

CUMULATIVE IMPACTS TECHNICAL REPORT
FOR THE
I-25 (US 36 to 104th Avenue)
Environmental Assessment

Prepared for:



Colorado Department of Transportation
Region 1
2829 W. Howard Place
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List of Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CO ₂	carbon dioxide
dBA	A-weighted decibels
EA	Environmental Assessment
EPA	Environmental Protection Agency
FHU	Felsburg Holt & Ullevig
FHWA	Federal Highway Administration
GHG	greenhouse gas
MOVES	Motor Vehicle Emissions Simulator
MSAT	mobile source air toxic
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standard
NAC	Noise Abatement Criteria
PEM	Palustrine Emergent
PSS	Palustrine Scrub/Shrub
PUB	Palustrine Unconsolidated Bottom
RTD	Regional Transportation District
RTP	Regional Transportation Plan
USDOT	United States Department of Transportation
VMT	Vehicle miles traveled

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1.0 Project Description

A cumulative impacts evaluation was completed for the Interstate 25 (I-25) North, United States Highway 36 (US 36) to 104th Avenue project. Colorado Department of Transportation (CDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a template Environmental Assessment (EA) for the I-25 North, US 36 to 104th Avenue project. Regional Transportation District (RTD) is a cooperating agency.

The I-25 North, US 36 to 104th Avenue project includes improvements to relieve congestion and improve safety on I-25 from US 36 to 104th Avenue in Adams County and the City of Thornton, Colorado (**Figure 1** and **Figure 2**). The project will provide improvements to an approximately 4-mile segment of I-25 between US 36 and 104th Avenue. The current cross-section of I-25 between US 36 and 104th Avenue generally includes three general-purpose lanes and one Express Lane along the inside shoulder with an auxiliary lane between US 36 and 84th Avenue and Thornton Parkway. The inside shoulder varies in size between 2 and 12 feet, and the outside shoulder varies between 10 and 12 feet. There is a 2-ft inside shoulder and a 2-ft buffer between the Express Lane and the nearest general-purpose lane.

Proposed improvements associated with this project are as follows:

- ▶ Adding a fourth general-purpose lane in each direction from 84th Avenue to Thornton Parkway with the northbound general-purpose lane extending to 104th Avenue,
- ▶ Constructing continuous acceleration and deceleration lanes between the I-25/84th Avenue interchange, and the I-25/Thornton Parkway interchange,
- ▶ Widening the inside and outside shoulders to a consistent 12-foot width,
- ▶ Accommodating a proposed median transit station and pedestrian bridge for the Thornton Park-n-Ride just south of 88th Avenue, and
- ▶ Replacing the 88th Avenue bridge.

The proposed typical section on I-25 will consist of four 12-ft general purpose lanes, a 12-ft Express Lane along the inside traveled way, and a 12-ft outside auxiliary lane between each interchange.

Additionally, the inside and outside shoulders will be widened to 12 feet, and the Express Lane buffer will be widened to 4 feet, and a 2-ft barrier will separate the northbound and southbound lanes of I-25. Surrounding the median station will be a 2-ft concrete barrier separating the Express Lanes from the bus station and bus lanes.

2.0 Cumulative Impacts Assessment

According to Council on Environmental Quality (CEQ) regulations, a cumulative effect “results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions and regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time” (40 Code of Federal Regulations [CFR] § 1508.7).

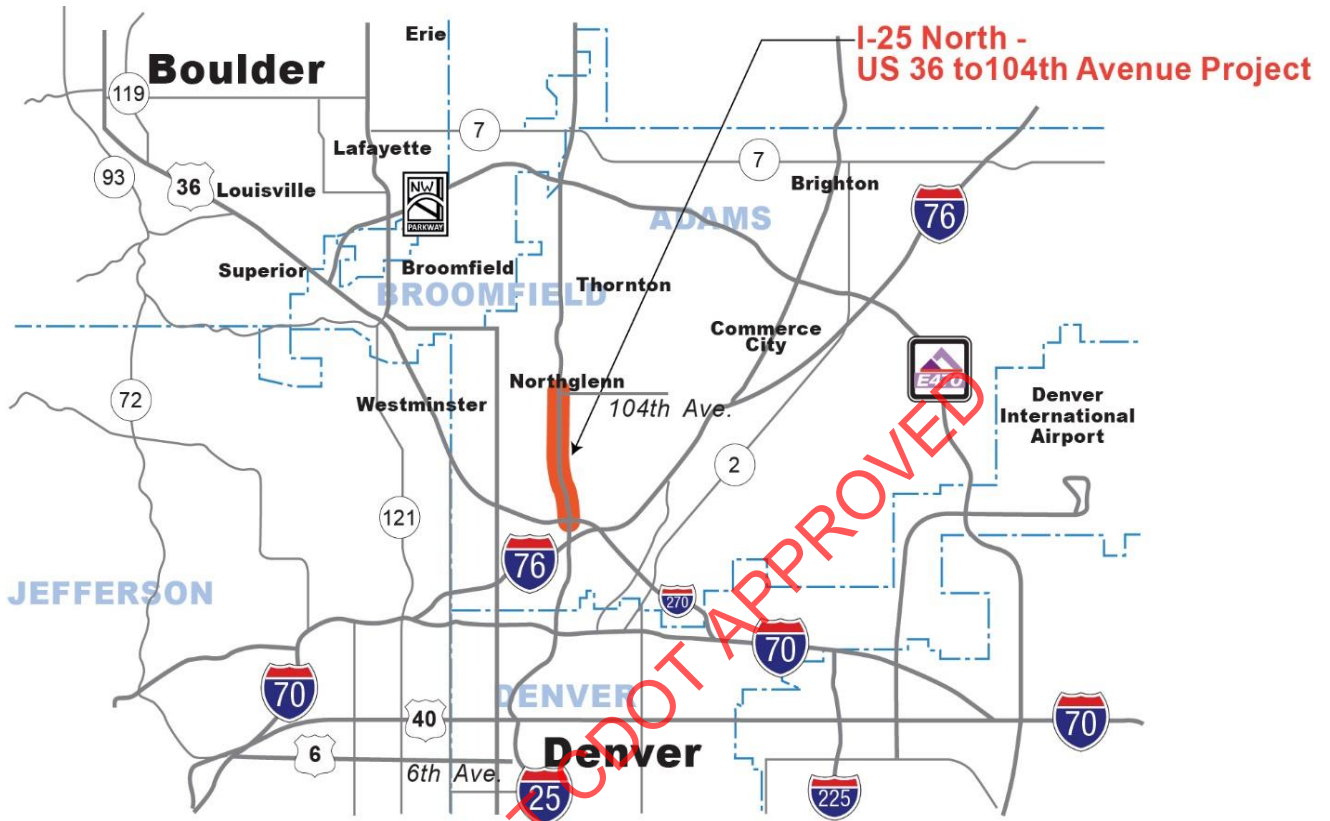
In other words, cumulative impacts result over time when impacts of an action are added to impacts of other actions. This effect can result in a compounded resource impact in the same geographic area. CEQ guidance limits cumulative impact analysis to “important issues of national, regional, or local significance” (CEQ, 1997). Therefore, not all issues identified for impact assessment in this EA are analyzed for cumulative effects at the same level. Because of the wide geographic scope of a cumulative assessment and the variety of activities assessed, cumulative impacts are commonly examined at a more qualitative and less detailed level than direct impacts of the action alternatives.

