenue and Peoria Street at the downstream end, and the intersection of Potomac Street and East 112th Avenue on the upstream end. Key features of this project area include a connection for Brighton's 120th/Peoria Lift Station, and a connection for SACWSD near the intersection of East 120th Avenue and Potomac Street. Alignment descriptions are provided at the beginning of each alternative analysis section.

Additionally, this project area includes crossings of East 120th Avenue, the Burlington Ditch, I-76, the Burlington/O'Brien Ditch, BNSF Railroad tracks, and SH 2. The crossing of East 120th Avenue has the potential for open-cut construction, which will eliminate the need for a tunnel. If open-cut construction is determined not to be a viable approach because of the existing land use, viable trenchless techniques will include excavation by guided auger bore or guided pipe ram, depending on the groundwater and subsurface conditions encountered during the geotechnical investigation. Representative trenchless crossing sections are provided in Appendix A of the Permit Application.

The remainder of the crossings for Project Area 3 are anticipated to be completed using trenchless methods. The major risks for these crossings include settlement or heaving of the roadway, traffic disruptions, sinkholes within the ditch, and fluid frac-out. The anticipated subsurface conditions include dry fine to coarse alluvium (clay, silt, sand, and gravel). Viable trenchless techniques for these crossings include excavation by tunnel boring machine (TBM) or micro-tunnel boring machine (MTBM). If a center shaft is used and tunnel lengths can be reduced to less than 200-foot segments,

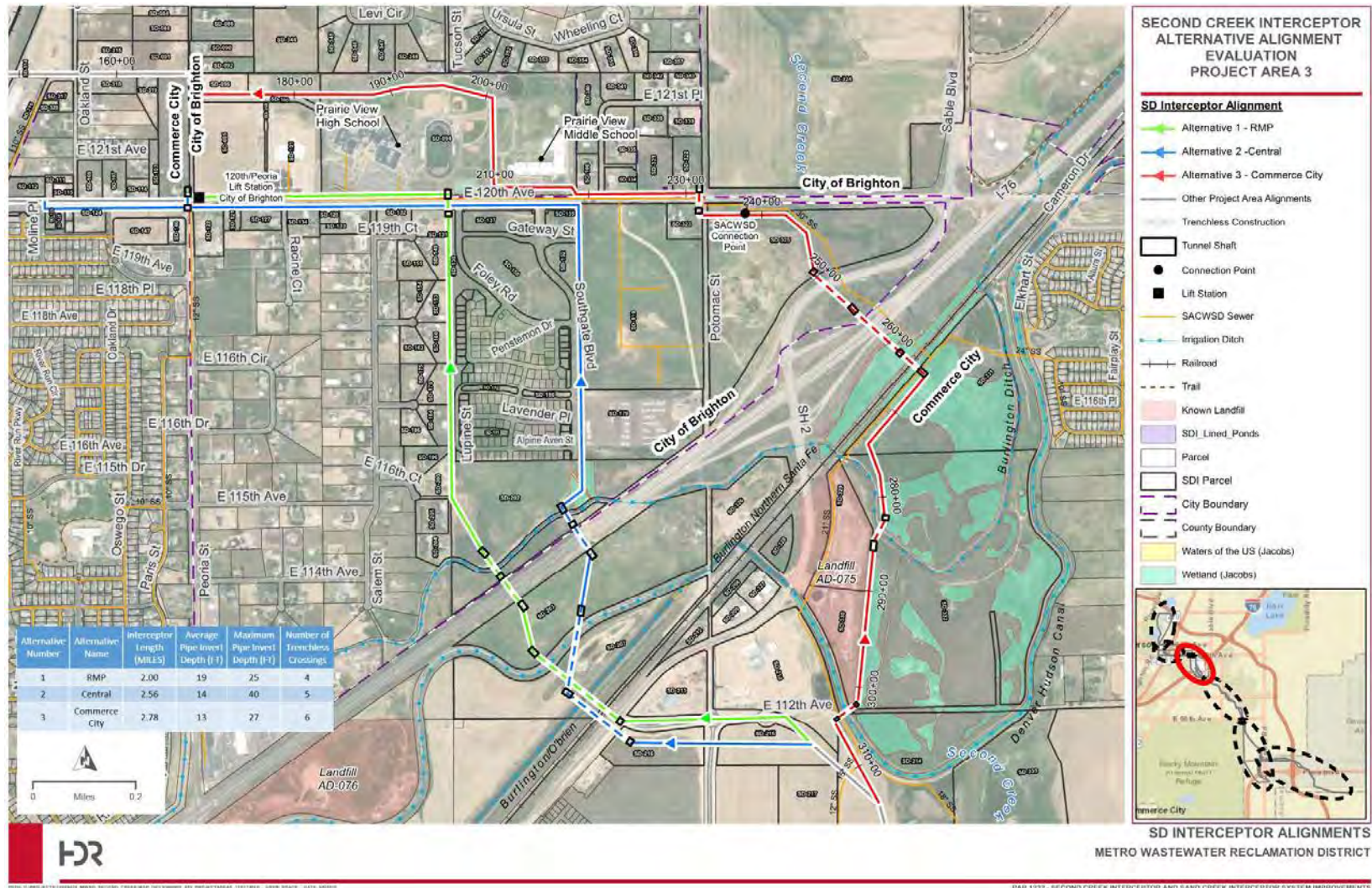


Figure B-2: Project Area 3 Alternatives Data

**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 1 – RMP Alignment**

This alignment (based on the alignment presented in the *Sand Creek and Second Creek Basins Regional Master Plan*, which is referred to as the RMP) will run east along East 120th Avenue before turning south at the western edge of a new development (2,650 feet east of Peoria Street). The alignment will continue south along the western boundary of the development and will then cut diagonally to the southeast to cross I-76, Burlington Ditch, Denver Hudson Canal, the BNSF Railroad tracks, SH 2, and O'Brian Canal. The alignment will then continue east along East 112th Avenue, remaining on the southern side of the Commerce City Bison Ridge Recreation Center and cutting through the newly constructed roundabout at Potomac Street to end at the project area boundary.

Alternative 1 General Summary:

- Length ~ 2 miles
- Depth ~ 7 to 25 feet
- Diameter – 48 inches
- Trenchless Installations – 4
 - o East 120th Avenue
 - o Burlington Ditch and I-76
 - o Denver Hudson Canal
 - o BNSF Railroad Tracks, SH 2, and O'Brian Canal
- Agency Connections – 2 (Brighton and SACWSD)
- Dewatering – Medium
- Production Rate – Low

Public Impacts

Transportation Impacts	Moderate traffic impacts are anticipated because half of the alignment will be through undeveloped land. Road closures and detours will be likely required on East 120th Avenue, and Potomac Street bus and parent drop-off access to the schools on East 120th Avenue will be difficult to coordinate. Brighton is not in favor of this alignment because of impacts on future development and church/school access constraints.
Private Property Value Impacts	The development to the south of East 120th Avenue is currently under construction. Multiple new parcel owners will be affected on the eastern and western sides of the alignment. This alternative will place the interceptor under a planned drainageway for the development.
Public Facility Impacts	Access to the Commerce City Bison Ridge Recreation Center from Potomac Street will be affected during construction. The alignment will be open cut directly through two newly constructed roundabouts for the Recreation Center on East 112th Avenue. Access to the schools on the northern side of East 120th Avenue will be affected, and there will be the potential to disrupt the parking lots depending on the final alignment of the interceptor.

Operations and Maintenance

Maintenance Access	Maintenance access will be difficult through the new development because of the planned drainage swale and piping. Separate easements will be required for a maintenance road to access the manholes on the southern side of I-76.
Operator Safety	Safety for maintenance will be affected by high traffic volumes along East 120th Avenue. Traffic control may be needed depending on the final interceptor location.

**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 1 – RMP Alignment**

Design Factors

Conflicts and Relocations	Key factors for this alternative will include navigating and avoiding existing utilities along and within the East 120th Avenue ROW. Brighton has water and sewer located in the ROW, and SACWSD's Second Creek sewer is also within the roadway. A large fiber optic duct bank occupies the northern side of the street just outside the roadway. The water and sewer lines to the new development have already been constructed on the southern side of the roadway.
Wetland and Environmental Impacts	Temporary wetland impacts are anticipated. Traverses through BNSF Railroad property and near one closed leaking underground storage tank (LUST) site. May require proper disposal of material/soil (low risk).
Floodplains and Drainageways	Segment limits will be outside the floodplain.

Project Schedule

Permitting and Third-party Coordination	Coordination will be necessary with Commerce City, Brighton, and Brighton School District. Colorado Department of Transportation (CDOT), BNSF, and Farmers Reservoir and Irrigation Company coordination and permitting will be required for each crossing. A USACE Section 404 Permit will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for hazardous materials (HazMat). Alignment crosses a National Register of Historic Places (NRHP)-eligible ditch (5AM.465.8), which will require Section 106 Consultation with SHPO and other parties.
Land Acquisition	Extensive permanent and temporary construction easements will be required between the existing development and new development.
Construction Access	Construction access will be constrained along the entire alignment considering the canals, BNSF Railroad, I-76, the Commerce City Bison Ridge Recreation Center, and the new development. This project area is the most constrained segment of the SD Interceptor.

Construction Cost

Trenchless vs. Open-cut Construction	The trenchless crossing at East 120th Avenue will be directly across from the Prairie View High School, and the school in-session dates will likely affect the tunnel construction schedule. The southern trenchless shaft for this crossing will need to be coordinated with overhead utilities on the southern side of East 120th Avenue. The crossings at the southern end of the project area will be perpendicular to all utilities and surface features, which is ideal for trenchless construction.
Construction Dewatering	Dewatering is anticipated in areas near the Denver Hudson Canal, Burlington Ditch, and O'Brian Canal.
Depth and Length of Construction	The preliminary profile will exceed typical depths for an interceptor (e.g., less than 15 feet), primarily because of the roadway crossings and proximity to Second Creek.

**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 2 – Central Alignment**

This alignment will run east along East 120th Avenue before turning south at the eastern edge of a new development (~4,000 feet east of Peoria Street). The alignment will continue south along the eastern boundary of the development to cross I-76 and the Burlington Ditch. The alignment will then cut to the southwest to avoid excessive bury depths that will be required to cross parcels Second Creek (SD)-213 and SD-212. From there, it will cross the Denver Hudson Canal, the Burlington/O'Brian Canal, the BNSF Railroad tracks, and SH 2. The alignment will then continue east along East 112th Avenue, remaining on the southern side of the Commerce City Bison Ridge Recreation Center and cutting through the newly constructed roundabout at Potomac Street, ending at the project area boundary.

Alternative 2 General Summary:

- Length ~ 2.56 miles
- Depth ~ 4 to 40 feet
- Diameter – 48 inches
- Trenchless Installations – 5
 - o East 120th Avenue
 - o Burlington Ditch and I-76
 - o Denver Hudson Canal
 - o BNSF Railroad Tracks, SH 2, and O'Brian Canal
- Agency Connections – 2 (Brighton and SACWSD)
- Dewatering – Medium
- Production Rate – Low

Public Impacts

Transportation Impacts	Moderate traffic impacts are anticipated because two-thirds of the alignment will be through undeveloped land. Road closures and detours will likely be required on East 120th Avenue, and Potomac Street bus and parent drop-off access to the schools on East 120th Avenue will be difficult to coordinate. Brighton is not in favor of this alignment because of impacts on future development and church/school access constraints.
Private Property Value Impacts	The development to the south of East 120th Avenue is currently under construction. Multiple new parcel owners could be affected on the western side of the alignment depending on the final location of the interceptor.
Public Facility Impacts	Access to the Commerce City Bison Ridge Recreation Center (SD-210) from Potomac Street will be affected during construction. The alignment will be open cut directly through two newly constructed roundabouts for the Commerce City Recreation Center on East 112th Avenue. Access to the schools on the northern side of East 120th Avenue will be affected, and there is the potential to disrupt the parking lots depending on the final alignment of the interceptor.

Operations and Maintenance

Maintenance Access	Maintenance access will be difficult through the new development because of the planned drainage swale and piping. Separate easements will be required on SD-203 for a maintenance access road to the manholes on the southern side of I-76.
Operator Safety	Safety for maintenance will be affected by high traffic volumes along East 120th Avenue. Traffic control may be needed depending on the final interceptor location.

**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 2 – Central Alignment**

Design Factors

Conflicts and Relocations	Key factors for this alternative will include navigating and avoiding existing utilities along and within the East 120th Avenue ROW. Brighton has water and sewer located in the ROW, and SACWSD's Second Creek sewer is also within the roadway. A large fiber optic duct bank occupies the northern side of the street just outside the roadway. The water and sewer lines to the new development have already been constructed on the southern side of the roadway. A gas station for the bus storage and parking facility exists on the southwestern side of SD-179.
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Wetland and Environmental Impacts	Temporary wetland impacts are anticipated. Traverses through BNSF Railroad property and near one closed LUST site. May require proper disposal of material/soil (low risk).
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Floodplains and Drainageways	Segment limits will be outside the floodplain.
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Project Schedule

Permitting and Third-party Coordination	Coordination will be necessary with Commerce City, Brighton, and Brighton School District. CDOT, BNSF, and Farmers Reservoir and Irrigation Company coordination and permitting will be required for each crossing. A USACE Section 404 Permit will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for HazMat. Alignment crosses NRHP-eligible ditch (5AM.465.2), which will require Section 106 Consultation with SHPO and other parties.
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Land Acquisition	Extensive permanent and temporary construction easements may be required to the east of the new development depending on the final alignment. Land acquisition will be simplified if the interceptor is primarily located within the East 120th Avenue ROW, SD-119, and SD-179.
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Construction Access	Construction access will be constrained along the entire alignment considering the canals, BNSF Railroad, I-76, the Commerce City Bison Ridge Recreation Center, and the new development. This project area is the most constrained segment of the SD Interceptor.
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Construction Cost

Trenchless vs. Open-cut Construction	The trenchless crossing at the intersection of East 120th Avenue and Peoria Street will require more traffic control and will provide less laydown area than will be needed under Alternative 1. Coordination will still be required with Prairie View High School concerning in-session dates. The crossing of the Burlington/O'Brian Canal will be a long, skewed crossing, which is not ideal for trenchless construction. The remainder of the crossings will be perpendicular and will share the same risks as those under Alternative 1.
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Construction Dewatering	Dewatering is anticipated in areas near the Denver Hudson Canal, Burlington Ditch, and O'Brian Canal.
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Depth and Length of Construction	The preliminary profile will exceed typical depths for an interceptor (e.g., less than 15 feet), primarily because of the roadway crossings and proximity to Second Creek.
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**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 3 – Commerce City Alignment**

This alignment will begin north of East 120th Avenue on Peoria Street and will head directly east on the southern side of parcel SD-96. It will continue east through the Prairie View High School and cut south through the Prairie View Middle School parcel on the western side of the track. The alignment heads east along the northern side of East 120th Avenue and crosses East 120th Avenue at the intersection of Potomac Street via trenchless construction. From there, it will head east to cross Potomac Street and southeast to cross SH 2, I-76, the BNSF Railroad tracks, the Burlington Ditch, and the Denver Hudson Canal in five separate trenchless crossings, ending at the project area boundary. A portion of this alignment will parallel an existing landfill (AD-075).

Alternative 3 General Summary:

- Length ~ 2.78 miles
- Depth ~ 4 to 13 feet
- Diameter – 48 inches
- Trenchless Installations – 6
 - o East 120th Avenue
 - o SH 2
 - o I-76
 - o BNSF Railroad Tracks
 - o Burlington Ditch
 - o Denver Hudson Canal
- Agency Connections – 2 (Brighton and SACWSD)
- Dewatering – Medium
- Production Rate – High

Public Impacts

Transportation Impacts	Minimal traffic impacts are anticipated as most of the alignment will be through undeveloped land and the major roadway crossings will be trenchless installations.
Private Property Value Impacts	The southern portion of the alignment will be on Commerce City property and parallel to the City's master planned trail system. A few parcels on the northern side of East 120th Avenue will be affected by required permanent and temporary easements.
Public Facility Impacts	This alignment will avoid impacts on the Commerce City Bison Ridge Recreation Center but will cut across the northern side of the two schools located on the northern side of East 120th Avenue. Access to the schools can be maintained with this alternative. A future Second Creek Park is planned for parcels SD-331 and SD-332 within Commerce City. This alignment has been coordinated with future park plans to benefit the public and to provide the District with uninterrupted access under highways.

Operations and Maintenance

Maintenance Access	Access to manholes for the northern half of the alignment will be available from East 120th Avenue and through the school property. Manholes between SH 2 and I-76 will be difficult to access. Gravel roads will need to be constructed for maintenance between the two ditches east of Landfill AD-075 until the Commerce City trail system is in place.
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**Project Area 3 – I-76 and BNSF Railroad Crossing
Alternative 3 – Commerce City Alignment**

Operator Safety	This alternative will have the best operator safety provision because of all manholes being located outside of roadways and the shallower depth of construction associated with the proximity of the alignment to the creek.
Design Factors	
Conflicts and Relocations	This alternative will avoid the congested East 120th Avenue utility corridor. A 1,200-foot connection lateral will be required across SD-95 to tie in the Brighton Lift Station. Crossing overhead power lines will be required between the middle school and the private property to the east (SD-106).
Wetland and Environmental Impacts	Permanent and temporary wetland impacts are expected.
Floodplains and Drainageways	Portions of the segment limits will be inside the floodplain. No permanent impacts are anticipated if the manholes are located at grade, and the existing grade is restored.
Project Schedule	
Permitting and Third-party Coordination	Coordination will be necessary with Commerce City, Brighton, Brighton School District, CDOT, BNSF, and governing entities for the various canals. Access to the BNSF and I-76 ROW will also be needed. A USACE Section 404 Permit will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for HazMat. Alignment crosses two NRHP-eligible ditches (5AM.465.8 and 5AM.465.5) and NRHP farm (5AM.889), which will require Section 106 Consultation with SHPO and other parties.
Land Acquisition	Few private parcels will be affected on the northern side of East 120th Avenue. Most of the alignment will fall on Commerce City property or Brighton School District property.
Construction Access	Access between the Burlington Ditch and Denver/Hudson Canal will be difficult. Ditch rider bridges and access roads may not be adequate for equipment crossings. Continuous (straight through) access will not be possible because of the highways and railroad. Temporary roads outside the alignment corridor may be needed.
Construction Cost	
Trenchless vs. Open-cut Construction	The crossing of East 120th Avenue at Potomac Street will require more traffic control than Alternative 1 (RMP Alignment) but will provide more laydown area than Alternative 2 (Central Alignment). The I-76 and SH 2 interchange crossing will be much larger for this alternative and will require several tunneled segments, or one extremely long tunneled segment. This alternative will not provide the benefit of tunneling the two ditches within the same tunnel as the roadway, as in the other two alternatives.
Construction Dewatering	This alternative has greater dewatering potential because of the proximity of the alignment to the canals and Second Creek, when compared to the other alternatives.
Depth and Length of Construction	The preliminary profile will be within typical depths for interceptor construction.

Project Area 4

Figure B-3 shows the Project Area 4 extents with two alternative alignments between the intersection of Potomac Street and East 112th Avenue on the downstream end and the crossing of East 96th Avenue at the upstream end. Alignment descriptions are provided at the beginning of each alternative analysis section. At the far upstream portion of the project area near SD-265, there are planned improvements at Buckley Road. The improvements include the expansion of the Rocky Mountain Arsenal further to the east where the RMP alignment is currently located. Because of this planned expansion and the number of planned creek crossings, the RMP alignment is not viable and will not be further evaluated as a part of this report.

Additional key features in this project area include crossings of Chambers Road, East 104th Avenue, and East 96th Avenue. Commerce City has indicated that open-cut construction may be a viable option for the crossing of Chambers Road. If tunneling is required for this crossing, viable trenchless methods will include excavation by guided auger bore or guided pipe ram, depending on the groundwater and subsurface conditions encountered during the investigation.

Commerce City has indicated that the crossings at East 104th Avenue and East 96th Avenue will require trenchless construction methods. The anticipated subsurface conditions at both crossings include dry to wet, fine to coarse alluvium (clay, silt, sand, and gravel). Viable trenchless methods for the East 104th Avenue crossing include excavation by MTBM, guided auger bore, or guided pipe ram. Viable trenchless methods for the East 96th Avenue crossing only include TBM or MTBM because the length of this tunnel precludes other trenchless methods. The selection of the final trenchless method will depend on groundwater and subsurface conditions encountered during the investigation.

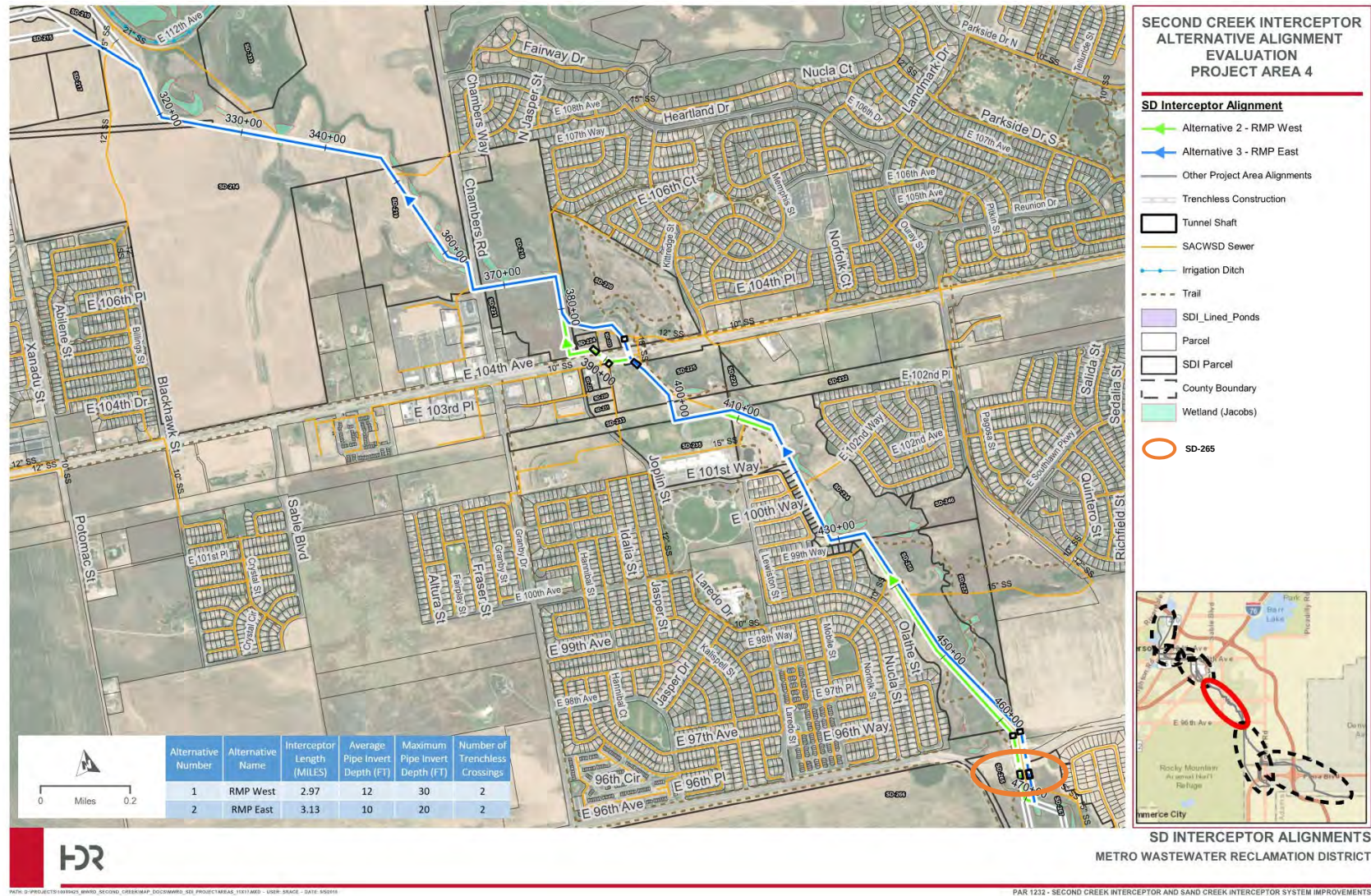


Figure B-3: Project Area 4 Alternatives Data

**Project Area 4 – Commerce City Rec Center to 96th Avenue
Alternative 1 – RMP West Alignment**

This alignment will remain on the western side of Second Creek and an existing SACWSD sewer interceptor, which it will parallel for the entire length. Remaining on the western side of the SACWSD sewer will eliminate crossings of SACWSD's main interceptor. Only three crossings of SACWSD lateral sewer lines are anticipated for this alignment alternative.

Key features of the alignment include crossings of Chambers Road, East 104th Avenue., and East 96th Avenue. Development plans on parcel SD-224 will likely require a diagonal trenchless crossing of East 104th Avenue.

