

Chapter 3

Impacts and Mitigation Measures



Chapter 3. Impacts and Mitigation Measures

The Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA) conducted a comparative analysis to examine key issues associated with the No Action and Meander Alternatives for potential improvements to SH 402 from US 287 east to the I-25 interchange. This chapter describes the direct and indirect impacts and mitigation measures associated with these two alternatives, in accordance with the requirements of the National Environmental Policy Act (NEPA). Impacts related to widening between US 287 and CR 13C (St. Louis Avenue) are not included in this analysis and the existence of this developed portion of SH 402 did not restrict consideration of alternatives. The impacts discussed in this chapter are organized by resource and are based on conceptual design.

Human and Community Resources

Human and community resources and issues described in this section include:

- ❑ socioeconomic
- ❑ right-of-way acquisitions and relocations
- ❑ environmental justice
- ❑ land use
- ❑ farmland
- ❑ visual resources
- ❑ recreation resources
- ❑ hazardous materials and waste
- ❑ utilities and services
- ❑ emergency services
- ❑ historic preservation
- ❑ archaeology
- ❑ Native American consultation
- ❑ Sections 4(f) and 6(f) resources
- ❑ noise

3.1 Socioeconomics

Much of the data describing the existing socioeconomic environment are available only on a countywide basis. County data were used in this analysis to describe broad regional trends. Socioeconomic information was obtained from the Colorado Department of Labor and Employment and State Demographer's Office websites. Most of the detailed local data presented are from 2001 or 2002. For consistency, all data, except forecasts and trends, are provided for comparable time periods.

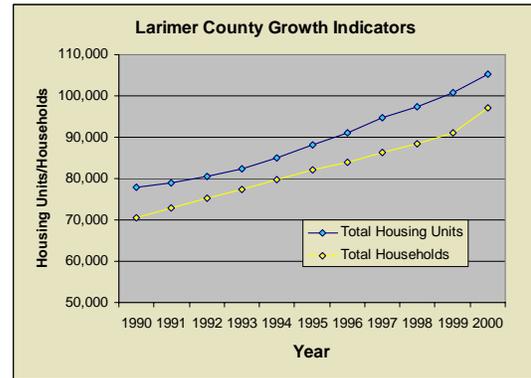
3.1.1 Population

Loveland city limits extend east of US 287 to CR 13C and include the Waterford Place Apartments. The remainder of the project area is located in unincorporated Larimer County. The entire SH 402 corridor is within the city of Loveland's Growth Management Area (GMA).

Table 3-1 presents historic population data for the city of Loveland and unincorporated Larimer County. Larimer County and the city of Loveland have experienced continuous growth over the past three decades.

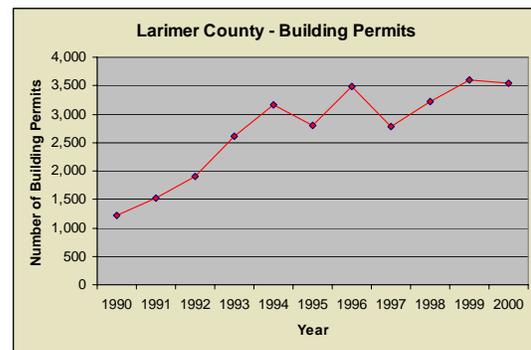
Predictions by the state of Colorado indicate that Larimer County will experience a 46 percent increase in population, reaching 366,115 by 2020, and an additional 20 percent increase by 2030 to 441,904 (Colorado DOLA 2003). This results in a total population increase of 76 percent between 2000 and 2030. City of Loveland planners anticipate continued growth in population and employment, including the SH 402 project area.

Larimer County growth from 1990 to 2000 is reflected in housing growth and building permits issued, as shown in Figure 3-1 and Figure 3-2. In 2002 the city of Loveland accounted for 30 percent of total new dwelling units in Larimer County.



Source: DOLA 2003

Figure 3-1. Larimer County Growth Indicators



Source: DOLA 2003

Figure 3-2. Larimer County Building Permits

Table 3-1. Population in the City of Loveland and Larimer County

Location	1970	1970–1980	1980	1980–1990	1990	1990–2000	2000
City of Loveland	16,220	86%	30,215	24%	37,357	35%	50,608
Unincorporated Larimer County	26,413	79%	47,384	13%	53,557	28%	68,819
Total Larimer County	89,900	66%	149,184	25%	186,136	35%	251,494

Source: Department of Local Affairs (DOLA) 2003

3.1.2 Economics and Employment

Larimer County's economy supports a diverse array of industries and employment opportunities. As in any local economy, local services and retail trade provide a significant portion of the jobs (21 percent and 13 percent, respectively). Government—including elementary, secondary, and college educational institutions—provides 17 percent of employment, while manufacturing provides 15 percent of county jobs. Construction provides approximately 8 percent of employment in Larimer County (Northern Colorado Economic Development Corporation [NCEDC] 2004, based on available 2001 annual averages).

In the economic projections summary for 2000 to 2010, the state demographer projects that Colorado's employment growth rate will slightly exceed the national average. Additionally, the demographer estimates that northern Colorado's employment growth rate will exceed the state's. The demographer also notes that jobs in traditional economic base sectors such as agribusiness, mining, and manufacturing will grow slowly (City of Loveland, Economic Development website 2004).

Retail trade and service jobs are expected to continue increasing, with the fastest growth in business service jobs, and construction jobs are expected to increase, but at a slower pace than during the 1990s. In the government sector, state jobs (largely in education) are expected to account for most of the growth.

Employment trends from 1990 to 2000 indicate relatively steady growth in Larimer County (US Census 2000). Employment projections indicate a sharper growth rate after 2005. The top five employers (by number of employees) in the Loveland area include the Big Thompson School District, Agilent Technologies, Wal-Mart Distribution Center, McKee Medical Center, and Hewlett-Packard (NCEDC 2004). No major employers are located along SH 402 in the study area.

Between 2000 and 2010, northern Colorado's employment growth rate is expected to exceed the state's.

Most Larimer County workers live in the county, and most out-of-county workers are from Weld County (DOLA Demography Section, Summary of US Census 2000 Data on Place-of-Work, March 2003). Many of Agilent Technologies' 2,400 employees use SH 402 to commute to and from work. Most Larimer County commuters travel to Boulder County. Remaining commuter destinations are primarily southward and include the Denver metropolitan area.

3.1.3 No Action Alternative

The No Action Alternative will not provide adequate transportation infrastructure for expected population and economic growth in and around the city of Loveland. SH 402 capacity for peak hour commuters will be limited under the No Action Alternative and might force commuters to use other routes or discourage commuters in general. Given the availability of land, city and county land use plans (zoning and future annexation of land into the city of Loveland), it is anticipated that development will occur regardless of whether improvements are made to SH 402.

3.1.4 Meander Alternative

The Meander Alternative would provide adequate capacity to accommodate 2030 travel demand. SH 402 would continue to be used as an access route between US 287 and I-25 and to play an important role in Larimer County's transportation infrastructure. Implementing the Meander Alternative is consistent with current zoning, local policies, and plans; it is not expected to affect land use or development.

3.1.5 Mitigation Measures

No mitigation measures are required. Implementation of the Meander Alternative is consistent with long-range local and regional land use and transportation plans.

3.2 Right-of-Way Acquisition and Relocations

The information in this section is based on conceptual design; the actual number of relocations will be known when final design is complete. Measures to further reduce the number of relocations will be implemented as part of final design.

3.2.1 No Action Alternative

The No Action Alternative would not require right-of-way acquisitions or residential/commercial relocations.

3.2.2 Meander Alternative

The Meander Alternative has been designed to avoid and minimize impacts on existing properties to the greatest extent possible. Implementation of the Meander Alternative would require acquisition of six homes and three outbuildings (small barns and sheds). Figure 3-3 shows the locations of these acquisitions. The six residential structures located in close proximity to SH 402 are on properties that would otherwise be most adversely affected by loss of yards, parking, and driveways. For the right-of-way, 47.58 acres of residential property and 7.15 acres of commercial property will need to be acquired. Due to the dispersed rural development pattern that currently exists for most of the project corridor, loss of frontage on SH 402 will most often mean loss of unimproved portions of large tracts.

Right-of-way impacts are greatest on the north side of SH 402 between CR 11H (Boise Avenue) and Heron Drive. This will result in acquisition of approximately 120 feet off the property frontages (measured from the edge of the existing right-of-way). Several non-residential parcels, including the Larimer County buildings and the CDOT Loveland Residency, will also experience loss of parking along the frontage to their buildings. Minimal to no acquisition will occur at Paradise Acres east of Heron Drive. The frontage lost on the west and east ends of the project will be

approximately 50 feet. Accesses may be altered as part of the implementation of the Meander Alternative. During final design, an access control plan will be developed. The Meander Alternative would be designed to minimize residential, business, and environmental impacts.

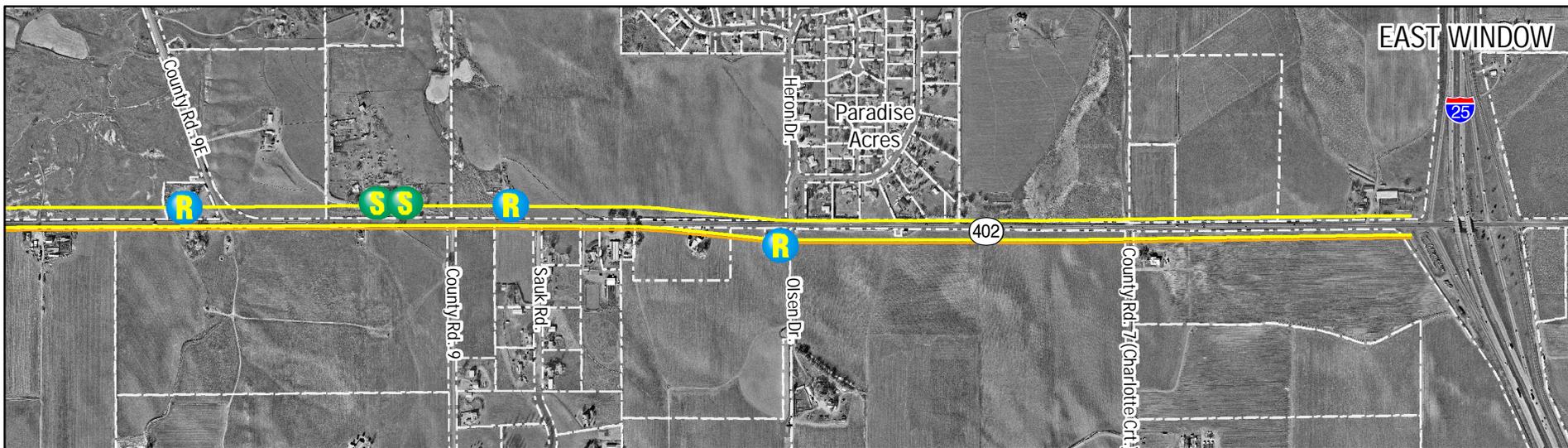
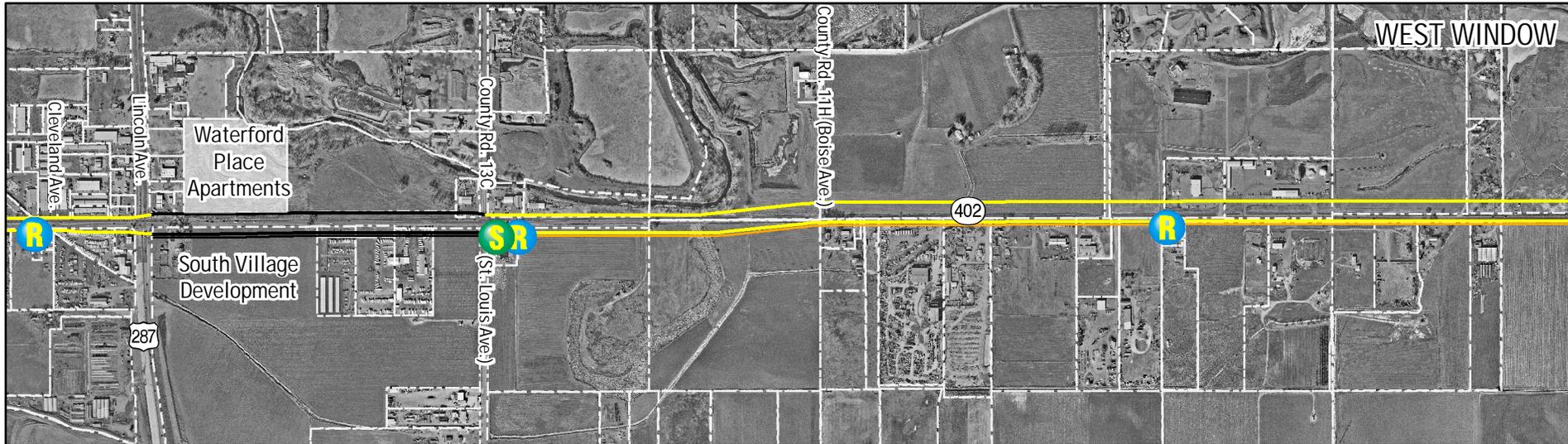
3.2.3 Mitigation Measures

To minimize unavoidable residential relocations, measures to further reduce the number of relocations will be implemented as part of final design.

CDOT will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act), which provides for uniform and equitable treatment of all persons displaced from their homes, businesses, or farms. The Uniform Act is a form of compensation, not mitigation.

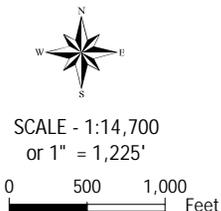
The owner of real property acquired for right-of-way will be compensated based on fair market value. Assistance will be provided to any eligible owner or tenant in relocating their business or residence at the time of displacement. Benefits under the Uniform Act to which each eligible owner or tenant might be entitled will be determined on an individual basis and explained in detail.

No relocatees will have to move from a dwelling without at least 90 days' written notice. A 90-day notice is not effective for a residential occupant unless a comparable replacement dwelling has been identified. Qualified relocatees receive monetary payments, which may include payments for moving expenses, business in lieu of payments, rent supplements, down payments, or increased interest payments. No person will be displaced by a federally assisted project unless and until adequate replacement housing has been offered to all affected persons, regardless of race, color, religion, sex, national origin, age, or disability. CDOT will assist any eligible owner or tenant to relocate a business or residence at the time of displacement.



LEGEND

-  Property Parcel Boundaries
-  Proposed Meander Alternative Right-of-Way
-  Proposed Meander Alternative Utilities Right-of-Way (25-feet)
-  Existing Right-of-Way
-  Outbuilding Relocation
-  Residential Relocation



SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Map produced November 29, 2006 by JFSA.



Meander Alternative Right-of-Way and Associated Relocations

FIGURE 3-3

Benefits under the Uniform Act to which each eligible owner or tenant might be entitled will be determined individually and explained to the parties in detail, along with information about financial options.

3.3 Environmental Justice

3.3.1 Background

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," was signed on February 11, 1994, and published in the Federal Register on February 16, 1994. The EO focuses federal attention on the environmental and human health conditions of minority and low-income populations, promotes nondiscrimination in federal programs affecting human health and the environment, and provides minority and low-income populations with access to public information and an opportunity to participate in matters relating to the environment. The United States Department of Transportation (DOT) issued an order on environmental justice in 1997 (DOT Order 5610.2), followed by the Federal Highway Administration in 1998 (FHWA Order 6640.23). Both of these orders directly address environmental justice activities and responsibilities at the DOT and FHWA.

A minority individual is one who identifies himself or herself as belonging to at least one of the following groups: Black, Hispanic, Asian, American Indian or Alaskan Native, Hawaiian or Other Pacific Islander, Some Other Race, or Two or More Races. Low income is usually defined as household income (or in the case of a community or group, median household income) at or below the US Department of Health and Human Services (HHS) poverty guidelines. FHWA Order 6640.23 defines minority and/or low-income population as "any readily identifiable group of minority and/or low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons who will be similarly affected by a proposed FHWA program, policy or activity."

3.3.2 Method

For this project, the following methodology was used to identify low-income and minority populations and the potential for disproportionate impacts on these populations:

- Census tracts and block groups in the study area were identified.
- Demographic information was gathered for each study area block group. Additional research by blocks was conducted for minority populations. (Note that income data are not available at the block level.)

A block is a subdivision of a census tract, and the smallest geographic unit for which the Census Bureau tabulates 100 percent data. A collection of blocks is called a block group. Many blocks correspond to individual city blocks bounded by streets, but some blocks, especially in rural areas, encompass many square miles and may have boundaries that are not streets. Information about race is tabulated by block, and income information is tabulated by block group.

- Council on Environmental Quality (CEQ) guidance states that the standard for the definition of an environmental justice population is either over 50 percent, or containing a minority population meaningfully larger than the minority percentage in the general population (CEQ 1997). Environmental justice requirements would apply to all block groups or sets of blocks adjacent to SH 402 that contain minority or low-income populations approaching or exceeding 50 percent, or greater than the Larimer County average minority populations. Larimer County's minority population is 12.5 percent (US Census 2000).
- Low-income populations are populations with income below the federal poverty thresholds. According to HHS, the 1999 poverty threshold is \$17,029 for a family of four. Because the federal poverty threshold is considered low compared to the cost of

living, 50 percent of area median income (AMI is used to determine housing assistance because housing typically makes up the majority of cost for a household. Due to higher costs of living in the project area, 50 percent of the AMI was used to screen for low income for this project.) This follows US Department of Housing and Urban Development guidelines for defining low income. Fifty percent of AMI in the Fort Collins-Loveland Metropolitan Statistical Area (MSA) was \$22,229 in 1999.

Note that the HHS low-income figure for a family of four increased to \$18,850 in 2004. The AMI data for the Fort Collins-Loveland MSA are from 2002, showing 50 percent of AMI for a family of four as \$30,400. However, because detailed population and income data are based on the 2000 Census information, the updated HHS low-income figure and AMI can be used only as a qualitative measure of the dollar amount.

Poverty Threshold Summary

HHS (family of 4):
1999 - \$17,029
2004 - \$18,850
50% Fort Collins-Loveland MSA AMI:
1999 - \$22,229
2002 - \$30,400

3.3.3 Minority and Low-income Populations in the Project Area

Minority and low-income population designations are based on 2000 Census data and environmental justice guidance prepared by the Environmental Protection Agency (EPA). Information from the US Census 2000 was used in the analysis.

The project area houses a dispersed rural population, including portions of four census tracts:

- ❑ Census Tract 17.05
- ❑ Census Tract 17.04

- ❑ Census Tract 20.08
- ❑ Census Tract 20.07

Refer to Figure 3-4 for census tract locations.