For this project, the cumulative impact assessment focuses on resources and issues located within the Cumulative Impacts Study Area (**Figure 3**). This area encompasses the location where major travel pattern changes could occur as a result of implementing the project. Boundaries of the Cumulative Impacts Study Area have been established using traffic analysis zones. In general, actions being considered have occurred since 1953 (when development along the I-25 corridor in the area began) or they will occur before 2040 (based on traffic and growth projections in the area). **Table 1** shows resources identified for cumulative effects analysis for this EA.



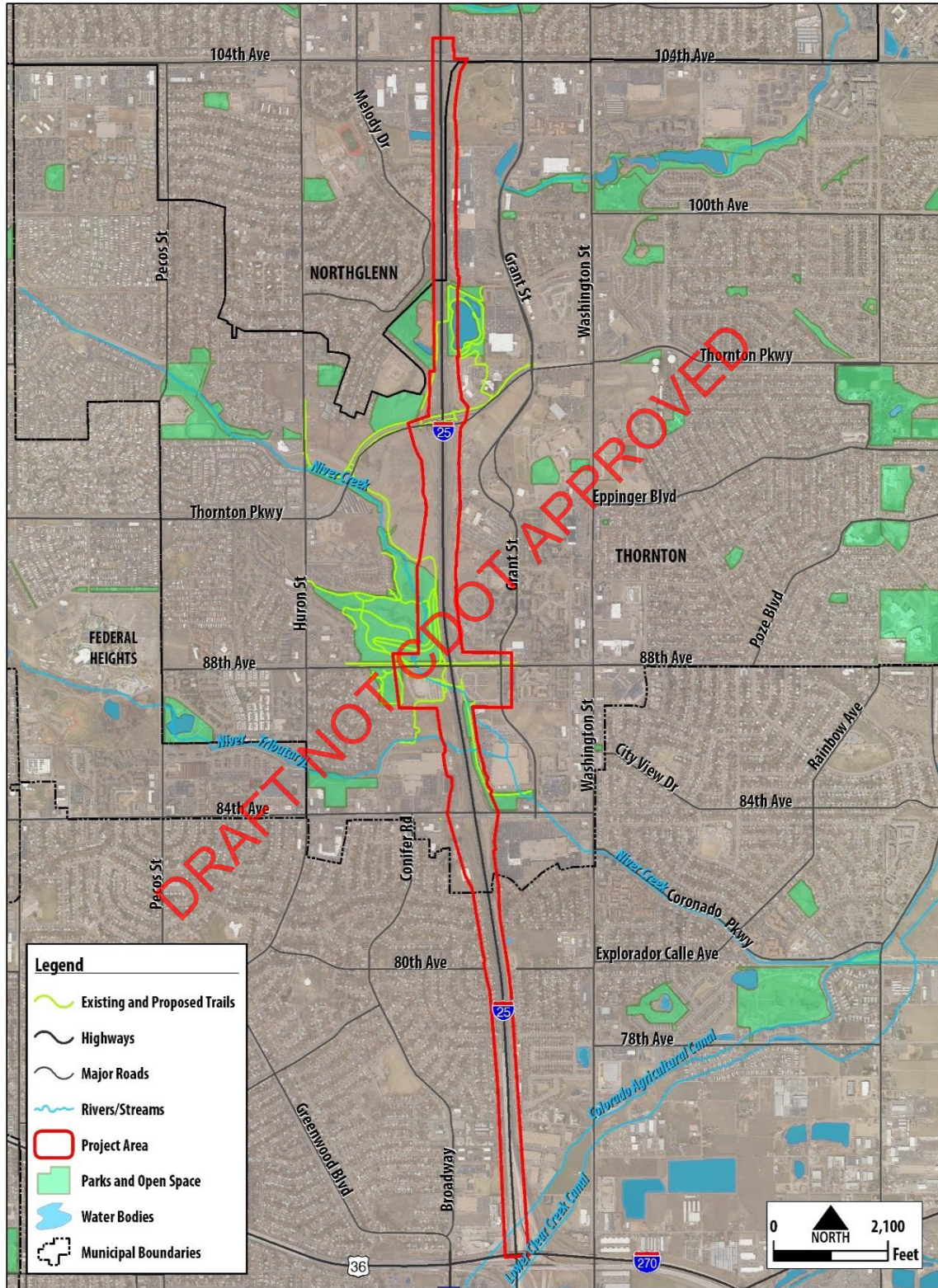
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Figure 1. Project Vicinity