Alternative 1 General Summary:

- Length ~ 2.97 miles
- Depths ~ 4 to 30 feet
- Diameter – 48 inches
- Trenchless Installations – 2
 - o East 104th Avenue
 - o East 96th Avenue
- Agency Connections – 0
- Dewatering – High
- Production Rate – High

Public Impacts

Transportation Impacts	Overall minimal impacts. The crossings of East 96th Avenue and East 104th Avenue are expected to be trenchless. If Chambers Road is open cut, a minor closure and detour will be required.
Private Property Value Impacts	Impacts on private properties will be minimal and isolated to a few parcels around the East 104th Avenue crossing.
Public Facility Impacts	The Second Creek trail will need to be closed during construction. Trail improvements could be incorporated into the Project to assist in public perception. Construction adjacent to Stuart Middle School (SD-235) will require coordination but will not have a significant impact on the school.

Operations and Maintenance

Maintenance Access	Gravel access roads will need to be constructed for the alignment north of East 104th Avenue. All other manholes could be accessed via roadways or the existing trail system.
Operator Safety	This alternative will have good operator safety provision because of all manholes being located outside of roadways and the shallower depth of construction associated with the alignment's proximity to the creek.

Design Factors

Conflicts and Relocations	The alignment will parallel the SACWSD sewer interceptor on the western side. One main crossing and three lateral crossings will be required. Preliminary review of survey data and as-built drawings indicates that the SACWSD sewer will be above the SD Interceptor. Overhead power lines and buried gas lines are present in the area to the north of Stuart Middle School on parcels SD-233 and SD-232. The gas line crossings will require extensive research, planning, and coordination.
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Project Area 4 – Commerce City Rec Center to 96th Avenue Alternative 1 – RMP West Alignment	
Wetland and Environmental Impacts	Because of its proximity to Second Creek, this project area will have the largest impact on wetlands. Both alternatives considered for this project area are considered to have the same impact. Underground storage tanks adjacent to the alignment within parcel SD-228 may require coordination and possible work restrictions within a certain distance of the tanks. Rocky Mountain Arsenal National Wildlife Refuge (NWR) is a Superfund site adjacent to the alignment within parcel SD-226. This site has ongoing cleanup and controls but presents a low risk because the alignment stays outside of federal land.
Floodplains and Drainageways	Most of the segment limits will be inside the floodplain. No permanent impacts are anticipated if the manholes are located at grade and the existing grade is restored.
Project Schedule	
Permitting and Third-party Coordination	Coordination with Commerce City will be required for the crossings at Chambers Road, East 96th Avenue, and East 104th Avenue. Additional coordination with SACWSD will be necessary because of the location of its sewer interceptor. A USACE Section 404 Permit will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for Superfund site information.
Land Acquisition	The interceptor will parallel an existing SACWSD sewer easement for the majority of this project area. Additional easements are expected to be streamlined because of the already encumbered land within the floodplain. Private land owners around the East 104th Avenue crossing will be affected by permanent and temporary easements.
Construction Access	Construction access roads will be necessary north of East 104th Avenue. Continuous access along the alignment will streamline construction.
Construction Cost	
Trenchless vs. Open-cut Construction	This alignment will cross East 104th Avenue at an angle, which will increase both the distance and the time for which roadway infrastructure will be at risk. Additionally, the crossing will be much shallower than the crossing presented in Alternative 2, which will decrease the amount of cover and increase the risk of roadway settlement.
Construction Dewatering	Construction dewatering is anticipated for most of the alignment because of its proximity to Second Creek.
Depth and Length of Construction	The preliminary profile will exceed typical depths for an interceptor (e.g., less than 15 feet).

**Project Area 4 – Commerce City Rec Center to 96th Avenue
Alternative 2 – RMP East Alignment**

This alignment will also remain on the western side of Second Creek; however, it will parallel the SACWSD sewer interceptor on the eastern side for its entire length. This will require six crossings of the SACWSD sewer interceptor and will push the SD Interceptor alignment very close to Second Creek in some areas.

Key features of the alignment include crossings of Chambers Road, East 104th Avenue, and East 96th Avenue. A perpendicular trenchless crossing at East 104th Avenue is possible for this alternative.

Alternative 2 General Summary:

- Length ~ 3.13 miles
- Depths ~ 4 to 20 feet
- Diameter – 48 inches
- Trenchless Installations – 2
 - o East 104th Avenue
 - o East 96th Avenue
- Agency Connections – 0
- Dewatering Potential – High
- Production Rate – High

Public Impacts

Transportation Impacts	Overall minimal impacts. The crossings of East 96th Avenue and East 104th Avenue are expected to be trenchless. If Chambers Road is open cut, a minor closure and detour will be required.
Private Property Value Impacts	Impacts on private properties will be minimal and isolated to a few parcels around the East 104th Avenue crossing.
Public Facility Impacts	The Second Creek trail will need to be closed during construction. Trail improvements could be incorporated into the Project to assist in public perception.

Operations and Maintenance

Maintenance Access	Gravel access roads will need to be constructed for the alignment north of East 104th Avenue. All other manholes can be accessed via roadways or the existing trail system.
Operator Safety	This alternative will have good operator safety provision because of all manholes being located outside of roadways and a shallower depth of construction associated with the alignment's proximity to the creek.

Design Factors

Conflicts and Relocations	The alignment will parallel the SACWSD sewer interceptor on the eastern side. Several sewer main crossings will occur that may require bypass pumping. Preliminary review of survey data and as-built drawings indicates that the SACWSD sewer will be above the SD Interceptor. Overhead power lines and buried gas lines are present in the area to the north of Stuart Middle School on parcels SD-233 and SD-232. The gas line crossings will require extensive research, planning, and coordination. Segments of this alternative cut extremely close to Second Creek, which increases the risk of river bed erosion and pipe scouring.
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**Project Area 4 – Commerce City Rec Center to 96th Avenue
Alternative 2 – RMP East Alignment**

Wetland and Environmental Impacts	Because of its proximity to Second Creek, this project area will have the largest impact on wetlands. Both alternatives considered in this evaluation will have the same impact. The NWR is a Superfund site adjacent to the alignment within parcel SD-226. This site has ongoing cleanup and controls but presents a low risk because the alignment stays outside of federal land.
Floodplains and Drainageways	Most of the segment limits will be inside the floodplain. No permanent impacts are anticipated if the manholes are located at grade and the existing grade is restored.
Project Schedule	
Permitting and Third-party Coordination	Coordination with Commerce City will be required for the crossings at Chambers Road, East 96th Avenue, and East 104th Avenue. Additional coordination with SACWSD will be necessary because of the location of its sewer interceptor. A USACE Section 404 Permit will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for Superfund site information.
Land Acquisition	The interceptor will parallel an existing SACWSD sewer easement for the majority of this project area. Additional easements are expected to be streamlined because of already encumbered land within the floodplain. Private land owners around the East 104th Avenue crossing will be affected by permanent and temporary easements.
Construction Access	Construction access roads will be necessary north of East 104th Avenue. Continuous access along the alignment will streamline construction.
Construction Cost	
Trenchless vs. Open-cut Construction	This alternative will cross East 104th Avenue underneath the embankment for the Second Creek overpass. The tunnel shafts could be placed on either side of the embankment to limit the shaft depth. The tunneled segment of pipe will have more cover than will be had under the previous alternative, which will decrease the risk of roadway settlement.
Construction Dewatering	Construction dewatering is anticipated for most of the alignment because of its proximity to Second Creek.
Depth and Length of Construction	The preliminary profile will exceed typical depths for an interceptor (e.g., less than 15 feet).

Project Area 5

Figure B-4 shows the Project Area 5 extents with three alternative alignments between the crossing of East 96th Avenue at the downstream end and the Gateway Lift Station at the upstream end. One key feature in this project area is the junction point between the First Creek Segment from the south, the Second Creek Segment from the east, and the Combined Segment to the north. The junction point originally proposed in the RMP was shifted slightly to the north to avoid locating the structure within waters of the U.S. limits and to provide a better location for maintenance access. Alignment descriptions are provided at the beginning of each alternative analysis section.

Denver is also planning to construct two detention ponds within the vicinity of this project area. The first will be located west of Tower Road and south of Denver's property line, and the second will be in the northwest corner of the Peña Boulevard/Tower Road underpass. Detention pond locations are shown on Figure B-4 and were considered in the evaluation of alternatives.

Other key features in this project area include crossings of East 88th Avenue, Peña Boulevard, North Tower Road, and the A-Line commuter rail. Commerce City has indicated that open-cut construction may be a viable option for the crossing of East 88th Avenue. Crossings at Peña Boulevard, North Tower Road, and the A-Line are anticipated to be completed using trenchless construction methods. The risks associated with these crossings include settlement of roadways and rail lines, traffic disruptions, and potential damage to a mechanically stabilized earth wall located near the A-Line crossing. The design may consider ground improvements, such as pre-excavation grouting, to limit potential damage to the mechanically stabilized earth wall.

The anticipated subsurface conditions in this project area include dry to wet, fine to coarse alluvium (clay, silt, sand, and gravel). Feasible trenchless technologies for the crossings of Peña Boulevard and Tower Road only include TBM or MTBM because of the lengths of the tunnels. The A-Line commuter rail crossing is short, and many trenchless methods are viable. If the geotechnical investigation suggests that the tunnel will be above groundwater, guided auger boring or excavation by TBM may be considered. If the tunnel will be below groundwater, guided pipe ram or MTBM may be appropriate.



Figure B-4: Project Area 5 Alternatives Data

**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 1 – Modified RMP Alignment**

The combined segment for this alternative will run south from East 96th Avenue, paralleling Second Creek to the west until it reaches the modified junction point in the northeastern corner of parcel SD-286. The alignment will cut through the eastern edge of the Denver International Airport (DEN) parking lot to remain on the western side of West Fork Second Creek for the crossing of Peña Boulevard. At this point, it will head east to cross West Fork Second Creek and North Tower Road, and then will head south to cross the A-Line commuter rail and connect to Denver's Gateway Lift Station.

Alternative 1 General Summary:

- Length ~ 3.63 miles
- Depth ~ 6.5 to 40.5 feet
- Diameter – 36 inches
- Trenchless Installations – 3
 - o Peña Boulevard
 - o North Tower Road
 - o A-Line Commuter Rail
- Agency Connections – 1 (Denver)
- Dewatering – Medium
- Production Rate – High

Public Impacts

Transportation Impacts	Traffic impacts are expected to be moderate. Road closures and detours will be required at East 88th Avenue and East 81st Avenue. There will be some traffic impacts on Tower Road and Peña Boulevard associated with access to trenchless construction shafts.
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Private Property Value Impacts	The closure of East 81st Avenue will affect access to the airport parking lot on parcel SD-286. Alternative access will need to be coordinated and constructed. There will be potential lost revenue associated with the open-cut construction through the parking lot. DEN is planning to develop parcel SD-295 in the future.
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Public Facility Impacts	None identified.
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Operations and Maintenance

Maintenance Access	Maintenance access is considered good because of the location of the alignment near several roadways and existing access roads. The connection structure will need to be located outside the parking lot, so that there are no access limitations, including gates or parked cars over the structure.
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Operator Safety	No specific items identified.
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Design Factors

Conflicts and Relocations	The alignment will generally parallel the SACWSD sewer interceptor until East 81st Avenue. The water and sewer services for parcel SD-286 will be crossed by the SD Interceptor. Conflicts are not expected because of the anticipated depth of the interceptor. High- and medium-pressure gas lines run down East 80th Avenue to DEN. The SD Interceptor will likely cross under these utilities.
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**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 1 – Modified RMP Alignment**

Wetland and Environmental Impacts	Three or four mapped wetlands are near the alignment. The Project Team will mitigate this issue by delineating the wetlands to determine more accurate boundaries and adjusting the alignment to avoid them, if possible. The NWR is a Superfund site adjacent to the alignment within parcel SD-226. This site has ongoing cleanup and controls but presents a low risk because the alignment stays outside of federal land.
Floodplains and Drainageways	A majority of the alignment will be within the floodplain for this segment. Manhole locations will be located outside the floodplain where possible.
Project Schedule	
Permitting and Third-party Coordination	Coordination with Denver, Commerce City, DEN, CDOT, Regional Transportation District (RTD), and SACWSD will be necessary. USACE Section 404 permitting will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for Superfund site information. Alignment crosses NRHP-eligible canal segment (5AM.261), which will require Section 106 Consultation with SHPO and other parties.
Land Acquisition	Permanent utility easements and temporary construction easements will be needed for a majority of the alignment.
Construction Access	Construction access will be difficult for the trenchless crossing near the Peña Boulevard ramps.
Construction Cost	
Trenchless vs. Open-cut Construction	In general, construction of this alternative will be shallower than construction of the other two alternatives, which will decrease construction cost. The crossing of Peña Boulevard for this alternative will occur within a large fill slope, which will require deep tunnel shafts. Additionally, the length of this tunnel will be much longer than tunnel lengths under the other alternatives, which will increase construction risk. The crossing of Tower Road at this location will provide a good layout area and access for trenchless construction.
Construction Dewatering	Construction dewatering is expected along the entire alignment because of its proximity to West Fork Second Creek and Second Creek.
Depth and Length of Construction	The proposed profile will exceed typical depths for an interceptor (e.g., less than 15 feet) on the upstream end because of roadway crossings. The depth of bury will decrease as the segment gets closer to Second Creek.

**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 2 – East Alignment**

The combined segment for this alternative is the same as that for Alternative 1. After the junction point, this alternative will head southwest and cross West Fork Second Creek at approximately station 2000+50. It will then run south on the eastern side of the creek to cross Peña Boulevard. After crossing Peña Boulevard, it will head east to cross North Tower Road, and then south to cross the A-Line commuter rail and connect to Gateway Lift Station.

Alternative 2 General Summary:

- Length ~ 3.56 miles
- Depth ~ 7.5 to 32 feet
- Diameter – 36 inches
- Trenchless Installations – 3
 - o Peña Boulevard
 - o North Tower Road
 - o A-Line Commuter Rail Tracks
- Agency Connections – 1 (Denver)
- Dewatering – High
- Production Rate – High

Public Impacts

Transportation Impacts	Traffic impacts are expected to be moderate. Road closures and detours will be required at East 88th Avenue and East 81st Avenue. There will be some traffic impacts on Tower Road and Peña Boulevard associated with access to trenchless construction shafts.
Private Property Value Impacts	The closure of East 81st Avenue will affect access to the airport parking lot on parcel SD-286. Alternative access will need to be coordinated and constructed. There will be potential lost revenue associated with the open-cut construction through the parking lot. Parcel SD-295 is planned for development by DEN.
Public Facility Impacts	None identified.

Operations and Maintenance

Maintenance Access	Maintenance access is considered good because of the location of the alignment near several roadways and existing access roads. The connection structure will need to be located outside the parking lot to prevent access limitations, including gates or parked cars over the structure.
Operator Safety	No specific items identified.

Design Factors

Conflicts and Relocations	The alignment will generally parallel the SACWSD sewer interceptor until East 81st Avenue. The water and sewer services for parcel SD-286 will be crossed by the alignment. Conflicts are not expected because of the anticipated depth of the interceptor. High- and medium-pressure gas lines run down East 80th Avenue to DEN. The interceptor will likely cross under these utilities.
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**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 2 – East Alignment**

Wetland and Environmental Impacts	Three or four mapped wetlands are in the vicinity of the alignment. The Project Team will mitigate this issue by delineating the wetlands to determine more accurate boundaries and adjusting the alignment to avoid them, if possible. The NWR is a Superfund site adjacent to the alignment within parcel SD-226. This site has ongoing cleanup and controls but presents a low risk because the alignment stays outside of federal land.
Floodplains and Drainageways	A majority of the alignment will be within the floodplain for this segment. Manhole locations will be located outside the floodplain where possible.
Project Schedule	
Permitting and Third-party Coordination	Coordination with Denver, Commerce City, DEN, CDOT, RTD, and SACWSD will be necessary. USACE Section 404 permitting will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for Superfund site information. Alignment crosses NRHP-eligible canal segment (5AM.261), which will require Section 106 Consultation with SHPO and other parties.
Land Acquisition	Permanent utility easements and temporary construction easements will be needed for a majority of the alignment.
Construction Access	Construction access will be difficult near the Peña Boulevard ramps for the trenchless crossing.
Construction Cost	
Trenchless vs. Open-cut Construction	The crossing of Peña Boulevard for this alternative will avoid a large fill area, some wetlands, and the Peña Boulevard off-ramp, which will make this a more ideal tunneling location. The crossing of Tower Road in this location will occur within a fill area with a lowered roadway, which will require deeper shafts, provide less cover for tunneling, and increase the risk of roadway settlement.
Construction Dewatering	Construction dewatering is expected along the entire alignment because of its proximity to West Fork Second Creek and Second Creek.
Depth and Length of Construction	The proposed profile will exceed typical depths for an interceptor (e.g., less than 15 feet) on the upstream end because of roadway crossings. The depth of bury will decrease as the segment gets closer to Second Creek.

**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 3 – Buckley Road Alignment**

For this alternative, the junction point between the First Creek Segment, Second Creek Segment, and Combined segments of the SD Interceptor will be located just to the south of East 96th Avenue. The First Creek Segment will run south along Buckley Road, cut diagonally southeast through parcel SD-295, cross Peña Boulevard, and then head directly east along East 72nd Avenue to cross West Fork Second Creek and North Tower Road, ending at Denver's Gateway Lift Station.

The Second Creek Segment of the interceptor will follow the same route as that presented for Alternative 1 until it ends at the original junction point and the new project area boundary. The alignment will not continue south from the junction point on parcel SD-286 because flows from Gateway Lift Station will be collected by the Buckley Road segment of the alignment.

One key factor for this alternative is the expected depth of construction. The Buckley Road leg of this alternative will be further from Second Creek, and the increase in grade elevation is expected to push the construction depth to an average of 50 feet.

Alternative 3 General Summary:

- Length ~ 3.66 miles
- Depth ~ 4 to 83 feet
- Diameter – 36 inches
- Trenchless Installations – 3
 - o Peña Boulevard
 - o North Tower Road
 - o A-Line Commuter Rail Tracks
- Agency Connections – 1 (Denver)
- Dewatering Potential – Medium
- Production Rate – Low

Public Impacts

Transportation Impacts	The alignment will be offset from Buckley Road so as not to affect the roadway during construction. Road closures and detours will be required at East 88th Avenue and East 72nd Avenue. There will be some traffic impacts on Tower Road and Peña Boulevard associated with access to trenchless construction shafts.
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Private Property Value Impacts	The alignment will cross through the newly constructed parking lot for the building on the eastern edge of parcel SD-286. The closure of East 81st Avenue will affect access to the airport parking lot on parcel SD-286. Alternative access will need to be coordinated and constructed. There will be potential lost revenue associated with the open-cut construction through the parking lot. Parcel SD-295 is planned for development by DEN. This alternative will dissect the parcel and will decrease land value and the potential for development.
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Public Facility Impacts	None identified.
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Operations and Maintenance

Maintenance Access	Access to the alignment will be good because of its proximity to Buckley Road and other streets. This alternative presents the longest alignment, which will require more pipe and manholes to maintain.
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Operator Safety	As the parcels along Buckley Road are developed, the amount of traffic will increase.
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**Project Area 5 – 96th Avenue to Gateway Lift Station
Alternative 3 – Buckley Road Alignment**

Design Factors

Conflicts and Relocations	The Second Creek Segment will generally parallel the SACWSD sewer interceptor until East 81st Avenue. The water and sewer services for parcel SD-286 will be crossed by the interceptor. Conflicts are not expected because of the anticipated depth of the interceptor. High- and medium-pressure gas lines run down East 80th Avenue to DEN. Both legs of the interceptor will likely cross under these utilities.
Wetland and Environmental Impacts	Three or four mapped wetlands are in the vicinity of the alignment. The Project Team will mitigate this issue by delineating the wetlands to determine more accurate boundaries and adjusting the alignment to avoid them, if possible. The First Creek Segment will not encounter wetlands. The NWR is a Superfund site adjacent to the alignment within parcel SD-226. This site has ongoing cleanup and controls but presents a low risk because the alignment stays outside of federal land.
Floodplains and Drainageways	A majority of the alignment will be within the floodplain for this segment. Manhole locations will be located outside the floodplain where possible.

Project Schedule

Permitting and Third-party Coordination	Coordination with Denver, Commerce City, DEN, CDOT, RTD, and SACWSD will be necessary. USACE Section 404 permitting will be required, which may include coordination with USFWS. Appropriate city/county/state agencies will need to be contacted for Superfund site information.
Land Acquisition	Permanent utility easements and temporary construction easements will be needed for a majority of the alignment. Because of the overall length of the two segments, this alternative will have the highest land acquisition cost.
Construction Access	Construction access along Buckley Road will be good where the alignment parallels the street. Construction access will be difficult near the Peña Boulevard ramps for the trenchless crossings.

Construction Cost

Trenchless vs. Open-cut Construction	This alternative will be farther from Second Creek than both of the previous alternatives. The distance from the creek will push the construction depth to as deep as 80 feet in some areas. This depth of construction will only be possible through trenchless construction methods and will increase the risk and cost of construction significantly for this alternative.
Construction Dewatering	Construction dewatering is expected along the entire Second Creek Segment because of its proximity to West Fork Second Creek and Second Creek. Dewatering is not anticipated for the First Creek Segment along Buckley Road.
Depth and Length of Construction	The proposed profile will exceed typical depths for an interceptor (e.g., less than 15 feet) along Buckley Road and on the upstream end because of roadway crossings. The depth of bury will decrease as the Second Creek Segment gets closer to Second Creek.

Project Area 6

Figure B-5 shows the Project Area 6 extents with two alternative alignments between the intersection of East 80th Avenue and North Tower Road on the downstream end and the Second Creek Lift Station on the upstream end. One key factor in this project area is the connection at the upstream end to the Second Creek Lift Station. Second Creek Lift Station is the most-upstream connection point of the SD Interceptor, and the inlet elevation at the lift station will serve as a fixed starting elevation for the Project. Most of this project area is within DEN property. Alignment descriptions are provided at the beginning of each alternative analysis section.

Coordination with DEN improvements were considered for this project area. DEN's future construction improvements include the widening of Peña Boulevard, a business park development, and a future runway project. Additionally, DEN has plans to connect to the SD Interceptor at approximately station 1080+00, which was proposed as a part of the RMP.

Additional key features in this project area include trenchless crossings of North Tower Road, E-470, and Peña Boulevard. The crossing of the A-Line commuter rail will be at an elevated portion of the rail and can likely be constructed via open cut. The crossing of North Tower Road will occur where the roadway and pedestrian trail have been recently upgraded and replaced, and new utilities within this corridor will need to be investigated. The anticipated subsurface conditions include dry fine to coarse alluvium (clay, silt, sand, and gravel) over shallow claystone bedrock. Viable trenchless methods for this crossing include TBM or a guided auger bore equipped with a cutting edge suitable for claystone. The crossings of Peña Boulevard and E-470 will occur within dry to wet, fine to coarse alluvium (clay, silt, sand, and gravel) over shallow claystone bedrock. The most viable trenchless method for both crossings is TBM.



Figure B-5: Project Area 6 Alternatives Data

**Project Area 6 – First Creek Interceptor Junction Point to Second Creek Lift Station
Alternative 1 – RMP Alignment**

This alignment will head east from the Junction Point to cross E-470. After the crossing, it will generally follow Second Creek southeast until it turns south to cross Peña Boulevard at a perpendicular angle. Then, it will head southeast again along Second Creek, cross in front of the future DEN runway, and end at the Second Creek Lift Station and the project area boundary.

Alternative 1 General Summary:

- Length ~ 5 miles
- Depth ~ 10 to 50 feet
- Diameter – 42 inches
- Trenchless Installations – 3
 - o E-470
 - o Tower Road
 - o Peña Boulevard and A-Line Commuter Rail Tracks
- Agency Connections – 2 (Denver and Aurora)
- Dewatering – Medium
- Production Rate – High

Public Impacts

Transportation Impacts	Minimal traffic impacts are anticipated on Tower Road to access the pits for the trenchless crossing. The trenchless crossings for E-470 and Peña Boulevard will be located at elevated road segments; therefore, no traffic impacts are expected other than for construction surveys and monitoring.
Private Property Value Impacts	None identified.
Public Facility Impacts	No impacts identified. Alignment will cross to the west of a future DEN runway.

Operations and Maintenance

Maintenance Access	Gravel access roads will need to be constructed for maintenance for most of the alignment. Access to manholes between the E-470 and Peña Boulevard crossings will be difficult.
Operator Safety	The alignment will be in the exclusion zone of a future runway and 1,000 feet from the edge of the runway. Noise and wind will be likely hazards.

Design Factors

Conflicts and Relocations	Several known high- and medium-pressure gas lines surround Peña Boulevard and the E-470 interchange. The interceptor will likely cross under these utilities.
Wetland and Environmental Impacts	The alignment will end at the Second Creek Lift Station, which is currently being constructed on the western side of Second Creek. A crossing of Second Creek will not be required; however, a tributary to Second Creek will be crossed. Only temporary wetland impacts are anticipated.
Floodplains and Drainageways	Most of the alignment will be within the floodplain for this segment. Manhole locations will be located outside the floodplain where possible.