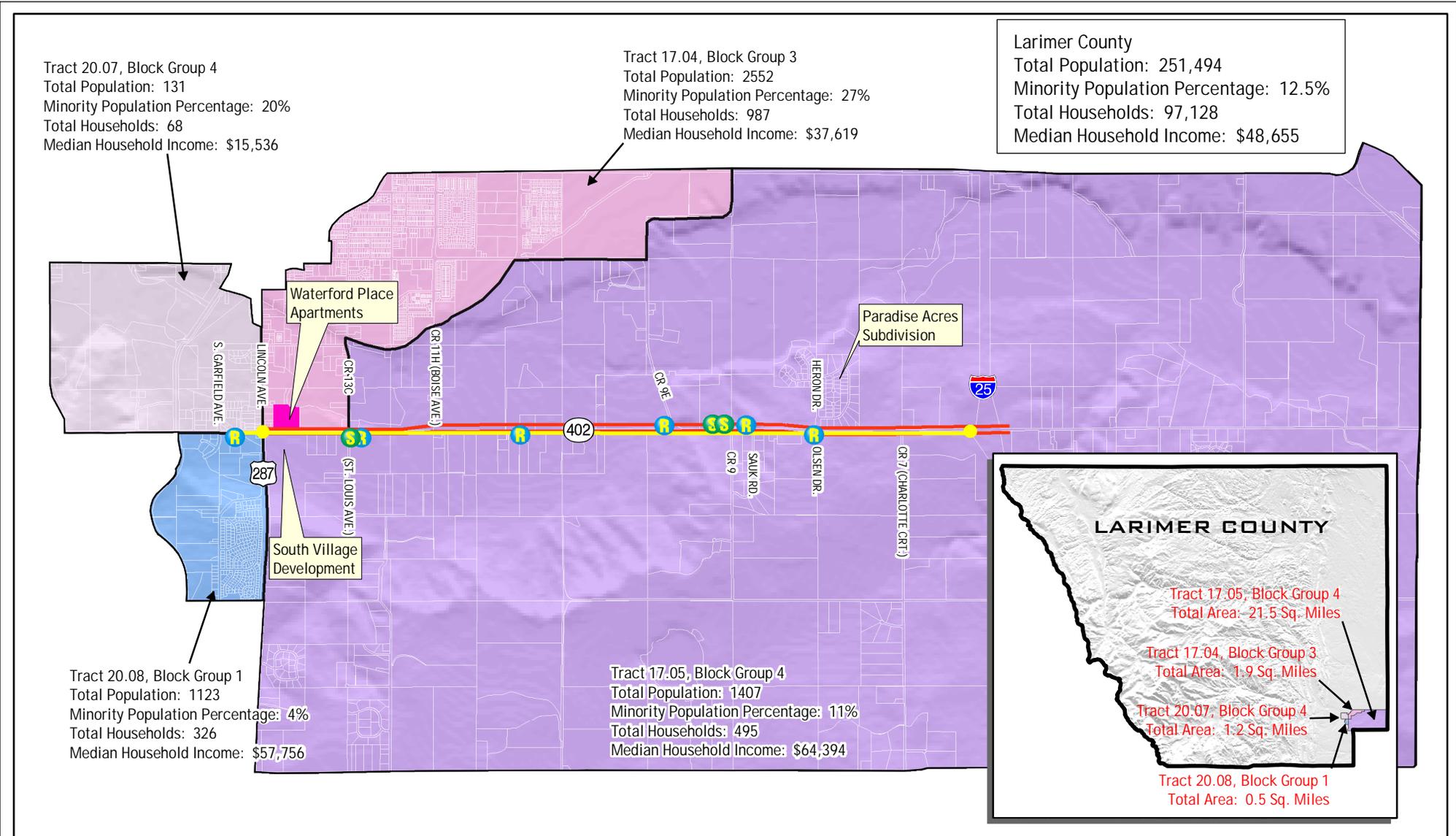
Census Tract 17.05

Most of the study area population resides in Census Tract 17.05, Block Group 4. This includes the north side of SH 402 from CR 13C east to the I-25 interchange, and the south side of SH 402 from US 287 to the I-25 interchange. Block Group 4 covers 21.5 square miles and includes 1,407 residents. Sixty-eight households or 13.7 percent lived below 50 percent of AMI in 1999. There are 311 people in this block group (22 percent) who reside in blocks adjacent to SH 402. Seven percent of the 311 are minority individuals (based on block group data), and 13.7 percent are low income (based on block group data). Table 3-2 summarizes minority and low-income population information for Block Group 4.

Other Census Tracts

Other census tracts relevant to this study are Census Tract 17.04, Block Group 3; Census Tract 20.08, Block Group 1; and Census Tract 20.07, Block Group 4. Thirteen individuals from these three block groups were recorded in the US Census 2000 as residing in the blocks adjacent to the highway and none identified themselves as minority. Income data are not available for Census tract blocks.

It is important to note that after the US Census 2000, the Waterford Place Apartments were constructed northeast of the intersection of US 287 and SH 402, to provide affordable housing for Larimer County residents. The development has 128 units, and rent calculations are based on 40, 50, and 60 percent of local median income. The current occupancy rate is about 65 percent. This project will not have an impact on the Waterford Place Apartments.

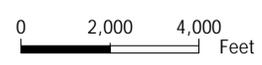


LEGEND

- Property Parcel Boundaries
- SH402 Between US287 and I-25
- Residential Relocation
- Outbuilding Relocation



SCALE - 1:51,600 or 1" = 4300'



SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Socioeconomic information obtained from the 2000 US Census Summary File 3. Demographic information obtained from the 2000 US Census Summary File 1. Map produced November 29, 2006 by JFSA.



2000 Census
 Socioeconomic and
 Demographic Statistics

FIGURE 3-4

Table 3-2. Minority and Low-income Population Comparisons

Minority ^a								
Demographic Area	Hispanic ^b	Black Alone	American Indian or Alaskan Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone ^c	Two or More ^e	Percent of Total Population
	Census Tract 17.05, Block Group 4	110	5	13	8	0	2	17
Census Tract 17.04, Block Group 3	612	16	11	11	1	9	33	27.2%
Census Tract 20.08, Block Group 1	39	3	0	0	0	1	3	4.0%
Census Tract 20.07, Block Group 4	15	0	3	3	0	0	5	19.8%
Larimer County	20,811	1,511	1,171	3,840	152	234	3,616	12.5%
^a US Census 2000 Summary File 1, Table P8 Total Population, Hispanic or Latino by Race ^b All Hispanic and Latino individuals, including those who claimed to be some other race alone and two or more races ^c Not Hispanic or Latino								
Low-Income (50% AMI)								
Census Tract 17.05, Block Group 4					13.7%			
Census Tract 17.04, Block Group 3					26.3%			
Census Tract 20.08, Block Group 1					20.7%			
Census Tract 20.07, Block Group 4					71.8%			
Larimer County					22.8%			

3.3.4 No Action Alternative

The No Action Alternative would not resolve mobility and safety requirements on SH 402 and would not meet the 2030 travel demand and growth needs; low-income and minority populations are expected to experience the same lack of benefits as the population as a whole. No disproportionate and adverse impacts on low-income or minority populations were identified for the No Action Alternative.

3.3.5 Meander Alternative

No disproportionate and adverse impacts on low-income or minority populations were identified for the Meander Alternative. The Meander Alternative uses an alignment that shifts from

north to south, minimizing impacts on the human and natural environments. These shifts resulted from ongoing design efforts to improve highway mobility and safety while minimizing potential adverse impacts, including residential relocations. The Meander Alternative would improve travel conditions by providing greater highway capacity, a left turn lane in the median, and consistent shoulders.

Six residential relocations may be required. The acquisitions are dispersed throughout the 4-mile corridor. The Meander Alternative was designed to minimize relocations. On the basis of population and income information, the probability of disproportionate and adverse

impacts on low-income and minority populations is very low.

All residents affected by relocation will be provided with CDOT's relocation package. All individuals using the improved highway would experience the benefits of enhanced mobility and safety. Improvements include bicycle and pedestrian lanes/sidewalks.

3.3.6 Mitigation Measures

No minority or low-income population was identified along SH 402. Public outreach was extended to the entire study area.

Because no disproportionate and adverse impacts are associated with the Meander Alternative, no mitigation measures are cited.

3.4 Land Use

This section describes existing and proposed land uses in the project area, and potential impacts on land use. *Section 1.3.2* provides information about land use and transportation policies and plans for the study area.

3.4.1 Existing and Proposed Land Uses

SH 402 is located 2 miles south of the city of Loveland in Larimer County. The project area is located along SH 402 between the US 287 intersection and the I-25 interchange in the city of Loveland's GMA.

The *Loveland, Colorado 2005 Comprehensive Master Plan* identifies SH 402 as part of the Loveland GMA. The *2004 Intergovernmental Agreement (IGA) for Growth Management* between the city and county includes these GMA boundaries (IGA 2004).

Although current land use is chiefly rural agricultural, dispersed low-density residential areas also exist (including the residential subdivision, *Paradise Acres*). Paradise Acres is located on the north side of SH 402, with access from Heron Drive/Olsen Drive. The Waterford Place Apartments are located in the northeast quadrant of the intersection of SH 402 and

US 287. See Figure 3-5 for existing land use in the study area. Figure 3-6 shows the city of Loveland future land use map.

Businesses in the corridor include gas stations, storage warehouses, a greenhouse, a landscaping center, and a feed yard. Public facilities include Larimer County's maintenance facility, the CDOT Region 4 Loveland Residency (on the north side of SH 402), and a carpool lot on the southwest corner near the I-25 interchange. Most of these properties are oriented toward the highway, with direct access and little definition of highway edge (that is, no sidewalks and little landscaping).

The *City of Loveland Land Use Plan* shows a neighborhood activity center at the intersection of US 287 and SH 402.

The *City of Loveland Land Use Plan* (May 2, 2000; amended March 6, 2007) categorizes the SH 402 corridor as an activity center mixed-use corridor. Activity center mixed uses provide shopping, services, public uses, and residences. The plan shows a community activity center in the southeast and southwest quadrants of the intersection of US 287 and SH 402. Low to medium density residential development north of SH 402 is shown between CR 9E and I-25. Development on the south side of SH 402 from CR 11H east to the I-25 interchange and on the north side between CR 11H and CR 9E is expected to produce employment opportunities.

Land use plans are meant to help focus growth in specific areas; they do not ensure that growth will occur.

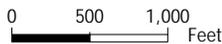


LEGEND

	Agricultural		Public
	Agricultural / Residential		Residential
	Commercial		Vacant
	Industrial		Property Parcel Boundaries
	Existing Right-of-Way		Meander Alternative Right-of-Way



SCALE - 1:14,700 or 1" = 1225'



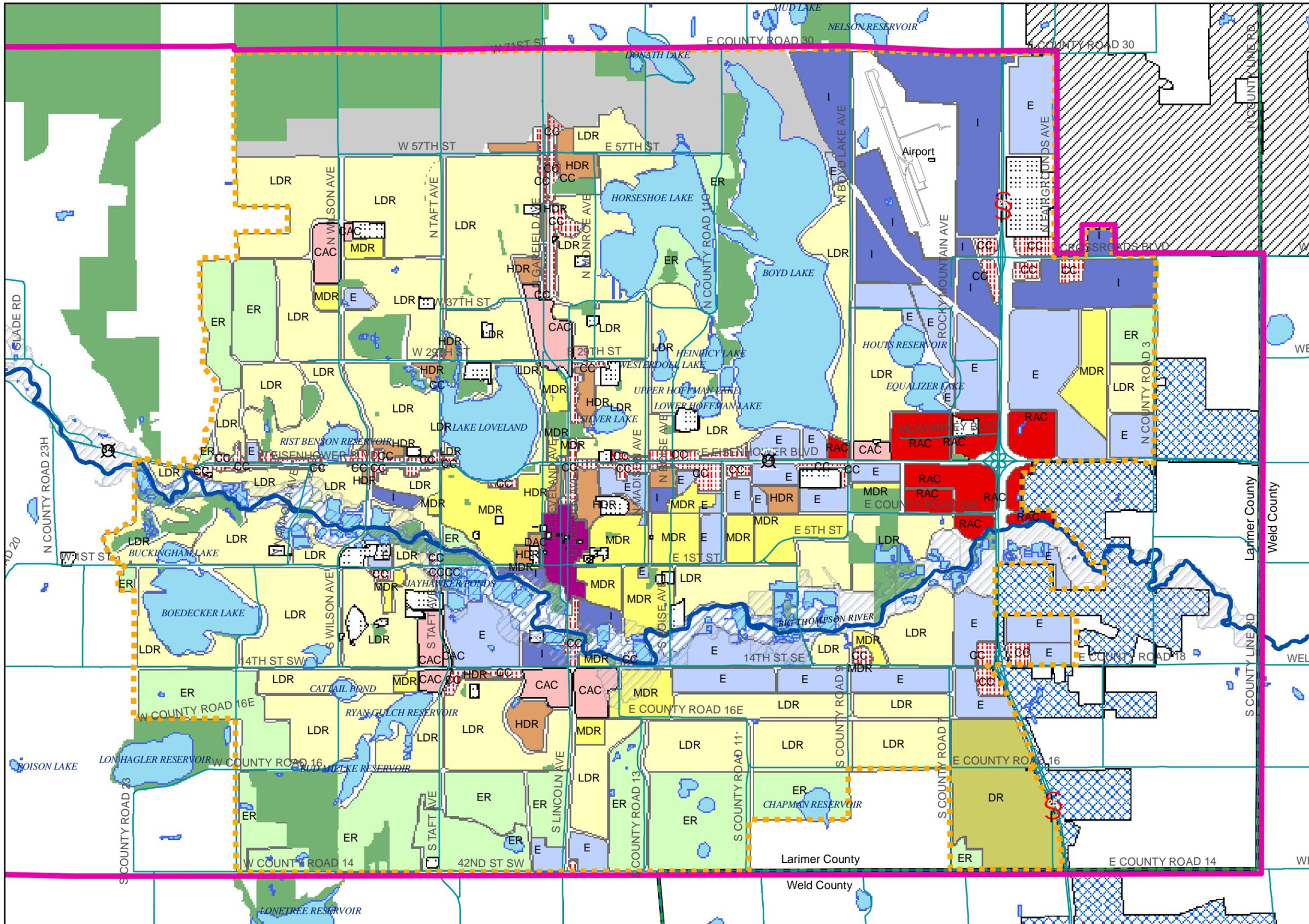
SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Map produced November 29, 2006 by JFSA.



Existing Land Use

FIGURE 3-5

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Land Use Categories

Residential Mixed-Use

- ER - Estate Residential
- LDR - Low Density Residential
- MDR - Medium Density Residential
- HDR - High Density Residential

Activity Center Mixed-Use

- RAC - Regional Activity Center
- DAC - Downtown Activity Center
- CAC - Community Activity Centers
- CC - Corridor Commercial
- E - Employment

Other Categories

- I - Industrial
- 100-Year Floodplain (FEMA)
- 100-Year Floodway (FEMA) (see note 3)
- Public Schools, Hospital, Public Facilities
- DR - Development Reserve
- Parks, Open Lands, Conservation Easements, Golf Courses and Cemeteries
- Fort Collins/Loveland Corridor Area Land Use generally north of 57th Street is guided by the document, "Plan for the Region Between Fort Collins and Loveland."

Windsor City Limits
Johnstown City Limits
Lakes and Ponds
GMA - Growth Management Area
CIA - Community Influence area
For westerly boundary of the CIA - refer to the Planning Boundaries Map
Major Streets
Big Thompson River
Fort Collins/Loveland Airport Influence Area (see note 2)

(1) This map is intended to serve as a guide for future land use patterns within Loveland's GMA and is advisory in nature. Land use patterns depicted on the map are generalized, recognizing that development proposals may contain a mixture of land uses and density levels which achieve the intent of the Comprehensive Master Plan. All development is subject to City standards for protection of environmentally sensitive areas, and other performance guidelines.

(2) For details regarding appropriate land uses within the Airport Influence Area refer to section 4.6, "Airport and Surrounding Areas" of the Comprehensive Master Plan.

(3) The 100-year Floodway is displayed only within City Limits, awaiting further data.

City of Loveland
The Logic System

0 0.5 1 2 Miles

**CITY OF LOVELAND
FUTURE LAND USE PLAN**

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3.4.2 No Action Alternative

If anticipated land use changes identified in the *City of Loveland Land Use Plan* occur, the No Action Alternative would not provide travel capacity and safety improvements needed for SH 402 and, therefore, would not support current zoning, local policies, and plans. Given the availability of land, city and county land use plans (zoning and future annexation of land into the city of Loveland), it is anticipated that development will occur regardless of whether improvements are made to SH 402.

3.4.3 Meander Alternative

Implementing the Meander Alternative is consistent with current zoning, local policies, and plans. No land use effects are expected. The project supports approved local plans, and the completion of portions of the highway widening by local developers ahead of the EA is an indicator of this trend.

3.4.4 Mitigation Measures

The Meander Alternative alignment was based on sensitivity toward existing land uses. No additional mitigation measures are required.

3.5 Farmland

Areas classified as prime, unique, statewide, or local-important farmlands must be identified under the requirements of the Farmland Protection Policy Act (FPPA 1981), which was enacted to minimize the extent to which federally funded projects contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. Only prime farmlands were identified in the study area. The potential for the project site to contain prime farmland was determined by inspection of the Soil Survey mapping and descriptions developed by the Natural Resources Conservation Service (NRCS) for Larimer County in 1975. Information from NRCS electronic databases was used to overlay the Meander Alternative on a map of prime farmland soils (see Figure 3-7).

Seven soil types considered to be prime farmland occur adjacent to the existing SH 402 highway in the project area: Ascalon sandy loam, Caruso clay loam, Paoli fine sandy loam, Satanta loam, Table Mountain loam, Weld silt loam, and Wiley silt loam. Table 3-3 lists soil types and characteristics.

Observed agricultural use in the study area includes irrigated corn and hay production and rangeland for livestock grazing. NRCS also listed beans and alfalfa as crops grown in the study area.

The SH 402 corridor is located within the Loveland GMA, which encourages urban development within GMA boundaries. The *City of Loveland Land Use Plan* (adopted May 2, 2000, and amended March 6, 2007) projects a shift away from agricultural use along SH 402, showing no remaining agricultural land uses adjacent to SH 402 in the project study area.

Agricultural viability for sustained crop production on these lands has been reduced by either planned development or proximity to development, according to criteria developed by NRCS and adopted by the county (Larimer County Land Evaluation and Site Assessment System [LESA] 2001).

Although land in the SH 402 corridor is composed of prime soil types, the farmland itself is not subject to FPPA. According to 1989 FHWA guidelines, "Prime farmland which is already in or committed to urban development is by definition farmland not subject to the FPPA."

All of the land adjacent to SH 402 is shown as residential or activity center mixed uses in the *City of Loveland Land Use Plan* (May 2, 2000, amended March 6, 2007).

3.5.1 No Action Alternative

The No Action Alternative would not affect prime farmland in the project area.

Table 3-3. Prime Farmland Soil Types in the Project Area

Soil Type	Percent Slope	Runoff/Permeability	Wind/Water Erosion Hazard
Ascalon sandy loam	0 to 3	Slow/moderate	Moderate/slight
Caruso clay loam	0 to 1	Slow/moderately slow above 25 inches and moderately rapid to rapid below	Slight
Paoli fine sandy loam	0 to 1	Slow/moderately rapid	Moderate/slight
Satanta loam	1 to 3	Slight/moderate	Slight to moderate
Table Mountain loam	0 to 1	Slow/moderate	Slight
Weld silt loam	0 to 3	Slow/moderate above 7 inches, moderately slow from 7 to 20 inches, and moderate below 20 inches	Slight, but soil losses can be substantial after heavy rains
Wiley silt loam	1 to 3	Slow to medium/moderate	Moderate

3.5.2 Meander Alternative

The Meander Alternative and associated utility corridor cross section with soil types and current land uses have identified a permanent loss of approximately 0.8 acre of Ascalon sandy loam, 4.23 acres of Caruso clay loam, 6.05 acres of Paoli fine sandy loam, 1.8 acres of Satanta loam, 6.7 acres of Table Mountain loam, 3.8 acres of Weld silt loam, and 0.8 acre of Wiley silt loam, for a total of approximately 24.2 acres of prime farmland soil impacts. Five acres of this will be affected by the utility corridor easement. Portions of the easement may be able to be returned to agricultural use.