Source: FHU, 2019a

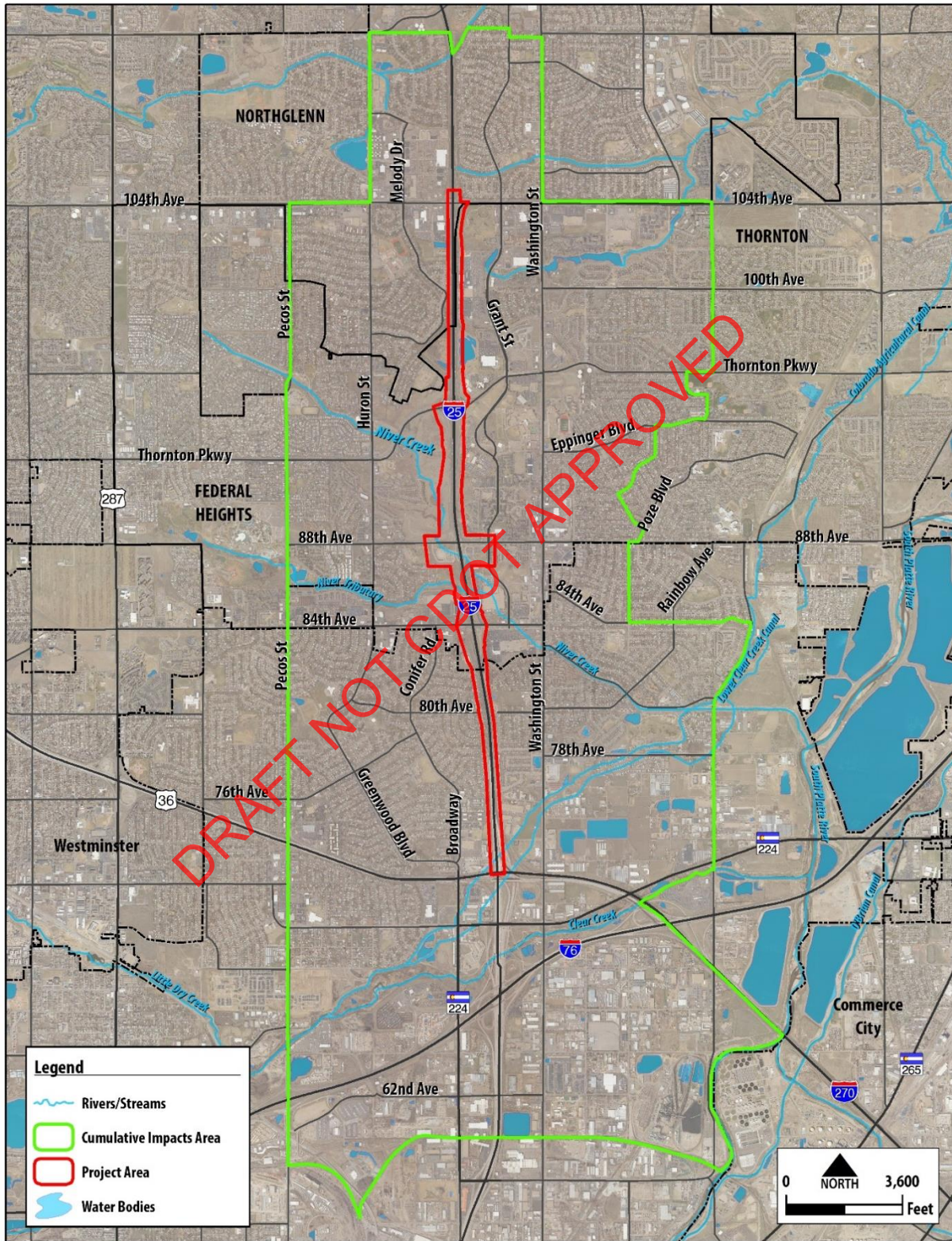
Figure 2. Project Area



Source: FHU, 2019a



Figure 3. Cumulative Impacts Study Area



Source: FHU, 2019a



Table 1. Environmental Resources Considered in Cumulative Impact Analysis

Resources Evaluated for Cumulative Impacts in Section 3	Resources Determined Not to Have Substantial Cumulative Impact
<ul style="list-style-type: none"> • Noise • Air Quality • Land Use • Wetlands • Wildlife • Water Quality 	<p>Geologic Resources/Soil – Impacts are directly relatedly to disturbed areas and are not expected to have a measured cumulative effect on geology and soil in the study area.</p> <p>Historic Properties – The Proposed Action would have no adverse effect on historic properties and would not cause an additive cumulative impact on historic resources.</p> <p>Floodways and 100-year Floodplain – The City of Thornton, the City of Northglenn, and Adams County would require a floodplain permit. The Proposed Action is not expected to have an additive cumulative impact on floodplains.</p> <p>Parks, Recreation, and Open Space – Parks, recreation, and open space resources are not common in the project area. The Proposed Action is not expected to have an additive cumulative impact on parks, recreation, and open space resources.</p> <p>Archaeology – No archaeological resources were found during the archaeological survey. The Proposed Action is not expected to have an additive cumulative impact on archaeological resources.</p> <p>Paleontology – No fossils were found during the paleontological survey. The Proposed Action is not expected to have an additive cumulative impact on paleontological resources.</p> <p>Environmental Justice/Social Economics – The Proposed Action would produce a beneficial community effect in terms of improving local and regional connectivity along the transportation system.</p> <p>Residential/Business/Right-of-Way/Relocation – No relocations are expected to occur with the Proposed Action. Right-of-way acquisition will be minimal relative to the cities of Northglenn and Thornton and Adams County’s transportation systems.</p> <p>Utilities – The impacts are considered to be minor and will not have an adverse impact on utility owners. The Proposed Action is not expected to have an additive cumulative impact on utility resources.</p> <p>Energy – Although energy usage would be anticipated during construction and operation of this corridor, it represents only a small portion of the energy usage relative to the cities of Northglenn and Thornton and Adams County’s transportation systems.</p> <p>Hazardous Materials – No cumulative impacts on hazardous materials sites are expected. Measures would be implemented to address potential releases during construction.</p>

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Source: FHU, 2019a



3.0 Past, Present, and Reasonably Foreseeable Future Actions

The cumulative impact analysis must consider environmental aspects affected by the Proposed Action and impacts of that action in relation to other past, present, and reasonably foreseeable actions in the vicinity and/or region. Other actions are considered in this analysis to:

- ▶ Establish the background status of the resource
- ▶ Describe the trend of the health of the resource
- ▶ Describe the incremental effect of our action on the resource (i.e., will the Proposed Action affect the trend of the resource)
- ▶ Conclude the overall effects from all the actions on the resource

3.1 Past and Current Actions in the Cumulative Impacts Study Area

The city of Thornton developed after World War II to assist in accommodating Denver's rapid growth. Thornton was incorporated as a city in August 1956. The population continued to increase by thousands every year. The area adjacent to I-25 in unincorporated Adams County and Thornton began to develop in the late 1960s.

Growth and technological advances have changed the city of Thornton over the last 50 years. In 1970 Thornton's population grew to over 13,000. By 2000, the population had grown to almost 80,000. In 1985, Thornton created an urban renewal district to build an I-25 interchange at Thornton Parkway (92nd Avenue) and to assist in the reconstruction of Thornton's original business district mainly along Washington Street between 84th Avenue and 92nd Avenue. On July 21, 2004, the I-25 and 136th Avenue Interchange opened (City of Thornton, 2018).

In 1959, the first five show homes were built on the northeast corner of what is now the intersection of I-25 and 104th Avenue in Northglenn. By October 1962, this new development grew to 10,000 residents and 3,000 homes. A regional shopping center, the Northglenn Mall, opened in 1968. Northglenn officially became a city on April 18, 1969. In the 1970s, Northglenn dedicated

several parks and open spaces, including Centennial Park and Northwest Open Space. Northglenn continued to grow and develop. In the late 2000s and 2010s, the city suffered a recession. In spring 2014, the Webster Lake Promenade, located at 120th Avenue and Grant Street, rejuvenated the entire area and the first multi-family development in years opened on Community Center Drive (City of Northglenn, 2018).

Federal Heights is located west of I-25 between 104th Avenue and 84th Avenue on the north and south and Huron Street and US 287 on the east and west. The city has a total area of 1.8 square miles. In 1950, the population consisted of 173 people, and today the population has grown to more than 13,000 people and is home to a major family water park, Water World (Federal Heights, 2018).

The Denver metro area has grown substantially in the past 15 years. Both Adams County and the City of Thornton, however, have grown at a faster compound annual growth rate than the metro area during this time. The City of Thornton grew by 45,000 persons, while Adams County grew by more than 139,000 persons. The population of Northglenn increased over the past 15 years but at a slower pace than that of the metro area, Thornton, and Adams County. Thornton saw the greatest household growth, followed by Adams County. The population of Federal Heights has essentially remained unchanged over the past 15 years.

3.2 Reasonably Foreseeable Future Actions in the Cumulative Impacts Study Area

Reasonably foreseeable actions are future activities that have been committed to or are known proposals. These actions are expected to occur within the Cumulative Impacts Study Area and within the defined planning horizon (by 2040). For this evaluation, other actions have been identified as reasonably foreseeable projects from the Denver Regional Council of Governments (DRCOG) 2040 Fiscally Constrained Regional Transportation Plan (RTP) (DRCOG, 2015), City of Thornton Capital Improvement Projects (2018), City of Northglenn Comprehensive Plan (2010), and Adams County Comprehensive Plan (2012). The City of Federal Heights has not updated the Comprehensive Plan since 1997. **Table 2** and **Figure 4** summarize future actions.