**Project Area 6 – First Creek Interceptor Junction Point to Second Creek Lift Station
Alternative 1 – RMP Alignment**

Project Schedule

Permitting and Third-party Coordination	Coordination with the Denver and DEN will be required, specifically with regard to the planned new runway. Access to DEN property will be difficult and will need to be coordinated. Permitting will be required through the Federal Aviation Association (FAA) because of the alignment's proximity to the future runway project. The alignment crosses an NRHP-eligible canal segment (5AM.261) and an NRHP-eligible archaeological site (5DV.3017), which will require Section 106 Consultation with SHPO and other parties.
Land Acquisition	Permanent utility easements and temporary construction easements will be needed for the entire alignment. DEN land acquisition will be time consuming.
Construction Access	Construction access for most of the segment will be good. The stretch of the alignment between E-470 and Peña Boulevard will be difficult to access and will need to be coordinated with DEN from East 78th Avenue.

Construction Cost

Trenchless vs. Open-cut Construction	Risks associated with the trenchless crossings for this alternative are the same as those under Alternative 2, including settlement of the roadways and traffic disruptions.
Construction Dewatering	Construction dewatering is anticipated for most of the alignment because of its proximity to Second Creek.
Depth and Length of Construction	Construction depth west of the future runway will exceed typical interceptor construction because of the required 1,000-foot offset to the runway. Larger working areas will be required to avoid additional trenchless construction.

**Project Area 6 – First Creek Interceptor Junction Point to Second Creek Lift Station
Alternative 2 – Northeast Alignment**

This alternative will generally follow the same path as the RMP alignment but will be slightly modified so that the alignment will be closer to Second Creek. This shift will increase the anticipated amount of construction dewatering; however, a significant decrease in the depth of construction will result in a lower total construction cost and a shorter construction schedule.

Alternative 2 General Summary:

- Length ~ 5 miles
- Depth ~ 6.5 to 30 feet
- Diameter – 42 inches
- Trenchless Installations – 3
 - o North Tower Road
 - o E-470
 - o Peña Boulevard and A-Line Commuter Rail Tracks
- Agency Connections – 2 (Denver and Aurora)
- Dewatering Potential – Medium
- Production Rate – Medium

Public Impacts

Transportation Impacts	Minimal traffic impacts are anticipated on North Tower Road to access the pits for the trenchless crossing. The trenchless crossings for E-470 and Peña Boulevard will be located at elevated road segments; therefore, no traffic impacts are expected other than for construction surveys and monitoring.
Private Property Value Impacts	A portion of the alignment will cross a landfill on parcel SD-270.
Public Facility Impacts	None identified. Alignment will cross to the north of a future DEN runway.

Operations and Maintenance

Maintenance Access	Gravel access roads will need to be constructed for maintenance for most of the alignment. Access to manholes between the E-470 and Peña Boulevard crossings will be difficult.
Operator Safety	The alignment will be in the exclusion zone of a future runway and 1,000 feet from the edge of the runway. Noise and wind will be likely hazards.

Design Factors

Conflicts and Relocations	Several known high- and medium-pressure gas lines surround the Peña Boulevard and E-470 interchange. The interceptor will likely cross under these utilities.
Wetland and Environmental Impacts	The alignment will end at the Second Creek Lift Station, which is currently being constructed on the western side of Second Creek. A crossing of Second Creek will not be required; however, a tributary to Second Creek will be crossed. Only temporary wetland impacts are anticipated.
Floodplains and Drainageways	Most of the alignment will be within the floodplain for this segment. Manhole locations will be outside the floodplain where possible.

**Project Area 6 – First Creek Interceptor Junction Point to Second Creek Lift Station
Alternative 2 – Northeast Alignment**

Project Schedule

Permitting and Third-party Coordination	Coordination with the Denver and DEN will be required, specifically with regard to the planned new runway. Access to DEN property will be difficult and will need to be coordinated. Permitting will be required through the FAA because of the alignment's proximity to the future runway project. The alignment crosses an NRHP-eligible canal segment (5AM.261), which will require Section 106 Consultation with SHPO and other parties.
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Land Acquisition	Permanent utility easements and temporary construction easements will be needed for the entire alignment. DEN land acquisition will be time consuming.
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Construction Access	Construction access for most of the segment will be good. The stretch of the alignment between E-470 and Peña Boulevard will be difficult to access and will need to be coordinated with DEN from East 78th Avenue.
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Construction Cost

Trenchless vs. Open-cut Construction	Risks associated with the trenchless crossings for this alternative are the same as those under Alternative 1, including settlement of the roadways and traffic disruptions.
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Construction Dewatering	Construction dewatering is anticipated for most of the alignment because of its proximity to Second Creek.
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Depth and Length of Construction	Construction depth west of the future runway will exceed typical interceptor construction because of the required 1,000-foot offset to the runway. Larger working areas will be required to avoid additional trenchless construction.
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Second Creek Recommended Alignment

To evaluate the alternatives for each project area, the decision support criteria (see Table B-2) were first assigned an overall importance weight. Next, the differentiators between alternatives were defined to provide a range in scores for each criterion. Table B-3 presents the criteria, scoring definitions, and the criteria weight.

Table B-3: Decision Support Criteria Weights and Scoring Definitions

Criteria	Points	Weight	Scoring Definition
Public Impacts			
1. Transportation Impacts		4	
None	10		Construction not within roadways.
Moderate	5		Construction within residential roadways with efficient detour opportunities.
High	1		Construction requiring multiple lane closures in collector or higher volume streets. Construction in arterial roadways.
2. Private Property Value Impacts		5	
None	10		No private property impacts. Work is contained within public ROW or within easements of adequate width.
Moderate	5		Work is contained within newly acquired easements but does not impact improvements on private property.
High	1		Sewer improvements will result in construction activities on private property that will impact improvements on property.
3. Public Facility Impacts		3	
None	10		No work within parks, open space, or other public spaces.
Moderate	5		Limited work within parks, open space, or other public spaces that will require short-duration and temporary closure of the area.
High	1		Significant work within parks, open space, or other public spaces that will require temporary closure of the area.
Operations and Maintenance			
4. Maintenance Access		10	
Good	10		No access issues associated with maintenance activities, including CCTV and Vector truck access.
Moderate	5		Select areas of poor or limited maintenance access.
Poor	1		Poor access for maintenance activities.

Table B-3: Decision Support Criteria Weights and Scoring Definitions

Criteria	Points	Weight	Scoring Definition
5. Operator Safety		14	
Good	10		All manholes are located in open space with none in existing roadways.
Moderate	5		Some manholes are located in existing roadways with lane or road closures available to perform maintenance activities.
Poor	1		All manholes are located in existing roadways with no lane or road closures available to perform maintenance activities.
Design Factors			
6. Conflicts and Relocations		5	
None	10		No utility conflicts are anticipated.
Moderate	5		Some number of utility conflicts requiring relocation.
High	1		Significant number of conflicts requiring relocation.
7. Wetland and Environmental Impacts		3	
None	10		No anticipated wetland impacts.
High	1		Significant wetland impacts.
8. Floodplains and Drainageways		4	
None	10		System is outside the 100-year floodplain, minimizing long-term maintenance issues, and system is outside the floodway/main channel, minimizing short-term construction risk.
Moderate	5		System is outside the 100-year floodplain, minimizing long-term maintenance issues, but system is not outside the floodway/main channel.
High	1		System is within the main channel and susceptible to flood-related maintenance issues.
Project Schedule			
9. Permitting and Third-party Coordination		7	
None	10		No significant permitting or third-party coordination required. No third-party infrastructure improvements that will impact the SD Interceptor.
Moderate	5		Typical third-party coordination requirements without schedule impacts.
High	1		Permitting and third-party coordination likely to impact schedule. Third-party infrastructure improvements likely to impact the SD Interceptor in the future.

Table B-3: Decision Support Criteria Weights and Scoring Definitions

Criteria	Points	Weight	Scoring Definition
10. Land Acquisition		7	
None	10		No land acquisition required.
Moderate	5		Land acquisition required. Schedule estimated to be less than 6 months.
High	1		Land acquisition required. Schedule estimated to be greater than 6 months.
11. Construction Access		9	
Good	10		Open access for construction equipment and materials. Access is available from multiple points along the alignment.
Poor	1		Access is constrained and available from only one point along the alignment.
Construction Cost			
12. Trenchless vs. Open-cut Construction		9	
None	10		Minimal construction risk. Typical construction issues and mitigation measures. Primarily open-cut construction.
Moderate	5		Moderate construction risk. Typical construction issues and mitigation measures. Use of trenchless methods in select areas.
High	1		Reliance on trenchless methods with few opportunities to mitigate risk through obtaining field data or similar information.
13. Construction Dewatering		8	
None	10		No construction dewatering anticipated. Groundwater not expected, or construction method will not require dewatering (i.e., trenchless).
Moderate	5		Minor construction dewatering anticipated with minimal regulatory risk.
High	1		Dewatering anticipated with discharge to Second Creek or the South Platte River and risk of CDPHE regulatory requirements.
14. Depth and Length of Construction		12	
Low	10		Average depth of interceptor is less than 20 feet.
Moderate	5		Average depth of interceptor is between 20 and 30 feet.
High	1		Average depth of interceptor is greater than 30 feet.

Note: CCTV = closed circuit television

Table B-4 presents the results of the alternatives evaluation for Project Areas 3 through 6 within Commerce City using the decision support criteria, weights, and scoring in a decision support matrix (see Table B-4). The Initial Status column on the right-hand side of the table indicates which alignment alternatives are ranked highest and preferred to be used for final design. These alignments will be further evaluated and refined as the design progresses.

Table B-4: Decision Support Matrix

Project Area	Alignment Alternative	Public Impacts			O&M		Design Factors			Project Schedule			Construction Cost			Weighted Totals	Initial Status
		Transportation Impacts	Private Property Value Impacts	Public Property Impacts	Maintenance Access	Operator Safety	Utility Conflicts and Relocations	Wetland and Environmental Impacts	Floodplain and Drainageways	Permitting and Third-party Coordination	Land Acquisition	Construction Access	Trenchless vs. Open-cut Construction	Construction Dewatering	Depth and Length of Construction		
	Criteria Weight	4	5	3	10	14	5	3	4	7	7	9	9	8	12	100	
3	1. RMP	2	1	3	2	5	4	9	10	4	1	2	4	5	2	352	
	2. Central	3	3	1	4	5	2	5	10	4	2	2	5	5	3	386	
	3. Commerce City	2	6	6	3	6	6	3	8	5	5	2	2	5	5	447	Selected
4	1. RMP West	5	7	2	8	9	8	5	4	6	4	7	7	5	4	622	Selected
	2. RMP East	5	7	2	8	9	5	4	3	5	3	5	8	5	4	577	
5	1. Modified RMP	7	4	9	6	8	7	4	5	6	5	5	6	4	5	582	
	2. East	7	4	9	6	8	7	5	4	6	5	5	7	4	6	602	Selected
	3. Buckley Road	7	4	9	8	6	7	9	9	3	3	5	3	2	1	479	
6	1. Modified RMP	8	9	10	4	6	3	7	3	5	3	1	5	6	3	473	
	2. Northeast	8	9	10	4	6	7	7	3	5	3	1	5	6	4	505	Selected

Note: O&M = operations and maintenance

Appendix C:

Flammable Gas Investigation Plan

Memo

Date:
(Revision 1) Monday, March 04, 2019

Date:
(Initial Submittal) Monday, January 28, 2019

Project: PAR 1232: Second Creek Interceptor and Sand Creek Interceptor System Improvements

To: Tri-County Health Department

From: Metro Wastewater Reclamation District, HDR Engineering, and Shannon & Wilson

Subject: Flammable Gas Investigation Plan

Introduction

The PAR 1232 Second Creek Interceptor (SD Interceptor) and Sand Creek Interceptor System (SCIS) Improvements Project (Project) is being initiated by the Metro Wastewater Reclamation District (Metro District or District) to provide a regional solution to conveyance in the northeastern portion of the Metro District's service area. This Project includes the design and construction of the new SD Interceptor, an approximately 17.5-mile long interceptor, as well as improvements to portions of the existing SCIS to alleviate capacity constraints in the system. The Project will be delivered through the Construction Manager at Risk (CMAR) project delivery method. This delivery method was recommended to enhance overall Project value through collaboration with the CMAR contractor and specialty subcontractors during design and construction phases.

The purpose of this memo is to provide a flammable gas investigation plan (Plan) for portions of the SD Interceptor and SCIS improvements that are located within 1,000-feet of known landfill sites. The Tri-County Health Department (TCHD) has recommended in a meeting on October 2, 2018 that a flammable soil gas investigation should be performed to evaluate if methane gas may potentially be present as a result of these landfills. The Plan includes groundwater and methane monitoring wells installed in conjunction with the geotechnical investigation for the Project.

After completion and acceptance of the Plan by TCHD, the wells will be installed during winter/spring 2019. Initial monitoring will be performed during well installation, and subsequent periodic monitoring will be performed at the frequencies proposed below. Monitoring results will be summarized in reports during the design and construction phases and submitted to TCHD for review. All pre-construction groundwater and methane monitoring will be performed by the geotechnical subcontractor, and construction monitoring will be performed by the CMAR. Based on recommendations from TCHD, additional or follow-up monitoring will occur as necessary.

In addition, prior to beginning construction in 2020, a Materials Management Plan (MMP) will be submitted to TCHD and the Colorado Department of Public Health and Environment's (CDPHE) Solids Waste Division for review. CDPHE must approve the MMP prior to the start of construction. To ensure appropriate health and safety measures during construction, the construction

specifications will also require that a Health and Safety Plan (HASP) is prepared prior to the start of construction.

Site Descriptions and Monitoring Requirements

The SD Interceptor alignment passes within 1,000-feet of four known landfill sites. The portion of the SCIS improvements adjacent to the District's Robert W. Hite Treatment Facility (RWHTF) is within one known landfill. Appendix A provides figures of the SD Interceptor and SCIS alignments in relation to these known landfills, as well as proposed monitoring locations.

The following sections define flammable gas monitoring requirements for each individual landfill site as recommended by TCHD in a phone call that occurred on November 20, 2018. Two phases of monitoring are proposed: initial monitoring during the design phase of the Project, and monitoring to take place during construction of the Project. Shannon and Wilson Inc. is conducting the geotechnical work during the design phase, and will be conducting all initial pre-construction methane and groundwater monitoring. Garney, the CMAR contractor, will be responsible for methane monitoring during the construction phase. Garney will develop a separate construction-phase monitoring plan, and will summarize the results in reports that will be submitted to TCHD for review. Additionally, Garney will be responsible for developing and submitting the MMP for approval by TCHD and CDPHE, as well as the HASP, prior to the start of construction.

SD Interceptor Sites

Landfill AD-113

The SD Interceptor is within 600-feet of this landfill, however the South Platte River is located between the landfill and the proposed interceptor location. No monitoring is required per TCHD recommendation, as the river acts as a barrier. See Appendix A, Figure 1.

Landfill AD-119

The SD Interceptor is within 600-feet of this landfill, however due to the known history of the landfill and per TCHD recommendation, no monitoring is required during the design phase in this location. Methane monitoring will be required during construction, and a separate monitoring plan will be prepared at that time. See Appendix A, Figure 1.

Landfill (Henderson Rd & E 124th Ave)

The SD Interceptor is within 250-feet of this landfill. A groundwater monitoring well and a methane monitoring well are required in this location per TCHD recommendation. Both wells should be tested weekly for a total of eight weeks during the design phase. Methane monitoring may be required during construction based on the results of this preliminary methane investigation.

Wells will be located at Geotechnical Boring number 1100TW, shown in Appendix A, Figure 2. A groundwater monitoring well was installed at this location at a depth of 18.5 feet on September 20, 2018. A methane monitoring well will be installed to a depth of approximately 8 feet adjacent to the existing groundwater monitoring well.

Landfill AD-75

The SD Interceptor runs adjacent to this landfill for approximately 2,000-feet. Monitoring of both groundwater and methane are required at this location per TCHD recommendations. Due to the presence of shallow groundwater at this location (< 1 foot below existing ground surface), both methane and groundwater monitoring will be performed with the groundwater monitoring wells; separate methane monitoring wells will not be utilized. Each well should be tested weekly for a total of eight weeks during the design phase. Methane monitoring will be required continuously during construction, and a separate monitoring plan will be prepared at that time.

Wells will be located at Geotechnical Boring numbers 3105TW & 3110PW, shown in Appendix A, Figure 3. Groundwater monitoring wells will be installed to the top of bedrock at these locations. Methane monitoring will be performed from within the groundwater monitoring wells using a passive sampler as described below under “Field Investigations.”

Landfill AD-072

The SD Interceptor runs adjacent to the parking lot of this active landfill. Methane monitoring wells have been installed on the active portion of the landfill site. These wells are continuously monitored by the Tower Road Landfill and the results are submitted to the TCHD quarterly. Figure 4 in Appendix A shows the SD Interceptor alignment in this area as well as the approximate location of existing monitoring wells. Data from these wells has been requested and will be included in the data report for this investigation plan. Additionally, Second Creek is located between the SD Interceptor alignment and the active portion of the landfill in this area, and it is anticipated that the creek will act as a barrier for contamination.

SCIS Sites – RWHTF Facility

Landfill AD-117

The SCIS runs adjacent to this landfill for approximately 550-feet. See Appendix A, Figure 5. Groundwater and methane monitoring are required in this location per TCHD recommendation. Landfill AD-117 has been abandoned and the site is now owned and operated by the Suncor Commerce City Refinery (Suncor). Appendix A, Figure 6 shows a map of the Suncor site including existing contaminant mitigation structures, groundwater elevation contours, and monitoring well and piezometer locations. Due to restrictions on Suncor property, both methane and groundwater monitoring will be performed within an existing groundwater monitoring well; a separate methane monitoring well is not viable and will not be utilized.

Existing well number WLA-TW-3 shown in the figures is proposed for monitoring. This well will be tested weekly for a total of eight weeks during the design phase. Methane monitoring will be required continuously during construction, and a separate monitoring plan will be prepared at that time. Depending on the level of groundwater in the well during sampling, methane monitoring can be performed using either of the methods listed below under “Field Investigations.”

Scope of Work

Well Installation and Monitoring Approach

Groundwater monitoring wells will be installed at the top of bedrock. The wells will consist of a threaded, flush-jointed, 2-inch inside diameter, Schedule 40, polyvinyl chloride (PVC) well casing with a slotted portion (screen) to allow for inflow of groundwater. The machine-slotted screen will have 0.010-inch wide openings (No. 10-slot). An end cap will be attached to the bottom of the slotted section. The length of the screened interval is expected to be 10 feet based on soil units encountered in nearby borings and anticipated groundwater levels.

A filter pack consisting of No. 10-20 silica sand will be poured in the annular space between the boring wall and the well screen from the bottom of the boring to approximately 2 feet above the top of the screen. A bentonite seal will be constructed above the top of the filter pack using hydrated bentonite chips, which will be placed to the top of the well.

Methane monitoring wells will be constructed in a similar manner to the groundwater monitoring wells, using the same materials. The methane monitoring wells would be installed to within 6 inches to 1 foot above the approximate groundwater depth to allow for potential seasonal groundwater fluctuations. To maximize the potential for methane gas to enter the well, the machine-slotted screen will be installed from the bottom of the well to just below the required bentonite well seal.

Both the groundwater and methane monitoring wells will be completed flush with the surrounding grade by placing a 6-inch-diameter, flush-mounted steel monument over the top of the borehole. The steel monuments will be set in place with quick-set concrete.

Periodic groundwater monitoring will be performed using an electronic water level indicator. Periodic methane monitoring will be performed using a direct read instrument such as a flame ionization detector (FID). A FID is capable of detecting lower concentrations of methane gas in the parts per million (ppm) range than a combustible gas indicator (aka multi-gas meter).

Where shallow groundwater (< 1 foot below existing ground surface) is encountered, methane monitoring wells will not be installed. Instead, monitoring for dissolved methane will be performed in the groundwater well using a passive diffusion sample bag (i.e. HydraSleeve). This methodology will also be utilized in the event the groundwater level in the methane monitoring wells were to rise too high to allow for monitoring using the FID. After the diffusion membrane sampler has been prepared, it will be placed in the well for up to three days and allowed to absorb groundwater and methane into the sampling bag. The sampler will then be collected and delivered under chain-of-custody procedures to an analytical testing laboratory and analyzed for dissolved methane using EPA method RSK-175. This testing method is considered an industry-accepted standard for sampling in shallow groundwater conditions. Based on information from the testing laboratory, the method detection limit is 0.01 mg/L, which is sufficiently low enough to ensure that low levels of methane will be detected in low solubility conditions.

Pumping down groundwater levels in areas of shallow groundwater was investigated. However, the process of pumping groundwater out of the well would introduce oxygen into the system, which could alter the biological processes responsible for generating methane. As a result, the methane concentrations (if possible to detect) would not likely be representative. Additionally, existing borings drilled near locations with high groundwater conditions encountered poorly-graded sands, which would likely recharge quickly and not allow the well to remain dry if groundwater were pumped out.

Bar hole probe monitoring was also investigated as an alternative means of monitoring in areas of shallow groundwater. While the bar hole probe approach has been used in the past in limited conditions, it can be difficult to obtain consistent and representative samples given that air intrusion could occur when driving in the bar. The passive diffusion sample bag method will be used for methane monitoring for this Project.

Field Data and Reporting

Field data such as sample date, time, location, weather conditions, sample methods used, and meter methane readings will be recorded in a project field book for all sample points. Upon completion of monitoring, a report will be prepared summarizing the investigation and methane results. Additional sampling, testing, and methane mitigation will be defined at this time if required given the results presented in the investigation report.

Schedule

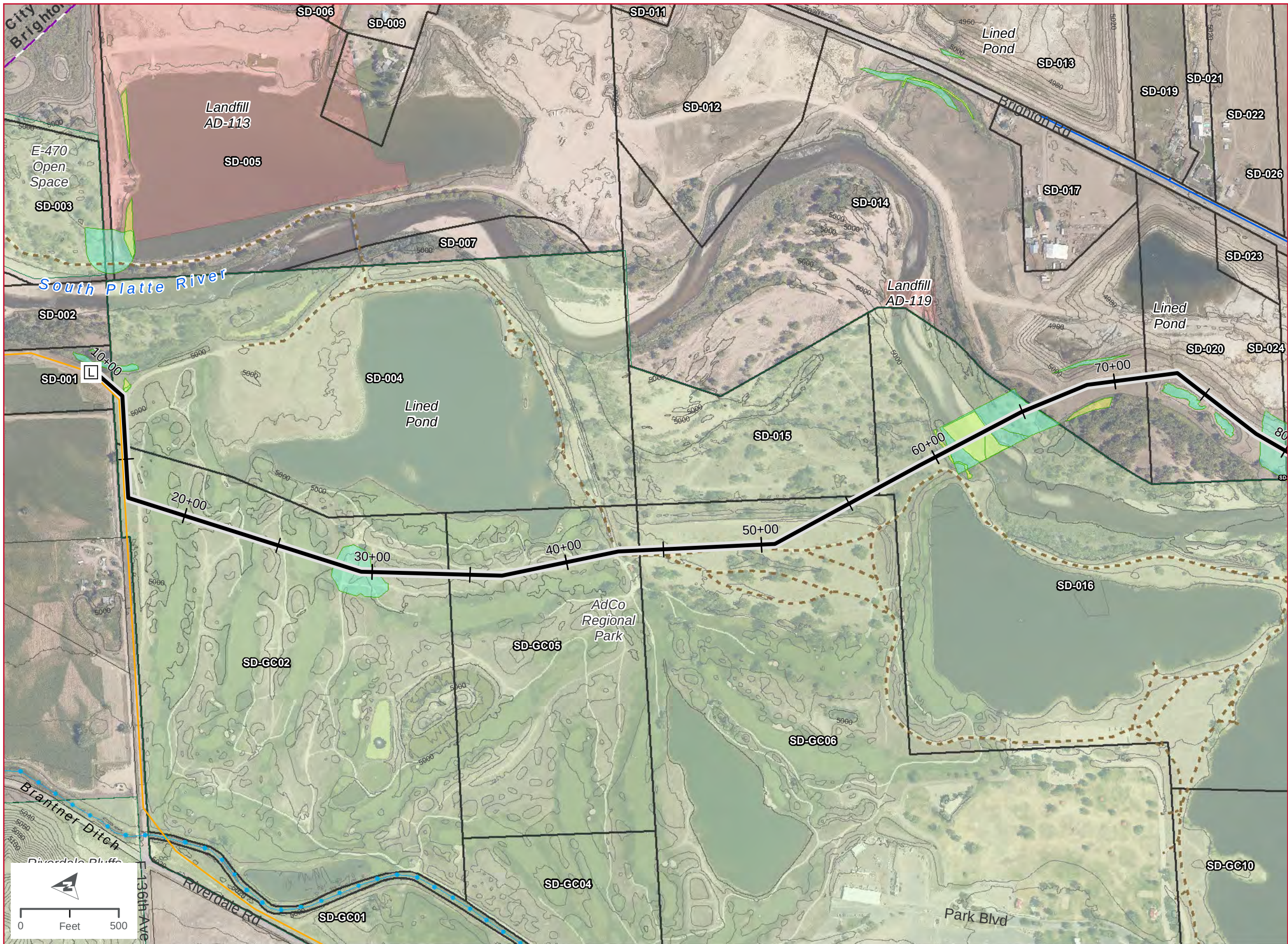
The SD Interceptor project is currently in the preliminary design phase. Phase 1 of the geotechnical boring work was completed on January 7, 2019. Installation of groundwater and methane monitoring wells will take place during the Phase 2 geotechnical boring work beginning on February 1, 2019 and continuing through December 31, 2019. The Design Phase of the project will continue through the end of 2020, with Construction taking place from 2020 through 2023.