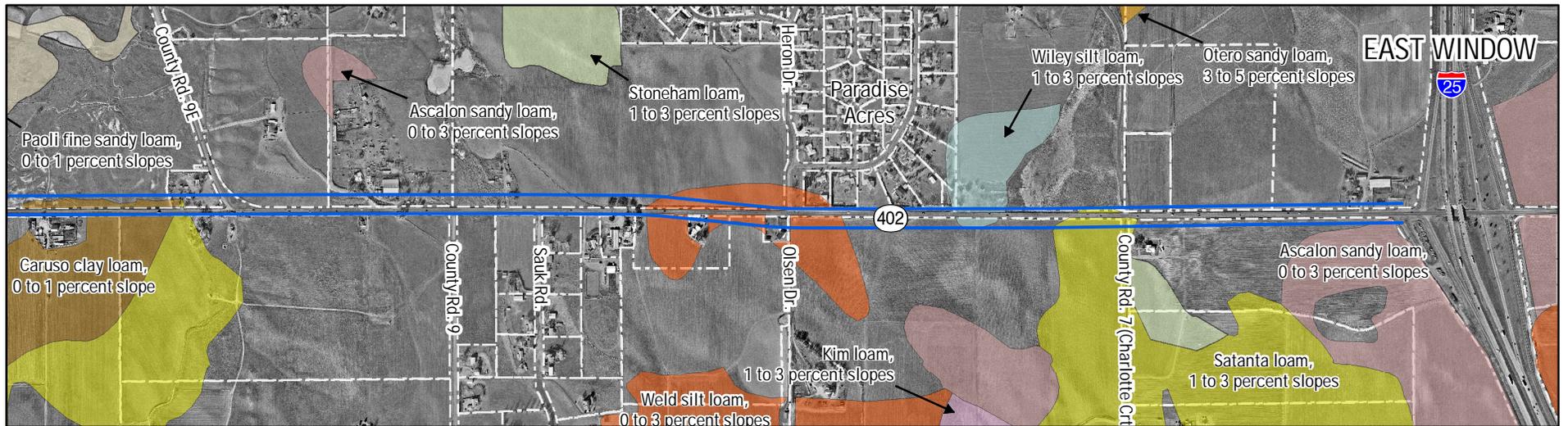
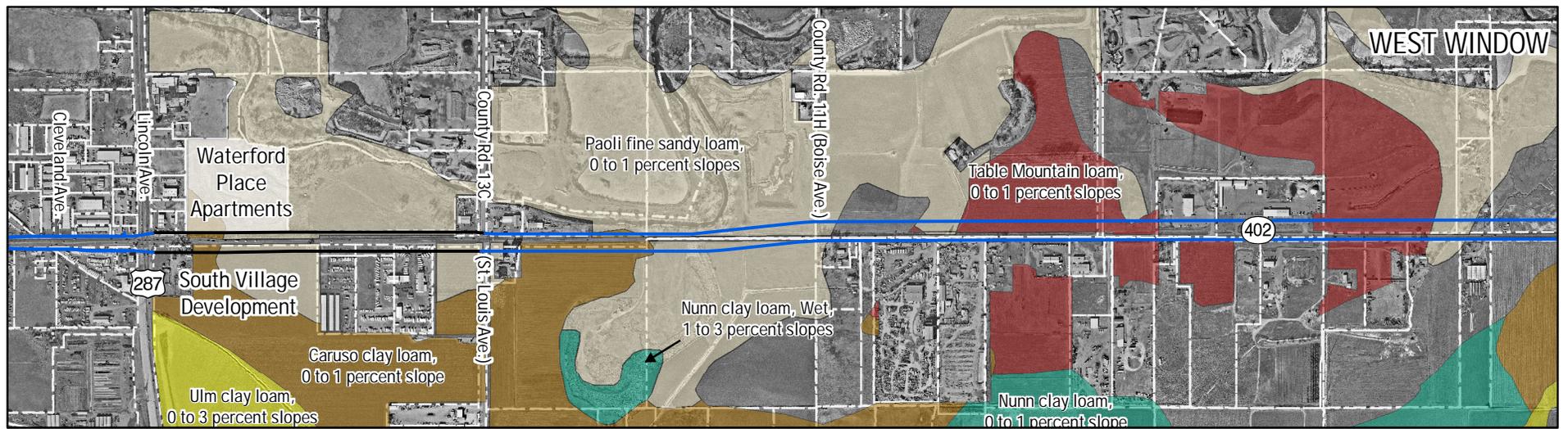
A LESA evaluation was conducted, and a US Department of Agriculture Form AD-1006 was submitted to NRCS in accordance with FHWA guidelines for implementing FPPA (FHWA 1989). The conversion impact rating for farmland in the SH 402 corridor was 213.2 points out of a possible 260 points (includes LESA) for the Meander Alternative (see *Appendix A*). The impact rating considers the total acres of prime farmland, percentage of farmland in the county that would be converted by the action, and 12 attributes that may detract from farmland being used to its full potential (that is, availability of farm support services and distance from urban development).

3.5.3 Mitigation Measures

Implementation of the Meander Alternative will result in the conversion of 24.2 acres of prime farmland along SH 402. Use of the periphery of currently active farms will be lost to highway right-of-way and easement. No mitigation is required under FPPA since FPPA does not apply for this corridor. Compensation for loss of property will occur under the Uniform Act (see *Section 3.2, Right-of-Way Acquisition and Relocations*). Each property owner will be given the opportunity to accompany the appraiser during the inspection of the property. CDOT must then establish just compensation based on fair market value. The owner of real property acquired for right-of-way will be compensated at fair market value, in accordance with the Uniform Act, federal CFRs, state statutes, and CDOT policies and procedures.

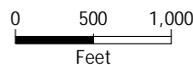
3.6 Visual Resources

This visual assessment includes an inventory of the potentially affected environment and an assessment of the anticipated effects of the No Action and Meander Alternatives. Visual impacts associated with construction of the Meander Alternative were assessed by determining the potential for a change in the area's aesthetic quality as related to existing views.



LEGEND

	Ascalon sandy loam		Stoneham loam
	Caruso clay loam		Table Mountain loam
	Kim loam		Ulm clay loam
	Nunn clay loam		Weld silt loam
	Otero sandy loam		Wiley silt loam
	Paoli fine sandy loam		Meander Alternative Right-of-Way
	Satanta loam		Existing Right-of-Way



SCALE - 1:14,700
or 1" = 1225'

SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Prime farmland soil information provided by NRCS. Map produced November 29, 2006 by JFSA.



Project Study Area
Prime Farmland Soil Types

FIGURE 3-7

3.6.1 Overview

The appearance of landscape features varies with the viewing distance. For this assessment, views seen by area residents and/or travelers on SH 402 were divided into three distance zones: *foreground* (from the viewer to 0.5 mile), *near middleground* (0.5 mile to 1 mile), and *middleground* (1 to 3 miles).

The homogeneous appearance of the mostly agricultural landscape in the project area is highlighted by wooded drainages along the Big Thompson River that provide visual diversity in color, form, and texture. The project foreground includes large plains cottonwoods in this area. Other trees were visible along SH 402 as landscaping or shelterbelts. For additional discussion on trees and vegetation, see *Section 3.17, Ecology*. Distant views to the west of the Front Range add a distinctive and sometimes dominant quality to the scenery.

The natural appearance of the project area has been modified by structures and facilities concentrated along travel routes, including US 287, CR 13C, CR 9, and SH 402. Land uses in the project area are increasingly expected to shift from rural dispersed development to areas of commercial use and employment, as well as residential development of greater density (see *Section 3.4, Land Use*, for additional land use information). Viewing conditions associated with the current landscape are mostly open and unrestricted; minor screening potential is provided by variations in local terrain, dispersed development, and isolated tree stands.

Visual impacts are considered high if a project would dominate the landscape. Impacts are considered moderate if the project would attract attention and begin to dominate the landscape. Impacts are considered low when the project would be visible without attracting attention.

3.6.2 No Action Alternative

No direct or indirect visual impacts would be associated with the No Action Alternative.

3.6.3 Meander Alternative

The Meander Alternative would be constructed in an area with relatively open views from dispersed rural residences and existing developments. With the exception of the widened highway and grading associated with cut-and-fill slopes, few new structural elements are proposed as part of this alternative (such as signal or street lights, retaining walls, bridges, and signage). New signalized intersections would be added at CR 11H, CR 9E, and CR 7 (Charlotte Court). Cut-and-fill slopes required to accommodate the proposed project would range in height from 0 to 15 feet (average 4 feet). Landform changes associated with the Meander Alternative would be most noticeable in foreground and near middleground distance zones. Changes are expected to be subordinate to the landscape character in the setting, with low visual impacts after implementation of Best Management Practices (BMPs) and mitigation measures.

3.6.4 Mitigation Measures

BMPs and mitigation measures to reduce or eliminate potential visual resource impacts of construction of the Meander Alternative include the following:

1. All disturbed slopes will be treated for erosion control and revegetated as appropriate, using native grasses and forbs. Shrubs will be included when feasible.
2. Sensitive grading techniques will blend grading with the natural terrain. Cut-and-fill slopes will be blended with the surrounding terrain to the greatest extent possible by means of slope rounding, layback, and warping techniques. BMPs for reducing slope modification and landform contrast will be developed individually for cut-and-fill slopes. Cut slopes are more easily modified than fill slopes by using slope layback, slope rounding, and slope warping techniques. These techniques will be implemented as follows:

- ❑ Slope rounding: used at the top of all cuts except in rock.
 - ❑ Slope layback: degree of layback would influence motorists' visual impression and would be crucial in establishing vegetation and preventing erosion. With the gentle nature of the terrain in the project area, cut-and-fill slopes could be laid back up to a 4:1 ratio.
 - ❑ Slope warping: used to achieve a more natural-looking transition between two unlike surfaces by varying the pitch of the cut slopes. This provides greater variation in slope faces and allows for vegetation. This technique involves both vertical and horizontal slope rounding as a more natural extension of landform surface configurations.
3. Removal of native cottonwoods will be avoided wherever practicable and revegetation BMPs implemented as noted in *Section 3.17, Ecology*.

3.7 Recreation Resources

The Larimer County Planning Department and the Loveland Parks and Recreation Department were consulted to help identify publicly owned parks, recreation areas, and wildlife/waterfowl refuge areas. The county Geographic Information Systems Department provided data layers. The county and city concur that there are no publicly owned parks, recreation areas, or wildlife/waterfowl refuge areas adjacent to the SH 402 corridor.

3.8 Hazardous Materials/Waste

This section summarizes the findings of the Modified Environmental Site Assessment (M-ESA) reports prepared for the project area by Kumar and Associates in 2001 and 2004. The reports comply with American Society for Testing and Materials E 1527-00, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, and the

CDOT scope of work for M-ESA reports. These reports were intended to identify environmental conditions that indicate an existing, a past, or a material threat of a release of hazardous substances or petroleum products into structures on the properties or into the soils, groundwater, or surface waters that could be affected by the No Action Alternative or Meander Alternative.

Government agencies were contacted and a database review was conducted to evaluate potential usage, storage, treatment, and disposal of hazardous waste and petroleum products at or near the site. Local agencies were contacted concerning records of spills or incidents involving hazardous substances or petroleum products that could have resulted in potential onsite contamination. Information was obtained from the Colorado Department of Oil Inspection Section (OIS), the Larimer County Department of Health and Environment (LCDHE), the Colorado Department of Public Health and Environment (CDPHE), and the Loveland Fire Department.

The database review was conducted in general accordance with the current ASTM standard for Phase I Environmental Site Assessments, except some additional records were reviewed. The following federal databases were included: National Priorities List; Comprehensive Environmental Response, Compensation, and Liability Information System; Resource Conservation and Recovery Information Systems; Emergency Response Notification System; PCB Activity Database System; Toxic Release Inventory; Section Seven Tracking System; Civil Enforcement Docket; and Toxic Substances Control Act Inventory.

The following State databases were searched: Colorado Hazardous Waste Sites List, Colorado Solid Waste Facilities, Colorado Leaking Underground Storage Tank List, and Colorado Underground Storage Tank List.

The M-ESA results indicated two sites in the SH 402 corridor that may contain hazardous materials or waste: the Diamond Shamrock gas

station at 1401 South Lincoln Avenue at the southwest corner of SH 402 and US 287, and A/B Auto Brokers and Chuck's Towing at the northwest corner of SH 402 and CR 13C. Neither of these sites will be affected by the Meander Alternative as improvements will be made to SH 402 from west of US 287 to North Garfield Avenue and from east of CR 13C. Right-of-way will not need to be acquired from these parcels.

In addition, no documentation of spills or leaking tanks was found for the Mini-Stop gas station, Wash Masters car wash, or convenience store also located in proximity to the northwest corner of SH 402 and US 287 (upgradient of SH 402) or the Loveland RV Service facility on the south side of SH 402 west of CR 13C. These sites are also outside the area of impact for the Meander Alternative.

No documentation of spills or leaking tanks was found for the Colorado Precast Concrete facility at 1820 SH 402 (south of SH 402 at CR 11H). The LaFarge Concrete Batch Plant, located behind a row of businesses in the northeast quadrant of SH 402 and CR 13C, is hydrogeologically isolated from the study area by the Big Thompson River and is not expected to have affected the subsurface of the study area. Numerous oil and gas wells are located on both sides of the highway but were set back 300 feet or more from the highway. No impacts are anticipated.

Two past LUSTs are associated with the Larimer County Fleet Shop and CDOT facility on the north side of SH 402 east of CR 11H. Current records indicate no further mitigation requirements.

Thirty pole-mounted transformers are located in or adjacent to the project area. Xcel Energy owns four, of which three have not been tested for polychlorinated biphenyls (PCB) content. One transformer has been tested, with negative results. The Poudre Valley Rural Electric Association owns the remaining 26 transformers and stated that these have not yet been tested.

They consider unlabeled and untested transformers PCB-contaminated. PCBs are regulated under the Toxics Substance Control Act as a toxic chemical; untested transformers must be tested before disposal. All of the transformers appear to be in good condition, with no evidence of leaks.

3.8.1 No Action Alternative

The No Action Alternative would not disturb any hazardous materials or waste sites.

3.8.2 Meander Alternative

Proximity of the LUST site at the Diamond Shamrock station and its hydrogeological upgradient location mean there is the potential that fuel-contaminated groundwater may have migrated to areas under the intersection of US 287 and SH 402 into the area of impact for the Meander Alternative. Utilities adjacent to SH 402 containing transformers would be relocated.

3.8.3 Mitigation Measures

Ongoing review of semi-annual groundwater monitoring reports for the Diamond Shamrock LUST site is recommended. These reports will indicate the extent of groundwater contamination and potential offsite migration of contaminants. Pre-characterization of soils and groundwater for project personnel health and safety, materials management, and dewatering is required before disturbance of subsurface soils or groundwater by highway construction activities. Depending on the results of the pre-characterization test, coordination with various agencies and permitting may be required. If the test samples are deemed hazardous, a materials management plan will be developed, describing the specifics of the hazardous waste permitting and compliance issues.

If any of the transformers test positive for PCBs, the utility company of ownership will be responsible for handling and disposal.

If additional hazardous materials are encountered before or during construction of the Meander Alternative, CDOT's *Section 250, Environmental Health and Safety Management* specification will be used. If necessary, a health and safety plan will be prepared and implemented to mitigate potential health and safety hazards to workers and the public.

3.9 Utilities and Services

Major utilities in the form of overhead telephone and power lines are located both sides of existing SH 402. Poles for overhead utilities and underground water and gas lines are within 20 feet of the existing pavement edge.

3.9.1 No Action Alternative

Utilities and services would not be affected or changed under the No Action Alternative.

3.9.2 Meander Alternative

Proximity of major utilities to the existing SH 402 edge of pavement would necessitate relocation of some of these utilities. A 25-foot utility corridor easement on the south side of the Meander Alternative is proposed to accommodate existing south side utilities and new utilities. Utilities currently on the north side of SH 402 will not be moved into the 25-foot utility corridor easement along the south side. These utilities will be relocated further north and will remain within the SH 402 footprint defined by the 160-foot to 175-foot cross section. CDOT would purchase this easement and grant utility permits to the various utility companies that need to locate facilities within this easement. Utility relocation costs are estimated at approximately \$1 million, based on conceptual design. Final design will allow more exact cost estimates.

3.9.3 Mitigation Measures

BMPs will be required to minimize any erosion or sediment disturbance that may be associated with utility construction within the CDOT easement. Coordination with county officials and local utility owners will minimize disruption of service.

3.10 Emergency Services

Project area emergency services are provided by the Larimer County Sheriff's Department, the Colorado State Patrol, Thompson Valley EMS, and the Loveland Fire and Rescue Department. McKee Medical Center in the city of Loveland is a full-size hospital. The new Medical Center of the Rockies is located near the northwest quadrant of US 34 and I-25, two miles north of SH 402. No emergency service providers are located on SH 402. Emergency services are provided for incidents along and accessed by SH 402.

3.10.1 No Action Alternative

Travel conditions on SH 402 would continue to deteriorate, resulting in a lower level of service (LOS) and increased travel times. It can be expected that travel time for emergency service vehicles will be affected by the worsening LOS resulting in longer travel time.

3.10.2 Meander Alternative

Better LOS associated with the addition of another travel lane, shoulders, and a center turn lane would be expected to improve traffic flow. This can be expected to result in faster travel time for emergency response vehicles when compared to the No Action Alternative.

3.10.3 Mitigation Measures

Emergency services will be coordinated with the appropriate authorities during construction.

3.11 Historic Preservation

Historic properties are protected under Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended; 16 USC 470 *et seq*; revised Advisory Council on Historic Preservation 36 CFR 800; and Section 4(f) of the US Department of Transportation Act of 1966.

Authorized under the NHPA of 1966, the National Register of Historic Places (NRHP) is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archaeological

and protect historic and archaeological resources. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history.

To be eligible for the NRHP, a historic property, typically, must be 50 years old or older and meet one or more of the following integrity and significance requirements per 36 CFR 60.04:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

- (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) that are associated with the lives of persons significant in our past; or
- (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (d) that have yielded, or may be likely to yield, information important in prehistory or history.

3.11.1 Historic Overview and Inventory Results

Three early settlement themes dominate the project area: exploration and fur trade, farming and ranching, and early transportation.

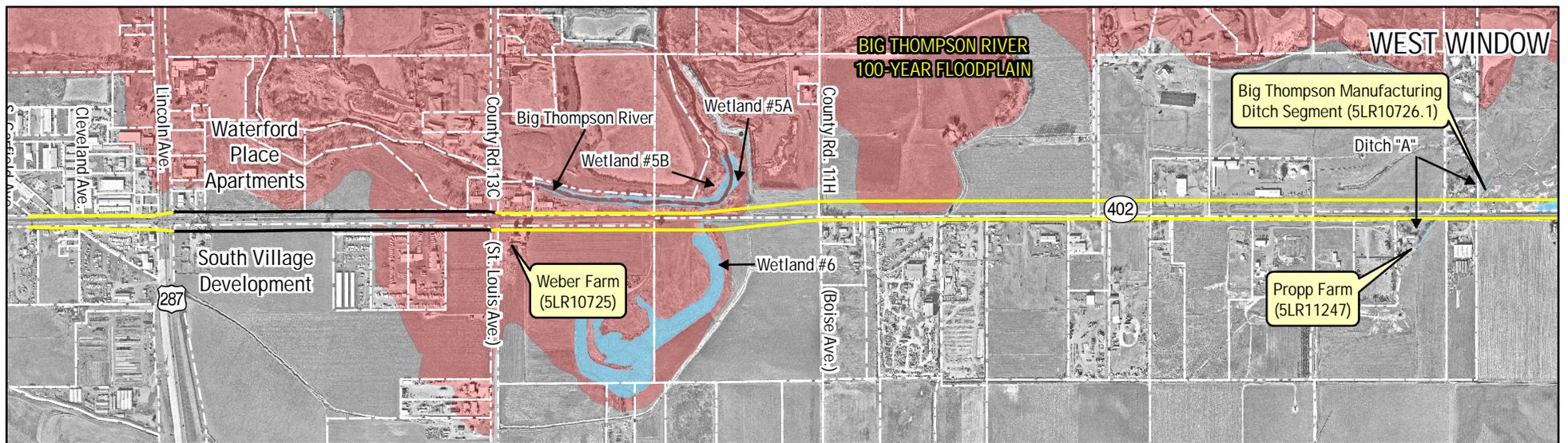
Exploration and fur trade occurred between 1761 and 1859. Farming and ranching began in the late 1800s and continue to this day. The South Platte River and Big Thompson River served as important transportation routes and were significant in the early settlement of the area.