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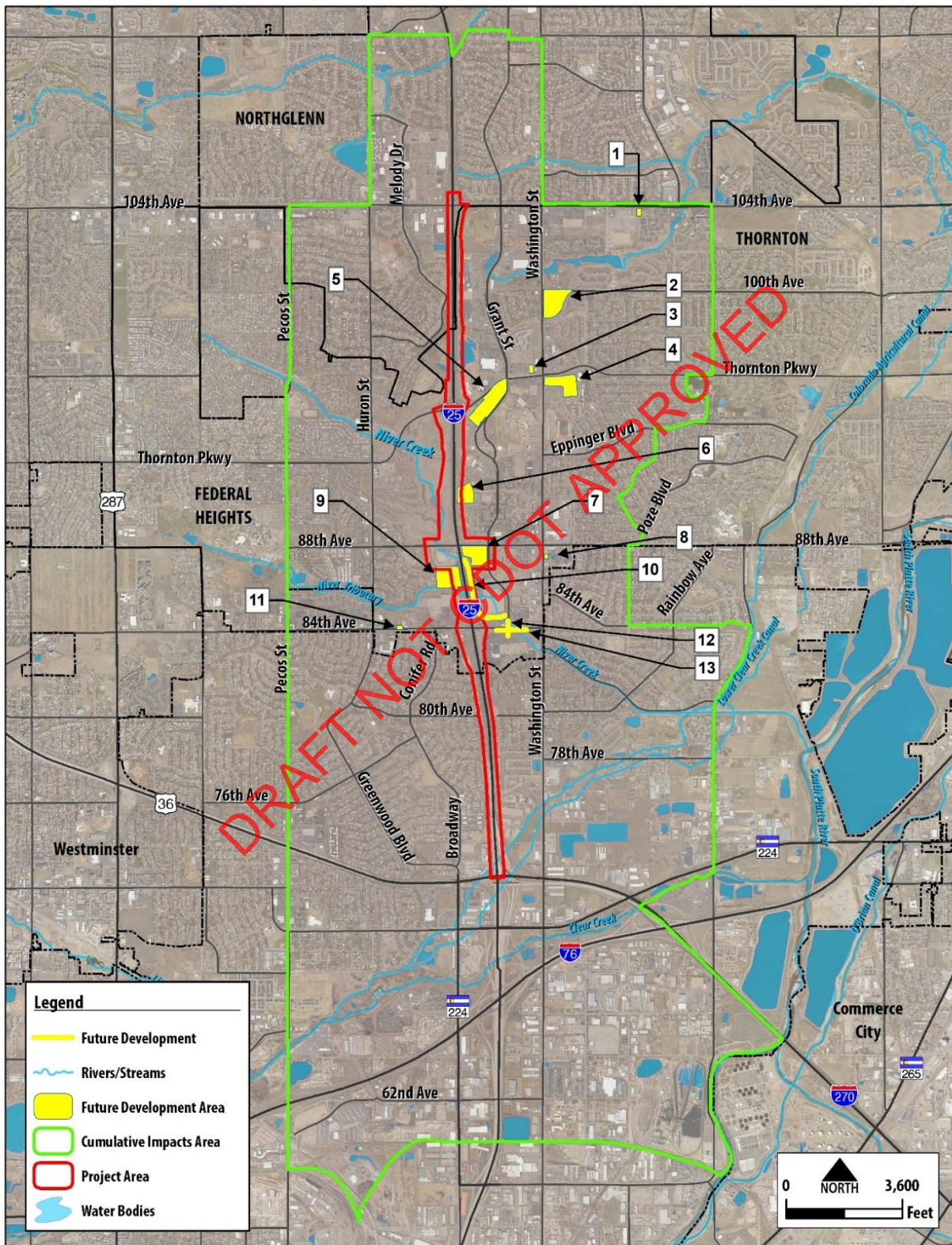
Table 2. Reasonably Foreseeable Future Actions in the Cumulative Impacts Study Area

Project Name	Description	Figure 4 Map ID
Future Development Projects in the Cumulative Impacts Study Area		
Broadstone at Thornton A2 L1A	Development for a 3,191 SF tunnel style car wash on the south side of 104 th Avenue and east of Marion Street.	1
Lambertson Lakes Sundance	Property to include 14 townhouse buildings with 96 individual lots.	2
HighPointe Park A7 Starbucks	Starbucks Development within the HighPointe Park Development Area.	3
Thornton Water Treatment Plant Replacement	This project constructs a new 20 million gallons per day treatment plant on land immediately east of the existing plant. After the new plant is operational, the existing plant will be demolished. The land will be used for a future expansion of the new plant (anticipated in approximately 2040).	4
Horizon Center	This project involves the development of a medical office building, hotel, multiple restaurants, and a credit union that complements the surrounding development and supports the comprehensive plan for this area.	5
Horizon Place F1 L5 B1	This project involves the development of a senior housing facility that will include assisted living, independent living, and memory care residents.	6
City View Heights Jiffy Lube	Proposed development of a new ground up Jiffy Lube on Lot 5A5 of the City View Heights Subdivision, at the southeast corner of 88 th and Washington.	8
Conifer Crossing	A site plan for a WoodSpring Suites hotel and associated drive aisles, parking, utilities, and landscaping improvements. Includes future lots for development, water quality and detention pond, and a tract to maintain Niver Creek and the existing floodplain.	9
Thornton T-Mobile	Development of a T-Mobile store (3,044 SF) in the currently vacant lot of 531 W 84 th Avenue.	11
Future Transportation Projects in the Cumulative Impacts Study Area		
RTD Park-n-Ride	Expand the existing Thornton Park-n-Ride parking lot by 211 spaces and provide infrastructure upgrades to better serve customers.	7
Niver Creek Trail Improvements	This project replaces an asphalt section of Niver Creek Trail with concrete from the east side of I-25 to Grant Street.	10
84 th Avenue and Grant Street Intersection Improvements	The project includes constructing double left turn lanes and right turn lanes in all directions at the intersection. New traffic signal poles will be installed at all four corners and a sidewalk will be constructed along the north side of 84 th Avenue, west of Grant Street.	12 and 13

Sources: City of Thornton, 2018b; City of Northglenn, 2010; Adams County, 2012; and DRCOG, 2015.



Figure 4. Reasonably Foreseeable Future Actions in the Cumulative Impacts Study Area



Source: FHU, 2019a



4.0 Resources Evaluated for Cumulative Impacts

The reasonably foreseeable projects would have the same impacts under the No Action Alternative as they would under the Proposed Action as these actions are independent from this study and would occur regardless of which alternative is selected. These developments include the conversion of land from a natural state to a developed one, resulting in impacts on noise, air quality, land use, wetlands, wildlife, and water quality.

4.1 Noise

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Traffic Noise Technical Report* (FHU, 2019b).

4.1.1 Background

The study area includes residential, recreation, undeveloped, and business areas that are of interest for this project's noise analysis. The current traffic noise conditions in the study area were assessed through a combination of measurements and modeling.

4.1.2 Current Trend or Health

Surrounded by residential, commercial, and industrial development, the ambient noise levels are to be expected within a city. Noise sources include traffic, recreation, construction, community facilities, and everyday activities at residences and businesses. I-25 is heavily traveled with relatively consistent traffic flow that has traffic noise that stabilizes quickly. Five CDOT noise barrier groups are currently present along I-25 in the project corridor. Under 2017 existing conditions, modeled noise levels at 119 receivers ranged from 28.3 to 76.3 A-weighted decibels (dBA).

4.1.3 Incremental Effect of Alternatives

No Action Alternative

The No Action Alternative is not expected to have an adverse incremental effect on noise. Under the No Action Alternative, noise levels were modeled at 119 receivers, with noise levels ranging from 29.0 to 76.8 dBA.

Proposed Action

The Proposed Action is not expected to have an adverse incremental effect on noise. Under the 2040 Proposed Action, modeled noise levels at 116 receivers would range from 29.5 to 76.3 dBA, and 39 receivers representing 118 receptors were calculated to exceed the applicable CDOT Noise Abatement Criteria (NAC). No receivers would experience a substantial noise increase of at least 10 dBA. Therefore, 118 receptors would be affected during the 2040 peak noise hour.

Previous projects installed five groups of existing CDOT noise abatement barriers along I-25 in the Noise Study Zone. These barriers were intended to benefit the five main residential areas abutting I-25. The Proposed Action is not expected to physically affect four of these barriers. All four barriers were found to be effective without modification for the Proposed Action. Each barrier would provide noise reductions at or above the CDOT design goal of 7 dBA at multiple receptors, and many front-row receptors were found to benefit with a minimum 5-dBA reduction. The barriers cover the entire neighborhoods in question.