Limitations

Flammable gas investigations will be performed in a manner that is consistent with generally accepted practices undertaken in similar studies in the same geographic area during the same period. Actual conditions may vary from those encountered at specific sampling points. The data, interpretations, findings, and final recommendations will be based solely on data obtained at the time and within the scope of this investigation plan. This investigation will not result in any guarantee that the site is free and clear of hazardous materials other than those which may be indicated in the report.

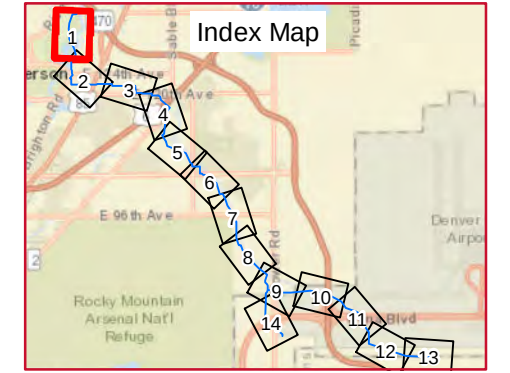
Appendix A

Supporting Figures



SECOND CREEK INTERCEPTOR
PREFERRED ALIGNMENT
FIGURE 1

- SDI Preferred Alignment
 - Irrigation Ditch
 - Trail
 - Known Landfill
 - Waters of the US (Jacobs)
 - Wetland (Jacobs)
 - Park / Open Space
 - SDI Parcel
 - City Boundary
 - County Boundary
- Existing Utilities
- Lift Station
 - Water Main
 - Sanitary Main

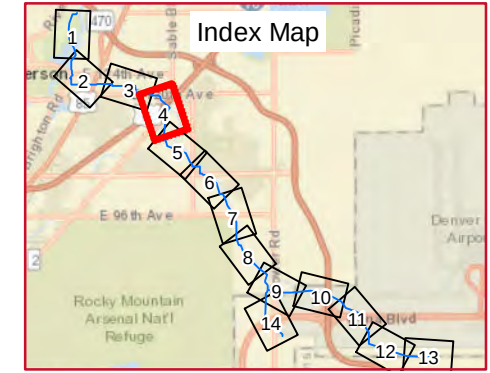


DATA SOURCES: MWRD, City and County of Denver, Adams County, National Wetlands Inventory, Commerce City, HDR

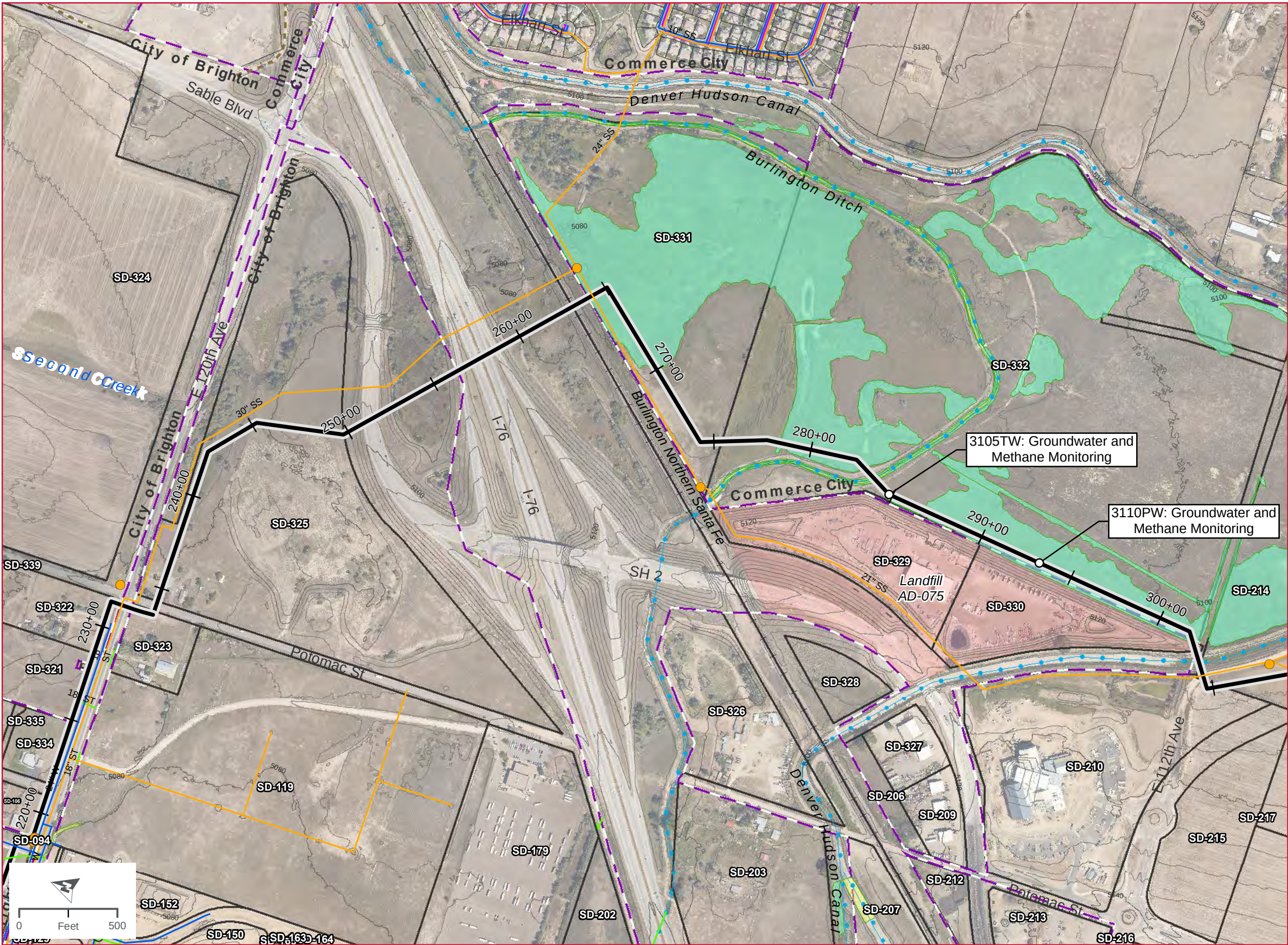


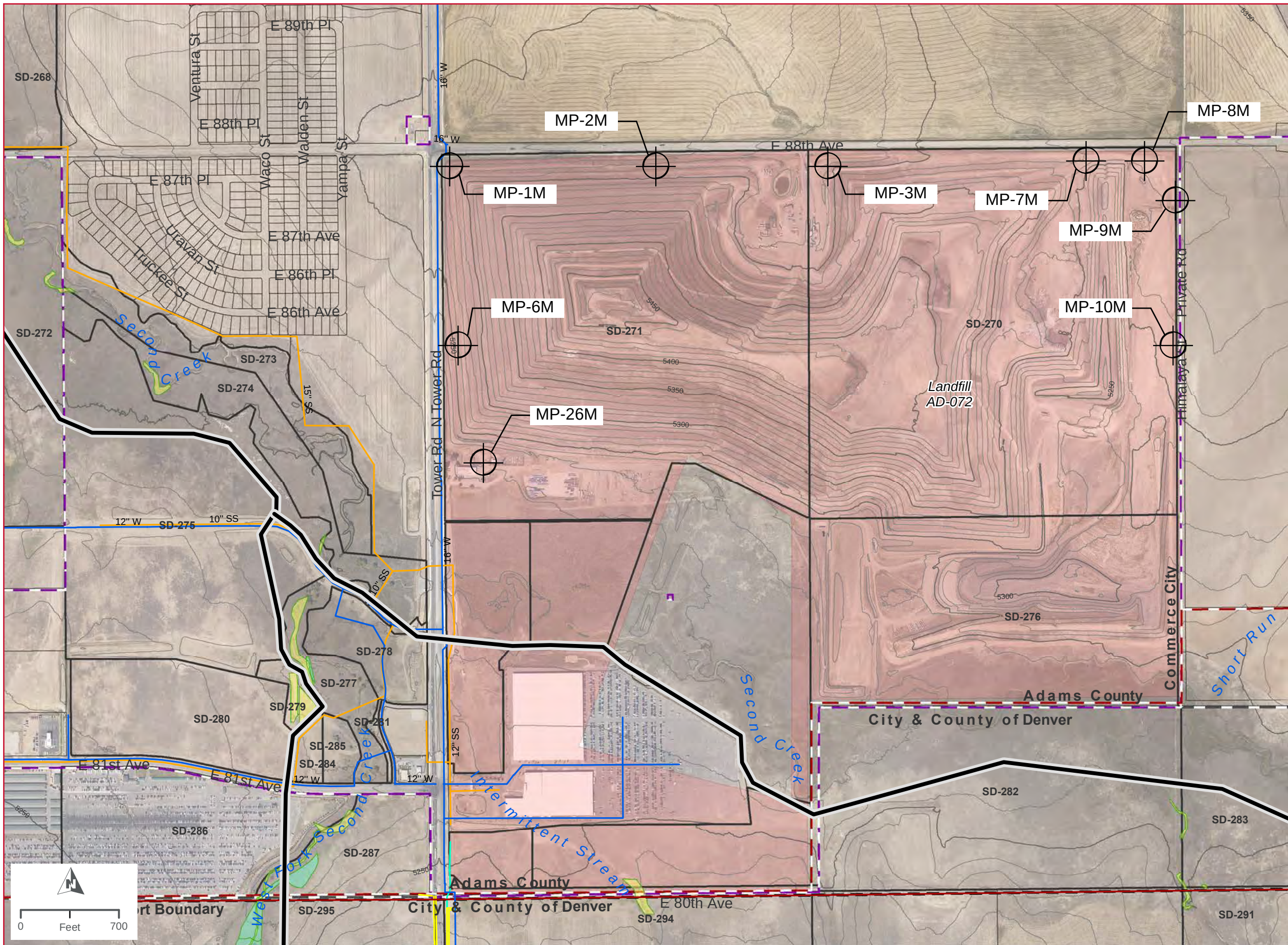
SECOND CREEK INTERCEPTOR
PREFERRED ALIGNMENT
FIGURE 3

- SDI Preferred Alignment
 - Irrigation Ditch
 - Railroad
 - Trail
 - Known Landfill
 - Waters of the US (Jacobs)
 - Wetland (Jacobs)
 - Park / Open Space
 - SDI Parcel
 - City Boundary
 - County Boundary
- Existing Utilities
- Lift Station
 - Water Main
 - Sanitary Manhole (Surveyed)
 - Sanitary Main
 - Non-potable Water Main
 - Storm Main



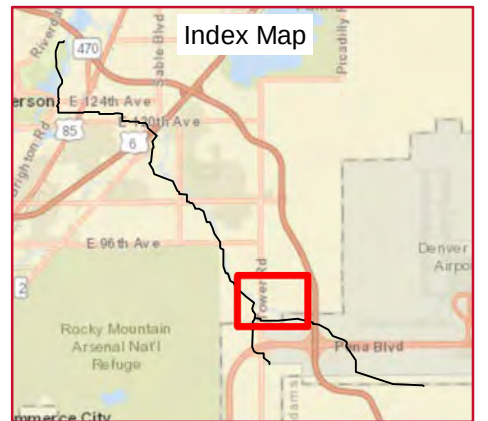
DATA SOURCES: MWRD, City and County of Denver, Adams County, National Wetlands Inventory, Commerce City, HDR





SECOND CREEK INTERCEPTOR PREFERRED ALIGNMENT TOWER LANDFILL FIGURE 4

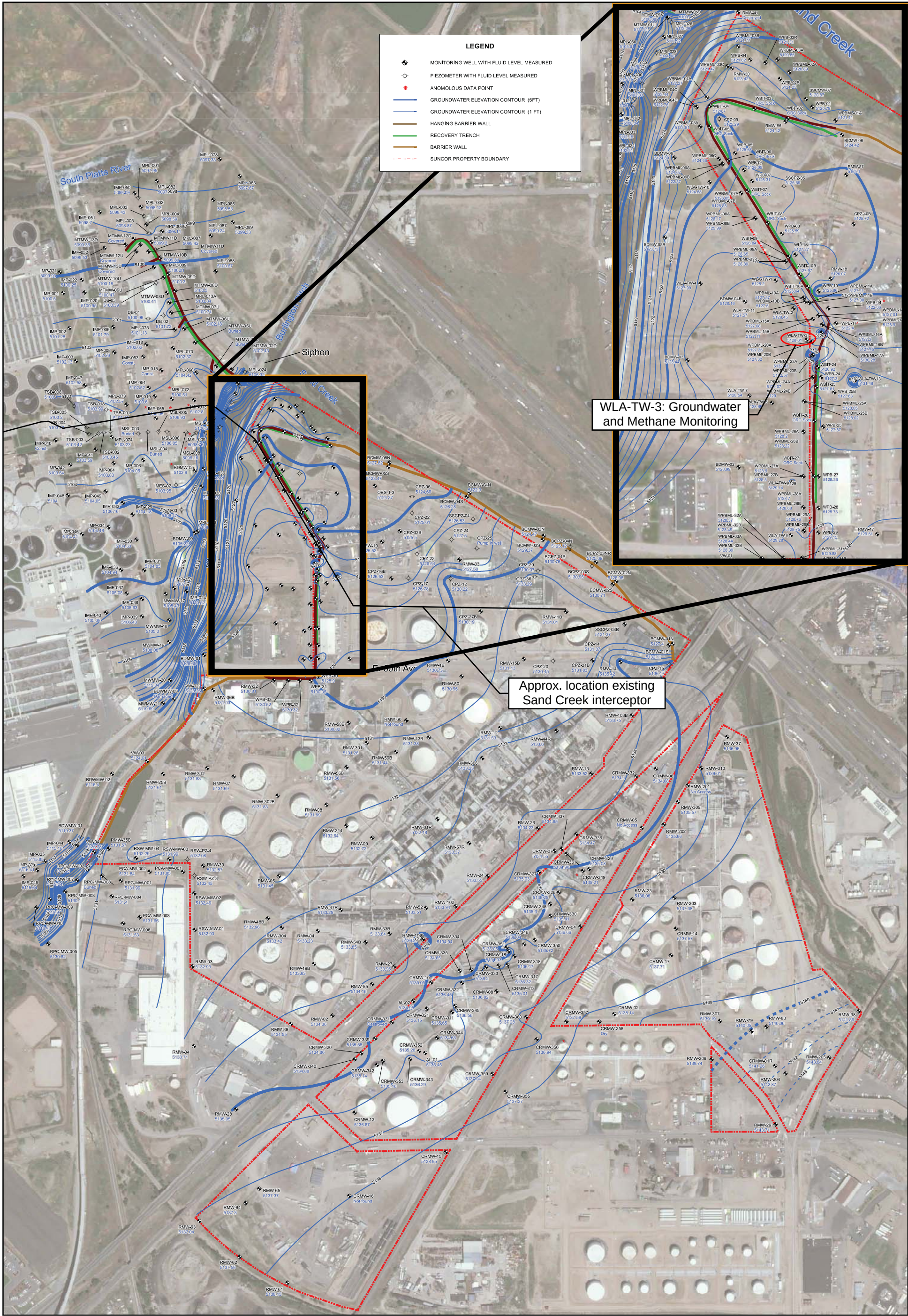
- SDI Preferred
 - Known Landfill
 - Waters of the US (Jacobs)
 - Wetland (Jacobs)
 - Park / Open Space
 - SDI Parcel
 - DEN Airport
 - City Boundary
 - County Boundary
- Existing Utilities
- Lift Station
 - Water Main
 - Sanitary Main
 - DEN Jet Fuel Line
 - Underground Electric
 - Telecom Line
 - Methane Monitoring Well



DATA SOURCES: MWRD, City and County of Denver, Adams County, National Wetlands Inventory, Commerce City, HDR



SAND CREEK INTERCEPTOR IMPROVEMENTS
METRO WASTEWATER RECLAMATION DISTRICT
FIGURE 5



Appendix D:

**2017 Annual Operating Report and Transmission Emergency
Response Schedule and Procedure**

2017 RWHTF Annual Operating Plan

Metro Wastewater Reclamation District RWHTF Operations and Maintenance Department

The plan for operation of the Robert W. Hite Treatment Facility (RWHTF) and Transmission System in 2017 is outlined in this document. Beyond routine daily operations, the O&M Department works with other District departments to support facility planning, coordination with PARs, District Initiatives, and in identifying and resolving challenges and opportunities that ultimately help make operations more efficient, cost-effective, and up-to-date with industry.

This Plan provides:

- Section 1 – Focus Area plans for addressing challenges and opportunities in 2017
- Section 2 – Anticipated flow/load conditions for 2017 with unit process capacity ratings
- Section 3 – Operating approaches for the major unit processes
- Section 4 – 2017 Annual FIP for Transmission

1. FOCUS AREAS

The Operations Division, in collaboration with multiple other District Divisions and Departments, will implement a new concept in 2017 for addressing challenges and opportunities facing the Treatment and Transmission systems, and for making significant progress towards O&M, Strategic Plan, and broader District goals. In 2017, Focus Area Teams will be assembled to allow staff to take ownership in specific technical process, business process, outreach, strategic planning, and staff training improvements. The Focus Area Teams will report quarterly on progress towards the specifically assigned objectives, and will develop an annual report on the benefits gained through the efforts of staff. This section outlines the eight Focus Areas that have been identified for increased effort during 2017, identifies the Focus Area Team leads for each, and provides a currently estimated timeline for initiation, progress, and completion.

- a) Streamlined Operational Reporting: The Weekly Targets and Monthly Reports that have been generated by Treatment have become outdated and cumbersome to maintain. Simplified systems have been presented to the District for managing the data and information contained within the reports, allowing for staff time savings along with improved automation and reliability of reports. In 2017, this Focus Area Team will assist Treatment with implementing a new Weekly Targets format that meets the needs of a state-of-the-art treatment facility.

Specific goals and timelines for the Streamlined Operational Reporting Focus Area include:

- Initiation of the Streamlined Operational Reporting Focus Area Team (March 2017)
- Determination of hardware/software systems to be used for the new Weekly Targets (by May 2017)
- Single unit process trial of the new Weekly Targets automation and presentation approach (by August 2017)

- Full-plant implementation of the new Weekly Targets automation and presentation approach (by December 2017)

Focus Area Team Leads: Martin Alvis, Tom Acampora, Perry Holland

Support Staff: Bill Wendt, Barbara Wilson

Champion Operators:

- b) Secondary Process Energy Optimization: Secondary process energy consumption represents a significant cost center for Treatment at the RWHTF, particularly regarding the energy involved with aeration in the activated sludge basins. In 2017, Treatment will have a nearly-full complement of aeration basins available for use in both the NSEC and SSEC. In conjunction with PAR 1295, the Focus Area Team will work to develop strategies to reduce energy consumption in the secondary processes, while improving the reliability of the systems to meet effluent water quality targets.

Specific goals and timelines for the Secondary Process Energy Optimization Focus Area include:

- Initiation of the Secondary Process Energy Optimization Focus Area Team (by February 2017)
- Automated ammonia-based aeration control testing and implementation (by June 2017)
- NSEC/SSEC flow split optimization and automation (by September 2017)
- Implementation of Energy Control Measures (ECMs) Recommended by PAR 1295 (by December 2017)

Focus Area Team Lead: Wendy Anderson

Support Staff: Ian Myers, Greg Budzynski, Orren West, Ron Nicholson, Liam Cavanaugh

Champion Operators:

- c) Biological Phosphorus Removal Operation: Biological phosphorus removal at the RWHTF presents significant advantages, challenges, and cost implications for the District. To support the goals of the Phosphorus Initiative, biological phosphorus removal operation in the SSEC will be necessary during the first half of 2017. Additionally, deammonification startup in the second half of 2017 will likely cause the RWHTF to operate in full-plant biological phosphorus removal. This Focus Area Team will need to closely coordinate with other departments, including Strategy and Innovation, Environmental Services, and Legal/Regulatory in order to ensure that District goals are met while balancing operational risks, costs, and performance.

Specific goals and timelines for the Biological Phosphorus Removal Focus Area include:

- Initiation of the Biological Phosphorus Removal Operation Focus Area Team (by March 2017)
- Operation of the South Secondary in biological phosphorus removal mode to support piloting activities associated with the Phosphorus Initiative (by June 2017)
- Monitoring of the effects of biological phosphorus removal operation on operational performance of the RWHTF, including the impacts of struvite formation and dewaterability degradation, and reporting on risk and cost impacts as required (by July 2017)

- Iron addition as necessary to control the negative impacts of biological phosphorus removal on the solids stream processes, while coordinating with the deammonification Focus Area Team to limit negative impacts on that sidestream process performance (by September 2017)
- Long-term operational planning to support regulatory and strategic goals (by November 2017)

Focus Area Team Lead: Liam Cavanaugh

Support Staff: Kurt Carson, Blair Wisdom, Isaac Avila, Martin Alvis, Edyta Stec-Uddin, Matt Mullins, Jim Johnson

Champion Operators:

- d) Deammonification Startup and Optimization: The PAR 1237 construction phase will complete the infrastructure improvements for the Anita-Mox deammonification process by the 3rd quarter of 2017. The new process is more technically-, instrumentation-, and oversight-intensive than many of the existing processes at the RWHTF, but is important for meeting long-term nitrogen and phosphorus removal goals. The startup of the deammonification process will require significant advanced planning, along with consistent oversight during the startup and commissioning of the system.

Specific goals and timelines for the Deammonification Startup and Optimization Focus Area include:

- Initiation of the Deammonification Startup and Optimization Focus Area Team (by March 2017)
- A multi-departmental startup plan that has adequate resources dedicated to the process to meet construction closeout, performance verification, training, and Treatment takeover needs (by May 2017)
- Detailed and completed documentation of the operating procedures that Treatment will use to operate and troubleshoot the new deammonification process (by October 2017)
- Full automation of the process to ensure that system downtimes, process upsets, and manual attention requirements are limited (by December 2017)

Focus Area Team Lead: Edyta Stec-Uddin

Support Staff: Stephanie Klaus (HRSD), Kurt Carson, Donat Pierre-Luigi, Cynthia Lynch, Mike Folgers, Johnny Tran

Champion Operators:

- e) Outreach to Support Regulatory Goals: In addition to traditional operations activities, in 2017 certain staff on the operations team will participate in outreach efforts to support ongoing regulatory work on nutrients. The Colorado Water Quality Control Commission is planning to hold a rulemaking hearing in October of 2017 concerning Regulation 85 and possibly Regulation 31, which are the regulations that address nutrients. The District's regulatory team is actively engaged in the stakeholder process. Through this stakeholder work the regulatory team has identified a need for technical assistance from the operations staff both through outreach efforts and during the rulemaking process itself. These outreach activities will include participating in technical discussions with operations staff from other utilities, regulators and environmental groups, as well as participating in presentations to state-wide or basin-wide organizations such as the

Wastewater Utility Council, the Colorado Monitoring Framework and AF CURE. The regulatory team will also need technical assistance to prepare the rulemaking filings for the Water Quality Control Commission, and possibly technical assistance at the rulemaking hearing in October. It is in the District's best interest to advocate for additional time to implement biological nutrient removal under Regulation 85 technology-based framework, and these outreach activities are a necessary component of the District's advocacy.

Specific goals and timelines for the Effluent Suspended Solids Management Focus Area include:

- Initiation of the Outreach to Support Regulatory Goals Focus Area Team (January 2017)
- Development of a permit application supplement for the RWHTF (by February 2017)
- Participation in requested meetings, seminars, and technical support groups as requested by District regulatory staff (by December 2017)

Focus Area Team Lead: Liam Cavanaugh, Emily Jackson
Support Staff: Kurt Carson, Blair Wisdom, Jim Johnson
Champion Operators:

- f) Annual Charge Business Practices: Annual Charges represent part of the core business of the District, and the accuracy of the Annual Charge program is paramount to the success and public perception of the Operations Division and District as a whole. In order to maintain an effective annual charge program, Transmission must effectively collect, vet, and ensure the accuracy of flow and load data in the interceptor system. In 2017, Transmission will work collaboratively with Environmental Services to develop a step-by-step plan, including how automation of discrepancy alarming, can improve the accuracy for how Annual Charge data is collected and verified.