A flexible Area of Potential Effect (APE) has been identified for the project. Because direct impacts are anticipated to be contained within 250 feet to either side of the existing edge of pavement, intensive field inventory or pedestrian survey (Class III Survey) was conducted within this area covering a total of 265 acres. Areas containing potentially sensitive historic resources whose boundaries intersected with this area of direct impact but may have extended as much as 0.25 mile beyond, were also examined (Class II Survey).

Literature searches for the entire APE were conducted at the Colorado Historical Society's Office of Archaeology and Historic Preservation in 2003 and 2005. File searches were also conducted for various portions of the SH 402 study area at various dates between March 2001 and August 2005.

Appendix A of this document includes CDOT, SHPO, and consulting party correspondence.

Five NRHP eligible properties have been identified in the SH 402 APE and are described below. Figure 3-8 illustrates the locations of these properties.



LEGEND

-  Wetlands
-  Floodplain
-  Property Parcel Boundaries
-  Proposed Meander Right-of-Way
-  Existing Right-of-Way



SCALE - 1:14,700 or 1" = 1225'



SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Wetland information obtained through field observation and aerial photo interpretation by JFSA. Floodplain information provided by FEMA. Map produced November 29, 2006 by JFSA.



Historic Property Locations

Figure 3-8

Weber Farm (5LR10725)

The Weber Farm abuts the south side of existing SH 402 from CR 13C east to the location where CR 11H ties into SH 402 from the north. The buildings on this 80-acre farm complex are located in the area immediately south and east of the intersection at CR 13C. Access to the property comes from both SH 402 and CR 13C.

The farm complex, built during the period from 1911 to the 1930s, is an example of the early 20th century irrigated farming patterns of small land holdings and the family farm. This farm complex includes eight buildings, a feedlot, and tilled fields. The Weber family acquired the farm property in 1926 and still owns the property. Family members operate it as a small farm. Its associations with early 20th century farming and the high level of physical integrity make the Weber Farm eligible to the NRHP under Criterion A. The house and outbuildings are aging but all retain a high degree of integrity and completeness as representative buildings of an early 20th century Larimer County farm, also resulting in NRHP eligibility under Criterion C.

Big Thompson Manufacturing Ditch Segment (5LR10726.1)

The Big Thompson Manufacturing Ditch system extends 10 miles in length, beginning 0.25 mile east of Wilson Avenue on the Big Thompson River and ending just east of the resource segment 5LR10726.1. The ditch has been identified as one of the oldest in the system with rights dating back to 1863. The SHPO concurred with the determination that the overall linear feature 5LR10726 is an NRHP eligible resource under Criteria A and C and that segment 5LR10726.1 has a low degree of integrity. The segment under discussion is located north of SH 402 and piped under the existing SH 402 at milepost 1.9.

Propp Farm (5LR11247)

The Propp Farm abuts the south side of existing SH 402 and is crossed on the east by the Big Thompson Manufacturing Ditch Segment

(5LR10726.1). The Weber Farm East (5LR11249) is one property east of the Propp Farm.

The Propp Farm was built in the mid-1920s. The current 21.8 acres includes 6 historic buildings and 18.5 acres of alfalfa hayfields.

The Propp Farm is eligible for inclusion in the NRHP under Criterion A for its association with a period of significance, the Colorado Plains - Post 1900 Agricultural - Sugar Beets context. The Propp Farm was part of a larger 80-acre farm then, where sugar beets, hay, and corn were grown.

Weber Farm East (5LR11249)

The Weber Farm East is under the same ownership as the Weber Farm (5LR10725). The Weber Farm East abuts the south side of existing SH 402 approximately 1.6 miles to the east of the Weber Farm. There are no cross streets in the vicinity, and the eastern boundary is approximately 870 feet west of CR 9E. This property accesses SH 402.

The Weber Farm East complex was built in the early 1900s with remodels to the main house. The 2.1-acre fenced complex consists of 13 buildings, a feedlot, and tilled fields.

The Weber Farm East is eligible for inclusion in the NRHP under Criterion A because it represents the typical early-to mid-20th century farming lifestyle in the Loveland and Larimer County area. The site is also eligible for inclusion in the NRHP under Criterion C as representative of early 20th century farm architecture in the Loveland area.

Mountain View Farm (5LR11242)

The Mountain View Farm is located in the northwest quadrant of the SH 402 and I-25 interchange.

The Mountain View Farm complex built in the 1920s includes both the farmstead and associated fields. The farmstead includes five historic buildings, six modern buildings, and eight modern features, including a feedlot. According

to the current owner, the main house was relocated and remodeled in 1964 due to the construction of I-25.

This property is eligible under Criterion A, for its association with the period of significance in the sugar beets context, even though the house has been moved. Previous owners grew hay, grain, and sugar beets and later ran a dairy at this location.

3.11.2 No Action Alternative

Implementation of the No Action Alternative would not affect any historic properties.

3.11.3 Meander Alternative

Implementation of the Meander Alternative will result in impacts on the following NRHP eligible resources:

- ❑ Big Thompson Manufacturing Ditch Segment (5LR10726.1)
- ❑ Propp Farm (5LR11247)
- ❑ Weber Farm East (5LR11249)
- ❑ Mountain View Farm (5LR11242)
- ❑ Weber Farm (5LR10725)

FHWA and CDOT, in consultation with the SHPO, concluded that this project widening will result in the following under Section 106 of the NRHP (see Appendix A for all Section 106 correspondence):

- ❑ No adverse effect
 - ❑ Big Thompson Manufacturing Ditch Segment (5LR10726.1) (see SHPO letter June 29, 2005, and again on September 13, 2006)
 - ❑ Propp Farm (5LR11247) (see SHPO letter August 22, 2006)
 - ❑ Weber Farm East (5LR11249) (see SHPO letter May 26, 2006, and again on September 13, 2006)
 - ❑ 5LR11242 Mountain View Farm (see SHPO letter August 22, 2006)
- ❑ Adverse effect
 - ❑ Weber Farm (5LR10725)

The City of Loveland Community and Strategic Planning Department was also afforded an opportunity to review the Section 106 findings. Impacts for each property are described below.

Big Thompson Manufacturing Ditch Segment (5LR10726.1)

The expansion of SH 402 will increase the length of the pipe under the highway. This would occur with all action alternatives. No other alterations to the ditch are anticipated. As a result of the finding of no adverse effect, no further action is required under Section 106 for ditch segment 5LR10726.1.

Propp Farm (5LR11247)

For the Meander Alternative, the alignment of the expanded SH 402 remains to the north, holding the existing southern edge of right-of-way the entire length of the Propp Farm. The only impact on the farm is the acquisition of a 25-foot permanent utility easement across the 410-foot front of the property.

Except for the possible loss of several trees associated with placing utilities underground, there will be no other impacts on the Propp Farm. Utility poles are currently located in an easement along the front of the property. The trees date from the 1960s and are not part of the historic landscape. As a result of the finding of no adverse effect, no further action is required under Section 106 regarding site 5LR11247.

Weber Farm East (5LR11249)

For the Meander Alternative, the alignment of the expanded SH 402 remains to the north, holding the existing southern edge of right-of-way the entire length of the Weber Farm East. The only impact on the farm is the acquisition of a 25-foot permanent utility easement across the front of the property.

Except for the probable loss of a cottonwood tree associated with placing utilities underground, no other physical features of the Weber Farm East property will be affected. The tree is not considered a part of the historic landscape. Utility

poles are currently located in an easement along the front of this property. As a result of the finding of no adverse effect, no further action is required under Section 106 for site 5LR11249.

Mountain View Farm (5LR11242)

The SH 402 project will taper from four to two lanes at the I-25 interchange adjacent to and east of the Mountain View Farm. The additional proposed right-of-way would take 35 feet off the front of the property for a distance of 1,935 feet. Potential physical highway improvements would generally remain south of the farm's existing fence line. The shoulder for the expanded SH 402 will end at the current fence; however, fill slopes associated with the construction would intrude further to the north. Possible impacts on features associated with the farm within the expanded right-of-way include loss of frontage from a modern feedlot, location adjacent to the front of the calving shed, and loss of a bank of weedy species trees located in front of the house. The field survey revealed an unkempt, dense growth of elms, sumac, and juniper. These trees, likely planted after the relocation of the house during the 1960s, are not part of the historic landscape. As a result of the finding of no adverse effect, no further action is required under Section 106 regarding site 5LR11242.

Weber Farm (5LR10725)

The widening of SH 402 at this location results in the need for additional right-of-way and a permanent utilities easement from the frontage of the Weber Farm with an approximate width of 58 feet for right-of-way and an additional 25 feet for permanent easement (total of 83 feet) the entire length of the SH 402 frontage.

In the vicinity of the buildings on the property, the result will be the loss of the main house and chicken brooder house. Note that the alignment veers north as SH 402 heads east past the Big Thompson River in the vicinity of the Manufacturing Ditch Lateral. This slightly reduces the right-of-way and easement requirements from the eastern 500 feet of Weber Farm frontage.

3.11.4 Mitigation

The SHPO was consulted on the impacts of the project. The following mitigation is recommended.

A Memorandum of Agreement to resolve adverse effects on this property was executed on February 9, 2007 (see *Appendix A*).

The Weber Farm (5LR10725) was recorded prior to construction so that there is a permanent record of its present appearance and history. Recordation consisted of Level II Documentation as determined in consultation with the SHPO and according to the standards established in Office of Archaeology and Historic Preservation Form #1595. The SHPO accepted the Level II Documentation on May 7, 2007 (see *Appendix A*). Copies of the documentation also will be sent to a local archive designated by the SHPO.

3.12 Archaeology

Cultural resources can be either prehistoric and/or historic, and may also be archaeological. These resources are nonrenewable and are protected by the same federal, state, and local laws, ordinances, and guidelines listed under Historic Preservation in *Section 3.11*.

3.12.1 Prehistoric Overview and Inventory Results

Prehistoric resources include the remains of artifacts and/or features representing one or more events. Artifacts include ceramics, bone, chipped stone, chipped volcanic glass, metal, perishable fiber, and wood. Features include stone, wood, earth, and mortar.

Colorado's Front Range and plains have been occupied by humans for more than 12,000 years. Four prehistoric cultural stages took place in the foothills and Front Range of the Platte River basin: the Pre-Projectile, the Paleoindian, the Archaic, and the Late Prehistoric (Chambellan et al. 2003). File and literature searches and the Class III inventory referred to in *Section 3.11*

included a search for archaeological sites over a total of 265 acres. No archaeological resources were found in the course of the pedestrian survey (intensive field survey conducted on foot), and no further work is recommended.

3.12.2 No Action Alternative

Implementation of the No Action Alternative would not have an impact on archaeological or prehistoric properties.

3.12.3 Meander Alternative

Implementation of the Meander Alternative would not affect any known archaeological or prehistoric properties.

3.12.4 Mitigation Measures

No mitigation is required.

Should evidence of historic or archaeological resources be discovered during construction of any alternative, the CDOT senior staff archaeologist will be notified immediately to ensure evaluation as required by NHPA and all other applicable state and federal regulations.

3.13 Native American Consultation

As mandated by Section 106 of the National Historic Preservation Act (as amended) and revised Advisory Council on Historic Preservation regulations (36 CFR 800), FHWA contacted 15 federally recognized Indian tribes with an established interest in Larimer County, Colorado. The tribes were invited to become consulting parties for the project (see *Appendix A*), thus acknowledging the government-to-government relationship between the United States and sovereign tribal groups. Federal agencies must be sensitive to the fact that historic properties of religious and cultural significance to one or more tribes may be located on ancestral, aboriginal, or ceded lands outside modern reservation boundaries. Consulting tribes are given an opportunity to voice concerns about cultural resources and how the proposed project might affect them. If it is found that a project would

have an impact on cultural resources eligible for inclusion on the NRHP and of religious or cultural significance to one or more consulting tribes, their role in the consultation process may also include participation in resolving how best to avoid, minimize, or mitigate impacts. By consulting interested parties in the Native American community, FHWA and CDOT strive to protect areas important to Native Americans.

Tribes invited by letter to participate as a consulting party included:

- ❑ Ute Mountain Ute Tribe
- ❑ Southern Ute Indian Tribe
- ❑ Ute Tribe of the Uintah and Ouray Agency ("Northern" Ute)
- ❑ White Mesa Ute Tribe
- ❑ Cheyenne and Arapaho Tribes of Oklahoma
- ❑ Comanche Tribe of Oklahoma
- ❑ Kiowa Tribe of Oklahoma
- ❑ Pawnee Nation of Oklahoma
- ❑ Cheyenne River Sioux Tribe
- ❑ Crow Creek Sioux Tribe
- ❑ Oglala Sioux Tribe
- ❑ Rosebud Sioux Tribe
- ❑ Standing Rock Sioux Tribe
- ❑ Northern Arapaho Tribe
- ❑ Northern Cheyenne Tribe

Six tribes wrote back and asked to be included as consulting parties for the project: the Southern Ute Indian Tribe, the Cheyenne and Arapaho Tribes of Oklahoma, the Kiowa Tribe of Oklahoma, the Pawnee Nation of Oklahoma, the Rosebud Sioux Tribe, and the Northern Arapaho Tribe. These tribes will continue to receive information pertinent to the NEPA documentation process for the duration of the SH 402 EA project.

The Cheyenne and Arapaho Tribes of Oklahoma expressed general concern about discovery of buried human skeletal remains during construction.

Consulting tribes raised no additional issues concerning proposed highway improvements or locations considered to have cultural or religious

significance. Should Native American human remains be inadvertently exposed during any phase of work associated with the proposed project, the six consulting tribes will be notified immediately and provided the opportunity to take a proactive role in the treatment and disposition of the remains.

By initiating, encouraging, and facilitating Native American consultation, FHWA and CDOT have fulfilled their legal obligations in this regard as stipulated in the Section 106 and Advisory Council regulations.

3.13.1 Mitigation Measures

Based on available information, no mitigation is required.

3.14 Sections 4(f) and 6(f) Resources

FHWA and CDOT recognize the importance and value of properties defined by Section 4(f) of the DOT Act of 1966 (49 USC 303) and 6(f) properties defined by Section 6(f)(3) of the Land and Water Conservation Fund Act.

DOT regulations explicitly state that the Secretary of Transportation cannot approve the acquisition of publicly owned land from a park, recreation area, or wildlife refuge, or land from a national, state, or local historic site unless no feasible and prudent alternative exists. These properties are commonly referred to as 4(f) properties.

The area adjacent to SH 402 does not include any parks, recreation areas, or wildlife refuges or properties purchased with funds from the Land and Water Conservation Act Section 6(f).

Therefore, no Section 6(f) resources have been identified.

- Five Section 4(f) NRHP eligible historic properties have been identified for this project. Four will have no adverse effects under Section 106 of the NRHP and, therefore, will have *de minimis* impacts under

Section 4(f) as per the FHWA *de minimis* finding dated November 15, 2006:

- Big Thompson Manufacturing Ditch Segment (5LR10726.1)
- Propp Farm (5LR11247)
- Weber Farm East (5LR11249)
- Mountain View Farm (5LR11242)

A determination of adverse effect has been made for the Weber Farm (5LR10725) resulting in a use under Section 4(f).

See *Chapter 4, Section 4(f) Evaluation* for additional discussion.

3.15 Noise

This project is subject to *CDOT Noise Analysis and Abatement Guidelines* (December 1, 2002; *Appendix D*). CDOT guidelines are consistent with FHWA guidelines (23 CFR 772) and have been approved by FHWA for use on federal-aid projects.

Noise levels are measured in units called decibels (dB). Noise levels are generally “weighted” to reflect the fact that the human ear responds differently to sounds of various levels and frequencies. Weighted sound levels are expressed in units called A-weighted decibels or dB(A). All noise levels discussed herein are A-weighted. Table 3-4 summarizes the human ability to perceive loudness and changes in noise levels; Table 3-5 shows typical noise levels.

Table 3-4. Relationship Between Decibels and Perception of Loudness

Change in Sound Level	Typical Perception
+10 dB(A)	Twice as loud
+5 dB(A)	Readily perceptible increase
+3 dB(A)	Barely perceptible increase
0 dB(A)	No change
-3 dB(A)	Barely perceptible decrease
-5 dB(A)	Readily perceptible decrease
-10 dB(A)	Half as loud

Table 3-5. Typical Noise Levels

Noise Source	Noise Level, dB(A)
Amplified rock band	115–120
Commercial jet takeoff at 200 feet	105–115
Community warning siren at 100 feet	95–105
Busy urban street	85–95
Construction equipment at 50 feet	75–85
Freeway traffic at 50 feet	65–75
Normal conversation at 6 feet	55–65
Typical office interior	45–55
Soft radio music	35–45
Typical residential interior	25–35
Typical whisper at 6 feet	15–25
Human breathing	5–15
Threshold of hearing	0–5

CDOT's guidelines establish noise abatement criteria, design requirements, and cost-effectiveness requirements for noise mitigation. These guidelines state that noise mitigation must be considered for any receptor or group of receptors for which predicted traffic noise levels (using future traffic volumes and highway conditions) meet or exceed CDOT's Noise Abatement Criteria (NAC) shown in Table 3-6. CDOT defines the approach level as 1 dB(A) less than the values shown in Table 3-6. This means a noise impact for Category B receptors (residences) occurs when the future noise levels reach or exceed 66 dB(A).

CDOT noise guidelines also state that noise mitigation should be considered for a receptor when predicted noise levels in future conditions exceed existing noise levels by 10 dB(A) or more.

The SH 402 noise analysis consisted of identifying existing noise levels, predicting noise levels from both the No Action and Meander Alternatives, and comparing noise levels to CDOT impact thresholds. The feasibility and reasonableness of noise mitigation measures were analyzed for each location where noise thresholds were exceeded. The following sections summarize noise analysis procedures and results. For additional information, refer to the *Noise Analysis Report, State Highway 402 –*

U.S. 287 to Interstate 25 (Hankard Environmental Report 22-06-1, November 2004).

3.15.1 Existing Noise Levels

Noise levels were measured at the eight locations shown in Figure 3-9. Measurements are listed in Table 3-7 and range from 55 to 71 dB(A). During the noise measurements, the volume and speed of traffic on all nearby major streets were recorded. These data were input into a STAMINA 2.0 model created specifically for this study. Measured and predicted levels (also shown in Table 3-7) were then compared to check the accuracy of the model. On average, the STAMINA 2.0 model predicted noise levels within 2 dB(A) of measured levels, which is within the desired accuracy of ± 3 dB(A).

3.15.2 No Action Alternative

Under the No Action Alternative in 2030, the loudest hour noise levels are predicted to equal or exceed the NAC Category B criterion of 66 dB(A) at eight residential locations: R5, R19, R25, R35, R43, R47, R50, and R69. Figure 3-9 illustrates residences where noise levels exceed 66 dB(A).

Loudest hour noise levels would be reached during the peak hour. Congestion limits how much noise is generated, as the loudest hour occurs when a substantial volume of traffic is able to travel at free-flow speeds. Noise levels were not predicted to reach or exceed the NAC Category C approach criterion of 71 dB(A) at any existing commercial locations.

3.15.3 Meander Alternative

Direct noise impacts were assessed by comparing predicted noise levels for the Meander Alternative in 2030 to the appropriate NAC Category Criterion and the 10 dB(A) increase criterion.

Noise levels attributed to 2030 traffic on I-25 were not assessed as a part of this analysis but are being analyzed as part of the North I-25 Environmental Impact Statement.