One existing barrier would need to be removed and rebuilt for the Proposed Action. The existing barrier is approximately 13 feet tall and 1,275 feet long. A replacement barrier in the same general location would be provided as part of the Proposed Action. The proposed location is on a new retaining wall along I-25 that is up to 18 feet farther east than the existing barrier, closer to the impacted Ashford East 88 Apartments. At this location, a wall that is approximately 13 feet tall (above ground on the apartment side) and 1,300 feet long was found to provide similar or better noise-reduction than the existing barrier and is the recommended replacement wall. The barrier would provide noise reductions at or above the CDOT design goal of 7 dBA at multiple receptors, and many front-row receptors were found to benefit with a minimum 5-dBA reduction.



4.1.4 Incremental Effect of All Actions

Based on plans for this area in terms of future developments and transportation improvements, noise levels in the Cumulative Impacts Study Area will continue to increase regardless of which alternative is selected. Impacts on traffic noise levels by either the No Action Alternative or the Proposed Action would have a minor overall effect on noise receptors in the area. The incremental impact would not be substantial in comparison to the extent of historical and future cumulative impacts involving noise. When combined with other past, present, and reasonably foreseeable future actions, neither the No Action Alternative nor the Proposed Action would be expected to result in traffic noise impacts greater than those identified previously.

4.2 Air Quality

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Air Quality Technical Report* (FHU, 2019c).

4.2.1 Background

The study area lies in the Denver metropolitan area, where maintenance plans are in place to ensure compliance with the National Ambient Air Quality Standard (NAAQS) for at least 10 years into the future. These plans consider air quality impacts from probable growth in the maintenance areas from both vehicles and other pollutant sources. By their nature, the plans are cumulative.

The Denver metropolitan area has been growing and developing steadily for more than 100 years. This historical growth and development has contributed to air quality problems that have been observed in the metropolitan area, culminating in the Environmental Protection Agency (EPA) designation of local nonattainment areas in the 1970s. However, air quality improvement actions over the past decades have resulted in better air quality and the redesignation of the metropolitan area by EPA from nonattainment to maintenance for all NAAQS pollutants by 2002. Denver was subsequently designated nonattainment for the 8-hour ozone NAAQS when that standard was revised.

4.2.2 Current Trend or Health

Generally speaking, regulatory controls are in place to ensure that cumulative air quality impacts do not occur from the combination of air pollutant sources in the Denver metropolitan area. In terms of the NAAQS pollutants, DRCOG completes regional conformity analyses for the 2040 Fiscally Constrained RTP and Transportation Improvement Program, which has been prepared to assure regional air quality conformity. That analysis includes projects occurring under the No Action Alternative and the Proposed Action. In addition, the Proposed Action is also depicted in DRCOG's *Carbon Monoxide and PM10 Conformity Determination* and in the *Denver Southern Subarea 8-hour Ozone Conformity Determination*.

4.2.3 Incremental Effect of Alternatives

No Action Alternative

The No Action Alternative is not expected to have an adverse incremental effect on air quality. In terms of the NAAQS pollutants, DRCOG completes regional conformity analyses for the 2040 Fiscally Constrained RTP and Transportation Improvement Program, which has been prepared to assure regional air quality conformity. Projects occurring under the No Action Alternative are included in that analysis.

Proposed Action

The Proposed Action is not expected to have an adverse incremental effect on air quality.

NAAQS Pollutants

The study area is part of the Denver metropolitan area that has been growing and developing steadily for more than 100 years. This historical growth and development has been a major contributor to air quality problems that have been observed in the metropolitan area, culminating in the designation by EPA of local nonattainment areas in the 1970s. However, several air quality improvement actions over the past decades have resulted in better air quality and the redesignation of the metropolitan area by EPA from nonattainment to maintenance for all NAAQS pollutants by 2002. Denver was subsequently designated nonattainment for the 8-hour ozone NAAQS when that standard was revised.



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For much of the past century, the study area has been increasingly developed to a point of becoming highly developed. Such growth would be expected to result in more vehicle traffic in the area and may lead to more vehicle emissions.

Maintenance plans are in place for the Denver metropolitan area. One of the main purposes of these plans is to ensure compliance with the NAAQS for at least 10 years into the future. Because these plans consider air quality impacts from probable growth in the maintenance areas from both vehicles and other pollutant sources, by their nature the plans are cumulative.

DRCOG is responsible for monitoring regional growth and regularly examines regional impacts of this kind through their regional conformity evaluations. If an evaluation result indicates that NAAQS violations may occur either from a specific project or from general growth, preventative actions would be necessary to ensure that the NAAQS are met. Therefore, mechanisms are in place to ensure that cumulative changes in air quality in the study area, regardless of pollutant source, do not lead to violations of the NAAQS.

The Proposed Action is intended to benefit regional transportation and alleviate traffic congestion. Improved traffic flow generally leads to fewer emissions from mobile sources, and this may lead to reduced emissions over the long term even with more vehicles in the area. Construction of the Proposed Action may generate additional vehicle trips during construction and require some traffic rerouting, but these should be temporary and would not create substantial adverse effects.

There are potentially mixed outcomes from the Proposed Action. Whereas more efficient roads may sustain higher intersection level of service (LOS) and higher average vehicle speeds that should reduce most emissions, the improvements could also attract more traffic that could increase the number of emission sources. Most vehicle emissions per mile are expected to decrease in the future because of cleaner vehicles. On the whole, traffic and emission sources may increase on a local scale; however, traffic and overall emissions should improve on the larger regional scale from the Proposed Action.

The net cumulative effect on regional air quality with the Proposed Action is considered in the regional conformity analysis performed by DRCOG for the RTP and TIP. Finally, future cumulative

growth within the Denver metropolitan area must continue to meet federal air quality regulations. Therefore, regulatory controls are in place to ensure that there are no cumulative air quality impacts from the combination of air pollutant sources in the Denver metropolitan area.

Global Climate Change

Climate change is an important national and global concern. While the earth has gone through many natural changes in climate in its history, there is general agreement that the earth's climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human caused) greenhouse gas (GHG) emissions contribute to this rapid change. Carbon dioxide (CO₂) makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane (CH₄) and nitrous oxide (N₂O).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two-thirds of the natural greenhouse effect. However, burning fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because atmospheric concentration of GHGs continues to climb, the planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

To date, no national standards have been established for GHGs, nor has the EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO₂ under the Clean Air Act. However, a considerable body of scientific literature addresses the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, EPA, and other federal agencies.

GHGs are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The affected environment for CO₂ and other GHG emissions is the entire planet. In addition, from a



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quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions such as actions involving an entire industry sector or large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Furthermore, there is no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

Under the National Environmental Policy Act (NEPA), detailed environmental analysis should focus on issues that are significant and meaningful to decision-making.¹ Based on the nature of GHG emissions and the exceedingly small potential GHG impacts of the Proposed Action, as discussed below and shown in **Table 3**, GHG emissions from the Proposed Action would not result in "reasonably foreseeable significant adverse impacts on the human environment" (40 CFR 1502.22(b)). GHG emissions from the project build alternatives would not be substantial and would not play a meaningful role in determining an environmentally preferable alternative or selecting the preferred alternative. More detailed information on GHG emissions "is not essential to a reasoned choice among reasonable alternatives" (40 CFR 1502.22(a)) or to making a decision in the best overall public interest based on a balanced consideration of transportation, economic, social, and environmental needs and impacts (23 CFR 771.105(b)). For these reasons, no alternatives-level GHG analysis has been performed for this project.