Specific goals and timelines for the Annual Charge Business Practices Focus Area include:

- Initiation of the Annual Charge Business Practices Focus Area Team (by March 2017)
- Completed review and update of current Annual Charges verification and reporting practices, including approval from Environmental Services on the validity of the current program. This review will also identify the positions in each District department that will be involved in Annual Charge data review and reporting, and the frequency of each requirement (by July 2017)
- Automation of data processing, alarming, reporting, and approval procedures and programming (by December 2017)

Focus Area Team Lead: Doug Woods
Support Staff: Kisha Ortiz, Craig Thomas, Aleah Menefee, Barbara Wilson, Bill Marquez
Champion Operators:

Additional Focus Areas that have been identified for later in 2017, or as a lower priority at this time, include:

- g) **Effluent Suspended Solids Management:** The District expects that a new effluent discharge permit will be issued for the RWHTF in 2017, and will include a 1 mg-P/L total phosphorus limit as a running annual median. The District is currently constructing infrastructure to reduce the soluble phosphorus concentration to less than the permit requirement via biological phosphorus removal, but particulate phosphorus represents an approximately 0.05 mg-P/mg-TSS contribution to the total phosphorus concentration. In 2016, the RWHTF averaged 12 mg-TSS, which correlates to approximately 0.6 mg-P/L of particulate phosphorus in the effluent under biological phosphorus removal conditions. While the new permit will likely have a phosphorus compliance period of five years associated with it, in order to reduce the total phosphorus concentration to less than permit limits, Treatment will need to optimize existing clarification, implement a new technology option, and/or recommend significant capital investments are made towards reducing effluent particulate phosphorus concentrations. In 2017, the initial phases of the effluent suspended solids reduction Focus Area will be implemented in order to support near-term permit compliance and long-term Phosphorus Initiative goals.

Specific goals and timelines for the Effluent Suspended Solids Management Focus Area include:

- Initiation of the Effluent Suspended Solids Management Focus Area Team (by May 2017)
- A review of current return activated sludge, solids retention time, and activated sludge wasting approaches at the RWHTF to ensure that industry best practices are understood for effluent suspended solids reduction (by August 2017)
- A two-year operating plan for NSEC Aeration Basin #2 that supports Treatment goals for effluent suspended solids reduction and the effluent phosphorus reduction goals of the Phosphorus Initiative (by October 2017)
- A 2017-2018 Winter Operating Plan, in coordination with the Secondary Process Energy Optimization Focus Area Team, to manage flow splits, secondary clarifier loading rates, operating factors, and polymer addition, detailing the potential benefits, risks, and long-term potential effluent quality impacts of the proposed operating and technology options (by November 2017)

Focus Area Team Lead: Kurt Carson

Support Staff: Isaac Avila

Champion Operators:

- h) **Staff Training Programs:** The O&M Department is currently in the process of updating the Interceptor System Operator and Plant Operator training programs to align with other District programs. Additionally, the emphasis on new technology at the District represents an opportunity to improve efficiency and effluent quality, but requires a more technically advanced staff in the long-term. In 2017, the baseline staff training programs will be updated to align with current needs. In order to advance the "Operator-of-the-Future" concept, a dedicated effort to get Operators involved in opportunities that they find interesting will be imperative. Operations will need "Champion Operators" to tackle the most complex tasks that are beyond the baseline staffing needs to maintain compliance with current regulations while improving efficiency. Ultimately, Operations

intends to decrease the baseline staffing numbers by shift and area while reassigning the highest performing staff to the most critical Focus Areas. This effort will require training throughout the Treatment and Transmission hierarchy, and will be focused on allowing a percentage of each employee's time to be dedicated to independent efforts towards a more efficient operational strategy.

Specific goals and timelines for the Staff Training Programs Focus Area include:

- Initiation of the Staff Training Programs Focus Area Team (by March 2017)
- Finalization of the formal operator training programs and progression process for the Treatment and Transmission groups (by April 2017)
- Assignment of staff to Focus Area Teams based on business needs, staff interests, and priorities (by December 2017)
- Development of a multi-facility operator training group to provide specialized facility and technical training as prioritized by the Superintendents (by December 2017)

Focus Area Team Lead: Orren West, Martin Alvis, Doug Woods

Support Staff:

Champion Operators:

2. ANTICIPATED OPERATING CONDITIONS FOR TREATMENT

Prepared operation of the RWHTF includes projecting wastewater flows and loads, a review of facility and unit process capacities, a review of permits, and a review of PARs and other activities that will impact routine operations. It also includes recognition of areas where limitations in capacity or performance do exist, and advocacy for efforts to resolve these limitations.

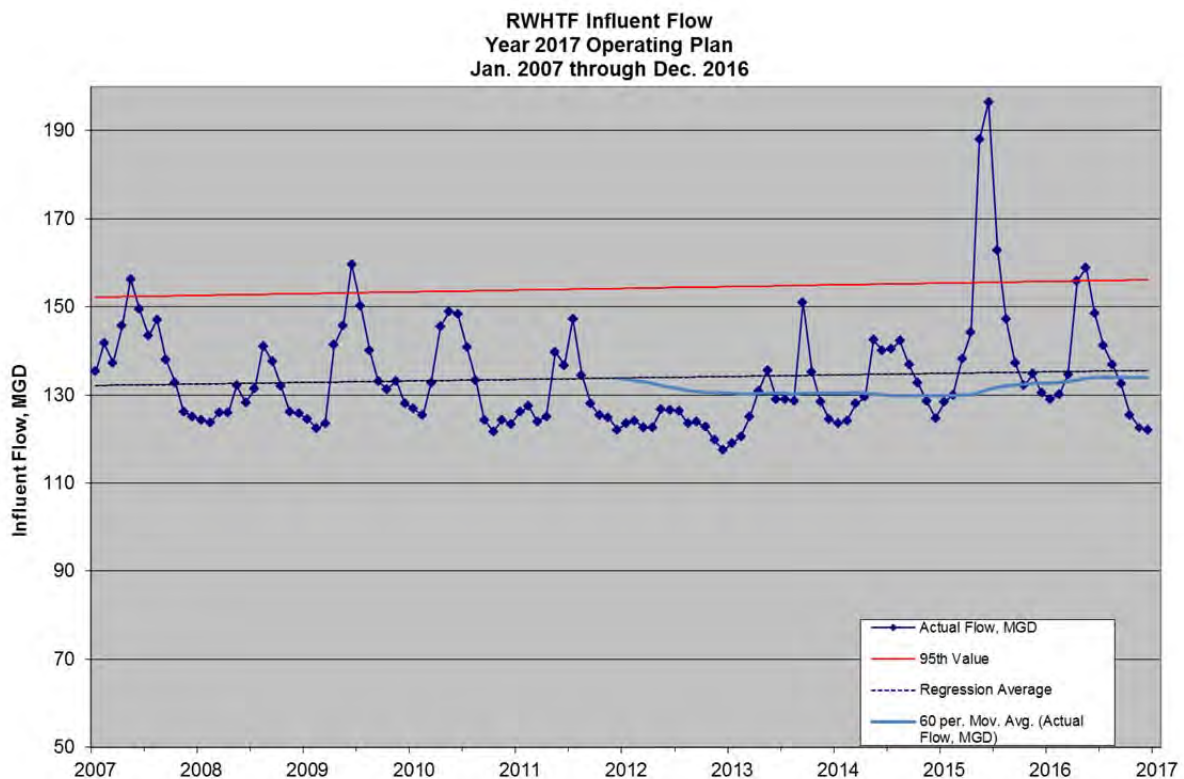
2.1. Influent Wastewater Flows and Loads

Anticipated wastewater flow and pollutant load projections for 2017 are based on trends from the last five years, as well as current observations of the impact of the Northern Treatment Plant startup. Based on this information, the expected range of wastewater flows and loads for 2017 are summarized in Table 1. The Maximum Month Values represent a reasonable upper limit of expected influent conditions and are used to estimate facility utilization.

Table 1 Summary of Anticipated Wastewater Flow and Loads		
Parameter	Average Value ⁽¹⁾	Maximum Month Value
Influent Flow, mgd	138	161
Primary Influent TSS, tpd	169	199
Primary Influent BOD, tpd	165	190
⁽¹⁾ Based on full-year trends through 2016, with values that correspond closely with those used in 17R/18P budget development.		

Historical tracking of influent flow and loads that support Table 1 are shown in Figures 1, 2, and 3. Average influent flow increased dramatically in 2015, averaging 147 mgd, after having remained near 130 mgd for well over a decade. While 2016 influent flows decreased from the 2015 values, the maximum month reached 158 mgd, representing 72% of the permitted flow rate. While the annual precipitation total for 2016 was 11.85" vs the 14.30" average, the spring months still had high hydraulic flows, seemingly due to the same increase in infiltration and inflow observed over the last two years. The anticipated Maximum Month Flow is 161 mgd, which is slightly above the observed 95th percentile flow condition, but is below the observed absolute Maximum Month Flow value (197 mgd) during June 2015.

Figure 1 – Influent Flow



In addition to increased flow due to precipitation, Figures 2 and 3 demonstrate growth in the RWHTF service area. The City and County of Denver and surrounding metro area population has sustained approximately 2.0% growth through 2016, which is anticipated to continue through 2017. The observed loadings to the RWHTF are generally consistent with these population trends. It should be noted that while Northern Treatment Plant startup reduced the RWHTF influent BOD load by as much as 8 tons per day (tpd), the observed Annual Average BOD Load value (158 tpd) is approaching 80% of the 212 tpd design capacity of the RWHTF (75% observed value).

Figure 2 – Influent BOD Trend

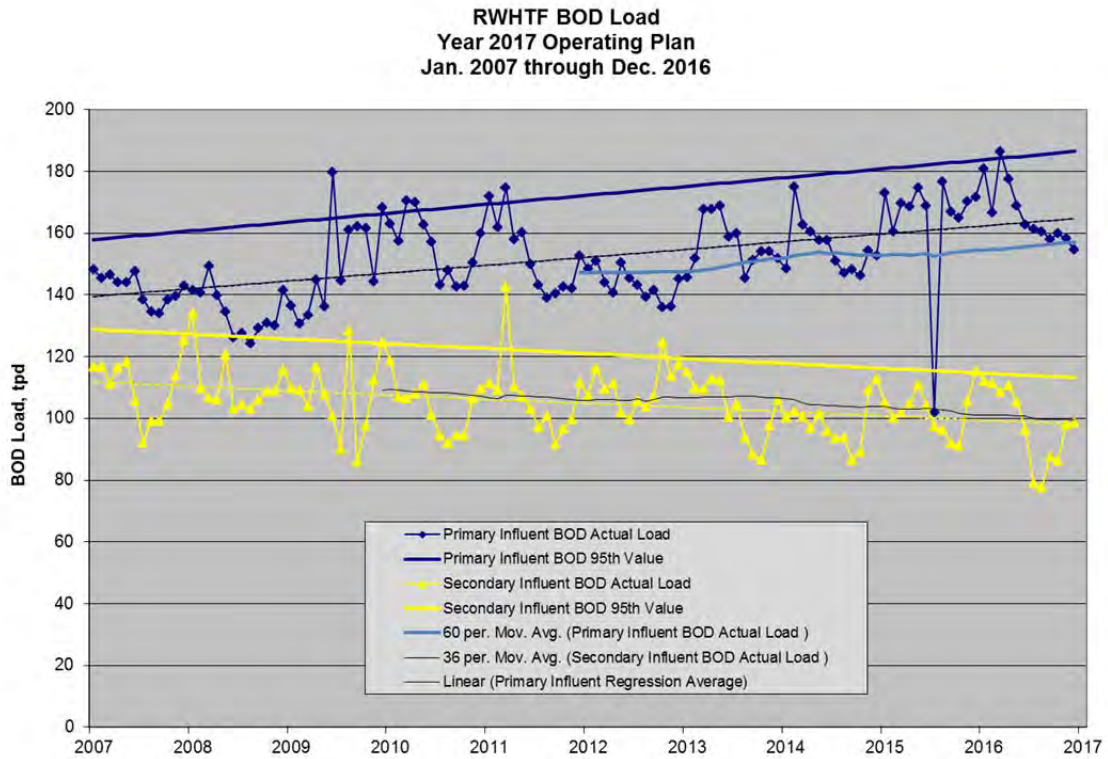


Figure 3 – Influent TSS Trend

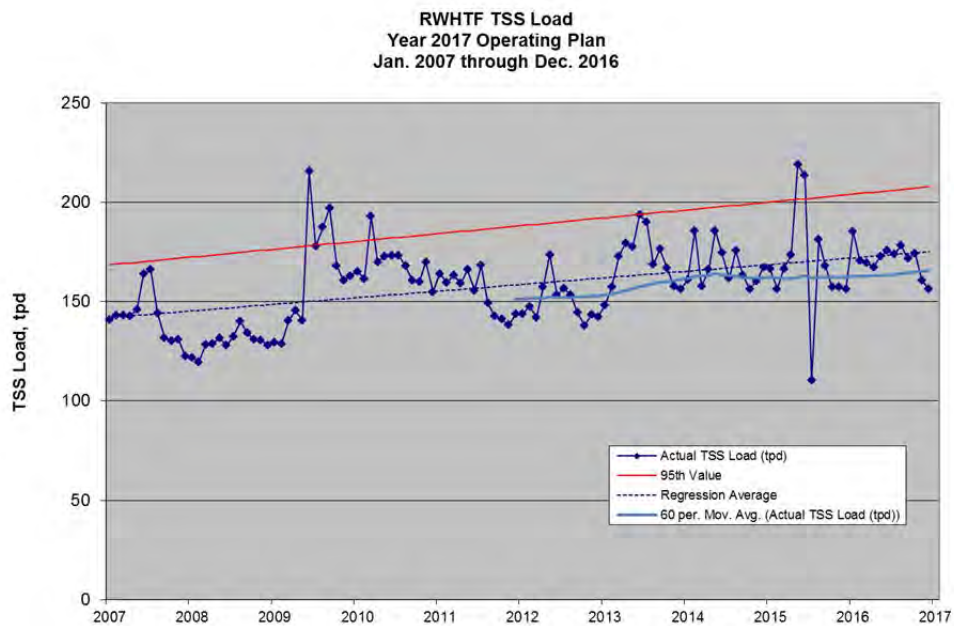


Table 2 summarizes anticipated sludge production conditions. Of particular note, as shown in the development of the 2017 Revised Budget, is that the increase in TSS and BOD to the plant will increase primary and secondary sludge production, while increasing struvite formation in the digesters due to ongoing enhanced biological phosphorus removal activities will further increase digested sludge production. Furthermore, the planned addition of iron to control struvite in the digestion, dewatering, and centrate management processes will increase sludge production through chemical sludge precipitation. These increases will impact RWHTF Operations costs as well as RR&R hauling costs, and budgets have been developed to reflect these changes.

Table 2 Summary of Anticipated Sludge Production ⁽¹⁾		
Parameter	Avg. Value	Max. Month Value
Primary Sludge Production, tpd	121 ⁽²⁾	176
WAS Production, tpd	87 ⁽³⁾	106
Digested Effluent Solids (fed to Centrifuges), tpd	96 ⁽⁴⁾	112
Dewatered Cake (to RR&R), tpd	91 ⁽⁴⁾	106
⁽¹⁾ Based on full-year trends through 2016, with values that correspond closely with those used in the 17R/18P budget development. ⁽²⁾ Based on a net primary clarifier efficiency of 72%. ⁽³⁾ Based on an expected observed yield of 0.78 lb-TSS/lb-BOD. ⁽⁴⁾ Increase based on observations from 2016.		

2.2. Facility and Unit Process Capacities

Table 3 is adapted from the 2013 Facility Plan and summarizes (a) the current flow and load condition of the RWHTF relative to permitted design capacity, and (b) unit process capacity ratings for the RWHTF. The summary of the RWHTF permitted capacity shows that while in 2015 when the facility was operated at 89% of its maximum month hydraulic capacity, this flow decreased to 72% in 2016 due to decreased rainfall. Additionally, the RWHTF operated at 75% of its annual average BOD loading capacity during 2016. For this 2017 Annual Operating Plan it is assumed that the maximum month flow to the RWHTF will be approximately 73% percent of the plant hydraulic capacity and annual average loading will be in the range of 78% of the plant BOD loading capacity. The 2018 Annual Operating Plan will revisit these projections and facility utilizations. As Table 4 shows, with one exception (cake tower), all major unit processes provide adequate capacity for the foreseeable future. Table 4 shows equivalent annual average flow, which is used to normalize the capacity of those processes that are based on other design conditions. For example, mechanical screening must convey peak instantaneous flow conditions (PIF). Using appropriate peaking factors, this PIF capacity translates to an EEAF of 210 mgd which is higher than our current 138 mgd projected annual average flow. There are, however, eight unit process areas where – from an Operations perspective – there is at least an internal need to explore capital, engineering, and operational opportunities to retain high operational efficiency, performance or capacity. These process areas are denoted in the two columns along the right side of Table 3.

Table 3 – Summary of RWHTF and Major Unit Process Capacities

RWHTF Permitted Capacity	Permitted Value	2016 Historical	2017 Forecasted		
Hydraulic Flow (mgd) ⁽¹⁾	220	158 (72%)	161 (73%)		
Organic Loading (tpd _{BOD}) ⁽²⁾	212	166 (78%)	165 (78%) ⁽³⁾		
⁽¹⁾ 30-day Average ⁽²⁾ Annual Average ⁽³⁾ Environmental Services to Provide Direction on 80% Threshold Needs					
Liquid Stream Unit Process	Total	Condition	EAAF ⁽¹⁾ (mgd)	Capacity Concern	Perform. Concern
Mechanical Screening (mgd)	441	PIF	210	#7	
Grit Basins(mgd)	233	MMF	349	#8	
Primary Clarification(mgd)	269	MMF	236		
with EPC (mgd)	Same but with higher Performance				
Primary Sludge Pumping (tpd)	252	PDSL	200		#1
Primary Effluent Pumps(mgd)	224	PIF	107		
Secondary Treatment(mgd)	220	MMF	193		
NSEC (mgd)	106	MGD	-		#2
SSEC (mgd)	114	MGD	-		
Disinfection(mgd)	330	PHF	201		
Dechlorination(mgd)	330	PHF	201		
PWC System					#3
Solids Stream Unit Process	Total	Condition	EAAF (1) (mgd)	Capacity Concern	Perform. Concern
Grease Handling Sys. (mgd)	231	MMF	202		
Gravity Thickeners (tpd)	170	AASL	187	#4	
GVT Sludge Pumps (tpd)	432	PDSL	287		
DAF Thickeners (tpd)	182	PDSL	246		#5
DAF-Thickened Sludge Pumps (tpd)	404	PHSL	511		
Sludge Holding Tanks ⁽¹⁾ (tpd)	233	MMSL	173		
Anaerobic Digesters (tpd)	272	MMSL	168		#6
Centrifuge Feed Pumps (tpd)	316	MMSL	196		
Centrifuge Dewatering (tpd)	130	MMSL	162		
Cake Tower Storage (tpd)	100	MMSL	125		
Hot Water System					
⁽¹⁾ EAAF - Equivalent Annual Average Flow PIF – Peak Instantaneous Flow MMF – Maximum Month Flow		PDSL – Peak Daily Solids Load PHF – Peak Hour Flow MMSL – Maximum Month Solids Load			

1. *Primary Clarifier Underflow Pumping* – Performance of the NPRI 3 and SPRI complexes may be experiencing hindrances in performance due to hydraulic limits on the underflow pumping capacity for these batteries of clarifiers. Undoing these bottlenecks could improve TSS and BOD removal performance in these complexes.
2. *Secondary Clarifier Capacity* – A significant issue area is the limitation of the clarifiers in the secondary processes, and particularly the NSEC. During late winter through early summer, hindered sludge settling commonly occurs and can reduce throughput to 80 mgd (~72 tpd BOD) or even less. This can be addressed by either adding polymer to the clarifiers or by running more flow through the SSEC. Both of these options come with operating cost impacts. Near-term expectations of consistent biological phosphorus removal performance will be hampered if typical operation of the NSEC clarifiers necessitates high blanket levels as is the current practice.
3. *PWC System* – The condition and integrity of the PWC can challenge the operation of numerous unit processes at the RWHTF including disinfection and dechlorination. A failure or line break can compromise the ability to run the plant's unit processes. A project is currently underway to construct improvements to this system.
4. *Gravity Thickeners* – The existing GVTs are highly loaded and result in large blanket swings in the units if desired target underflow solids concentrations are to be maintained. They also undergo significant corrosion and wear given their service condition and thus undergo annual inspection and maintenance. Given the criticality of these units, it may be desirable to install two additional units in advance of the Facility Plan's recommendation after the new OSB Building is occupied and the old OSB can be demolished to make room.
5. *Dissolved Air Flotation* – Optimization of polymer consumption in the DAF continues to be challenging, and high polymer doses are necessary to maintain acceptable float solids concentrations. Over the last several years, attempts have been made to improve the batching quality and the dosage control in the DAF building with limited success. An evaluation of thickening centrifuges to ultimately replace the DAF process should be considered based on operating performance requirements and costs going forward.
6. *Struvite Accumulation and Digester Feed Configuration* – Struvite has long been a challenge at the RWHTF and it has become more pronounced with the implementation of biological phosphorus removal. The SSEC will operate in biological phosphorus removal mode for extended periods of time in 2017 to support piloting, and potentially regulatory, objectives. Struvite most significantly impacts reliable operation of the digesters, centrifuges and centrate handling system. This Plan includes a struvite management approach for 2017. Also, the configuration of the feed piping into the digesters can present challenges presumably due to grease and/or debris impacting the feed piping. When this occurs, the feed rate needs to be slowed to the digester or some of the APD sludge will overflow back into the SSEC. Improvements are expected to be made to the digester feed configuration beginning in 2017.
7. *Mechanical Screening* – Construction of South Headworks Improvements will require

that the capacity of that system be reduced. This will reduce the overall RWHTF mechanical screening capacity intermittently for several years, which will increase the risk associated with very high flow events.

8. *Grit Basins* – Construction of South Headworks Improvements will require that the capacity of the South Grit Basins be reduced by 50% for the next two years. While transferring flow to the North Headworks will allow for adequate performance of the preliminary treatment systems, the potential exists for a very high flow event at the South Plant Influent to exceed the hydraulic throughput capacity of the grit basins.

2.3. Permit Limits that will Drive most of the Operational Decision-making in 2017

The RWTF must comply with a variety of complex parameters, including the final effluent Discharge Permit, 503 Regulations, and Title V air permit. While all are important, some more than others drive the majority of the daily operational decision-making. Table 4 summarizes the parameters that Treatment has identified that will likely drive the majority of operational decision-making and process adjustments for 2017. With the increasingly stringent permit limits, most of the operational decision-making must now be based on online analyzer trends. It is through use of these analyzers that Treatment will be most prepared and capable of maintaining high assurance of compliance with daily and weekly limits. In 2017, Treatment will continue to work closely with the In-line Instrumentation Team to develop the necessary calibration, verification, and validation (CVV) program to ensure reliable monitoring. As in previous years, the Treatment Group will use the conditions set in the District's Spill and Non-compliance Reporting Procedure to communicate potential issues with maintaining continuous facility operation to Environmental Services.

Table 4		
Parameter	Operational Target	Monitoring Strategy
Ammonia	<1 mg-N/L daily (July-September) <1.5 mg-N/L daily (October-June)	Treatment uses the flow-weighted effluent ammonia trend to monitor and adjust RWHTF performance. Trends use the multiple analyzers, including the ChemScan analyzer located at the end of the chlorine contact basins.
E. Coli, #/100mLs	<100 weekly	The Assistant Treatment Superintendent updates daily, the flow-weighted geometric mean spreadsheet that monitors the status of each week against the limit.
Dissolved Oxygen	>3.0 continuous	Probes installed just upstream of outfalls provide trends of DO giving Treatment real-time capability to monitor and adjust RWHTF performance.
503 Requirements	>15 days & 35 C	Temperature is monitored real-time and Treatment staff adjusts the hot water loop as necessary to maintain temperature. The Assistant Treatment Superintendent uses the ODS reports to track SRT and support decision-making with regard to placing digesters in and out of service to accommodate maintenance activities.
Phosphorus	<1 mg-P/L	Treatment anticipates that the issuance of a new discharge permit in 2016 will require that the RWHTF

	(SSEC)	reduce total phosphorus in the effluent to less than 1 mg-P/L. In order to prepare for the new limits, Treatment will operate the SSEC in biological phosphorus removal mode to gain experience with the nuances of the operating mode and to support District goals.
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2.4. Summary of PAR Activities that will Significantly Impact Operations

The following major PARs will have the most significant impact on routine Treatment Group operations during 2017. Where applicable, this Plan includes provisions to accommodate these PAR activities where they have an impact on RWHTF operations.