Results show that noise levels would meet or exceed the NAC Category B criterion of 66 dB(A) at 11 residential receptors: R19, R24, R25, R31, R43, R45, R47, R50, R57, R59, and R69 (not including residences R5 and R35, which would be acquired for widening under the Meander Alternative). Noise levels did not reach or exceed the NAC Category C approach criterion of 71 dB(A) at any business.

Figure 3-9 illustrates the residences affected by noise. Note that the eight residences affected by the No Action Alternative are also affected by the Meander Alternative.

Noise levels are predicted to increase an average of 4 dB(A) for adjacent properties in the corridor by 2030, with a maximum increase for one property of 8 dB(A). The increases in noise are due to a combination of projected traffic volume increases and realignment of SH 402 closer to receptors in some locations. Because the maximum projected increase is less than the 10 dB threshold for substantial increase, no properties are considered affected by this criterion.

Table 3-6. CDOT Noise Abatement Criteria Hourly A-Weighted Sound Level in Decibels [dB(A)]

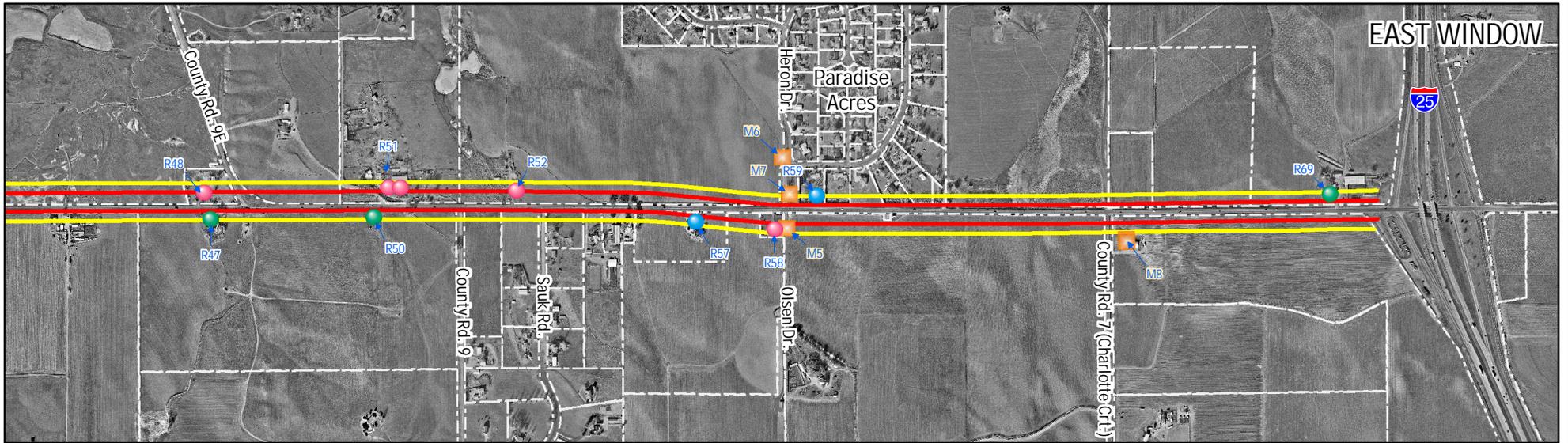
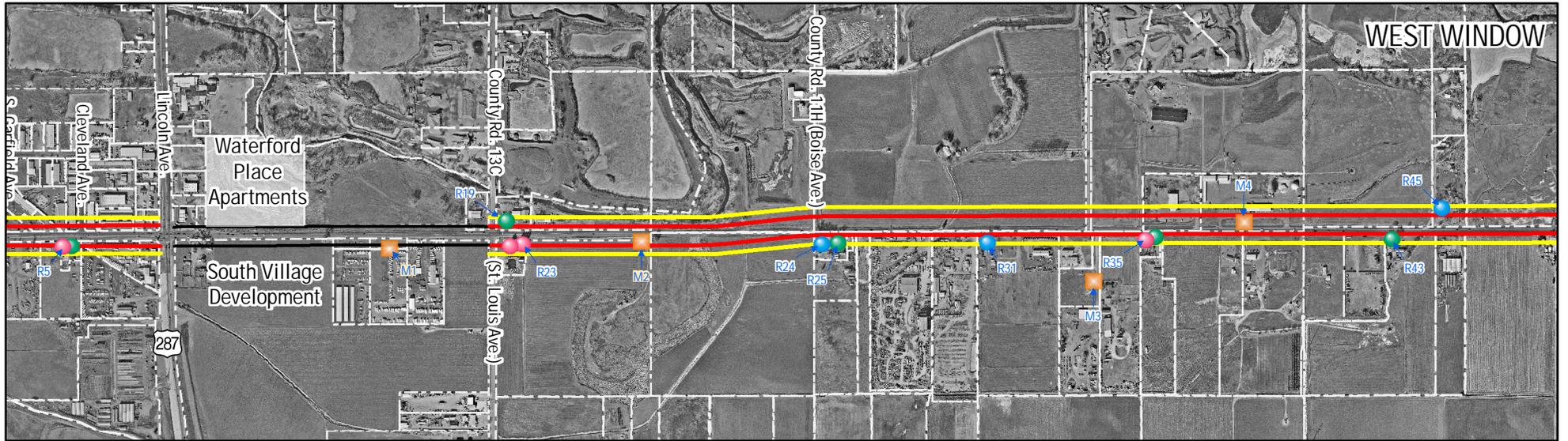
Activity Category	$L_{eq}(h)^a$	Description of Activity Category
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

^a Hourly A-weighted equivalent level for the “loudest hour” of the day in the design year

Table 3-7. Measured and Predicted Noise Levels [L_{eq} dB(A)]

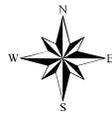
Site	Time	Measured Level	Predicted Level	Predicted Minus Measured
M1	8:45 AM to 9:45 AM	64.9	63.9	-1.0
M2		67.1	69.0	1.9
M3		57.5	55.2	-2.3
M4		71.1	69.3	-1.8
M5	10:45 AM to 11:45 AM	65.0	62.4	-2.6
M6		55.4	56.2	0.8
M7		63.3	64.3	1.0
M8 ^a		63.6	59.8	-3.8

^a Wind blowing from the highway into the microphone likely resulted in measured levels in excess of predicted levels at this location

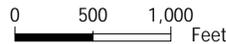


LEGEND

-  Property Parcel Boundaries
-  Existing Right-of-Way
-  66 dBA Noise Level Contour
-  71 dBA Noise Level Contour
-  Receptors Only Impacted by Meander Alternative
-  Receptor Impacted by Either No Action or Meander Alternative
-  Home and Outbuilding Acquisitions under Meander Alternative
-  Noise Measurement Locations



SCALE - 1:14,700 or 1" = 1225'



SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Noise receptor information provided by Hankard Environmental. Map produced November 29, 2006 by JFSA.



Noise Measurement and Impact Locations

FIGURE 3-9

3.15.4 Mitigation Measures

A noise mitigation analysis was conducted at each of the 11 residences where Meander Alternative noise levels are predicted to equal or exceed the 66 dB(A) criterion. Noise barrier configurations were analyzed for feasibility and reasonableness in accordance with CDOT *Noise Analysis and Abatement Guidelines* (Appendix D).

CDOT guidelines for feasibility are: 1) if constructed, can a barrier be built in a continuous manner; 2) can noise be reduced at least 5 dB(A); and 3) will maintenance or safety issues cause a "fatal flaw"?

Guidelines for reasonableness are: 1) do existing and future noise levels exceed the standards; 2) is the cost-benefit per affected receptor per decibel of noise reduction within a \$4,000 limit; 3) does the mitigation meet the desires of the residents; and 4) how are Category B land uses affected? Cost-benefit is calculated using a simple formula of total estimated cost of mitigation divided by the number of homes benefited times the decibel reduction.

Noise mitigation was determined to be infeasible at eight locations (R19, R31, R43, R45, R47, R50, R57, R69) because all have direct access on to SH 402. A substantial break in the noise barrier would be required to allow for safe access, which would lessen the effectiveness of the mitigation. Furthermore, most of these residences are dispersed, resulting in a high cost per residence.

A noise wall 250 feet long in the proposed Meander Alternative right-of-way was modeled for R24 and R25 and would affect residences on the south side of the CR 11H intersection. Wall height would need to be 15 feet tall to achieve the required 5 dB(A) noise reduction. Using a cost index of \$30 per square foot, the estimated cost of the wall would be \$112,500. Two noise receptors would benefit, with an average noise reduction of about 5 dB(A). The resulting cost-benefit of \$112,500 (cost of noise barrier divided

by the number of benefited noise receptors and by the average noise reduction) would exceed the CDOT maximum of \$4,000 per receptor. Although the noise wall would be feasible, it is not considered reasonable due to the high cost-benefit ratio. Thus, no noise mitigation is recommended for this location.

A noise wall 1,250 feet long in the proposed Meander Alternative right-of-way was modeled for the Paradise Acres neighborhood, located on the corner of SH 402 and Heron Drive. Though noise was considered to have an impact on only one location, R59, a noise wall, was designed to protect the entire neighborhood. Wall height would need to be at least 6 feet tall to achieve the required 5 dB(A) noise reduction, but it was determined that a 10-foot wall resulted in an improved cost-benefit. Using a cost index of \$30 per square foot, the estimated cost of the 10-foot wall would be \$375,000. Twelve noise receptors would benefit, with a noise reduction of 4.4 dB(A). The resulting cost-benefit of \$7,100 exceeds the CDOT maximum of \$4,000 per receptor. Although the noise wall would be feasible, it is not considered reasonable due to the high cost-benefit ratio. Thus, no noise mitigation is recommended for this location.

Two receptors, R5 and R35, will be acquired for the Meander Alternative highway widening and are not subject to noise mitigation.

Figure 3-9 illustrates noise impact locations based on 2030 traffic conditions. It also includes both 66 dB(A) and 71 dB(A) noise level contours. Future development of certain types (including residential) will not be compatible with noise levels that exceed 66 dB(A). The 66-foot contour line is estimated to fall between 135 and 180 feet from the edge of pavement of existing SH 402. The 71-foot contour line is closer, ranging from approximately 70 to 100 feet from the existing edge of pavement.

Natural Environment

Natural environment resources and issues described in this section include:

- ❑ air quality
- ❑ ecology
- ❑ threatened and endangered species and species of special concern
- ❑ wetlands
- ❑ floodplains
- ❑ water quality
- ❑ geology
- ❑ paleontology

3.16 Air Quality

The city of Loveland has a climate typical for mid-latitude high elevations and is strongly affected by local and regional topographic features. In general, the city experiences low relative humidity, light precipitation, and abundant sunshine. The combination of low moisture and windy days can increase airborne particulates (windblown particulate emissions and fugitive dust).

National Ambient Air Quality Standards

(NAAQS). The Clean Air Act of 1970 required the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants that pose a risk to public health. Standards were set for six "criteria" pollutants: sulfur dioxide, carbon monoxide (CO), ozone, lead, nitrogen dioxide, and particulates (of 2.5 microns [PM_{2.5}] or less and of 10 microns or less [PM₁₀]).

The State of Colorado has adopted the NAAQS for these pollutants. The Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD) monitors concentration of these pollutants. Geographic areas that violate a particular NAAQS pollutant standard are considered "nonattainment" areas for that pollutant. Violations are determined by a prescribed number of exceedances of the particular standard.

The APCD also monitors for visibility, as well as pollutants that do not have a national standard established. These "noncriteria" pollutants include nitric oxide, total suspended particulates, arsenic, and sulfates.

Greenhouse gases (water vapor, carbon dioxide [CO₂], methane, and nitrous oxide) and emissions are discussed in *Climate Change & Colorado, A Technical Assessment* (CDPHE 1998) and the November 2000 supplement. The APCD has developed several CO₂ reduction strategies and will be considering regional

programs to reduce station, area, and mobile CO₂ sources.

Carbon Monoxide (CO). Because the city of Loveland and town of Johnstown are outside the Fort Collins carbon monoxide attainment/maintenance area and that urban growth area, they are not required to conform to the requirements of the Fort Collins air quality maintenance plan for CO. Hot-spot modeling is not required for this project because the highway is located in a CO attainment area.

Ozone. In 2004 the EPA designated the Denver metropolitan area as nonattainment for the 8-hour ozone standard. This area includes portions of Larimer and Weld counties, including the city of Loveland and town of Johnstown.

An Early Action Compact (EAC) designed to achieve and maintain the 8-hour ozone standard has been developed for this nonattainment area. The EAC for ozone includes specific milestones that must be met to achieve the standard by December 31, 2007. The EAC was submitted to the EPA in July 2004. EPA has deferred nonattainment designation for the region as long as EAC milestones are met. No further action is required for the proposed SH 402 project at this time.

Particulates (PM₁₀ and PM_{2.5}). Transportation conformity is required for federally supported transportation projects in areas that have been designated by EPA as not meeting NAAQS. On March 10, 2006, EPA issued amendments to the Transportation Conformity Rule to address localized impacts of particulate matter: *PM_{2.5} and PM₁₀ Hot-Spot Analysis in Project-level Transportation Conformity Determinations for the New PM_{2.5} and Existing PM₁₀ NAAQS* (71 FR 12468). These rule amendments require assessment of localized air quality impacts for federally funded or approved transportation projects for PM₁₀ and PM_{2.5} nonattainment and maintenance areas.

The entire city of Loveland and town of Johnstown are outside both the Fort Collins and Greeley air quality boundaries. This means that the SH 402 project corridor is located outside air quality boundaries for any nonattainment or maintenance areas for NAAQS related to those communities. Both Fort Collins and Greeley are in attainment for PM₁₀. No information was identified for PM_{2.5} at this time. The amendments to the Transportation Conformity Rule do not apply to the SH 402 transportation improvement project.

Re-entrained dust from road sanding is a prime contributor to PM₁₀. CDOT reduces street sanding emissions for highway corridors through the use of alternative deicing compounds such as magnesium chloride, lower temperature "M-Caliber 1000 and 2000," and "Ice-slicer" and rapid sand cleanup.

Mobile Source Air Toxics. In addition to the NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (such as airplanes), area sources (such as dry cleaners) and stationary sources (such as factories or refineries). The *FHWA Air Toxic Interim Guidance* (February 3, 2006) is used for analysis of mobile source air toxics (MSATs) for highway projects. The following discussion and the discussion in *Appendix F, SH 402 Air Quality Technical Memorandum for Mobile Source Air Toxics*, are in accordance with the interim guidance.

MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. See document No. *EPA420-R-00-023* (December 2000).

In the 2001 rulemaking, EPA identified six priority MSATs: benzene, acrolein, formaldehyde, acetaldehyde, 1,3-butadiene, and diesel exhaust. EPA is in the process of assessing the risks of various kinds of exposures to these pollutants.

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

Project Level MSAT Discussion. In this EA, FHWA has provided a qualitative analysis of MSAT emissions relative to the No Action and Meander Alternatives and has acknowledged that these may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

As discussed above, FHWA believes technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. This can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—from the No Action and Meander Alternatives. The qualitative assessment presented below is based in part from a study conducted by the FHWA entitled *A*

Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

Although the differences in 2030 ADT for the No Action and Meander Alternatives were not calculated, vehicle miles traveled (VMT) for the Meander Alternative is expected to be slightly higher than for the No Action Alternative because the additional capacity increases the efficiency of the highway and attracts some rerouted trips from elsewhere in the transportation network. Typically, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative.

The increase in VMT would lead to slightly higher MSAT emissions for the Meander Alternative along the highway corridor, together with a corresponding decrease in MSAT emissions along other routes as user habits change. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds. According to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs, except diesel particulate matter, decrease as speed increases.

For SH 402, it is possible that the congestion relief and associated increases in speed as a result of the additional capacity (laneage) will have more of an effect on reducing emissions than the offset due to an increase in VMT. In the case of the proposed improvements, increased capacity will mean the difference between a design year (2030) LOS F for the No Action Alternative at most intersections east of CR 13C and for through traffic east of CR 11H versus a range of LOS A to D for intersections and LOS C for through traffic for the Meander Alternative. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

The additional travel lanes contemplated as part of the Meander Alternative will have the effect of moving some traffic closer to nearby homes and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be slightly higher under the Meander Alternative than the No Action Alternative. However, as discussed above, the magnitude and the duration of these potential increases compared to the No Action Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Meander Alternative could be higher relative to the No Action Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause regionwide MSAT levels to be significantly lower than today's levels.

National Level MSAT Reductions. Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 56 to 81 percent between 2005 and 2030. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

No air quality problems have been identified for the SH 402 corridor. Motor vehicle emissions in the study area would not result in any exceedance of the NAAQS; therefore, no direct project air quality mitigation is necessary.

3.16.1 No Action Alternative

No additional air quality conformity or analyses for CO, ozone, particulates of 10 microns or less, or MSATs are applicable to the No Action Alternative.

3.16.2 Meander Alternative

No additional air quality conformity or analyses for CO, ozone, particulates of 10 microns or less, or MSATs are applicable to the Meander Alternative.

3.16.3 Mitigation Measures

Based on available information, no mitigation is required.

3.17 Ecology

Both vegetation and wildlife are addressed in this section. Field trips to the project area were taken numerous times during the study. Local natural resource information was obtained from consultations with local biologists, city and county websites, the Colorado Natural Heritage Program (CNHP) Element Occurrence database, and the Colorado Division of Wildlife's (CDOW's) Natural Diversity Information System (NDIS).

3.17.1 Vegetation

Portions of the project area that are not residential or commercial are vegetated primarily by plants introduced as crop, pasture, or landscape species. Unused pasture and fallow croplands have been invaded by weedy species in many areas. The most valuable habitat for native vegetation species and structural diversity remaining in the project area is the riparian or streamside habitat along the Big Thompson River.

Riparian Habitat

The most diverse habitat in the project area occurs along the Big Thompson River as riparian forest and shrub (a fringe of wetlands is confined to the low-flow level along the bank). The river occurs within 60 feet of SH 402 near the intersection with CR 13C. The river angles north

and then northeast from this point eastward and ranges from approximately 0.33 to 0.5 mile north of the highway to where it crosses I-25. Dominant riparian and wetland plant species include peach-leaved willow (*Salix amygdaloides*), sandbar willow (*S. exigua*), plains cottonwood (*Populus deltoides* ssp. *monillifera*), Russian-olive (*Elaeagnus angustifolia*), showy milkweed (*Asclepias speciosa*), reed canarygrass (*Phalaroides arundinacea*), and Emory sedge (*Carex emoryi*).

Although valuable in relation to other habitat along SH 402 because of structural diversity, the *Loveland Natural Areas* report (LNA 1996) indicates that this wildlife habitat along SH 402 near the Big Thompson River is of moderate to low value. The study included associated gravel mining ponds as part of this habitat. Probably due to extensive agricultural and other development activity as well as channelization of the river, the riparian habitat in this area near the highway occurs in a narrow corridor.

Woodlands

Large plains cottonwood trees (up to 30 inches diameter breast height [DBH]) characterize the area north of SH 402 where the Big Thompson River approaches the road and are also scattered along the corridor in association with farmsteads. Other trees that were observed along the road as landscaping or shelterbelts include Chinese elm (*Ulm pumila*), Russian-olive, red cedar (*Sabina virginiana*), honey locust (*Gleditsia triacanthos*), crab apple (*Malus* spp.), box elder (*Negundo aceroides*), sumac (*Rhus* spp.), weeping willow (*Salix babylonica*), peach-leaved willow (*Salix amygdaloides*), Austrian pine (*Pinus nigra*), ponderosa pine (*Pinus ponderosa* ssp. *scopulorum*), piñon pine (*Pinus edulis*), and blue spruce (*Picea pungens*). This area contains evidence of past disturbance with the understory dominated by crested wheatgrass (*Agropyron desertorum*), kochia (*Bassia sieversiana*), and smooth brome (*Bromopsis inermis*).