The context in which emissions from the Proposed Action would occur, along with the expected GHG emissions contribution from the project, illustrates why the project's GHG emissions would not be substantial and would not be a substantial factor in decision-making. The transportation sector is the second largest source of total GHG emissions in the United States, behind electricity generation. The transportation sector was responsible for approximately 27 percent of all anthropogenic (human caused) GHG emissions in the United States in 2010.² Most transportation GHG emissions result from fossil fuel combustion. CO₂ makes up the largest component of these GHG emissions. U.S. CO₂ emissions from the consumption of energy accounted for 18 percent of worldwide energy consumption CO₂ emissions in 2010.³ U.S. transportation CO₂ emissions accounted for about 6 percent of worldwide CO₂ emissions.⁴

While the contribution of GHGs from transportation in the United States as a whole is a large component of U.S. GHG emissions, as the scale of analysis is reduced, the GHG contributions become quite small. Using CO₂ because of its predominant role in GHG emissions, **Table 3** presents the relationship between current and projected Colorado highway CO₂ emissions and total global CO₂ emissions, as well as information on the scale of the project relative to statewide travel activity.

¹ See 40 CFR 1500.1(b), 1500.2(b), 1500.4(g) and 1501.7

² Calculated from data in U.S. Environmental Protection Agency, Inventory of Greenhouse Gas Emissions and Sinks, 1990-2010.

³ Calculated from data in EIA International Energy Statistics, Total Carbon Dioxide Emissions from the Consumption of Energy,

<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8>, accessed 2/25/13.

⁴ Calculated from data in EIA figure 104:

<http://www.eia.gov/forecasts/archive/ieo10/emissions.html> and EPA table ES-3:

<http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf>



Table 3. Statewide and Project Emissions Potential, Relative to Global Totals

	Global CO ₂ Emissions, MMT ⁵	Colorado Motor Vehicle CO ₂ Emissions, MMT ⁶	2010 Colorado Motor Vehicle Emissions, % of Global Total	Project Study Area VMT, % of Statewide VMT	Percent Change in Statewide VMT due to Project
Current Conditions (2012)	29,670	10.3	0.0348%	1.10%	(None)
Future Projection (2040)	45,500	11.9	0.0261%	0.85%	0.85%

Table Notes: MMT = million metric tons. VMT = vehicle miles traveled

Sources: Global emissions estimates, data for Figure 104, projected to 2040 (EIA, 2010); Nevada emissions and statewide VMT estimates are from MOVES2010b (EPA, 2012).

Based on emissions estimates from EPA’s Motor Vehicle Emissions Simulator (MOVES) model⁷, global CO₂ estimates, and projections from the Energy Information Administration (EIA), CO₂ emissions from motor vehicles in the state of Colorado contributed less than 0.1 of 1 percent of global emissions in 2010 (0.0348 percent). These emissions are projected to contribute an even smaller fraction (0.0261 percent) in 2040⁸. Vehicle miles traveled (VMT) in the project study area represents 1.1 percent of total Colorado travel activity. The project would increase statewide VMT by less than 1 percent. (Note that the project study area, as defined for the mobile source air toxic (MSAT) analysis, includes travel on many other roadways in addition to the Proposed Action.)

FHWA estimates the Proposed Action could result in a potential increase in global CO₂ emissions in 2040 of 0.00044 percent (less than 0.001 of 1 percent), and a corresponding increase in

Colorado’s share of global emissions in 2040 of 0.0265 percent. This small change in global emissions is well within the range of uncertainty associated with future emissions estimates.^{9, 10}

Mitigation for Global GHG Emissions

To help address the global issue of climate change, U.S. Department of Transportation (USDOT) is committed to reducing GHG emissions from vehicles traveling on our nation’s highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy and first-ever GHG emissions standards for model year 2012-2025 cars and light trucks, with an ultimate fuel economy standard of 54.5 miles per gallon for cars and light trucks by model year 2025. Further, on September 15, 2011, the agencies jointly published the first-ever fuel economy and GHG emissions

⁵ These estimates are from the EIA’s International Energy Outlook 2010 and are considered the best-available projections of emissions from fossil fuel combustion. These totals do not include other emissions sources, such as cement production, deforestation, or natural sources; however, reliable future projections for these emissions sources are not available.

⁶ MOVES projections suggest that Colorado motor vehicle CO₂ emissions may increase by 14.9 percent between 2010 and 2040; more stringent fuel economy/GHG emissions standards will not be sufficient to offset projected growth in VMT.

⁷ <http://www.epa.gov/otaq/models/moves/index.htm>. EPA’s MOVES model can estimate vehicle exhaust emissions of CO₂ and other GHGs. CO₂ is frequently used as an indicator of overall transportation GHG emissions because the quantity of these emissions is much larger than that of all other transportation GHGs combined, and because CO₂ accounts for 90 to 95 percent of the overall climate impact from transportation sources. MOVES includes estimates of both emissions rates and VMT used to estimate the Colorado statewide highway emissions in **Table 3**.

⁸ Colorado emissions represent a smaller share of global emissions in 2040 because global emissions increase at a faster rate.

⁹ For example, Figure 114 of the Energy Information Administration’s International Energy Outlook 2010 shows that future emissions projections can vary by almost 20 percent, depending on which scenario for future economic growth proves to be most accurate.

¹⁰ When an agency evaluates reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency is required to make clear that such information is lacking (40 CFR 1502.22). The methodologies for forecasting GHG emissions from transportation projects continue to evolve and the data provided should be considered in light of the constraints affecting the currently available methodologies. As previously stated, tools such as EPA’s MOVES model can be used to estimate vehicle exhaust emissions of CO₂ and other GHGs. However, only rudimentary information is available regarding the GHG emissions impacts of highway construction and maintenance. Estimation of GHG emissions from vehicle exhaust is subject to the same types of uncertainty affecting other types of air quality analysis, including imprecise information about current and future estimates of VMT, vehicle travel speeds, and the effectiveness of vehicle emissions control technology. Finally, there is no scientific methodology that can identify causal connections between individual source emissions and specific climate impacts at a particular location.



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standards for heavy-duty trucks and buses.¹¹ Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce CO₂ emissions in future years.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs—particularly CO₂ emissions—and to assess the risks to transportation systems and services from climate change.

To assist states and metropolitan planning organizations (MPOs) in performing GHG analyses, FHWA has developed a *Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process*. The Handbook presents methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level and will demonstrate how such evaluation may be integrated into the transportation planning process.

FHWA has also developed a tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and to meet state GHG reduction targets and goals. To assist states and MPOs in assessing climate change vulnerabilities to their transportation networks, FHWA has developed a draft vulnerability and risk assessment conceptual model and has piloted it in several locations.

At the state level, several programs are underway in Colorado to address transportation GHGs. The Governor's Climate Action Plan, adopted in November 2007, includes measures to adopt vehicle CO₂ emissions standards and to reduce vehicle travel through transit, flex time, telecommuting, ridesharing, and broadband communications.

CDOT issued a Policy Directive on Air Quality in May 2009. This Policy Directive was developed with input from several agencies, including the State of Colorado's Department of Public Health and Environment, EPA, FHWA, Federal Transit Administration, Denver Regional Transportation District, and Denver Regional Air Quality Council. This Policy Directive and implementation document, the CDOT Air Quality Action Plan

addresses unregulated MSATs and GHGs produced from Colorado's state highways, interstates, and construction activities.