- *PAR 1088* – The NTP startup activities have drawn from existing staff at the RWHTF. Additionally, staff from the RWHTF Operations Division may be assigned to the NTP temporarily to support ongoing needs. The NTP Director of O&M and the Operations Officer have developed staffing strategies to help maintain critical minimum staffing needs at the RWHTF during 2017 as the NTP completes startup activities and transitions to unattended nighttime operation.
- *PAR 1225* – The South Headworks Improvements construction will require that 50% of grit basin capacity remain unavailable for two years. This work will limit the hydraulic capacity of the South Headworks, therefore requiring that flow be diverted through the North Headworks and then returned to the South Complex via the Primary Effluent Flow Split. All work for other projects that could impact the availability of the NSEC influent channel was completed before the South Grit Basin capacity was reduced, so that PEFS can be used for this extended period of time without interruption.
- *PAR 1237* – The Sidestream nutrient removal improvements will increase the robustness of biological phosphorus removal at the RWHTF, while studying opportunities to improve secondary clarifier performance to reduce effluent total phosphorus concentrations. In 2017, this PAR will impact Operations most significantly through the need to start the deammonification process in the SSEC, and a Focus Area Team will be developed to tackle this effort.
- *PAR 1259* – Coordinated efforts between Treatment, Maintenance, and Engineering are required to allow new coatings, telescoping valve installations, and feed piping modifications to occur inside Digester Complex. Efforts are ongoing to maintain a reasonable schedule for removing Digesters from operation and completing required cleaning in order to meet the needs of each Department. This PAR will address item #6 in Table 3 above.
- *PAR 1295* – Secondary Process Energy Optimization is a Focus Area for the Operations Division in 2017. This PAR will work with multiple District groups, including Operations, Maintenance, Inline Instrumentation, and Strategy and Innovation to implement the optimal operating and maintenance strategies for secondary process optimization.

3. Unit Process Operating Plans

2017 unit process operating plans are presented in this section for each major process area.

3.1. Headworks

The construction work of PAR 1225 will impact the capacity of the South Headworks during 2017. The Treatment Superintendent is tasked with coordinating this construction work with O&M Technical Services to ensure that flow split plans are developed in order to adequately convey influent flow. The interaction of the headworks, flow splits, and secondary process limitations will need to be carefully planned and coordinated by the Treatment Superintendent in 2017 and beyond in order to effectively support the required activities of Engineering and Maintenance while optimizing operating costs.

3.2. Primary Treatment

Primary treatment across the RWHTF is provided by the North and South Primary Clarifier Complexes and the Gravity Thickeners (GVTs). The Primary Treatment Performance Trending Tool will be reviewed and used by the Assistant Treatment Superintendent in 2017 to monitor overall primary treatment performance and make adjustments if/as necessary. Treatment targets maximum primary treatment efficiency at all times. Effective monitoring and trending measures are in place to support a performance-based approach to operating the primary treatment unit processes at the RWHTF. Some additional improvement may be possible through greater attention to load allocation across the three North Primary areas but this proves to be challenging. Motor actuated gates may make this type of adjustment easier than in the past. Primary sludge production has trended upward in step with the increase in pollutant loadings described in previous sections. In 2017, depending on priority, Treatment and Maintenance may work to determine whether current underflow pumping capacity on NPRI Area 3 and SPRI is limiting sludge conveyance and if so, recommend an approach to relieve this equipment constraint.

3.2.1. Normal Primary Clarifier Operation: For 2017, due to South Headworks construction, the North Primary clarifiers will provide conventional primary treatment to about 75% and the South Primary clarifiers will treat the remaining 25% of the total RWHTF influent. Operation of the primary clarifiers will focus on achieving maximum TSS removal at all times by:

- Adjusting sludge underflow rate as needed,
- Protecting the accuracy of operational data by assuring, assure that proper maintenance is being performed on density and flow meters, and that representative influent, and effluent samples are being collected.
- Adjusting the number of operating units as necessary for maximum efficiency, and
- Adjusting as necessary passive flow splitters to appropriately distribute influent flow/load between clarifiers.

Gravity Thickeners

The Assistant Treatment Superintendent is responsible for operating the GVTs and will coordinate with the Focus Area Teams to ensure that primary sludge thickening objectives are met.

These units thicken the underflow from the primary clarifiers. Thickened sludge from the bottom of the thickeners is pumped to a sludge holding tank and blended with concentrated WAS prior to anaerobic digestion. GVT overflow can be returned to upstream of the North Primary clarifiers or immediately upstream of the NSEC. The preference is to return it to the upstream end of the NSEC, until enhanced biological phosphorus removal upgrades are completed in 2017, which will require tighter monitoring, control, and flow split management. The 2017 operating strategy envisioned for the GVTs is as follows:

- Operate all units.
- Operate with a targeted nominal blanket depth as necessary to maximize solids capture.
- Target 5.5 %TS underflow or greater.
- Use sweetener water if/as necessary.
- Minimize solids carryover in the GVT overflow.
- Operate primary underflow pumps to target a specific diurnal density range to help ensure that the SOR on the GVTs doesn't become too high.

3.3. Secondary Treatment

New effluent ammonia limits went into effect on January 1, 2015. Thirty-day average limits now range from a low of 2.0 up to 4.6 mg-N/L. Daily limits range from 6.17 to 12.67 mg-N/L. The most challenging period will once again be the 7-day limits that are in effect from July 1st through September 30th. These weekly limits are as low as 1.75 mg-N/L.

Principles of compliance are as follows:

- Target 1 mg-N/L or less during the July to September timeframe, and target 1.5 mg-N/L or less during the remainder of the year.
- Monitor digester cleaning impacts, and coordinate cleaning schedules to ensure that targets can be achieved. The Treatment Superintendent is responsible for directing necessary changes to digester cleaning schedules.
- Rely on the ChemScan analyzer for performance monitoring. The Assistant Treatment Superintendent is responsible for assuring that this analyzer is in proper working order at all times and that Supervisors are aware of contingency monitoring approaches if/as necessary when the ChemScan is down.
- The Inline instrument group develops and maintains a CVV program to assure precision, accuracy and reliability of this compliance instrument.
- The Assistant Treatment Superintendent will routinely review the C:N calculator spreadsheet to base the proportioning of ammonia-laden centrate to the NSEC and SSEC CaRRBs. This helps to optimize denitrification and nitrification performance in both complexes.
- The Assistant Treatment Superintendent routinely reviews the SRT calculators, Operating Factors, DO setpoints, CaRRB operation, and flow split to ensure stable base plant operating conditions.
- The Assistant Treatment Superintendent will develop quick response strategies to deal with unforeseen plant interruptions and weekend ammonia peaks.
- Also, see Disinfection and chloramine formation control.

Secondary clarifier capacity very often limits the throughput of BNR processes in cold weather climates, and the RWHTF is no exception. The SSEC is better off than the NSEC because the clarifiers are deeper and the surface wasting design is an improvement over the system installed in the NSEC. Especially during late winter through early summer, poor settling combined with peak seasonal flows reduce the ability to operate at well-nitrifying SRTs and also retain hydraulic throughput. Subsequently, flow needs to be shifted between the NSEC and SSEC based on settling behaviors in each complex and the number of clarifiers available for service. Additionally, recent economic analyses have shown the running as much flow through the NSEC as possible while meeting effluent quality objectives is the most cost-effective mode of operation.

As in past years, plant process modeling was conducted to consider historic SVI conditions and how that will impact flow split between the NSEC and SSEC. Table 5 below shows the anticipated flow split for each month of 2016 based on a combination of historic experience with flow and settling and modeling. The modeling exercise included a sufficient operating factor to ensure reliable nitrification. Table 5 sets comfortable flow conditions that use NSEC throughput for each month as a baseline for operating the secondary complexes through 2017. More flow can always be shifted to the SSEC but the goal with this table is to take a planned approach to apportioning flow between the NSEC and SSEC. Quick shifts in flow result in ammonia bleed through until the process can stabilize. It also leads to disturbances in clarifier loadings and the SRT calculator. Therefore, anticipated and slow changes in flow split can help reduce the impact on effluent ammonia. This table helps to make the necessary changes in a slow and predictable way. Even still, it may be necessary to deploy time-of-day polymer addition to the NSEC clarifiers to compact the blankets and avoid spikes in the effluent TSS. The decision if/when to deploy emergency polymer addition resides with the Assistant Treatment Superintendent. One goal for 2017 is to accurately portray the future effluent suspended solids condition in the NSEC by studying the clarifier performance without polymer addition, which will be tackled by the Effluent Suspended Solids Management Focus Area Team. Treatment will attempt to use 100% surface wasting in both the NSEC and SSEC in order to reduce SVIs throughout 2017, as long as operating conditions allow the facility to run effectively within the surface wasting flow limitations. Table 5 reflects a best estimate of the desired flow split by month based on all of the above objectives.

Table 5 – Anticipated flow split between NSEC and SSEC based on settling limitations in the NSEC and construction activities.

Month	Assumed SVI Condition	Assumed RWHTF Flow (MGD)	North (MGD)	North Split	South (MGD)	South Split
January	199	129	71	55%	58	45%
February	229	130	73	56%	57	44%
March	235	130	73	56%	57	44%
April	236	145	83	57%	62	43%
May	183	161	95	59%	66	41%
June	175	154	97	63%	58	37%
July	139	151	98	64%	53	36%
August	130	145	101	68%	39	32%
September	115	143	98	69%	45	31%
October	146	140	97	69%	43	31%
November	154	138	96	70%	42	30%
December	154	130	95	74%	35	26%

Disinfection has historically and continues to be based on formation of chloramines in the treated wastewater. Whether the required ammonia is provided through residual concentrations in the settled effluent or by the ammonia feed facility, typical chlorine dosage control philosophies have so far resulted in a net increase of about 0.3 to 0.7 mg-N/L of ammonia in the final effluent. This will again present challenges during periods of the year of complying with both effluent ammonia and E.coli limits. The Assistant Treatment Superintendent is responsible for continually optimizing disinfection performance to help limit the amount of ammonia added to the effluent to maintain effective chloramine formation. During 2017, the Assistant Treatment Superintendent will continue to improve the optimization of the ammonia-based aeration control in the NSEC so that automatic control can be run year-round. Additionally, efforts will begin with IS to develop ammonia-based aeration control for the SSEC as part of the Secondary Process Energy Optimization Focus Area.

An interruption to plant power can jeopardize the ability to provide enough aeration to the basins to oxidize ammonia. It takes several hours for the process to resume low effluent ammonia concentrations when a power interruption knocks out blower service. Treatment's response to these types of events is limited. Depending on which feeder is affected, it may be possible to shift flows to help attenuate the spike in ammonia. Treatment does not have any practical experience with the necessary response strategies. In 2017, the Assistant Treatment Superintendent is responsible for developing response strategies and integrating them into the countermeasure responses taken by the Supervisors.

3.4. Disinfection

The RWHTF now operates a disinfection system that depends on dosing SHC, aqueous ammonia, and SBS at the proper dosages. A set of ammonia analyzers on each settled effluent stream (i.e., NSEC and SSEC) assess if and how much ammonia needs to be added to assure that the operator defined chlorine-ammonia ratio is met. Higher chlorine dosage rates mean that more ammonia is added to the effluent. In 2016, Treatment completed the full-scale implementation of using in-situ chlorine analyzers for making automated adjustments to the chlorine dosage rate to maintain the disinfection goals set in the Weekly Targets. In 2017, this automation practice will continue, and the upstream target will be associated with a desired downstream chlorine residual, and will be set by the Assistant Treatment Superintendent with guidance from the Treatment Superintendent.

3.5. WAS Thickening

RAS Compaction – With the HPO system gone, it is now possible to improve the solids feed concentration delivered to the DAFs. By targeting a higher feed concentration, it may be possible to reduce polymer consumption per dry ton of solids. The Assistant Treatment Superintendent will coordinate with the Focus Area Teams whenever possible to optimize NSEC and SSEC clarifier operation and wasting to deliver the highest possible solids feed concentration to the DAF units.

3.6. Anaerobic Digesters

Routine cleaning and inspection of the digesters is necessary for a well-operated facility.

Over time, grit and struvite accumulate in the bottoms of the digesters, potentially taking up a significant portion of the total volume that would otherwise be active for solids stabilization. Also, equipment, concrete, and coatings inside the digesters wear out, so periodic inspections and corrective maintenance is necessary. The digester cleaning plan for 2017 is currently being developed by Treatment, Maintenance and Engineering to support PAR 1259 construction activities. The Assistant Treatment Superintendent is responsible for ensuring that digesters are placed in- and out-of-service appropriately to support Maintenance and construction activities while maintaining permit compliance and efficient operational conditions.

The acid-phase digestion process has been used at the RWHTF for a decade, with little attention to the optimization opportunities that the process provides. The impact of acid-phase digester operations on biogas production, solids stabilization, struvite formation, and dewatering performance is not fully understood. In 2017, the Assistant Treatment Superintendent will improve acid-phase digester operation stability such that the District can best balance operating costs, maintenance costs, digester cleaning requirements, and engineering needs while retaining effective sludge stabilization conditions. The Assistant Superintendent will develop tracking tools that display the impacts of various acid-phase digestion operating targets on other digestion and dewatering process parameters.

Figure 8 shows that digested solids increased in 2016 over levels seen in previous years. This increase is attributed to multiple factors, including increased inorganic loading to the RWHTF and increased struvite accumulation in the digestion process due to secondary process biological phosphorus removal. The observed increase in digested solids is projected to continue in 2017 due to the continuance of biological phosphorus removal operations and the increase in iron addition to reduce the impacts of struvite in the centrate management system.

Figure 8– Digested Solids Trend (tons per day)

RWHTF Digested Solids
Year 2017 Operating Plan
Jan. 2007 through Dec. 2016

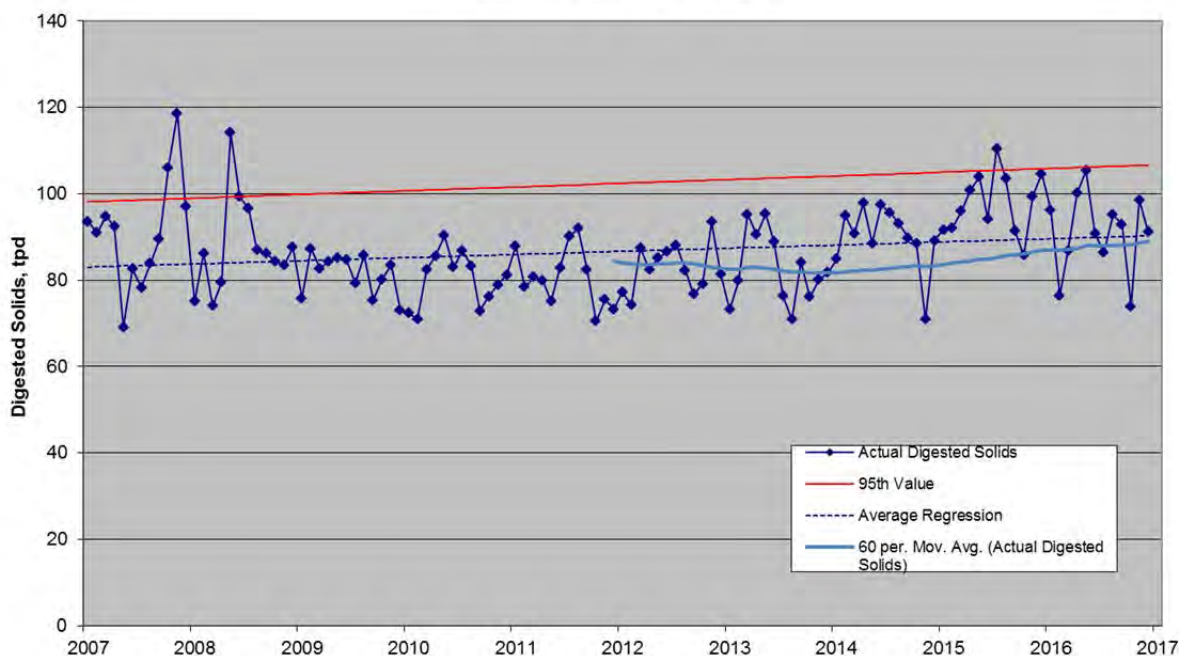
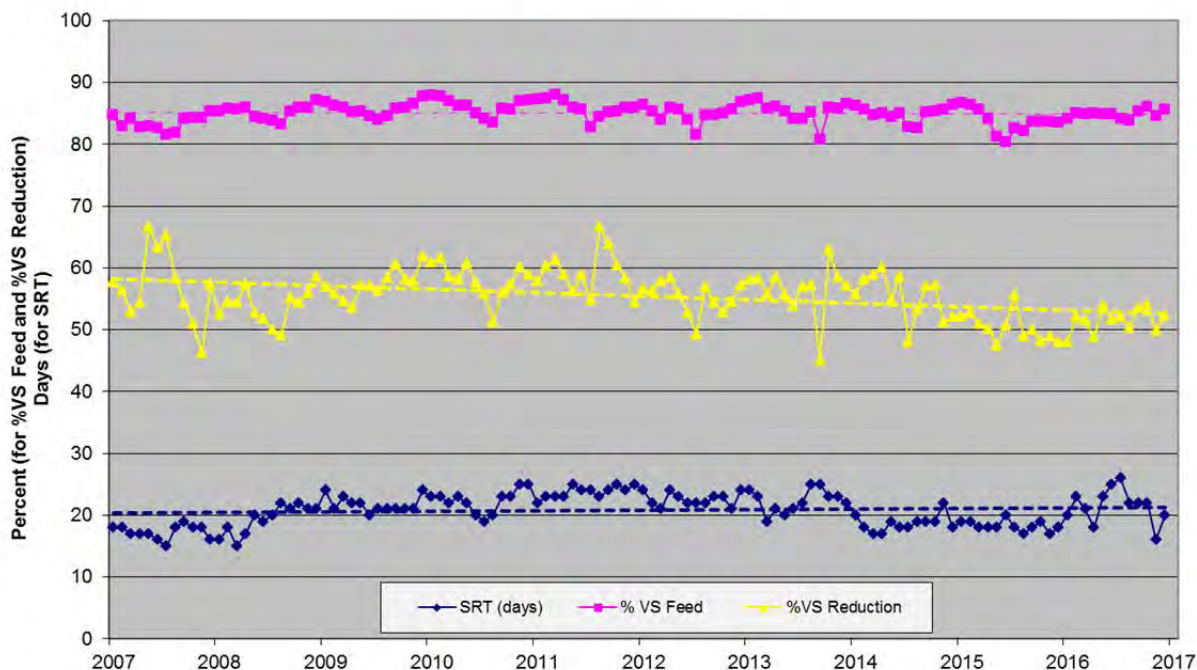


Figure 9 displays the overall performance of the digestion process, which has remained relatively stable over the last decade. In 2015, however, the volatile solids reduction began to decrease in the second half of the year, coinciding with a decrease in digester feed volatile solids concentration. This decrease is attributed to the inorganic load increase at the RWHTF during the high flow months, the higher operating factors that the secondary processes maintained leading to more decay in the secondary process prior to wasting, and the increase in struvite generation in the digestion process. In 2016, a holistic evaluation of secondary process operating factors took into account the changes observed in the digestion process, including volatile solids reduction, digested sludge production, and biogas generation. This analysis showed that secondary process operating factors had little overall effect on total costs when also including impacts on the solids stream processes.

Figure 9 – Trends showing Digester Performance

**RWHTF Digester Performance
Year 2017 Operating Plan
Jan. 2007 through Dec. 2016**



The anaerobic digester complex will again be an area of particular focus in 2017. The Assistant Treatment Superintendent will utilize an expanded set of Weekly Targets and key trends to monitor digester operations and make process and operational decisions. These include the following:

- Acid-phase digestion SRT – Process trends will be developed to monitor and ultimately target an ideal SRT in the acid-phase digestion process. This effort may also include monitoring of SRT in the Digester Feed Sludge Holding Tank.
- Digester Feed Rate – Weekly Targets will include the settings and any required adjustments to the acid-phase digester sludge feed rates to each individual mesophilic digester in operation.
- Total volatile acids – Performance data review with the Weekly Targets will include trend data on total volatile acids in the acid-phase digestion process.
- Centrifuge Feed Heat Exchanger – Weekly Targets and performance trend information will be maintained for performance of the heat exchanger in the Anaerobic Digester Mall Complex. This heat exchanger has been shown to have a significant impact in reducing polymer costs for dewatering.

- Feed solids concentration trending and evaluation of opportunities to improve feed solids consistency.

3.7. Biosolids Dewatering

On an average basis, cake solids production is expected to increase in 2017 over 2016 levels. As described in above sections, cake solids loading will increase due to plant loading, struvite, and iron sludge.

Treatment has implemented a 90th percentile approach for communicating dewatering targets within its ranks. It establishes an expectation of statistical performance, recognizing that transient instability may at times prevent one from meeting the target. A 90th percentile key performance indicator (KPI) has been established that accommodates some variability in performance. **Cake solids should never fall below 18%.** The 90th percentile value is always less than the median monthly value, which is more useful in determining long-term operating impacts. Table 6 summarizes the targets for 2017. The targets set for the first half of the year are based on recent historic performance. The targets take into account recent dewatering experience with biological phosphorus removal-impacted digested sludge. Treatment will meet with RR&R weekly to discuss dewatering performance and coordination issues, while a larger group will meet quarterly to discuss medium-term and long-term biosolids production planning.

Treatment recognizes that the recent implementation of the biological phosphorus removal process in the SSEC has the potential to significantly impact dewatering operations. In 2017, Treatment intends to use all available resources to meet cake solids targets, including increasing the ferric chloride and dewatering polymer doses. As part of efforts to continually improve performance, Treatment will conduct an optimization routine every month, with the support of O&M Technical Services. The main goal of each optimization routine will be to confirm/refine the machine set points that influence polymer consumption, cakes solids, and capture efficiency. This effort will focus on optimizing cake solids to meet targets, determining the optimal mechanical operating parameters of the centrifuges, and optimizing chemical consumption.

Table 6 – Anticipated Cake Solids Content and Associated KPI for Dewatering Targets

Month	Anticipated Cake Solids, % (median) ⁽¹⁾	Dewatering Target KPI (90 th Percentile)
Jan	21	20
Feb	21	20
Mar	21	20
Apr	21	20
May	21	20
Jun	21	21
Jul	21.5	20.5
Aug	21.5	20.5
Sep	21.5	20.5
Oct	21.5	20.5
Nov	21.5	20.5
Dec	21	20
⁽¹⁾ Current biological phosphorus removal operations will produce uncertainty in the expected cake solids % for 2017, and the current performance will be discussed at weekly and quarterly meetings with RR&R.		

The digestion, dewatering, and centrate management systems have historically had high maintenance demands for struvite mitigation, and the challenges are expected to continue in 2017 with the operation of biological phosphorus removal in the secondary process. Struvite control will be an area of increased attention in 2017 for the entire O&M Department.

The Assistant Treatment Superintendent will collaborate as the primary Treatment representative for O&M activities geared at control of nuisance struvite formation. Five control strategies have been identified and will be deployed in 2016:

1. *Preventative Maintenance Cleaning* – The Assistant will work with Maintenance to ensure that routine PMs are occurring to prevent issues with the centrate conveyance systems and the centrifuge machines.
2. *Digester Effluent Piping* – The Assistant will monitor Digester level behavior in response to the feed rates specified in the Weekly Targets and work with Maintenance to schedule ST 2520 chemical struvite removal from these lines when operating data trends begin to show emerging concern. This monitoring is captured with the Weekly Targets.
3. *Ferric Chloride Addition* – Significantly more ferric chloride will be added to the centrate system than in past years in order to control struvite formation. The

Operations Officer and Treatment Superintendent will coordinate with the Focus Area teams in order to ensure that the objectives of all areas are being appropriately balanced.

4. *PWC Addition* – The Assistant will set targets for use of PWC to help dilute centrate phosphorus and magnesium concentrations.
5. *Struvite Inspections* – Routine inspections take place on a regular basis and are discussed at the Near-term meetings. These inspections are important as they allow removal activities to occur before the scaling becomes too challenging.

4. Transmission

The Transmission Division is responsible for operating and maintaining approximately 238 miles of interceptor sewers and force mains, including roughly 3,730 manholes, 30 siphons, 77 diversion structures, 3 lift stations, and 3 odor control systems. The group also maintains 99 meter facilities and the sampling program used for the District's annual charges and Industrial Waste Pretreatment monitoring. Additional responsibilities of Transmission include storm sewer sampling, inspection services for facility improvements and new connections, the line-locate program for the District, and response as necessary to sanitary sewer overflows and events within the served area of the District and its Connectors.