Upland Prairie

Representative prairie plants remaining in the project area occur along the eastern half of the corridor and include saltgrass (*Distichlis stricta*), fringed sage (*Artemisia frigida*), Canada wild rye (*Elymus canadensis*), sand dropseed (*Sporobolus cryptandrus*), wild sunflower (*Helianthus annuus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and a mint (potentially horsemint [*Monarda fistulosa*]). A shortgrass prairie site with a black-tailed prairie dog town occurs approximately 0.25 mile north of SH 402 and immediately east of CR 9.

Developed/Reclaimed Vegetation (Weedy Species)

Areas that have been disturbed and left as fallow ground or reclaimed are characterized by ruderal or weedy species. Such areas occur sporadically in the highway right-of-way and along crop and field edges. Many of these weedy species are not included on the county, CDOT, or state noxious weed lists but, nonetheless, are good indicators for the developed/reclaimed vegetation type. Some of the species identified in the project area included curly dock (*Rumex crispus*), crested wheatgrass (*Agropyron desertorum*), yellow and white sweetclover (*Melilotus* spp.), prickly lettuce (*Lactuca seriola*), cocklebur (*Xanthium strumarium*), ragweed (*Ambrosia* spp.), reed canarygrass (*Phalaroides arundinacea*), lamb's quarters (*Chenopodium* spp.), Chinese elm (*Ulmus pumila*), smooth brome (*Bromopsis inermis*), and kochia (*Bassia sieversiana*).

3.17.2 Noxious Weeds

Colorado's current list of noxious weeds may be found in the Colorado Department of Agriculture, Plant Industry Division, 8 CCR 1203-19 Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act C.S.R. 35-5.5 101-119. State-listed noxious weed species that

were observed in the project area are noted in Table 3-8 and addressed in the Noxious Weed Management Plan (*Appendix E*). Invasive plant control is regulated by the state and carried out by CDOT along state highways, and by local governments on other public lands, focusing on weeds included on the Colorado Noxious Weeds List. Concentrated infestations noted in CDOT noxious weed mapping and during the October 1, 2004, weed survey include Canada thistle (*Breea arvensis*), Russian-olive (*Elaeagnus angustifolia*), and field bindweed (*Convolvulus arvensis*). State-listed noxious weeds that were noted, but not in major infestations, included musk thistle (*Carduus nutans*), quackgrass (*Elytrigia repens*), and puncturevine (*Tribulus terrestris*). Canada thistle (*Breea arvensis*) and Russian-olive (*Elaeagnus angustifolia*) tended to grow where extra moisture was available near ditches, in the old river meander, and on wetland edges. A map of state-listed noxious weed locations is presented in *Appendix E* as Figure E-1.

3.17.3 Wildlife

Big Thompson River Habitats

The portion of the Big Thompson River in the SH 402 study area near CR 13C provides habitat of moderate to low value, and the addition of highway and development activity in the area will not likely encourage habitat use. Highways tend to fragment habitat by reducing connectivity, depending on traffic volumes, noise, and species sensitivity (Singleton et al. 2002).

Upland Habitats

The existing pasture and adjacent crop fields also provide little habitat value for wildlife. Recent development projects on the western end of the project area have reduced the amount of habitat further, making the area even less suitable for wildlife species.

Table 3-8. Weedy Species: Larimer County and Colorado Noxious Weed Lists

Common Name	Scientific Name	Larimer County Weed List ^a	CDOT Weed List ^b	State Noxious Weed List ^a
Quackgrass	<i>Elytrigia repens</i>			B
Russian-olive	<i>Elaeagnus angustifolia</i>		X	B
Musk thistle	<i>Carduus nutans</i> ssp. <i>macrolepis</i>	X	X	B
Canada thistle	<i>Breea arvensis</i>	X	X	B
Puncturevine	<i>Tribulus terrestris</i>			C
Field bindweed	<i>Convolvulus arvensis</i>			C

Taxonomy follows Colorado Flora: Eastern Slope, Weber and Wittmann, 2001.

^a From Colorado Department of Agriculture Plant Industry Noxious Weeds website, including 2003 Revised Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act (8 CCR 1203-19), accessed 12 November 2003; includes county lists. State management plans include the following designations: A = species to be eradicated, B = stop continued spread, and C = species left to local jurisdictions and use of integrated weed management controls supported.

^b From CDOT Noxious Weed Mapping Project June 2004.

Project Area Wildlife

The wildlife species most likely to inhabit the project area are those adapted to using the edges of semirural to rural human environments. These include seasonal (such as breeding birds) and year-round residents (including mammals).

Species observed directly or by signs (such as tracks and scat) during limited site visits are described below.

Large mammal game trails were observed in riparian areas of the Big Thompson River near CR 13C. Large mammals common to Front Range agricultural and riparian areas that may inhabit the project area include mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), and coyote (*Canus latrans*).

Burrows were observed for the red fox (*Vulpes vulpes*). Old tree-cutting evidence of beaver (*Castor canadensis*) activity was seen along the Big Thompson River, and a muskrat (*Ondatra zibethicus*) was observed near the project area. Other medium-sized and small mammals that inhabit the riparian and wooded area near the Big Thompson River that parallels SH 402 near CR 13C area include the raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), and numerous

small rodents (for example, deer mouse [*Peromyscus* spp.]).

Other bird species common to rural and semirural areas with tree cover and grasslands likely to occur in the project area include the house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), northern flicker (*Colaptes auratus*), and American crow (*Corvus brachyrhynchos*). With the river's steep banks and lack of shrubs and native grasses, few waterfowl and shorebird nest sites are expected in the project area.

Numerous bird species in Colorado are adapted to habitat edges of human-altered landscapes and may spend at least part of the year in the project area. Birds observed during site visits included western meadowlark (*Stella neglecta*), black-billed magpie (*Pica pica*), blue jay (*Cyanocitta cristata*), Canada goose (*Branta canadensis*), American white pelican (*Pelecanus erythrorhynchus*), mallard (*Anas platyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), mourning dove (*Zenaida macroura*), rock dove (*Columba livia*), red-winged blackbird (*Agelaius phoeniceus*), great blue heron (*Ardea herodias*), belted kingfisher (*Ceryle alcyon*), double-crested cormorant (*Phalacrocorax auritus*), and California gull (*Larus californicus*).

No birds of prey or raptor nests were observed in field visits to the project area. Birds of prey (raptors) that are common in Front Range semirural areas and hunt in croplands and other grasslands include the bald eagle (*Haliaeetus leucocephalus*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), and short-eared owl (*Asio flammeus*).

3.17.4 No Action Alternative

No loss of vegetation or wildlife habitat is associated with the No Action Alternative.

3.17.5 Meander Alternative

Vegetation Impacts

The Meander Alternative includes highway improvements that would primarily impact CDOT right-of-way and edges of previously disturbed vegetation. Disturbance of native wetland vegetation areas is discussed in detail in *Section 3.19, Wetlands*. Permanently disturbed land cover/vegetation types (determined from aerial photographs and field inspections) were estimated at 23.7 acres. Of the total 23.7 acres of vegetation impacts, 0.3 acre is prairie, 8.0 acres are pasture, 12.5 acres are cropland, 2.5 acres are already disturbed (that is, driveways), and 0.4 acre is woodlands. Thus, more than 80 percent is used for crops, pasture, or other agricultural purposes. Approximately 3 percent of the impacts will occur in woodland or upland prairie.

The Meander Alternative avoids the loss of cottonwood trees to the extent possible. However, based on GIS mapping of the alternative footprint and aerial photograph interpretation with field inspections, a grove of approximately 27 cottonwoods with trunks between 4 and 10 inches in diameter near the Big Thompson River would need to be removed. This would affect part of the Big Thompson River woodland habitat. An additional 145 trees within the alternative footprint (many of which were

planted as part of landscaping or shelterbelts along SH 402 in association with rural fields and residences) would need to be removed for construction. Probable species affected include plains cottonwood, Chinese elm, Russian-olive, and red cedar (*Sabina virginiana*).

Wildlife Impacts

Few direct impacts on wildlife are associated with the Meander Alternative. This alternative was specifically designed to reduce residential relocations and also reduces impacts on wildlife by minimizing direct impacts on the habitat around the Big Thompson River. No additional wildlife habitat fragmentation would occur under the Meander Alternative because the existing highway already divides the area. The design of the Meander Alternative will minimize direct impacts on habitat around the Big Thompson River corridor, especially trees and wetlands. Specific habitat impacts are described under Vegetation above. Wildlife species that can adapt to the rapidly developing area would be expected to continue to use the riparian corridor, remaining cropland edges, and rural residences once highway construction is complete.

Temporary indirect impacts on wildlife would include daytime and nighttime disturbances from construction activities, increased noise, and additional human presence in the area during construction. Specific effects from highway improvements construction may be comparable to other construction disturbances associated with ongoing development in the area. Wildlife species now present may already be habituated to these types of disturbances, while others may have abandoned the area.

3.17.6 Mitigation Measures

Vegetation

Permanent impacts on vegetation from the Meander Alternative were estimated at 23.7 acres. More acreage would be temporarily affected by construction activities but will be reclaimed after construction is completed in individual areas.

Vegetation replacement will be coordinated with landowners (city of Loveland and private property), and agricultural land mitigation will be based on crops or pastures disturbed for project implementation. Native species will be used to the greatest extent feasible, depending on designated land use, and will be specified for CDOT rights-of-way. Riparian trees will be replaced on a 1:1 basis; all other trees will be replaced when feasible.

Techniques used by CDOT to stabilize and minimize erosion and to revegetate areas are outlined in detail in *Standard Specifications for Road and Bridge Construction* (2005), part of CDOT BMPs.

The following measures are designed to reduce direct and indirect impacts on vegetation and to control soil erosion and noxious weeds:

- ❑ Specification 207 covers salvaging and stockpiling topsoils for reuse in reclamation. No imported topsoil will be allowed. Topsoil heavily infested with noxious weeds will be removed from the site or buried under a minimum of 5 feet of fill.
- ❑ Specification 208 directs contractors to permanently stabilize (that is, cover disturbed areas with final seed and mulch as indicated in plans) each 17-acre increment of the project immediately after grading is finished for that section.
- ❑ Specifications 208 and 216 cover other mechanical erosion prevention methods (besides seeding, for example) and include use of soil retention blankets, placement of bales in drainages, use of silt fence, berms/diversions, slope drains, storm drain protection, check dams, channel stabilization, sediment traps or basins, and sandbag barriers.
- ❑ Specification 212 covers seeding.
- ❑ Specification 213 covers mulching seeded and other bare soil areas.

- ❑ Specification 214 covers planting.
- ❑ Specification 217 covers herbicide treatments, if needed for weed control.

A weed management plan has been developed and a weed survey was conducted to locate and map weed populations that may be spread by construction activities. Required construction contractor practices to minimize new weed infestations and control the spread of current weed populations are described in detail in *Appendix E, Noxious Weed Management Plan*. Practices include:

- ❑ application of appropriate herbicides
- ❑ requirement that construction vehicles arrive at the construction site free of soil or vegetative plant parts capable of containing noxious weed seed/plant parts
- ❑ storage of weed-free topsoil and restriction on importation of topsoil
- ❑ use of only weed-free mulch for reclamation in accordance with the Weed Free Forage Act, CRS Title 35, Article 27.5
- ❑ monitoring and care of revegetation will be accomplished by the CDPS permit requirements
- ❑ restrictions on mowing and cutting weeds when seeds are ripe for dispersal

In addition to the above required practices, sensitive areas such as riparian habitat, woodlands, and wetlands in the vicinity of project construction activities will be fenced to prevent vegetation damage from construction machinery. Construction access will be limited to fenced areas to curtail erosion, weed invasions, and damage to habitats.

Wildlife

Few direct or indirect impacts on wildlife are associated with the Meander Alternative. Mitigation for impacts includes CDOT BMPs specified under Vegetation above. Clearing of vegetation should be done between September and April to reduce the effects on nesting

activities and to comply with Migratory Bird Act requirements.

3.18 Threatened and Endangered Species and Species of Special Concern

The Endangered Species Act (ESA) of 1973 established measures for conservation of federally listed plant and animal species, including protection of critical habitat necessary for their continued existence (16 USC §§ 1531 *et seq.*). Critical habitat is defined as designated areas of a listed species' habitat that are essential to the conservation of that species. Federally listed and state listed threatened, endangered, and other sensitive species (including federally proposed species and candidates for federal listing), state species of concern, and species considered imperiled in the state by CNHP were assessed for potential project impacts. These species are collectively referred to as TES species. CNHP, the organization responsible for cataloging TES species in Colorado, was queried for plant and animal species recorded in the project area. Other state and federal agency specialists, websites, and current literature were consulted to aid in the development of a comprehensive list of TES species that may occur in the proposed project area. Additionally, project biologists performed a series of site visits to make direct observations of suitable habitat for TES species potentially present.

In accordance with Section 7 of the ESA, an informal consultation was conducted with the US Fish and Wildlife Service (USFWS) to obtain a list of species with potential to occupy the project area. (See *Appendix A* for correspondence.) An initial coordination letter

was received on November 18, 2003. Table 3-9 lists the individual TES species identified by the USFWS for Larimer County in this letter.

Additional evaluations and surveys, if warranted, will be conducted prior to project construction for any new TES species identified subsequent to the current study.

3.18.1 Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was officially delisted from protection under the ESA on June 28, 2007. It is still offered some protection under the Bald and Golden Eagle Protection Act of 1940 as amended in 1978. The bald eagle is also protected under the Migratory Bird Treaty Act. Although no nest or roost sites have been identified in the study area, foraging activities may occur along this stretch of the Big Thompson River.

Bald eagles are seasonal migrants and winter residents in Larimer County and have been recorded to use urban lakes and rivers for foraging and roosting. The entire Big Thompson River corridor from west of the city of Loveland into the vicinity of the SH 402 project area along SH 402 is designated by CDOW as bald eagle concentration area, bald eagle winter forage area, and part of the extensive bald eagle winter range that covers Colorado's Front Range (NDIS 2003). Important areas include roost sites—usually tall cottonwoods on the edge of water sources. The nearest recorded roost site is approximately 9 miles southeast of the project area on Saint Vrain Creek. No bald eagles have been recorded as nesting in the city of Loveland; the nearest known nest is outside the southern city limits about 2 miles from the project area (NDIS 2003).

Table 3-9. TES Species Identified by USFWS as Potentially Occurring in the Project Area

Species	Scientific Name	Status	Probability of Occurrence/ Potential to Be Affected
Bald eagle (delisted June 28, 2007)	<i>Haliaeetus leucocephalus</i>	FT, ST	No; occasional winter roosting is possible; no presence observed/No adverse effect anticipated.
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	FT, ST	No; nine studies in the area were negative; area is quite disturbed/No adverse effect anticipated.
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	FT	No; lack of suitable wet meadows and no individuals observed during site survey/No adverse effect anticipated.
Colorado butterfly plant	<i>Gaura neomexicana</i> ssp. <i>coloradensis</i>	FT	No; lack of undisturbed wet meadows and no individuals observed during site survey/No adverse effect anticipated.

FT = listed as federally threatened, ST = listed by Colorado as threatened

Based on observations of no bald eagle nests or roost sites in the study area, and because the overlap of winter forage and concentration along SH 402 is only 1 mile long, minimal use of the study area by the bald eagle is expected. Typical winter prey species include fish (where water remains open), waterfowl, and rodents such as prairie dogs. No prairie dog towns are located in the project area, but fish and waterfowl are potentially available along the Big Thompson River and associated wetlands.

There are no direct project impacts on bald eagles along the Big Thompson River.

3.18.2 Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)

CNHP records indicate that nine potential habitat sites along the Big Thompson River were determined to be not suitable, or Preble's meadow jumping mouse (PMJM) were not present before 2001. In 2001, a mouse was captured on the east side of I-25 approximately 1.5 miles from the project area. PMJM habitat assessments were conducted during field investigations (fall 2001) in the project area. Suitable habitat for this mouse requires structural diversity, including tree, shrub, and grass components next to running streams. No suitable PMJM habitat was identified in the project area. Most potential habitats in the study area have been previously disturbed and are accessible to predators such as domestic dogs and cats. This negatively affects habitat quality for PMJM; therefore, this species is not expected in the

project area. *Appendix A* contains USFWS concurrence dated July 29, 2004. USFWS concurrence must be renewed before construction.

3.18.3 TES Plants

Habitat assessments were also conducted for the Ute ladies'-tresses orchid (*Spiranthes diluvialis*) in wet areas along the SH 402 corridor. The project area has been almost completely modified from its natural state and is now dominated by introduced species. The project area does not contain a floodplain with suitable hydrology and vegetation cover conditions necessary for suitable ladies'-tresses or Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*) habitat. *Appendix A* includes USFWS concurrence dated October 13, 2004.

3.18.4 Candidate TES Species

The black-tailed prairie dog (*Cynomys ludovicianus*) was listed in the USFWS letter of correspondence dated November 18, 2003. However, in a news release dated August 12, 2004, the USFWS stated that it has determined that the black-tailed prairie dog does not meet the Endangered Species Act definition of threatened and is being removed as a candidate for listing (USFWS 2004). Field reconnaissance verified that black-tailed prairie dogs inhabit a relatively small patch of shortgrass prairie immediately north (that is, outside) of the project construction envelope. No other suitable black-tailed prairie dog habitat has been identified in the project area.

3.18.5 Downstream TES Species

The USFWS letter dated November 2003 listed eight TES species occurring in Nebraska, downstream from the project area, which use habitat on the South Platte River. It is presumed that if this project were to take enough water from the Big Thompson River to cause water depletions on the South Platte River in Nebraska, indirect impacts could affect whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), interior least tern (*Sterna antillarum*), western prairie fringed orchid (*Platanthera praeclara*), American burying beetle (*Nicrophorus americanus*), bald eagle (*Haliaeetus leucocephalus*), Eskimo curlew (*Numenius borealis*), and pallid sturgeon (*Scaphirhynchus albus*). At this time, there is no information to suggest a need for water depletions from the Big Thompson River and subsequent downstream effects on the South Platte River.

3.18.6 No Action Alternative

The No Action Alternative would not affect any TES species.

3.18.7 Meander Alternative

The Meander Alternative would not affect any TES species.

3.18.8 Mitigation Measures

No mitigation is required.

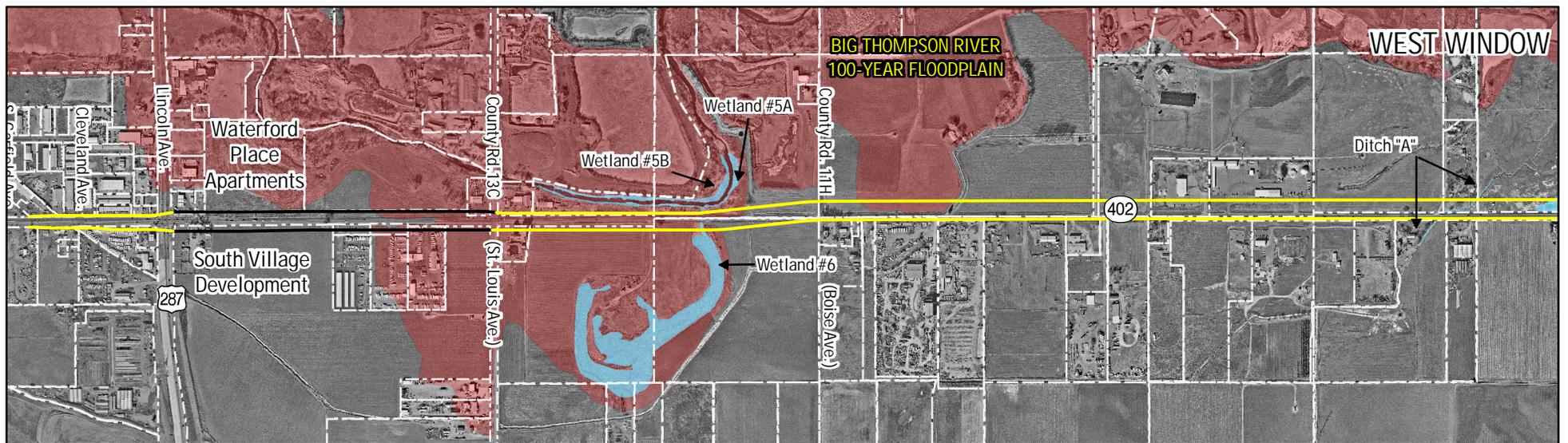
3.19 Wetlands

The presence of wetlands in the project area was determined from aerial photograph interpretation and confirmed in field investigations. Aerial photography used for initial wetland identification and to assist with delineations included color photography obtained in 2001 with a 2-foot pixel resolution and gray-scale photography obtained in 2002 with a 0.5-foot pixel resolution. Wetland determination methods followed 1987 US Army Corps of Engineers (USCOE) guidelines that specify vegetation, soil, and hydrology characteristics used to identify wetlands.