As a part of CDOT's commitment to address MSATs and GHGs, some of CDOT's program-wide activities include:

- ▶ Researching pavement durability opportunities with the goal of reducing the frequency of resurfacing and/or reconstruction projects.
- ▶ Developing air quality educational materials, specific to transportation issues, for citizens, elected officials, and schools, including development of vehicle idling reduction programs for schools and communities.
- ▶ Offering outreach to communities to integrate land use and transportation decisions to reduce growth in VMT, such as smart growth techniques, buffer zones, transit-oriented development, walkable communities, access management plans, etc.
- ▶ Committing to research additional concrete additives that would reduce the demand for cement.
- ▶ Expanding Transportation Demand Management efforts statewide to better use the existing transportation mobility network.
- ▶ Continuing to diversify the CDOT fleet by retrofitting diesel vehicles, specifying the types of vehicles and equipment contractors may use, purchasing low-emission vehicles, such as hybrids, and purchasing cleaner burning fuels through bidding incentives where feasible.
- ▶ Exploring congestion and/or right-lane only restrictions for motor carriers.
- ▶ Funding truck parking electrification.
- ▶ Researching additional ways to improve freight movement and efficiency statewide.
- ▶ Committing to use ultra-low sulfur diesel for non-road equipment statewide.
- ▶ Developing a low-VOC emitting tree landscaping specification.

Even though project-level mitigation measures will not have a substantial impact on global GHG emissions because of the exceedingly small amount of GHG emissions involved, the above-identified activities are part of a program-wide effort by FHWA and CDOT to adopt a practical means to

¹¹ For more information on fuel economy proposals and standards, see the National Highway Traffic Safety

Administration's Corporate Average Fuel Economy website: <http://www.nhtsa.gov/fuel-economy/>.



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avoid and minimize environmental impacts in accordance with 40 CFR 1505.2(c).

Summary

This document does not incorporate an analysis of the GHG emissions or climate change effects of each alternative because the potential change in GHG emissions would be very small in the context of the affected environment. Because of the insignificance of the GHG impacts, those impacts would not be meaningful to a decision on the environmentally preferable alternative or to a choice among alternatives. As outlined previously, FHWA is working to develop strategies to reduce transportation's contribution to GHGs—particularly CO₂ emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. Finally, the construction best practices described previously represent practicable project-level measures that, while not substantially reducing global GHG emissions, may help reduce GHG emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the Federal-aid highway program.

4.2.4 Incremental Effect of All Actions

As noted, regulatory controls are in place to ensure that cumulative air quality impacts do not occur from the combination of air pollutant sources in the Denver metropolitan area. When combined with other past, present, and reasonably foreseeable future actions, the No Action Alternative or the Proposed Action would not be expected to substantially adversely impact air quality.

4.3 Land Use

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Land Use and Community Profile Technical Report* (FHU, 2019d).

4.3.1 Background

The study area is located in the cities of Northglenn, Thornton, Federal Heights, and unincorporated portions of Adams County. The study area is predominantly developed and includes commercial, residential, open space, schools, hospital and medical centers, and some vacant property. Between US 36 and 85th Avenue, the study

area contains regional and local commercial uses at major intersections, with residential uses present between 76th Avenue and 83rd Drive. Between 84th Avenue and 88th Avenue, the area consists of commercial centers and the Thornton park-n-ride. From 88th Avenue to Thornton Parkway, the area consists of open space, vacant property, and HealthOne North Suburban Medical Center. Multiple apartment complexes are also interspersed with commercial uses. South of this area, between Thornton Parkway and 98th Avenue, includes vacant parcels, the City of Thornton's government complex, a park, schools, a few single-family residences, and commercial areas. The area from 98th Avenue to 104th Avenue includes residential areas for single family and apartments, Colorado Christian University, commercial areas with a large shopping center and big box retail stores, a large cemetery, and some park space.

4.3.2 Current Trend or Health

Population growth, development, and land use change have continued within the study area. Commercial centers have developed around I-25 and major intersections. Residential development has continued north of Denver and communities have used programs to preserve open space and parks as a means to separate themselves from other cities and towns in the region. In general, the area immediately adjacent to I-25 between US 36 and 104th Avenue is relatively stable, and large land use changes are not anticipated.

4.3.3 Incremental Effect of Alternatives

No Action Alternative

The No Action Alternative is not expected to have an adverse incremental effect on land uses. For the No Action Alternative, right-of-way would not be acquired and project improvements would not be constructed beyond the existing and committed transportation system. The No Action Alternative would not have a direct impact on land use.

Proposed Action

The Proposed Action is not expected to have an adverse incremental effect on land uses. The Proposed Action would convert small amounts of vacant and public lands; residential parcels; and commercial properties to a transportation use due to roadway construction and right-of-way. Impacts on land use would have a minor overall effect on land use in the area.



4.3.4 Incremental Effect of All Actions

Land uses are regulated at the local level to ensure that development generally coincides with local agency/community plans and visions. Based on plans for this area in terms of future developments and transportation improvements, land in the Cumulative Impacts Study Area will continue to be developed for various uses regardless of whether the Proposed Action is implemented. The Proposed Action and other planned actions are consistent with local land use and comprehensive plans. When combined with other past, present, and reasonably foreseeable future actions, neither the No Action Alternative nor the Proposed Action would not be expected to have a substantial adverse impact on land uses.

4.4 Wetlands

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Wetland Delineation Technical Report* (FHU, 2019e).

4.4.1 Background

Surface water resources within the project area include Badding Creek, Badding Reservoir, Croke Lake, Niver Creek, Niver Creek Tributary L, associated tributaries to these drainages, and several water quality/detention basins. Wetlands within the study area consist of Palustrine Emergent (PEM), Palustrine Unconsolidated Bottom, commonly referred to as a pond (PUB), and Palustrine Scrub/Shrub (PSS). PEM wetlands are located along irrigation and roadway ditches and swales, along edges of detention ponds, and adjacent to perennial and intermittent waterways. PUB wetlands are ponds or lakes occurring within the study area. PSS wetlands are located close to Niver Creek and contain a more dominant tree and shrub stratum.

4.4.2 Current Trend or Health

Relatively dense development currently exists in the Cumulative Impacts Study Area with a few areas of open space or landscaped park. Areas containing the highest concentrations of higher quality riparian/wetland vegetation include Niver Creek, Niver Creek Tributary L, and Badding Reservoir.

4.4.3 Incremental Effect of Alternatives

No Action Alternative

No wetland impacts would be anticipated as a result of the No Action Alternative.

Proposed Action

The Proposed Action is not expected to have an adverse incremental effect on wetlands. The Proposed Action would permanently impact approximately 0.4 acre of wetlands, including 0.344 acre of wetlands previously delineated in the FEIS and 0.021 acre of new wetlands delineated for this report. The 0.021 acre of impacts to new wetlands delineated for this report will require a Wetland Finding Report and FACWet analysis (if wetland permanent impacts are 0.10 acre or greater), as well as a Clean Water Act (CWA) Section 404 Permit. Impacts on wetlands and jurisdictional open water will be avoided and minimized to the greatest extent possible during final design. Mitigation for temporary and permanent wetland impacts will be accomplished through onsite mitigation, offsite mitigation, purchase of wetland bank credits, or use of a separate strategy approved by the USACE, to both jurisdictional and non-jurisdictional wetlands on a 1:1 basis.