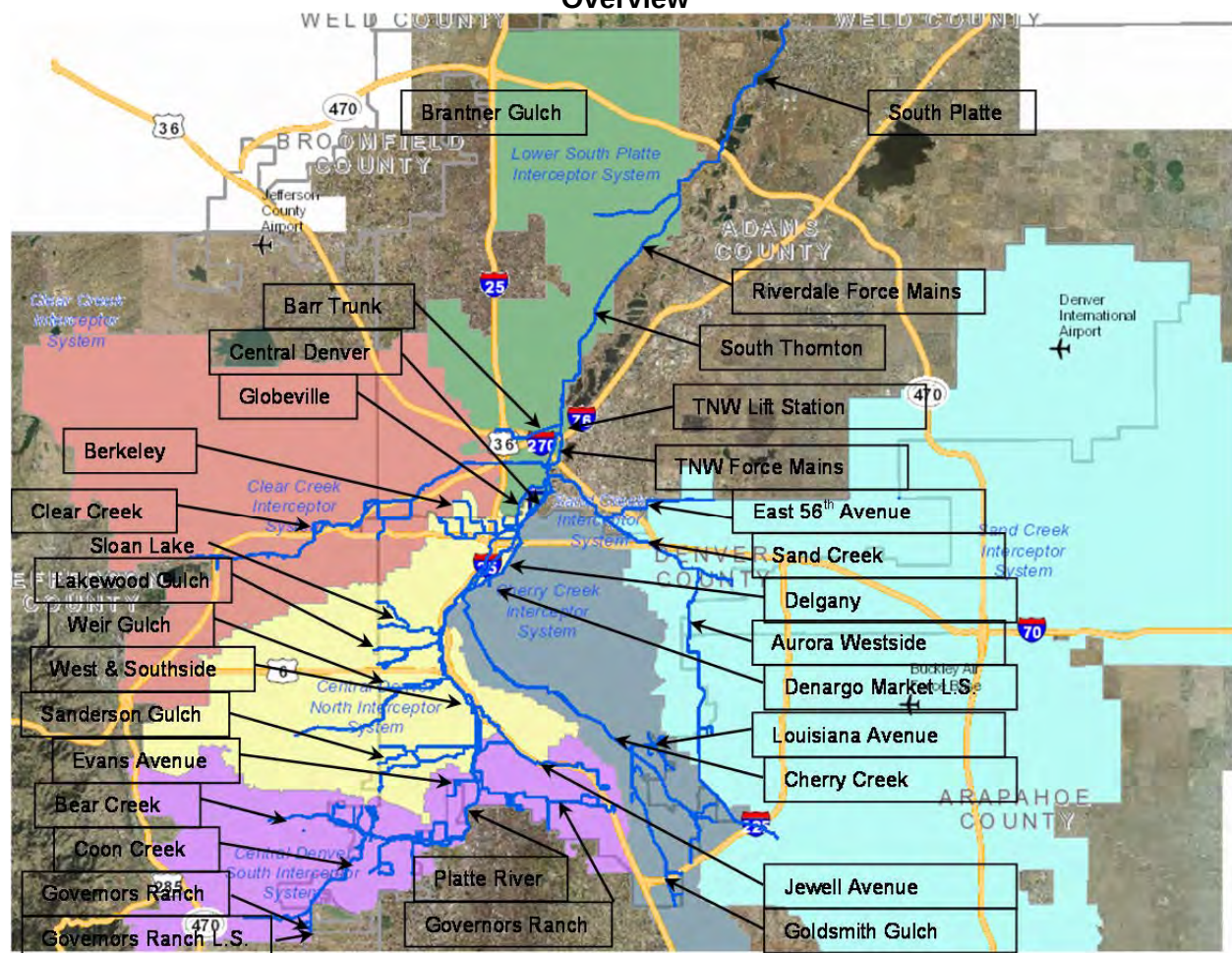
Safely conveying an average annual flow of approximately 138 mgd of wastewater to the RWHTF requires continual planning and execution of the Facility Inspection Program (FIP). The overall objectives of the FIP are to minimize risks to human health and the environment that might result from wastewater releases from the District's interceptor system, and to continually document the condition of the overall transmission system. This section outlines the FIP targets and goals for 2017.

4.1. District Transmission System Description

The District's transmission system covers approximately 540 square miles in the metropolitan Denver area. The system is comprised of 238 miles of interceptors ranging in size from 8-inches to 90-inches in diameter. Figure 13 presents an overview of the main components of the District's currently operated Transmission system.

In 2017, The Brantner Gulch Lift Station, and nine miles of Riverdale Forcemain will be demolished or abandoned.

Figure 13. District Transmission System Overview



4.2. Cleaning Operations

Routine cleaning is necessary to successfully operate and maintain the transmission system. The FIP provides status information on specific transmission system elements that are used to schedule cleaning activities, and also to assess the effectiveness of the cleaning program. Since 1989, the District has maintained the integrity of its transmission system with a rigorous Line Cleaning Program (LCP). This program includes jetting, flushing, and physical removal of debris. Primary objectives of the program include:

- Improving the quality of data collected at meter facilities and CCTV inspections,
- Reducing the risk of a Sanitary Sewer Overflow (SSO), and
- Maintaining existing capacity.

Scheduled line cleaning for 2017 is detailed below. The Quarterly reports for 2017 will report on progress against these specific goals.

Table 7 – 2016 Line Cleaning Schedule of Goals

Interceptor Name	Scheduled Line Cleaning (feet)
AURORA WESTSIDE	3,149
BEAR CREEK	14,163
BEAR CREEK COMMON	56,460
BERKELEY	5,816
BRANTNER GULCH	62
BARR TRUNK	1,316
CLEAR CREEK	134
CLEAR CREEK PARALLEL	1,550
CHERRY CREEK	13,000
CHERRY CREEK COMMON	116
COON CREEK	4,875
DELGANY	1,312
DELGANY COMMON	2,448
DAYTON STREET	4,873
EVANS AVENUE	2,956
EAST 56TH AVENUE	34
GOVERNORS RANCH FORCE MAIN	0
GOLDSMITH GULCH	5,217
GOVERNORS RANCH	255
GLOBEVILLE	5,337
HARVARD GULCH	12,373
JEWELL AVENUE	2,936
LOUISIANA AVENUE	10,747
LAKEWOOD GULCH	905
LAKEWOOD GULCH COMMON	63
PLATTE RIVER	3,656
PLATTE RIVER COMMON	0
PECOS STREET	11,055
SHERIDAN BLVD	6,724
SANDERSON GULCH	49
SANDERSON GULCH COMMON	1,232
SLOAN LAKE	1,720
UPPER WEIR GULCH	225
WEIR GULCH	931
WEIR GULCH PARALLEL	102
WEST & SOUTHSIDE	1,978
Total Length	177,769 feet or 33.7 miles

4.3. Closed Circuit Television Inspections

CCTV is used by the District to inspect and assess the physical condition of pipelines. A video camera is inserted into a pipeline and traverses the pipeline by floating, dragline, or robotic carrier. As the video camera is drawn through the pipeline, condition observations are noted by the Interceptor System Operator and stored electronically in the Interceptor Infrastructure System Database (IIS). Segments identified for inspection in 2017 have been selected based on:

- 10-yr cleaning and inspection cycle
- 45 degree bend or drop manhole increasing the inspection frequency
- A condition rating of “poor” increasing the inspection frequency

Table 8 below summarizes the CCTV workload for 2017. Quarterly reports for 2017 will present updates to this table to track progress against these explicit goals.

Table 8 – CCTV Schedule of Goals based on 10-yr Cycle

Interceptor Abbreviation	Name	Miles to Inspect
BCC	Bear Creek Common	10.7
DS	Dayton Street	1.4
EF	East 56th Avenue	3.8
ST	South Thornton	4.7
	Total	20.6 Miles

4.4. Surface Inspections

Surface inspection of interceptor facilities incorporates the following elements:

- Yearly inspection of selected access points along each interceptor to reveal potential problems.
- Documentation of the access point's condition. The data collected from this process are recorded.
- Physical testing (probing) of corroded and aging structures.

The Annual Surface Inspection Program has scheduled approximately 2,196 surface inspections for 2017. These are summarized on Table 9. The quarterly reports for 2017 will report on progress against these explicit goals.

Table 9 – Surface Inspection Schedule

Interceptor	Number of Inspections Scheduled	Interceptor	Number of Inspections Scheduled
Aurora Westside	114	Jewell Avenue	43
Barr Trunk	22	Lakewood Gulch	62
Bear Creek	173	Lakewood Gulch Common	24
Bear Creek Common	225	Louisiana Avenue	35
Berkeley	22	North Coon Creek	13
Brantner Gulch	16	Pecos Street	30
Central Denver	7	Platte River	100
Cherry Creek	94	Platte River Common	13
Cherry Creek Common	56	Republic Paperboard	5
Clear Creek	91	Riverdale FM	0
Clear Creek Parallel	80	Sand Creek	28
Coon Creek	78	Sand Creek Parallel	31
Dayton Street	31	Sanderson Gulch	20
Delgany	24	Sanderson Gulch Common	89
Delgany Common	15	Sheridan Boulevard	15
East 56th Avenue	44	Sloan Lake	47
Evans Avenue	14	South Thornton	63
Globeville	22	South Platte	27
Goldsmith Gulch	63	TNW Force Main	5
Governors Ranch	13	TNW Force Main Parallel	6
Governors Ranch FM	6	Upper Weir Gulch	56
Harvard Gulch	126	Weir Gulch	46
Jason Street	10	Weir Gulch Parallel	24
		West & Southside	68
Total Inspections	2,196		

Appendix E:

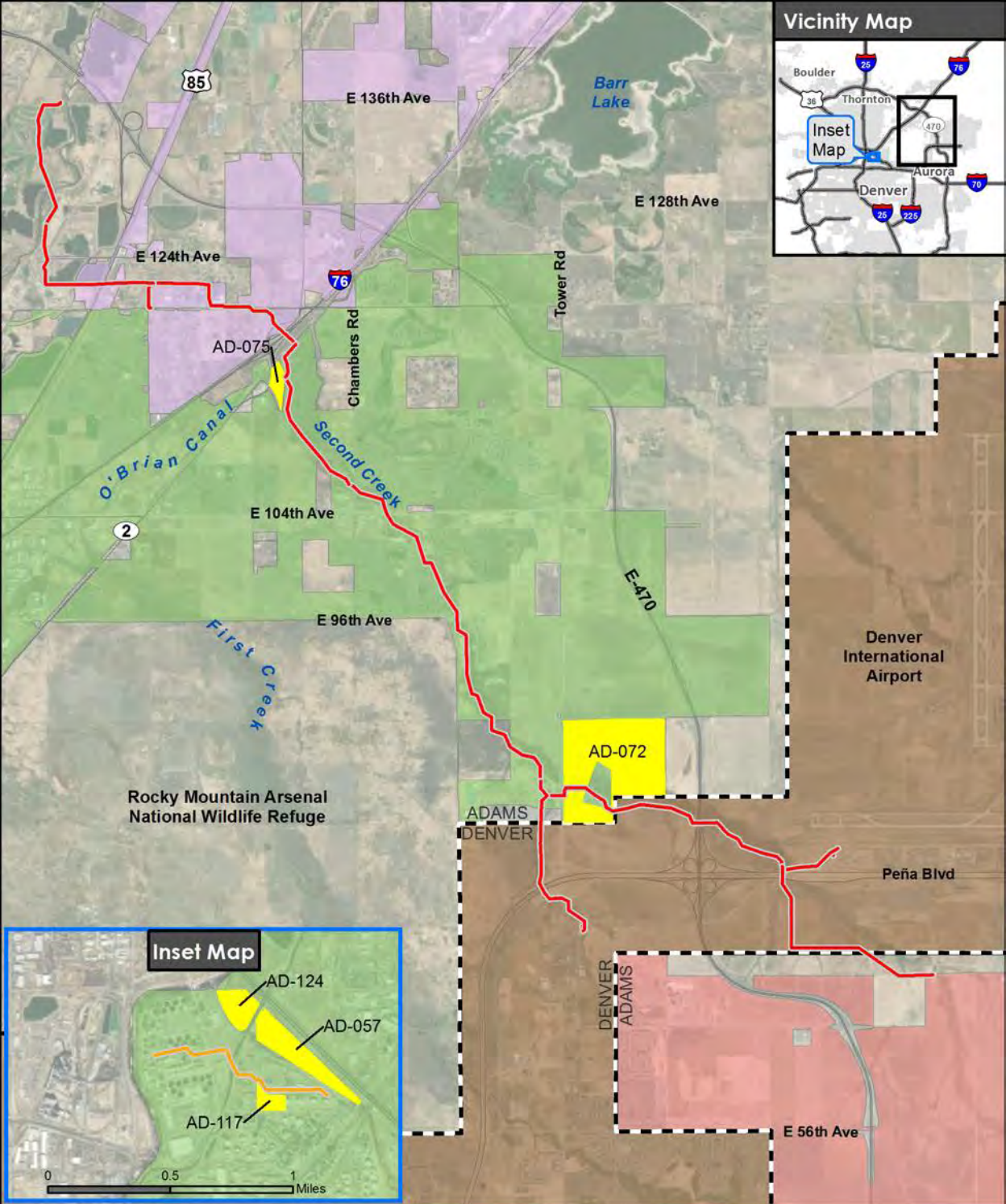
Landfills in the Project Area

Tri-County Historic Landfills in Proximity to SD Interceptor/SCIS Alignment in City of Commerce City
Metro Wastewater Reclamation District
PAR-1232 Second Creek Interceptor and Sand Creek Interceptor System Improvements

Tri-County Landfill No.	Project Parcel No.	Adams County Parcel No.	Landfill/Land Use	Location	Section/Township/Range	Methane Gas Monitoring	Current Owner	Years of Operation	Other Known Contaminants of Concern
AD-057	NA	182512102040 182512102041	Permitted Brighton Blvd. Sanitary Landfill (also known as Viking Steel Landfill) contains waste from residential, commercial, and industrial sources	North of Sand Creek, east of Burlington Canal, south of I-270, west of RR ROW	12/3S/68W	7/1979: 51% gas 6/1978: 37% gas 5/1978: 0% gas-70% LEL	Weaver Electric	1/9/63 - mid 1970s	Groundwater analysis performed 2/1986 on all former Landfill, Inc. sites indicates elevated levels of manganese, 1,1-dichloroethene, and trans-1,2 dichloroethene; source of contamination is presumed landfill related but no evidence of such.
AD-072	SD-270, SD-271, SD-276, SD-288	172327200001, 172327301001	Sanitary waste and construction debris	North of E.80 th Ave., east of N. Tower Road, south of E. 88 th Ave., and west of Himalaya St.	27/2S/66W	No data on file.	Allied Waste	4/19/81 - Present	Unknown
AD-075	SD-329, SD-330	0172306004001, 0172306004002	Inert Fill	North of E. 112 th Ave., East of Denver Hudson Canal and SH-2, south of Burlington Northern Sante Fe Railroad	6/2S/66W	No data on file.	Fiore & Sons Inc.	2/9/97 - Unknown	Unknown
AD-117	NA	182512102003	Non-permitted former sludge disposal site	North of 60 th , south of Sand Creek, east of Steel Street, west of Brighton Blvd (outside Sand Creek floodplain)	12/3S/68W	No historic data on file. Weekly monitoring data collected in April and May 2019 as part of the SCIS Project.	Suncor	Unknown	Asbestos, PCBs, dichloroethane, VOCs, Semi-VOCs, Total Recoverable Petroleum Hydrocarbons
AD-124	NA	182512202001, 182512101002, 182512102040, 182512102041, 182512102042	Sanitary waste and construction debris	North and west of the O'Brian Canal, south of HWY 36, and east of Sand Creek	12/3S/68W	Q4 2018: 1.8% gas Q3 2018: 0.4% gas Q2 2018: 1.3% gas Q1 2018: 0% gas Q4 2017: 2% gas Q1, 2, & 3 2017: 0% gas	Mr. & Mrs. Amato	Unknown	Unknown

Reference:
a) Tri-County Historic Landfills as shown on <https://www.arcgis.com/apps/OnePane/basicviewer/index.html?appid=9eeb7793a0e243ad8af3da0d94568673> accessed on 3/21/19.

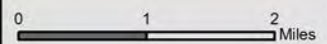
Vicinity Map



Inset Map



- Second Creek Interceptor Recommended Alignment*
- Sand Creek Interceptor System Alignment*
- Historic Landfill (per TCHD records)
- County Boundary
- City of Aurora
- City of Brighton
- City and County of Denver
- City of Commerce City



Projection: Lambert Conformal Conic
State Plane Colorado North Feet
North American Datum of 1983 (2011)

Basemap source: ESRI and its data partners

*Alignment based on current design and subject to design refinement

Appendix F:

Permit and Agency Contact List

Agency	Contact	Permit
FEDERAL		
Federal Emergency Management Agency	Casey Martin, E.I. CDM Smith, a member of Compass PTS JV 303-383-2333 martinc@cdmsmith.com	Conditional Letter of Map Revision
		Letter of Map Revision
U.S. Army Corps of Engineers	Aaron R. Eilers U.S. Army Corps of Engineers Omaha District Denver Regulatory Office 9307 South Wadsworth Boulevard Littleton, CO 80128 303-979-4120 aaron.r.eilers@usace.army.mil	Nationwide Permit 12
U.S. Dept. of the Interior: Fish & Wildlife Service	Dominic Barrett 134 Union Blvd Lakewood, CO 80228 303-236-7920 dominic_barrett@fws.gov	Concurrence letter
STATE		
Colorado Department of Public Health & Environment - Air Pollution Control Division	Chip Hancock 4300 E Cherry Creek Drive South Denver, CO 80246 303-692-3169 r.hancock@state.co.us	APEN for VOC emissions - equipment (Notice of Relocation for portable equipment)
		APEN for VOC emissions - pipe coating
		Land Development APEN General Permit (Fugitive Dust)
	Laura Shumpert APCD - Indoor Environment Program - Asbestos/IAQ Air Unit 4300 Cherry Creek Drive South, APCD-IE-B1 Denver, CO 80246 303-692-2100 l.shumpert@state.co.us	Asbestos Abatement Permit
Colorado Department of Public Health & Environment - Water Quality Control Division	Nathan Moore Clean Water Compliance Unit Manager 4300 E Cherry Creek Drive South <i>(same for all)</i> Denver, CO 80246 <i>(same for all)</i> 303-692-3555 nathan.moore@state.co.us	CDPS General Permit for Stormwater Discharges Associated with Construction Activity (including SWMP)
		CDPS Hydrostatic Testing of Pipelines, Tanks, and Similar Vessels Discharge Permit
	Margo Griffin CDPHE-WQCD ES B2 303-692-3607 margo.griffin@state.co.us	CDPS Individual Industrial Discharge Permit (Construction Dewatering)
	Bret Icenogle, P.E. Engineering Section Manager 303-692-3278 bret.icenogle@state.co.us	Site Location Approval

Agency	Contact	Permit
Colorado Department of Public Health & Environment - Hazardous Materials and Waste Management Division	Andy Todd CDPHE-HMWMD-B2 4300 Cherry Creek Drive South Denver, CO 80246 303-691-4049 andy.todd@state.co.us	Materials Management Plan
Colorado Department of Transportation - Region 1	Steve Loeffler 2829 W. Howard Pl. 2nd Floor Denver, CO 80204 303-757-9891 steven.loeffler@state.co.us	State Highway Access Permit - Temporary (see Utility/Special Use Permit)
		Special Transport Permit
		Utility/Special Use Permit
		State Highway 22 (E. 124th Ave.)
		State Highway 85
		State Highway 2
Colorado Division of Water Resources	David Nettles, P.E. Regional Engineer 810 - 9th Street Suite 200 Greeley, CO 80631 970-352-8712 x1208 david.nettles@state.co.us	State Highway 6 (Interstate 76)
		Permanent Monitoring Well Permit
		Temporary Dewatering Well Permit
Colorado Parks & Wildlife	Serena Rocksund District Wildlife Manager-Adams County 6060 Broadway (<i>same for all</i>) Denver, CO 80216 (<i>same for all</i>) 303-291-7132 serena.rocksund@state.co.us Jordan Likes District Wildlife Manager-Brighton (west of HWY 85) 303-291-7135 jordan.likes@state.co.us Megan Lacey District Wildlife Manager-Denver County 303-291-7137 megan.lacey@state.co.us	Temporary Monitoring Well Permit
		Raptor Monitoring Protocol
State Historical Preservation Office	Mark Tobias Intergovernmental Services Manager 1200 Broadway Denver, CO 80203 303-866-4674 mark.tobias@state.co.us	Section 106 of National Historic Preservation Act-Phase I (Not a permit. Support for USACE Nationwide Permit 12)

Agency	Contact	Permit
COUNTY		
Adams County	Shayla Christianson Administrative Technician 4430 South Adams County Parkway <i>(same for all)</i> Brighton, CO 80601 <i>(same for all)</i> 720-523-6985 schristianson@adcogov.org	Stormwater Quality Permit
	Greg Barnes Planner II - Community & Economic Development 720-523-6853 gjbarnes@adcogov.org	Areas and Activities of State Interest Permit (1041)
		Temporary Use Permit
	Greg LaBrie Floodplain Administrator 720-523-6824 glabrie@adcogov.org	Floodplain Use Permit
		On-site Grading and Drainage Permit
		Right of Way & Infrastructure Permit
		E. 81st Avenue
		E. 136th Avenue
		Oakland Street
		Peoria Street
		Utility Street Cut Permit (see Right of Way & Infrastructure Permit)
	Gordon Stevens Adams County Transportation Department 720-523-6965 gstevens@adcogov.org	Oversize Load Permit
	Rene Valdez Adams County Transportation Department 720-523-6961 rvaldez@adcogov.org	Building Permit
		Demolition Permit
		Underground & Above Ground Utility Permit
CITY		
City and County of Denver	Jennifer Williams Senior Engineer Wastewater Capital Projects Management 2000 W. 3rd Ave <i>(same for all)</i> Denver, CO 80223 <i>(same for all)</i> 303-446-3549 Jennifer.Williams@Denvergov.org	Building Permit
		Construction Activities Stormwater Discharge Permit
		Floodplain Permit
		Temporary Sign Permit
		Utility Plan Review
		Zoning Construction Permits
	Steve Forvilly, PE & PLS Senior Engineer Engineering, Regulatory & Analytics, Public Works City and County of Denver 720-913-4533 steven.forvilly@Denvergov.org	Street Occupancy Permit / Right of Way Construction Permit
		E. 72nd Avenue
		Peña Boulevard
		Tower Road
City of Aurora	Permit Center 15151 E. Alameda Parkway, 2nd Floor Aurora, CO 303-739-7000 permitcounter@auroragov.org	Building Permit
		Public Improvement Permit
		Sign Permit
		Stormwater Management Plan
		Stormwater Quality Discharge Permit for Construction Activities

Agency	Contact	Permit	
City of Brighton	Jason Bradford Planning Manager 500 S 4th Ave <i>(same for all)</i> Brighton, CO 80601 <i>(same for all)</i> 303-655-2024 jbradford@brightonco.gov	Conditional Use Permit	
	Matt Rowland Chief Building Official 303-655-2014 mrowland@brightonco.gov	Building Permit - Demolition	
		Building/Utility Construction Permit	
	Scott Olsen 303-655-2136 solsen@brightonco.gov	Erosion and Sediment Control Permit	
		Floodplain Permit	
	Customer Service Center 303-655-2017 1stop@brightonco.gov	Hydrant Meter Permit	
		Moving Permit	
		Right-of-Way Permit	
		Brighton Road	
		Henderson Road	
		Potomac Street	
		Sign Permit	
		Temporary Use Permit	
City of Commerce City	Jenny Axmacher, AICP City Planner 7887 E 60th Ave <i>(same for all)</i> Commerce City, CO 80022 <i>(same for all)</i> 303-289-3716 jaxmacher@c3gov.com	Conditional Use Permit	
	Building Safety Division 303-289-3790	Building Permit	
		Temporary Use Permit	
	Planner of the Day 303-227-8777 cdplanner@c3gov.com	Floodplain Development Permit	
	Public Works Department Municipal Services Center 8602 Rosemary Street Commerce City, CO 80022 303-289-8150	Grading Permit	
		Right of Way Permit	
		E. 88th Avenue	
		E. 96th Avenue	
		E. 104th Avenue	
		E. 112th Avenue	
		E. 120th Avenue	
		Chambers Road	
	Tower Road		
	Wheeling Street		
	RAILROADS		
	Burlington Northern Santa Fe	Melissa Leal Jones Lang LaSalle Brokerage, Inc. 4200 Buckingham, Suite 110 Fort Worth, TX 76155 817-230-2626 Melissa.leal@am.jll.com	Pipeline Crossing and/or Longitudinal (South of I-76 and east of State Highway 2)

Agency	Contact	Permit
Union Pacific Railroad	UPRR Real Estate - Contracts 1400 Douglas Street MS 1690 Omaha, NE 68179 402-544-8600 recontracts@up.com	Crossing Permit (East of State Highway 85 midway between E. 120th Avenue and E. 124th Avenue)
UTILITIES		
Xcel Energy	Preston GibsonArea Manager 1800 Larimer St., Suite 1400 Denver, CO 80202 303-425-3944 preston.e.gibson@xcelenergy.com	Application for Gas and Electric Services (Const trailers, Odor Control Facility)
MISCELLANEOUS		
Burlington Ditch Company	80 South 27th Avenue Brighton, CO 80601	Access Permit
DEN	Catherine A. Rafferty, PE, CFM, CCCA Senior Engineer Denver International Airport Airport Infrastructure Management – Development Airport Office Building, 7th Floor 8500 Peña Boulevard Denver, CO 80249-6340 (303) 342-4461; (303) 688-0099 CATHERINE.RAFFERTY@FLYDENVER.COM	Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) / Form 7460
E-470	Justine Brown Permits Coordinator 22470 E. 6th Parkway, Suite 100 Aurora, CO 80018 303-537-3470 jbrown@e-470.com	Construction Permit
		Annual Access Permit (Operation)
The Farmers Reservoir and Irrigation Company	Eve Craven Projects Coordinator 80 South 27th Avenue Brighton, CO 80601	Access Permit
Regional Transportation District	Manager of RTD Real Property 1560 Broadway Street, Suite 650 Denver, CO 80202 realproperty@rtd-denver.com	ROW Agreement Request (East of Tower Road and north of E. 72nd Avenue and east of E-470 and north of Peña Boulevard)
	RTD 1560 Broadway Street, Suite 650 Denver, CO 80202 BGAPpermits@rtd-denver.com	Utility Agreement (see ROW Agreement Request)
	RTD 1560 Broadway Street, Suite 650 Denver, CO 80202 BGAPpermits@rtd-denver.com	Facility Access Permit (Building Grounds Access Permit) (see ROW Agreement Request)
	RTD 1560 Broadway Street, Suite 650 Denver, CO 80202 railopspermits@rtd-denver.com	Light Rail Access Permit (see ROW Agreement Request)

Agency	Contact	Permit
	RTD 1560 Broadway Street, Suite 650 Denver, CO 80202 rwic@rtdcrail.com track.usage@rtdcrail.com	RTD/DTO Commuter Rail Right-of-Way Access Permit (see ROW Agreement Request)
South Adams County Water and Sanitation District	Abel Moreno Distribution and Collection Systems Manager 10200 E 102nd Ave Henderson, CO 80640 720-206-0590 amorena@sacwsd.org	Connection Permit
		Crossing Agreement
		Hydrant Permit
Tri-County Health Department	Warren Brown Senior Environmental Health Consultant 6162 South Willow Drive, Suite 100 Greenwood Village, CO 80111 303-220-9200 wbrown@tchd.org	Flammable Gas Investigation Plan



Second Creek Pipeline Construction Outreach Plan

PREPARED FOR METRO WASTEWATER RECLAMATION DISTRICT | MAY 2020
DISCLAIMER: THIS DRAFT PLAN IS SUBJECT TO CHANGE AND WILL BE FINALIZED
PRIOR TO CONSTRUCTION START IN FALL 2020

Prepared by

GBSM, Inc.