Detailed descriptions of the six wetlands recorded and their indicator plant species are presented in *Appendix B, Wetland Finding Report*. Wetlands are mapped in Figure 3-10. Table 3-10 summarizes these six wetlands by type and the area affected. Wetland delineations were conducted on August 24 and 25, 2001; October 25, 2001; and March 13, 2003. Wetland delineations were inspected by USCOE on May 19, 2004 (See USCOE letter dated June 1, 2004, in *Appendix B2*).

Most of the wetlands were classified as Palustrine Emergent (PEM) type, following Cowardin et al. (1979). The PEM type consists of marshlike wetlands, which, in the project area, are characterized by typical wetland indicator plant species including bulrush (*Scirpus palidus*), broad-leaved cattail (*Typha latifolia*), spikerush (*Eleocharis palustris*), reed canarygrass (*Phalaroides arundinacea*), and Emory sedge (*Carex emoryi*). The exception is the Palustrine Forested/Emergent (PFO/EM) wetlands of peach-leaved willow (*Salix amygdaloides*), sandbar willow (*S. exigua*), scattered plains cottonwood (*Populus deltoides* ssp. *monilifera*), reed canarygrass, and Emory sedge that occur along the Big Thompson River (Sites 5A and 5B). Soils of the PEM wetlands either contained mottles indicating a fluctuating water table or were very dark to grayish-blue (gleyed), indicating anaerobic conditions from nearly continuous saturation. Near the river, soil was either saturated to the surface or within 6 inches of the surface.

All of the identified wetlands except Site 4 are USCOE jurisdictional, with surface water or defined channel connections to other navigable waters of the US (such as the Big Thompson River). Based on USCOE CFR 33, Section 323 guidelines, jurisdiction under Section 404 of the Clean Water Act (CWA) applies to such waters (including wetlands) that have surface connections to waters of the US or other navigable waters.

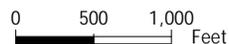


LEGEND

-  Wetlands
-  Floodplain
-  Property Parcel Boundaries
-  Proposed Meander Right-of-Way
-  Existing Right-of-Way



SCALE - 1:14,700 or 1" = 1225'



SOURCE: 2001 1/2-foot resolution aerial photography. Land use and parcel information provided by the City of Loveland. Wetland information obtained through field observation and aerial photo interpretation by JFSA. Floodplain information provided by FEMA. Map produced November 29, 2006 by JFSA.



Wetlands and the Big Thompson River 100-Year Floodplain

FIGURE 3-10

In addition, all of the wetlands in the study area have been altered in some way by human activities, including irrigation ditch diversions, upstream development, and stock pond construction. Site 5B (PFO/PEM) is on the north side of the Big Thompson River and will not be affected by activities on SH 402.

ecological processes of each area according to Adamus et al. (1987) and are listed in Table 3-11. The highest functional value wetland habitat in the project area is associated with the Big Thompson River in the western portion of the project area (Sites 5A/5B and 6), with ratings of moderate to high.

Functions and values for wetland sites were determined on the basis of their role in the

Table 3-10. SH 402 Wetlands by Location and Potential Impacts of Meander Alternative

Site	Location	Descriptions	Area (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Jurisdictional to Section 404, Clean Water Act					
2	N. SH 402, E. CR 9E ^a	PEM ^a ; cattail marsh	6.49	0.234	0.03
3	N. SH 402, E. CR 9	PEM ^a ; transitional edge of Site 3, wildrye, Baltic rush	0.14	0.124	0.01
Irrigation ditch A ^a	Bisects SH 402 ~1/2 mile west of CR 9E	PEM; reed canarygrass and Emory sedge at edge of ditch	0.16	0.061	<0.01
5A/5B	N. SH 402 along Big Thompson River	PFO/PEM; reed canarygrass with willows along channel	0.95	<0.005	0.01
6	S. SH 402, E. CR 13C	PEM; reed canarygrass, cattail marsh	10.65	0.029	0.01
Total			18.39	0.453	0.06
Nonjurisdictional to Section 404, Clean Water Act					
4 ^a	N. SH 402, W. CR 9E	PEM ^a ; saltgrass alkali seep	0.67	0.440	0.03
Totals			19.06	0.893	0.09

^a Cowardin et al. (1979) classification: PEM = Palustrine emergent wetland; PEM/SS = Palustrine emergent and scrub-shrub wetland

Table 3-11. Principal Functions and Values^a of Project Area Wetlands

Functions	Wetland Sites					
	2	3	4	Ditch A	5A/5B	6
Groundwater recharge	M	L	L	L-M	M	M
Groundwater discharge						L
Floodflow alteration	M	L	M	L	H	M
Sediment stabilization	M	L	L	L	M	L
Sediment/toxicant retention	H					M
Production export	L	L				
Aquatic diversity/abundance					L	
Wildlife diversity/abundance for breeding, wintering, migration	L	L			M	M
Recreation and uniqueness/heritage					M	
Qualitative functional rating	M	L	L-M	L	M	L-M

^a Functional values: L = low, M = moderate, H = high, blank = no identified function

The river has the most reliable perennial source of water and the most diverse habitat and is less disturbed than the other wetland areas. However, the larger PEM marsh wetland (Site 2) provides high functions for sediment/toxicant retention (water quality improvement).

3.19.1 No Action Alternative

No impacts on wetlands are associated with the No Action Alternative.

3.19.2 Meander Alternative

Approximately 0.89 acre of wetlands will be permanently affected by fill actions to expand the roadbed, of which 0.45 acre is jurisdictional. An additional area that includes 5 feet at the edge of the cut-and-fill line was included to ensure that impacts were not underestimated.

Wetlands associated with a stock pond (Site 2, 0.23 acre) and an alkali seep (Site 4, 0.44 acre) would incur the largest losses from construction of the Meander Alternative.

Temporary impacts will total 0.09 acre, of which 0.06 acre is jurisdictional. Temporary impacts were calculated within a 10-foot area from the construction footprint (with the 5-foot addition). This area includes impacts from exclusion fence and silt fence construction, dismantling of fences, and culvert work. This area will be reclaimed.

3.19.3 Mitigation Measures

CDOT BMPs include mitigation for all jurisdictional and nonjurisdictional wetlands permanently affected by construction projects, including replacement with created wetland areas or enhancement of existing areas to achieve a replacement-to-loss ratio of 1:1. Temporary disturbances of wetland areas can be mitigated by reclamation and revegetation with appropriate species. Topsoil from disturbed wetlands can be salvaged and reused for mitigation purposes unless infested with noxious weeds.

0.89 acre of wetlands will be replaced on a 1:1 basis.

Mitigation measures to offset impacts on wetlands during construction are addressed by BMPs that control erosion and minimize sedimentation in wetlands adjacent to construction sites.

General mitigation techniques include replacement plantings for native riparian species, especially trees and shrubs, between the river terrace and the highway toe-of-fill.

Should construction access roads and work pads be constructed in wetlands, protective material (fabric or hay) will be used, and topped with aggregate and/or soil fill. When construction is completed, the protective material will be removed with the goal of preserving the original wetland plant community. Any plants damaged will be replaced with species appropriate for the site.

A number of potential wetland mitigation sites have been identified during the environmental assessment process. Possible locations along SH 402 include the vicinity of Sites 2, 3, and 6.

Should it not be possible to create replacement sites in these areas, mitigation of wetland losses are proposed at the Big Thompson Ponds State Wildlife Area (SWA), which is approximately 0.5 mile north of SH 402 near I-25. The mitigation concepts for these sites are described in *Appendix B, Wetland Finding Report*.

Along SH 402, wetlands could be expanded by approximately 0.45 acre to account for losses of jurisdictional wetlands. Plant species such as bulrush, burreed, and sedges are suggested for this area to increase the wetland community diversity from primarily cattail-dominated marsh.

Nonjurisdictional wetland loss (approximately 0.44 acre) may be replaced at the Big Thompson Ponds SWA. Should potential wetland replacement sites along SH 402 not provide an adequate solution due to lack of landowner cooperation or lack of a suitable site, jurisdictional wetland loss can also be mitigated at the Big Thompson Ponds SWA.

Because the project impacts on jurisdictional wetlands are less than 0.5 acre and affect nontidal waters-wetlands, a Nationwide Permit 14 is appropriate (Carey 2004). Finalization of wetland mitigation site location and design of mitigation are required to obtain the Nationwide Permit 14 approval. Monitoring of mitigation sites will be specified in the USCOE permit.

3.20 Floodplains

The Big Thompson River meanders generally eastward on the north side of SH 402. The river dips south to within 60 feet of the highway between CR 13C and CR 11H before turning northward again. The existing SH 402 highway crosses through 5.78 acres of the Federal Emergency Management Agency (FEMA) 100-year floodplain for a linear distance of approximately 0.3 mile. The 100-year floodplain and floodway boundaries for the Big Thompson River were delineated in the 1999 FEMA Flood Insurance Study (FIS) for unincorporated areas of Larimer County (see Figure 3-10).

3.20.1 No Action Alternative

No floodplain impacts are expected under the No Action Alternative.

3.20.2 Meander Alternative

HEC-RAS (USCOE software used to determine flood profile) was used to gauge the impact of widening the highway on base flood elevations of the river. Because FEMA was unable to locate the data used to delineate the floodplain and floodway in the 1999 study, a model was created using river station locations from the 1999 FIS and ground survey contours created for the project area in 2002 (see FEMA letter in

Appendix A). The analysis included stretches of the floodplain that overlap SH 402. The limits of the model are from just west of US 287 (FIS River Station X) to just east of CR 11H (FIS River Station I). Model results indicate that the greatest increase in base flood elevation is only 0.02 foot at river stations Q and S from the FEMA FIS. River station Q is located immediately upstream of CR 13C, and river station S is located approximately 0.3 mile further upstream.

Based on the analysis, the Meander Alternative would have minimal impacts on the floodplain, within the limits set by Larimer County and FEMA.

3.20.3 Mitigation Measures

No mitigation is required. The base flood elevation increase of 0.02 foot is much less than Larimer County's limit/requirement of 0.1 foot and also less than FEMA's limit/requirement of 1 foot.

3.21 Water Quality

3.21.1 Existing Surface Water Environment

The dominant surface water feature in the project study area is the Big Thompson River, a perennial stream with headwaters in Rocky Mountain National Park. Its gently meandering channel flows eastward through the southern part of the city of Loveland and joins the South Platte River south of Greeley. In the reach of the Big Thompson between US 287 and I-25, numerous ponds are located near the river, and several minor drainages with wetland components feed into the river (see Figure 3-10). Urban development adjacent to SH 402 is prevalent in the westerly portion of the project corridor within the Loveland city limits.

Groundwater in the project area is associated with the alluvial and terrace deposits of the Big Thompson watershed. According to the Modified Environmental Site Assessment (M-ESA), 90 registered wells are within a 1-mile radius of the study area, 29 of which are monitoring wells. Only one well, a monitoring well owned by Total

Petroleum, is immediately adjacent to SH 402. No domestic or municipal wells are immediately adjacent to SH 402.

The Water Quality Control Commission (WQCC) and Colorado Department of Public Health and Environment (CDPHE) have identified water quality impaired streams and streams with classifications and standards to protect these resources under Section 303(d) of the Clean Water Act (CWA). Waters are classified according to the uses for which they are presently suitable or intended to become suitable. Numeric water quality standards apply for protection of these designated uses.

Two segments of the Big Thompson River in the project corridor have surface water classifications and standards. Segment 4b is located in the western project corridor and extends from US 287 to CR 11H, and Segment 4c continues from CR 11H to I-25. Both segments are classified as "use protected" for:

- ❑ Warm Water Aquatic Life Class 2 (fish are of catchable size and normally consumed are present and fishing occurs regularly)
- ❑ Agriculture
- ❑ Recreation Class 1A (streams generally unsuitable for primary contact recreation due to water temperatures and stream flows)
- ❑ Recreation Class 2 (primary contact recreation does not exist and cannot reasonably be expected to exist in the future and where municipal discharges are present).

More than 30 water quality standards are in effect for each of these segments. Classification standards for these segments are shown in Table 3-12.

Neither of these two segments of the Big Thompson River is classified for drinking water supply use, and there are no drinking water plants in the immediate area of SH 402. Although the city of Loveland Water Treatment Plant is located on the north side of the river on the east

side of CR 11H approximately 0.25 mile north of SH 402, there are no water intakes located along the river in the vicinity of SH 402.

Segments identified as impaired are those in which one or more classification or standard is not or may not be fully achieved. As necessary for the protection of the water resource to meet the requirements of the CWA, total maximum daily loads (TMDLs) are established by the Water Quality Control Division of CDPHE to set the maximum amount of pollutant that may be allowed while still complying with water quality standards. The two segments of the Big Thompson River in the project area are not impaired for their designated uses and are not on the current CDPHE TMDL list.

The effects of development and urbanization in the Big Thompson watershed are the primary water quality concerns in Larimer County. These development activities can increase stormwater runoff peak flows due to increased impervious surface area, and increase certain types of water pollutant sources. Pollutant sources can include point sources associated with industrial and wastewater discharge, as well as nonpoint sources such as from vehicles, commercial operations, and sediment from development construction activities. Existing land uses along the highway that already could have an impact on area water quality include agricultural, residential, commercial, and light industrial operations.

In 1986, the *City of Loveland Master Drainage Plan* and *Storm Drainage Criteria Manual* were initially completed and adopted. The city's *Drainage Criteria Manual* was updated in September 2002. The drainage plan outlined improvements to the existing system and established criteria that developers must follow for new developments. The projects include building regional detention ponds, increasing the size of existing storm sewers, and solving flooding problems following heavy rainstorms.

**Table 3-12. CDPHE Water Quality Control Commission Regulation #38
Surface Water Quality Classifications and Standards
Region 2 – Big Thompson River**

Segment	Classifications	Standards	
4b. Mainstem of the Big Thompson from the Greeley-Loveland Canal diversion to County Road 11H.	Use Protected Aq Life Warm 2 Agriculture 5/1 – 10/15 Recreation 1a 10/16 – 4/30 Recreation 2	D.O. = 5.0 mg/l	As(ch)=100(Trec)
		pH = 6.5-9.0	Cd(ac/ch)=TVS
		5/1 – 10/15	CrIII(ac/ch)=TVS
		F.Coli=200/100ml	CrVI(ac/ch)=TVS
		E.Coli=126/100ml	Cu(ac/ch)=TVS
		10/16 – 4/30	Fe(ch)=1000(Trec)
		F.Coli=2000/100ml	Pb(ac/ch)=TVS
		E.Coli=630/100ml	Mn(ac/ch)=TVS
		NH3(ac)=TVS	Hg(ch)=0.01(Tot)
		NH3(ch)=0.10	Ni(ac/ch)=TVS
		Cl2(ac)=0.019	Se(ac/ch)-TVS
		Cl2(ch)=0.011	Ag(ac/ch)=TVS
		CN=0.005	Zn(ac/ch)=TVS
		S=0.002	
		B=0.75	
		NO2=0.5	
		Fish Ingestion Organics	
4c. Mainstem of the Big Thompson from County Road 11H to I-25.	Use Protected Aq Life Warm 2 Agriculture 5/1 – 10/15 Recreation 1a 10/16 – 4/30 Recreation 2	D.O. = 5.0 mg/l	As(ch)=100(Trec)
		pH = 6.5-9.0	Cd(ac/ch)=TVS
		5/1 – 10/15	CrIII(ac/ch)=TVS
		F.Coli=200/100ml	CrVI(ac/ch)=TVS
		E.Coli=126/100ml	Cu(ac/ch)=TVS
		10/16 – 4/30	Fe(ch)=1000(Trec)
		F.Coli=2000/100ml	Pb(ac/ch)=TVS
		E.Coli=630/100ml	Mn(ac/ch)=TVS
		NH3(ac)=TVS	Hg(ch)=0.01(Tot)
		NH3(ch)=0.10	Ni(ac/ch)=TVS
		Cl2(ac)=0.019	Se(ac/ch)-TVS
		Cl2(ch)=0.011	Ag(ac/ch)=TVS
		CN=0.005	Zn(ac/ch)=TVS
		S=0.002	
		B=0.75	
		NO2=0.5	
		Fish Ingestion Organics Temporary modifications F. Coli=2000/100ml; and E.Coli=181/100ml Expiration date 12/31/04.	

The *Master Drainage Plan* comprises all of Loveland's Growth Management Area (GMA) and covers the entire project corridor. According to the city's Comprehensive Plan, the city intends to eventually provide services to the entire GMA.

The western portion of the urban section of SH 402 from US 287 to CR 13C is drained by a curb and gutter system into the city of Loveland's municipal sewer. The curb and gutter system is

in place along the northern highway from US 287 to the eastern edge of the Waterford Place development. Stormwater in the municipal sewer is combined with other urban runoff and discharged to the Big Thompson River. As further development takes place along the urban section, the curb and gutter system will be extended. Highway runoff in undeveloped portions of the urban section and the rural

section of SH 402 from CR 13C to I-25 is drained to vegetated ditches and swales. Numerous irrigation ditches that support area agriculture also cross the rural project area. Highway runoff may drain into irrigation ditches in areas where they are adjacent to the roadway. Conveyance of runoff in the rural section is less likely to affect receiving waters except during large storm events, because vegetated ditches and swales are likely to slow flows, filter sediment and other pollutants, and allow runoff to infiltrate into the ground.

A portion of the rural section of SH 402 between CR 13C and CR 11H is within 200 feet of the Big Thompson River. This highway section is flanked by vegetated ditches that allow for stormwater infiltration or conveyance to nearby irrigation ditches. No direct discharge of highway runoff into the river was identified in the rural section. In addition, existing riparian vegetation and wetland areas along the river in this area serve as a natural water quality buffer.

CDOT winter maintenance activities associated with existing SH 402 include application of a salt/sand mixture at a normal rate of 220 pounds per lane-mile. The liquid deicer magnesium chloride is currently applied at a rate of 40 gallons per lane-mile, but only in exceptional weather conditions. CDOT anticipates that the use of liquid deicer will become more prevalent in the future.

According to the hazardous waste M-ESA, the only documented hazardous materials spills in the project corridor have occurred at the I-25/SH 402 interchange. These spill incidents have been addressed appropriately to avoid contamination of surface water and groundwater.

3.21.2 Colorado Discharge Permit Overview

Construction and post-construction runoff discharge associated with development activities and government/commercial/industrial operations are regulated under the National Pollutant

Discharge Elimination System (NPDES) administered by the CDPHE Water Quality Control Division. The Colorado permit is referred to as the Colorado Discharge Permit System (CDPS) instead of NPDES. This permit system authorizes discharges from municipal separate storm sewer systems (MS4s), industrial activities, and construction sites that disturb one or more acres of land. MS4 permits generally include stormwater management program requirements such as maintenance of structural controls, new development and redevelopment planning program, industrial facilities program, construction sites program, and control of facility runoff program. CDOT will coordinate with the city of Loveland and Larimer County to ensure that the effort regarding the MS4 permits is not duplicative.