4.4.4 Incremental Effect of All Actions

Additional wetland impacts would be expected to occur as other development not associated with the Proposed Action occurs in the area. Similar to the Proposed Action, impacts from other actions would be subject to regulatory controls, coordination with the United States Army Corps of Engineers, and potential mitigation. While the Proposed Action would have impacts on wetlands, it would not substantially affect wetlands in relation to historical and future cumulative impacts from land development. When combined with other past, present, and reasonably foreseeable future actions, neither the No Action Alternative nor the Proposed Action would not be expected to have substantial adverse wetland impacts.



4.5 Wildlife

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Biological Resources Technical Report* (FHU, 2019f).

4.5.1 Background

Most of the land surrounding the study area consists of urban development with a few areas of open space or landscaped park. Areas containing the highest concentrations of wildlife habitat include Niver Open Space, Niver Creek Open Space Trail, Niver Creek Tributary L Trail, Badding Open Space, and a parcel containing Badding Reservoir and referred to as a wildlife habitat area.

4.5.2 Current Trend or Health

Based on the habitats present in the study area, many species of mammals, birds, reptiles, and amphibians could occur within the study area. The study area includes several areas of black-tailed prairie dog colonies and habitat for the common garter snake and northern leopard frog.

4.5.3 Incremental Effect of Alternatives

No Action Alternative

Under the No Action Alternative, impacts on wildlife could include additional loss, degradation, and fragmentation of habitat due to development in the surrounding landscape. Continual degradation of the surrounding riparian habitat could also occur from expansion of noxious weeds and compaction from the use of social trails in the study area.

Proposed Action

The Proposed Action would result in permanent loss of shortgrass prairie, which would directly result in permanent loss of habitat for terrestrial species, and potential cover for aquatic species. Effects on wildlife from implementation of the Proposed Action would include permanent habitat loss, degradation/disruption of habitat (for example, noise effects), and fragmentation of habitat due to the construction of the new roadway. These effects could be increased by additional development in surrounding areas.

4.5.4 Incremental Effect of All Actions

Similar to the No Action Alternative and Proposed Action, other actions could result in the spread of weeds throughout the study area and to adjacent lands unless the cities of Northglenn and Thornton, Adams County, and local landowners effectively treat existing noxious weed populations. Other actions and developments could also affect wildlife by contributing to loss, degradation, and fragmentation of habitat. While the Proposed Action would have impacts on wildlife, this alternative would not substantially affect wildlife in relation to historical and future cumulative impacts from land development. When combined with other past, present, and reasonably foreseeable future actions, the No Action Alternative or the Proposed Action would not be expected to have substantial adverse impacts on biological resources.

4.6 Water Quality

This resource is addressed comprehensively in the *I-25 (US 36 to 104th Avenue) Environmental Assessment - Water Quality and Floodplains Technical Report* (FHU, 2019g).

4.6.1 Background

Water pollution is caused by many factors related to regional development, including the construction and operation of the transportation infrastructure. Growth in traffic can cause increased runoff of pollutants created by brakes and tires. As the physical transportation network expands, the amount of impervious surface increases, resulting in greater runoff.

4.6.2 Current Trend or Health

Water quality has been reduced over time as development and transportation uses increased in the study area. Activities such as direct discharges and stormwater runoff have degraded water quality of receiving waters. The main receiving waterbodies from the project area are Niver Creek, Niver Creek Tributary L, and South Grange Hall Creek. Grange Hall Creek is a minor receiving waterbody for the project area. All waterbodies near the project are flowing toward an eventual confluence with the South Platte River. The South Platte River is listed as impaired by the Colorado Department of Public Health and Environment (CDPHE) *Section 303(d) List of Impaired Waters and Monitoring and Evaluation List*.



Several laws and regulations have developed as awareness of water quality degradation and its implications have increased. The regulatory controls put into place have resulted in improving water quality over the past several decades.

4.6.3 Incremental Effect of Alternatives

No Action Alternative

The No Action Alternative would contribute incrementally to the impact on water quality in the study area since most reasonably foreseeable future actions consist of planned urban development. However, Best Management Practices (BMPs) would minimize and mitigate water quality impacts.

Proposed Action

Based on preliminary designs and decisions, water quality in receiving waterbodies (Niver Creek and its tributaries, Grange Hall Creek and its tributaries, and the South Platte River) would benefit from this project. Temporary impacts during construction include working adjacent to and runoff potentially reaching Niver Creek, Grange Hall Creek, and their associated tributaries. The South Platte River, located down-gradient of the project area, would have the potential to be impacted by project activities; however, as project designs will include mitigation measures in areas with limited existing water quality BMPs, an improvement in the water quality reaching the South Platte River from the project vicinity is anticipated.

4.6.4 Incremental Effect of All Actions

Most cumulative impacts on water quality in the study area would be the result of planned urban

development. The No Action Alternative and the Proposed Action would both contribute incrementally to the impact on water quality in the study area. Increased impervious surface area and erosion would occur with either alternative; however, water quality features would be put in place to capture and treat surface runoff.

When combined with other past, present, and reasonably foreseeable future actions, the Proposed Action is expected to contribute to the trend of improving water quality in the study area.

5.0 Conclusion

In conclusion, the direct and indirect impacts of either the No Action Alternative or the Proposed Action would not incrementally result in a substantial cumulative impact for the analyzed resources. Land in the Cumulative Impacts Study Area will continue to be developed for various uses regardless of which alternative is selected. These factors have been and continue to be the primary cause of impacts on noise, air quality, land use, wetlands, wildlife, and water quality. The manner in which development and use occurs, as managed by local agencies with jurisdiction in the area, will shape the environment into the future. When combined with other past, present, and reasonably foreseeable future actions, the No Action Alternative and the Proposed Action would not be expected to have substantial adverse impacts on the analyzed resources.

Table 4 documents the cumulative impacts associated with the Proposed Action, and **Table 5** documents that there are no mitigation commitments for cumulative impacts associated with the Proposed Action.



Table 4. Impacts on Cumulative Impacts

Context	No Action Alternative	Proposed Action
<p>The Cumulative Impacts Study Area encompasses the location where major travel pattern changes could occur as a result of implementing the project. Boundaries of the cumulative impacts study area have been established using traffic analysis zones. In general, actions being considered have occurred since 1953 (when development along the I-25 corridor in the area began) or they will occur before 2040 (based on traffic and growth projections in the area). Existing trends in the corridor would continue to incrementally occur possibly resulting in degraded water quality in the study area since most reasonably foreseeable future actions consist of planned urban development. Best management practices (BMPs) would minimize and mitigate water quality impacts. Wildlife may experience additional loss, degradation, and fragmentation of habitat due to development in the surrounding landscape. Continual degradation of the surrounding riparian habitat could also occur from expansion of noxious weeds and compaction from the use of social trails in the project area.</p>	<p>Not Applicable</p>	<p>Permanent Impacts Cumulative impacts on air quality, noise, land use, wetlands, wildlife, and water quality have been examined. The Proposed Action would not incrementally result in a substantial cumulative impact for the resources analyzed. Land in the cumulative impacts study area would continue to be developed for various uses regardless of which alternative is selected. These factors have been and continue to be the primary cause of impacts on air quality, noise, land use, wetlands, wildlife, and water quality. The manner in which development and use occurs, as managed by local agencies with jurisdiction in the area, would shape the environment into the future. When combined with other past, present, and reasonably foreseeable future actions, the Proposed Action would not be expected to substantially adversely impact the analyzed resources.</p>

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Table 5. Impacts and Mitigation Commitments

Impact	Mitigation Commitment	Responsible Branch	Timing/Phase That Mitigation Will Be Implemented
None likely	Not required	NA	NA



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