555 17TH STREET | SUITE 900 | DENVER, CO 80202 | 303.825.6100

GBSM
INSIGHT | STRATEGY | RESULTS

TABLE OF CONTENTS

PURPOSE OF THIS DOCUMENT	1
2018-2019 ACTIVITIES	2
CONSTRUCTION ACTIVITIES – 2020 AND BEYOND	3
ISSUES MANAGEMENT	4
ISSUES MANAGEMENT PROTOCOL	5
IMPLEMENTATION SCHEDULE	6
APPENDIX A – CURRENT PROJECT FACT SHEET	8
APPENDIX B – PROJECT KICKOFF MAILER	10
APPENDIX C – PUBLIC MEETING ANNOUNCEMENTS.....	11

PURPOSE OF THIS DOCUMENT

In 2018, the Metro Wastewater Reclamation District (Metro District or District) finalized a Communications Plan for the Second Creek Pipeline. That Communications Plan developed key messages regarding the purpose and need for the Second Creek Pipeline. As the Second Creek Pipeline moves from the planning phase into construction, the Communications Plan will provide the underlying framework for continued stakeholder outreach during construction.

With the Communications Plan as its foundation, this Construction Outreach Plan details the overarching communications strategies and outreach objectives the Metro District will implement as it moves into the construction phase of the Second Creek Pipeline. This strategy should be viewed as a base level of proactive communication. There undoubtedly will be additional opportunities, milestones and issues that will require further planning, outreach, and support.

The Communications Team will work to achieve the following key goals and objectives with this construction outreach effort:

Goals:

- Proactively inform stakeholders about the construction process and provide additional updates at key milestones.
- Ensure timely and effective notification for activities that could cause potential disruption or disturbance at a minimum. Identified stakeholders will be notified prior to any disruptions as identified in regular recurring construction/communications meetings.
- Quickly identify and appropriately resolve any unforeseen issues.

Objectives:

- Contact stakeholders prior to construction start to establish baseline communication for the construction phase.
- The term “stakeholders” includes identified key stakeholders (and could include state and local government staff and elected officials, economic development agencies, local developers and business leaders), adjacent property owners to the pipeline alignment, and any additional stakeholders determined to be impacted directly or indirectly by pipeline construction.
- Maintain communications throughout the construction phase to keep stakeholders apprised of the construction progress.
- Establish a structured issues management process to proactively and consistently identify and respond to situations that may develop.

2018 ACTIVITIES – INITIAL STAKEHOLDER OUTREACH AND FIELD INVESTIGATIONS

The Communications Team made initial contact with applicable agencies and property owners adjacent to the proposed pipeline alignment in the summer of 2018 through a mass direct postcard mailing (see Appendix A). The mailer provided key information regarding the project timeline, telephone hotline, email address, and website. Approximately 6,000 postcards were distributed to residents and businesses within a half-mile radius of the proposed alignment. A database of contact information for property owners adjacent to the alignment was developed and is being consistently updated.

This approach was designed to keep property owners and other stakeholders adequately informed about the project, ensuring a clear communication pathway to address project questions and concerns. Outreach activities included the following:

- **Stakeholder Mailer:** The postcard mailer provided stakeholders with easy access to project information, including the project timeline and a means to contact the Second Creek Pipeline project team.
- **Bilingual Hotline Message:** The Second Creek Pipeline hotline message was activated in the summer of 2018 to provide relevant information and provide necessary updates including public meeting times and locations. The hotline is intended to provide an overview of upcoming and completed activities. The hotline will continue to be maintained in English and Spanish.
- **Environmental Evaluations:** The Metro District performed environmental evaluations during the preliminary design phase that were used in conjunction with other design information to optimize the interceptor alignments and provide supporting information for permit applications. The evaluations included hazardous material assessments, historical/archaeological field surveys in accordance with Section 106 of the National Historic Preservation Act, wetlands and waters of the U.S. surveys and delineation, and habitat and presence/absence surveys for threatened and endangered species.

2019 ACTIVITIES – FINAL DESIGN AND FIELD INVESTIGATIONS

- **Construction Message Platform:** A base set of key messages about construction activities will be established. The goal is to consistently and effectively communicate the baseline themes of the construction process (e.g. the need for the Second Creek Pipeline, commitment to being a good neighbor, basic construction timeline and project benefits).
- **Second Creek Pipeline Project Webpage:** Construction information will be added to the Second Creek Pipeline section of the Metro District's website. This page will contain project information and updates such as the construction fact sheet, stakeholder mailer and a summary-level construction schedule.

- **Public Meetings:** During the design and permitting phase, the Metro District hosted public meetings at three separate locations to inform and engage stakeholders in Adams County, Brighton, and Commerce City. The meetings occurred on May 9, July 10, and July 17 (see Appendix C). Following initial construction outreach, the Second Creek team will meet regularly to ensure a seamless stakeholder information sharing and engagement process is maintained.
- **Environmental Evaluations and Permitting:** The District performed supplemental environmental evaluations during the final design phase to address data gaps due to alignment refinements that occurred after the preliminary design. The evaluations included historical/archaeological field surveys in accordance with Section 106 of the National Historic Preservation Act, wetlands and waters of the U.S. surveys and delineation, and habitat and presence/absence surveys for threatened and endangered species. In addition, a raptor nest survey was conducted in spring/summer 2019 to establish a project baseline.

CONSTRUCTION ACTIVITIES – 2020 AND BEYOND

- **Phased and Targeted Outreach:** As the alignment is finalized and the project transitions into construction, we anticipate regular project updates to adjacent private property owners, businesses, neighborhood organizations, developers, and other identified stakeholders. Given the phased nature of pipeline construction, relatively brief disturbances will conclude at any one work site before moving to the next segment of the alignment. Ongoing localized coordination will occur throughout construction.
- **Final Alignment Materials Update:** Prior to construction activities commencing in 2020, all web materials and the fact sheet will be updated and reviewed to include final alignment and additional relevant project information. Additional communications materials will be shared at a variety of common use areas, including libraries and recreation centers.
- **Activity-Related Outreach:** Certain areas of construction that have the potential to be highly visible or impact nearby properties, may require special communication. For each, it will be determined which stakeholders (e.g., nearby properties, businesses, emergency services, local governments, Colorado Department of Transportation, news media, and HOA's) may be affected and what kind of advance communication should occur. Typically, a flyer (with contact information) distributed in advance of the upcoming activity is sufficient notice for potentially impacted properties. For more major activities, news media and/or other agencies may need to be contacted.
- **Elected and Appointed Officials Engagement:** Key stakeholders for each jurisdiction within the alignment corridor will be updated by internal communications through their respective staff in advance of public meetings and other major project milestones, as appropriate.
- **Other Stakeholders:** Project updates with adjacent property owners, businesses, developers, and pipeline stakeholders will ensure ongoing and consistent communication and may include website updates, mailers, flyer/door hangers, and face-to-face communication, as needed.

- **Environmental Evaluations and Permitting:** The environmental evaluation findings will be used in conjunction with the design plans to coordinate permit requirements with agencies and prepare permit applications for the construction phase.

In addition to these project-wide activities, outreach specific to each project component will be conducted as described in the following list. The Metro District also has developed separate databases for property owners adjacent to the Second Creek Pipeline. These databases, used for general construction updates and/or notifications specific to pipeline activities, will be reviewed annually over the course of the project.

- **Second Creek Pipeline Project Team Coordination:** The project team will coordinate closely during construction to ensure timely, consistent, and accurate communication. Communication outreach will be driven by the construction schedule and will highlight key milestones and activities. Project Team construction progress meetings will be held weekly.
- **Second Creek Information Cards:** Information cards with the hotline numbers and website address will be provided to field personnel. The information cards will include the main Metro District phone number and contact information for the Public Information Officer. Inquiries will be directed to District staff and the project team in the following order:
 - o Kelley Merritt, Communications Team Lead and Public Information Officer
 - o Jon Wicke, Second Creek Pipeline Project Manager
 - o Miles Graham, Communications Team
- **Consistent Information Source:** As is the practice with any infrastructure project involving construction, it is important to provide consistent information in response to public inquiries. Pipeline construction questions will be directed to District staff and the project team in the following order:
 - o Kelley Merritt, Communications Team Lead and Public Information Officer
 - o Jon Wicke, Second Creek Pipeline Project Manager
 - o Miles Graham, Communications Team

ISSUES MANAGEMENT

Even the best planned construction efforts encounter unforeseen events. These can range from major incidents (e.g. construction accidents with significant injuries) to minor interruptions (e.g. neighbors stopping by the construction site with questions). The key to success with any of these events is establishing and adhering to an agreed-upon process that will govern how a situation is assessed and managed.

Jon Wicke, Second Creek Pipeline Project Manager, will be responsible for communicating critical incident response procedures during construction and ensuring staff have been trained in its implementation. For minor incidents, the Issues Management Protocol described in the following paragraphs will facilitate the District's ability to form a highly organized and linear response that will:

- Help the Metro District and its contractors successfully manage a wide variety of situations in a manner that preserves the District's reputation as a leader in environmental stewardship.
- Identify areas of potential risk to the Metro District, its operations, staff, relationships with other agencies and public perception; and determine how such risk might be mitigated through proactive planning, preparation, and training.
- Ensure the Metro District's responses are consistent throughout the organization from executive leadership to employees and contractors in the field.
- Clearly articulate the core principles that are the foundation for how the Metro District operates.

ISSUES MANAGEMENT PROTOCOL

As unexpected situations develop, it is important that the Metro District and its contractors adhere to the following five steps for an effective, consistent, and organized way to manage each situation:

1. **Identify the Situation:** The first step is to develop an accurate and pragmatic assessment of the issue. Situations should be classified as having a minimal, moderate, or high level of significance. Circumstances that may result in media attention may include injuries, property or environmental damage, and involvement of another local, state or government agency.
2. **Alert Authorized Metro District Spokespeople and Assemble Appropriate Second Creek Pipeline Team Members:** Jim Mallore, Jon Wicke, and Kelley Merritt are the only authorized Second Creek Pipeline spokespeople. As Communications Lead and Public Information Officer, Kelley Merritt should be notified of an incident as soon as possible.
3. **Identify Next Steps:** The group will develop a list of action items and determine who will organize and manage the decision-making process.
4. **Develop the Metro District's Initial Response:** As an action plan is established, the Communications Team will consider the people and/or groups with whom it is most important to communicate and whether they are classified as internal or external (e.g. directors, employees, contractors, property owners, other organizations, and media). As soon as the stakeholders are identified, an initial response will be quickly developed and distributed and to address the District's awareness of the situation and commitment to resolving it. Future statements, if needed, can provide more details.
5. **Follow the Established Protocols:** After the initial response has been implemented, the group will continue to monitor the situation, stay on message with the initial statement, and evaluate the need for additional statements.

IMPLEMENTATION SCHEDULE

The table below outlines the early construction outreach implementation schedule from project commencement in 2018 through construction kickoff in late 2020. Construction is expected to be complete in 2024 and this Construction Outreach Plan and the implementation table will be updated at a minimum every six months as construction progresses and new stakeholders and strategies are developed to maintain consistent communication and outreach with invested stakeholders.

TIMING	OUTREACH/APPROACH
2018	
February-March 2018	Develop Stakeholders Database and Baseline Materials Fact sheet, postcards, FAQs, road-show presentations, field team cards
April 2018	Complete Communications Plan/Launch Web Advisory
March-December 2018	Conduct Agency and Stakeholder Project Introductory Meetings
2019	
January-December 2019	Continue conducting Agency and Stakeholder Project Introductory, coordination, or follow-up meetings to provide outreach to appropriate stakeholders during field investigations. Coordinate with local jurisdictional agencies on land use permitting. Submit applications and respond to stakeholder comments.
May 9, 2019	Neighborhood Meeting/Open House* Adams County/Brighton: 5-7pm, Riverdale Golf Course

TIMING	OUTREACH/APPROACH
July 10, 2019	Neighborhood Meeting/Open House* Commerce City: 5-7pm, Bison Ridge Rec Center
July 17, 2019	Neighborhood Meeting/Open House* Commerce City: 5-7pm, Eagle Pointe Rec Center
	*Permitting process will reveal if additional public meetings are necessary
Ongoing – and through construction	Continued coordination with local jurisdictional agencies on approval of land use, design, and construction permits. Continued outreach to Agencies and Stakeholders adjacent to the proposed pipeline alignment

APPENDIX A

Current Project Fact Sheet Updated in May 2019 – English Version

SECOND CREEK PIPELINE



WHAT IS THE SECOND CREEK PIPELINE?

The Second Creek Pipeline is new infrastructure to be constructed by the Metro Wastewater Reclamation District. This new pipeline will enable portions of Aurora, Brighton, Commerce City, Denver, Denver International Airport, and South Adams County to be served by the Northern Treatment Plant.

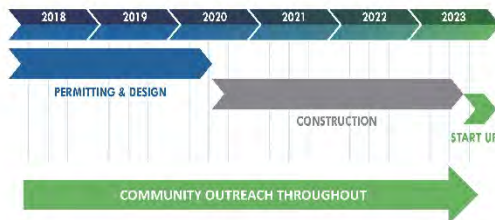
This collaborative effort identified the Second Creek Pipeline as the best long-term solution to address rapid regional growth and serve the 2 million Coloradans within the Metro District's service area.

SECOND CREEK PIPELINE FACTS

- Approximately 20 miles long
- Diameter ranges from 24 to 60 inches
- Constructed 5 to 50 feet underground
- Connects to existing South Platte Pipeline and conveys flows to the Northern Treatment Plant
- Avoids developed areas and traffic corridors when possible

Regional Benefits:

- Long-term infrastructure solution
- Regional collaboration
- Reflection of the Metro District's commitment to environmental stewardship
 - Sustainable gravity flow (up to 7 existing pump stations may be decommissioned)
 - Restoration or improvement of existing land conditions
- Expansion of regional water reclamation service
- Economic development and community growth



www.metrowastewater.com/SecondCreek • SecondCreek@mwr.dst.co.us
(303) 286-3115 (English) • (303) 286-3116 (Español)

METRO WASTEWATER RECLAMATION DISTRICT SECOND CREEK PIPELINE

¿DE QUÉ SE TRATA LA CANALIZACIÓN DEL ARROYO SECOND CREEK?

La canalización del arroyo Second Creek es una nueva infraestructura que se construirá en el Metro Wastewater Reclamation District (Distrito de Recuperación de Aguas Residuales). Dicha obra permitirá que la planta de tratamiento del norte del distrito abastezca partes de Aurora, Brighton, Commerce City, Denver, el Aeropuerto Internacional de Denver (DEN) y el condado de Adams.

Mediante este esfuerzo conjunto se identificó la canalización del arroyo Second Creek como la mejor solución a largo plazo para hacer frente al rápido crecimiento regional y atender a los 2 millones de habitantes en Colorado dentro del área de servicio del Distrito.

DATOS DE LA CANALIZACIÓN DEL ARROYO SECOND CREEK

- Aproximadamente 20 millas de largo
- Diámetro de 24 a 60 pulgadas
- Construcción entre 5 y 50 pies bajo tierra

- Conecta la existente South Platte Pipeline y transmite flujo a la planta de tratamiento del norte (Northern Treatment Plant)
- Evita áreas desarrolladas y corredores de tráfico cuando posible

Beneficios regionales de la obra

- Solución de infraestructura a largo plazo
- Colaboración regional
- Un reflejo del compromiso al cuidado del medio ambiente por parte de Metro District
 - flujos sostenibles usando gravedad (hasta 7 estaciones de surtidores existentes podrían ser dadas de baja)
 - restauración o mejora de las condiciones de terreno existentes
- Expansión del servicio regional de reclamación de agua
- Desarrollo económico y crecimiento comunitaria



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APPENDIX B

Project Kickoff Mailer – Distributed to Nearly 6,000 Residents/Business Owners



SECOND CREEK PIPELINE

PROJECT OVERVIEW

The Second Creek Pipeline is new infrastructure, approximately 20 miles long, to be constructed by the Metro Wastewater Reclamation District. This new pipeline will enable portions of Aurora, Brighton, Denver, Denver International Airport, and South Adams County to be served by the District's Northern Treatment Plant.

These partner agencies worked with the Metro District to develop the Second Creek Basin Regional Master Plan. This collaborative effort identified the Second Creek Pipeline and its First Creek Segment as the best long-term solution to address rapid regional growth and better connect the District's system with the 1.8 million Coloradans it serves.

Additional benefits of this gravity-powered pipeline may include:

- Closing up to seven existing pump stations
- Reducing energy use and carbon footprint
- Reducing long-term maintenance and operating costs

DESCRIPCIÓN GENERAL DEL PROYECTO

La canalización del arroyo Second Creek es una nueva infraestructura de unas 20 millas de largo que se construirá en el Metro Wastewater Reclamation District (Distrito de Recuperación de Aguas Residuales). Dicha obra permitirá que la planta de tratamiento del norte del distrito abastezca partes de Aurora, Brighton, Denver, el Aeropuerto Internacional de Denver (DEN) y el sur del condado Adams.

Dichos organismos asociados colaboraron con el distrito a fin de elaborar el plan regional maestro de la cuenca del arroyo Second Creek. Mediante este esfuerzo conjunto se identificó la canalización del arroyo Second Creek y el tramo correspondiente al arroyo First Creek como una solución a largo plazo para hacer frente al rápido crecimiento regional y conectar de forma más eficaz el sistema del distrito que abastece a 1.8 millones de habitantes en Colorado.

Los beneficios adicionales de esta tubería accionada por la gravedad incluyen:

- el cierre de hasta siete estaciones de bombeo existentes.
- la reducción del uso de energía y el impacto ecológico.
- la reducción de los costos operativos y de mantenimiento a largo plazo.

WHAT TO EXPECT: A gravity-powered pipeline that is the safest and most environmentally friendly solution for the region. The Second Creek Pipeline ensures reliable and cost-effective water reclamation for the current and future generations who rely on this essential public service.

In the coming months, crews will be in the project area performing routine survey work. For more information or to contact the project team, please visit www.metrowastewater.com/SecondCreek or call (303) 286-3115.



Metro Wastewater Reclamation District
6450 York Street
Denver, CO 80229

PROJECT SCHEDULE



QUÉ SE PUEDE ESPERAR: la tubería accionada por la gravedad es la solución más segura y ecológica para la región. Garantiza la recuperación de agua de manera confiable y rentable para el uso por parte de generaciones actuales y futuras que dependen de este servicio público esencial.

En los próximos meses, las cuadrillas realizarán trabajos de relevamiento de rutina en las zonas del proyecto. Para obtener más información o para comunicarse con el equipo del proyecto, visite www.metrowastewater.com/SecondCreek o llame al 303-286-3116.

APPENDIX C

May 9 Public Meeting Announcement

SECOND CREEK PIPELINE

NEIGHBORHOOD MEETING | COMMUNITY OPEN HOUSE
THURSDAY, MAY 9, 2019
5:00-7:00PM

CLUBHOUSE AT RIVERDALE GOLF COURSES
13300 RIVERDALE ROAD, BRIGHTON, CO 80602

Learn more about the permitting process, project schedule, and next steps.

REUNIÓN ABIERTA AL BARRIO Y A TODO EL PÚBLICO
VIERNES, 9 DE MAYO DE 2019
DE 5:00-7:00PM

CLUBHOUSE AT RIVERDALE GOLF COURSES
1330 RIVERDALE ROAD, BRIGHTON, CO 80602

Aprenda más sobre el proceso de permisos, el programa del proyecto, y los próximos pasos.

Spanish and sign language interpretation services will be provided upon request with a three business-day notice.
Contact SecondCreek@mwrdr.dsl.co.us

Se ofrecerán servicios de interpretación en español y lenguaje de señas si se solicita con tres días hábiles de antelación.
Contacte al SecondCreek@mwrdr.dsl.co.us.



Metro Wastewater Reclamation District
6430 York Street
Denver, CO 80229

PROJECT OVERVIEW

The Second Creek Pipeline is new infrastructure, approximately 20 miles long, to be constructed by the Metro Wastewater Reclamation District. This new pipeline will enable portions of Aurora, Brighton, Commerce City, Denver, Denver International Airport, and Adams County to be served by the Northern Treatment Plant.

This collaborative effort identified the Second Creek Pipeline as the best long-term solution to address rapid regional growth and serve the 2 million Coloradans within the Metro District's service area.

DESCRIPCIÓN GENERAL DEL PROYECTO

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Mediante este esfuerzo conjunto se identificó la canalización del arroyo Second Creek como la mejor solución a largo plazo para hacer frente al rápido crecimiento regional y atender a los 2 millones de habitantes en Colorado dentro del área de servicio del Distrito.

July 10 and 17 Public Meeting Announcement

SECOND CREEK PIPELINE

SECOND CREEK PIPELINE AND SAND CREEK INTERCEPTOR SYSTEM IMPROVEMENTS COMMUNITY OPEN HOUSES

WEDNESDAY, JULY 10, 2019

5:00 - 7:00 PM

BISON RIDGE RECREATION CENTER
13905 E. 112th AVENUE
COMMERCE CITY, CO 80022

WEDNESDAY, JULY 17, 2019

5:00 - 7:00 PM

EAGLE POINTE RECREATION CENTER
6060 PARKWAY DRIVE
COMMERCE CITY, CO 80022

Learn more about the permitting process, project schedule, and next steps.
The same information will be provided at both meetings.

REUNIONES ABIERTAS AL PÚBLICO

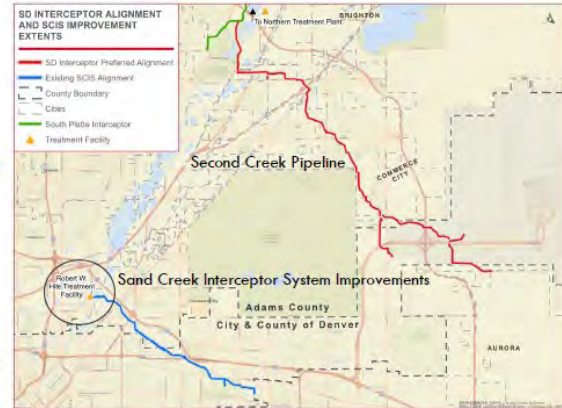
MÉRCOLES, 10 DE JULIO DE 2019
DE 5:00 - 7:00 PM

BISON RIDGE RECREATION CENTER
13905 E. 112th AVENUE
COMMERCE CITY, CO 80022

MÉRCOLES, 17 DE JULIO DE 2019
DE 5:00 - 7:00 PM

EAGLE POINTE RECREATION CENTER
6060 PARKWAY DRIVE
COMMERCE CITY, CO 80022

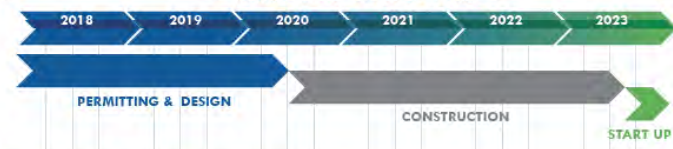
Aprenda más sobre el proceso de permisos, el programa del proyecto, y los próximos pasos. La misma información será proporcionada en ambas reuniones.



SECOND CREEK PIPELINE AND SAND CREEK INTERCEPTOR SYSTEM IMPROVEMENTS



PROJECT SCHEDULE



Metro Wastewater Reclamation District
6450 York Street
Denver, CO 80229

PROJECT OVERVIEW

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El arroyo Second Creek fue identificado como la mejor solución a largo plazo para hacer frente al rápido crecimiento regional y atender a los 2 millones de habitantes en Colorado dentro del área de servicio del Distrito.

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Contact SecondCreek@mwrddist.co.us

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