On March 13, 2003, the city of Loveland received its MS4 CDPS Permit and Certification from the CDPHE Water Quality Control Division. The CDPS general permit authorizes the city of Loveland to discharge stormwater from portions of its MS4 located in urbanized areas to state waters, including but not limited to the Big Thompson River. CDOT also has a MS4 permit (No. COS-000005) authorizing new or existing discharges composed entirely of stormwater from CDOT's MS4 in urbanized areas. CDOT's permit includes the designation of "sensitive" waters that are generally coincident with CDPHE's TMDL list. The Big Thompson River is not included on CDOT's sensitive waters list. CDOT's *New Development/Redevelopment MS4 Stormwater Management Program* calls for comprehensive planning procedures and controls to reduce the discharge of pollutants after new construction is complete.

The urban section of SH 402 (from US 287 to CR 13C) is under authority of both the city and CDOT MS4 permits. Larimer County also has an MS4 permit and would generally have authority over the rural section of the SH 402 corridor. However, the city includes the rural section in its Master Drainage Plan and GMA, and eventual

urbanization of the area might lead to both city and CDOT MS4 jurisdiction in the future. As noted previously, all three entities will work together on the permitting requirements.

3.21.3 No Action Alternative

Routine highway maintenance operations that include plowing, sanding, and resurfacing of the highway would continue under the No Action Alternative. Historic stormwater runoff from the highway and the potential for hazardous materials spills also would continue to exist under this alternative. However, spill impacts on area water resources are not a significant concern based on previously documented spill incidents. CDOT anticipates increased use of liquid deicers and decreased use of sand/salt mixture for winter maintenance in the future. Decreased sand usage would decrease the amount of sediment in highway runoff. Existing water quality in the Big Thompson River in the project corridor is not impaired for its designated uses. Runoff from SH 402 has not been identified as a specific concern for protection of Big Thompson watershed surface water quality. The No Action Alternative would not change existing stormwater runoff impacts associated with SH 402.

3.21.4 Meander Alternative

Potential impacts of the Meander Alternative include increased highway stormwater runoff because of an approximate 31-acre increased potential for highway runoff pollutants due to a projected 140 percent increase in traffic by year 2030. Increased highway runoff has the potential to impact the Big Thompson River with increased sediments, roadway deicers, metals from vehicle wear, particulates from vehicle exhaust, and petroleum products related to motor vehicles. The potential for hazardous materials spills would continue to exist with this alternative.

The urban section of the Meander Alternative includes a complete curb and gutter drainage system and will increase highway runoff to the municipal sewer system that discharges to the

Big Thompson River. However, the city's continuing drainage improvements and city and CDOT MS4 permit compliance and monitoring are expected to provide adequate protection to the river's water quality. Permit compliance includes mitigation requirements discussed in *Section 3.21.5* below. In addition, the city's *Storm Drainage Criteria* and *Master Drainage Plan* include regional strategies to address growth and development effects on water quality.

The rural section of the Meander Alternative will increase highway runoff to roadway ditches and swales. Some highway runoff in combination with other runoff will eventually discharge into the Big Thompson River. Because the rural section of SH 402 is included in the city's GMA, the city's *Storm Drainage Criteria* and *Master Drainage Plan* would be applicable tools to address growth and development effects on water quality. Larimer County's MS4 permit is currently in effect for the rural section, and the city and CDOT MS4 permits should also be considered for the rural section in light of future planning. Permit compliance includes mitigation requirements discussed in *Section 3.21.5* below.

With the continuation of city, county, and CDOT stormwater programs, the increased highway runoff associated with the Meander Alternative is not expected to have an impact on designated uses of the Big Thompson River in the project area. Mitigation activities required by CDPS permits and city and county land use codes will minimize water quality impacts due to increased highway runoff and the associated increase in highway runoff pollutants resulting from the Meander Alternative.

3.21.5 Mitigation Measures

City and county land use codes protect the river floodplain area from development activities. CDPS permits, city and county land use codes and storm drainage criteria, and CDOT guidance will generally specify mitigation activities. CDOT will comply with and obtain all necessary permits

for protection of water resources, including CDPS and dewatering permits as necessary.

Best management practices (BMPs) for temporary and permanent erosion control will be implemented with the construction of the Meander Alternative to minimize the impact of disturbance on receiving waters. The CDOT project design team will seek to minimize soil disturbance impacts on irrigation ditches and other drainages in the study area as part of the final design process. In addition, the 4:1 slopes created by placement of fill materials will be reseeded to reduce erosion and sedimentation.

Long-term drainage from highway projects may require permanent BMPs under applicable permitting to protect receiving waters from erosion, sedimentation, and other contaminants. City, county, and CDOT MS4 permits currently cover the entire project corridor. In addition, the *City of Loveland Storm Drainage Criteria*, updated in 2002, will apply to the entire project corridor and is within the city's *Master Drainage Plan* area. Drainage criteria and MS4 permits (both city and CDOT) would generally require regional and/or onsite detention that includes 100 percent capture volume for the first 0.5 inch of runoff and 80 percent capture of total suspended solids to the "maximum extent practicable" (note that project-specific requirements will vary). Other permanent BMP options such as maintenance programs, sediment traps, and flow control structures might also be implemented under MS4 requirements.

CDOT is obligated under its MS4 permit to "...develop and implement comprehensive planning procedures and controls to reduce the discharge of pollutants after construction is completed, from areas of new highway development and significant redevelopment and associated drainages..." Project plans for the Meander Alternative will be evaluated under the criteria of the MS4 for the need to include permanent stormwater BMPs. This review will occur as early as possible during the final design

process and will be guided by the CDOT MS4 *New Development Program* guidelines and procedures and the *CDOT Erosion Control and Stormwater Quality Guide*. This guide provides design and maintenance criteria for permanent BMPs. Based on the results of the design review process and in coordination with the city and county, CDOT will incorporate permanent BMPs to the maximum extent practicable and/or apply maintenance and administrative controls that provide equivalent protection for receiving waters. During final design, highway deicing and long-term maintenance and safety policy will be evaluated to determine the applicability of permanent controls.

The fact that CDOT, the city of Loveland, and Larimer County are all MS4 entities with separate permits will warrant interagency coordination due to potential issues of overlapping authority. This coordination will help prevent duplication of effort. According to CDPHE, a permitted MS4 entity would not be required to impose their program requirements on CDOT projects due to the MS4's limited authority to regulate CDOT, nor would an MS4 be responsible for regulating activities outside its jurisdiction. Coordination among CDOT, the city, and the county will occur during the project design phase to determine specific permanent BMPs for the project.

3.22 Geology

Impacts related to geological resources are considered important if:

- ❑ risk to human health and safety is increased
- ❑ impact leads to other adverse impacts
- ❑ unique geological or paleontological features or sites are impacted
- ❑ subsidence, erosion, or siltation are substantial
- ❑ recovery of other geological resources is impeded

The geological analysis was performed by evaluating available data and reports, followed by a drive-through of the corridor to review current

site conditions. No additional data collection or field investigations were done (Yeh and Associates 2004).

The bedrock formation directly underlying SH 402 in the project area is the Pierre Shale Formation. The Pierre Shale, a shale containing fossils and some limestone lenses, is about 6,800 feet thick in the project area. Ammonite fossils of *Baculites grandis*, *Baculites baculus*, *Baculites eliasi*, and *Baculites clinobatus* may be found in the project area. The Pierre Shale crops out in a belt as much as 20 miles wide from Loveland northward. The age of the Pierre Shale in the Loveland area ranges from Campanian to middle Maestrichtian, or about 67 to 82 million years ago. The structure of the bedrock in the project area is generally characterized by beds dipping gently east. Units of the Pierre Shale along SH 402 include an unnamed sandstone member and the type member Pierre Shale.

The Loveland oil field underlies the project area from US 287 to I-25 and is still in production. The method of production uses deep extraction that pulls primarily from the Dakota Formation. The proposed project is not expected to affect any existing extraction locations in the Loveland oil field and would not affect oil field production.

Alluvial gravels along the Big Thompson River are a possible source of construction aggregate material. These materials may be encountered near Hollowell's Corner, where the river passes close to SH 402 between CR 13C and CR 11H. Gravel pits are located north of SH 402. Local construction materials may be available from the gravel pits or from other alluvial deposits of the Big Thompson River.

Potential effects related to geological conditions include seismicity, expansive soils, slope instability/landslides, unique geological features, and erosion. Additional impacts related to soil type are identified in *Section 3.5.2*.

Seismicity. The project is located in an area of low seismic activity with no recent faulting and low topographic relief.

Expansive Soils. Bedrock in the project area is relatively flat-lying, and SH 402 has not historically experienced differential movements due to swelling soils.

Slope Instability/Landslides. The proposed project is located in an area of low topographic relief. Little impact is expected with properly designed cut-and-fill slopes.

Unique Geological Features. There are no unique geological resources in the project area; consequently, construction and operation of the proposed project is not expected to affect unique features.

Erosion. The project area is flat to gently sloping, with little surface disturbance and relatively competent soils. The proposed project is not expected to produce substantial erosion or to be adversely affected by erosion.

3.22.1 No Action Alternative

The No Action Alternative would not result in impacts on the geology, soils, or mineral resources of the project area. Gravel mining operations in the area will not be affected by this alternative.

3.22.2 Meander Alternative

The Meander Alternative involves limited disturbance and occurs in a relatively flat area. SH 402 would not be affected by any known geologic hazard and would have no impact on existing geological resources. Soil and erosion potential have not been identified for the project area. Gravel mining operations in the area will not be affected by the Meander Alternative.

3.22.3 Mitigation Measures

No mitigation is required.

3.23 Paleontology

Paleontological records searches were conducted at the University of Colorado at Boulder Museum and the Denver Museum of Nature and Science. A review of geological and paleontological literature was conducted at the Colorado School of Mines, and on October 2, 2003, a limited field survey of the project area was conducted (Erathem-Vanir Geological PLLC 2003).

No fossil localities were identified in the project area in the records searches. Scott and Cobban (1965, 1986) recorded three US Geological Survey (USGS) fossil invertebrate localities in the Pierre Shale, in and near the project area. These include 1) USGS D3638, from an unnamed sandstone member of the Pierre Shale, about 0.15 mile north of SH 402; 2) USGS D4054, from the middle part of the Pierre Shale, about 0.35 mile north of SH 402; and 3) USGS D4060, from the base of the "upper transitional member" of the Pierre Shale (Scott and Cobban 1986), about 0.75 mile north of SH 402.

These and other USGS and University of Colorado Museum fossil localities in the Pierre Shale that are further from the project area generally yielded only the remains of fossil invertebrates (cephalopods, bivalves, and gastropods). The localities are also well known for their ammonites and nautiloids. Scott and Cobban (1986) reported the presence of fish teeth at USGS locality D3638. In addition, the Pierre Shale and its marine equivalents in the Rocky Mountain region have produced rare bones of fish, hadrosaurian dinosaurs, mosasaurs (marine lizards), plesiosaurs, sharks, and turtles.

3.23.1 No Action Alternative

The No Action Alternative would not affect paleontological resources.

3.23.2 Meander Alternative

Although ultimately underlain by the Pierre Shale, soils at the surface of the project area formed on parent materials of Pleistocene or younger age. Therefore, depending on the depth of grading, either the Quaternary sediments or underlying Upper Cretaceous sediments of the Pierre Shale may be disturbed. As a result, disturbance could uncover fossils of Quaternary or Upper Cretaceous age.

After fieldwork, CDOT's staff paleontologist identified a Pierre Shale exposure along SH 402. A scientifically significant fossil locality (extremely rare, second known occurrence in the Pierre Shale bedrock unit in western North America) has been discovered in this Pierre Shale exposure. No impacts on this fossil locality are expected to occur based on conceptual design for the Meander Alternative.

3.23.3 Mitigation Measures

Only the following BMPs are required:

- If during design it is determined that any construction activities resulting from the proposed project will affect the Pierre Shale outcrop, CDOT will mitigate effects by preconstruction salvage of a representative sample of the fossils present at that locality.
- Should any fossil material be uncovered during construction grading or excavation, project personnel will contact the CDOT staff paleontologist immediately so that a more in-depth evaluation can be made to determine whether additional fossil recovery or mitigation is warranted.

Construction

3.24 Construction Costs

The following construction costs are stated in year 2003 dollars and do not include right-of-way acquisitions, relocations, utilities, or mitigation measures.

3.24.1 No Action Alternative

Because no construction would be done on SH 402 between US 287 and the I-25 interchange, there would be no cost under the No Action Alternative.

3.24.2 Meander Alternative

Construction of the Meander Alternative would cost approximately \$17.7 million based on conceptual design.

The project is currently programmed in the CDOT 2006 – 2007 STIP with a total of \$1 million (STIP #NF3392) for 2009. The North Front Range 2030 Plan identifies SH 402: US 287 to I-25, two to four lanes with a cost estimate of \$23.6 million.

3.25 Construction Impacts

Implementation of the Meander Alternative would result in short-term impacts related to construction. The following discussion describes these potential impacts and associated mitigation measures. Construction activities will be consistent with CDOT's Environmental Stewardship Guide.

3.25.1 Visual Resources

Impacts

Although construction impacts are short term, they usually result in some of the most noticeable visual contrast. Construction operations are highly visible activities: excavation, equipment, dust, and traffic are likely to attract the most attention. Impacts on visual resources during construction may result from removal of vegetation required to accommodate the

proposed project, disrupting landscape frontages of residences and businesses.

Mitigation Measures

The short-term highly visible construction equipment related activities cannot be mitigated. Dust impacts are discussed under *Section 3.25.6, Air Quality*. Access and traffic-related impacts are discussed under *Section 3.25.3, Access/Traffic Control/Emergency Services*. Permanent revegetation will be completed in disturbed areas and is further discussed in *Section 3.25.7, Ecology and Noxious Weeds*.

3.25.2 Hazardous Materials/Waste

Impacts

Use of heavy equipment during construction activities may result in inadvertent spillage or leakage of fuel, oil, grease, or chemicals.

Mitigation Measures

Releases will be contained and disposed of in accordance with CDOT BMPs and all applicable laws and regulations. Known contaminated sites will be characterized and cleaned up before construction. Leaks and spills will be prevented, contained, and remediated according to all applicable laws and requirements. A Materials Management Plan may be required. If hazardous materials are encountered before or during construction, CDOT's *Section 250, Environmental Health and Safety Management* specification will be used. If necessary, a health and safety plan will be prepared and implemented to mitigate the potential health and safety hazards to workers and the public.

3.25.3 Access/Traffic Control/Emergency Services

Impacts

Short-term disruption of residence and business access may occur during construction.

Mitigation Measures

Although traffic movement along SH 402 may be affected during construction, these impacts will be controlled by application of standard highway construction practices for traffic management. Highway construction practices would be coordinated with local emergency service providers to ensure that construction does not disrupt emergency assistance.

3.25.4 Archaeology

Impacts

Buried cultural materials may be exposed during construction.

Mitigation Measures

If cultural materials are exposed, the CDOT senior staff archaeologist will be notified immediately to ensure evaluation as required by NHPA and all other applicable state and federal regulations.

3.25.5 Noise

Impacts

Construction will generate noise and vibration from diesel-powered excavation equipment such as dump trucks and bulldozers, backup alarms on certain equipment, compressors, and pile drivers. Construction noise levels at offsite locations would usually depend on the loudest piece or two of equipment operating at the same time. Noise levels from diesel-powered equipment range from 80 to 95 dB(A) at a distance of 50 feet. Impact equipment such as rock drills and pile drivers can generate even more noise.

Mitigation Measures

Contractors will be encouraged to schedule construction activities during daytime hours to minimize and mitigate noise impacts. Weekend work would be discouraged, with the exception of activities best suited to off-peak hours.

Temporary construction noise impacts will be reduced by requiring contractors to use well-maintained equipment (with particular attention to mufflers), adapt work hours, monitor noise during work hours, and make use of measures such as temporary noise barriers where applicable.

The construction project will follow applicable sections of the *Ordinance Concerning Noise Levels in Unincorporated Larimer County* (No. 97-03).

3.25.6 Air Quality

Impacts

Possible construction impacts on air quality include fugitive dust that can result in elevated levels of particulates less than 10 microns without appropriate BMP mitigation.

Mitigation Measures

BMPs will be implemented to reduce the project's potential for impact due to particulates less than 10 microns during construction, including:

- ❑ spraying exposed soil and soil surfaces with water, wetting agents, and/or soil binding agents
- ❑ covering trucks carrying fine materials
- ❑ minimizing mud tracking from the construction area
- ❑ controlling speed limits for trucks traveling on roads with high silt loading in the construction area

3.25.7 Ecology and Noxious Weeds

Impacts

Temporary impacts on species may include disturbances from construction activities, noise, and increased human presence in the area during construction.

Bald Eagles

Although no impacts on TES have been identified, bald eagles could use the adjacent

riparian area for winter roosting. Some trees may be taken during project construction.

Mitigation Measures - Vegetation

Techniques used by CDOT to stabilize and minimize erosion and to revegetate areas are outlined in detail in *Standard Specifications for Road and Bridge Construction* (1999), part of CDOT BMPs.

The following measures are designed to reduce direct and indirect impacts on vegetation and to control soil erosion and noxious weeds:

- ❑ Specification 207 covers salvaging and stockpiling topsoils for reuse in reclamation. No imported topsoil will be allowed. Topsoil heavily infested with noxious weeds will be removed from the site or buried under a minimum of 5 feet of fill.
- ❑ Specification 208 directs contractors to permanently stabilize (that is, cover disturbed areas with final seed and mulch as indicated in plans) each 17-acre increment of the project immediately after grading is finished for that section.
- ❑ Specifications 208 and 216 cover other mechanical erosion prevention methods (besides seeding, for example) and include use of soil coverings, placement of bales in drainages, use of silt fence, berms/diversions, slope drains, storm drain protection, check dams, channel stabilization, sediment traps or basins, and sandbag barriers.
- ❑ Specification 212 covers seeding.
- ❑ Specification 213 covers mulching seeded and other bare soil areas.
- ❑ Specification 214 covers planting.
- ❑ Specification 217 covers herbicide treatments, if needed for weed control.

A weed management plan has been developed and a weed survey was conducted to locate and map weed populations that may be spread by

construction activities. Required construction contractor practices to minimize new weed infestations and control the spread of current weed populations are described in detail in *Appendix E, Noxious Weed Management Plan*. Practices include:

- ❑ application of appropriate herbicides
- ❑ inspection of construction vehicles and use of designated equipment cleaning areas
- ❑ storage of weed-free topsoil and restriction on importation of topsoil
- ❑ use of only weed-free mulch for reclamation in accordance with the Weed Free Forage Act, CRS Title 35, Article 27.5
- ❑ monitoring and care of revegetation sites for three years
- ❑ restrictions on mowing and cutting when seeds are ripe for dispersal

In addition to the above required practices, sensitive areas such as riparian habitat, woodlands, and wetlands in the vicinity of project construction activities will be fenced to prevent vegetation damage from construction machinery. Construction access will be limited to fenced areas to curtail erosion, weed invasions, and damage to habitats.

Mitigation Measures – Wildlife

Additional evaluations and surveys, if warranted, will be conducted prior to construction for any new TES species identified subsequent to the current study. Should bald or golden eagles be observed at that time, recommendations to avoid or minimize impacts are as follows:

1. Avoid unnecessary damage to the riparian area, especially cutting large trees.
2. If bald eagles frequent the area, construction should be scheduled between March 1 and November 30 to avoid disturbance. If this is not possible, then follow #3.
3. Avoid harassment of the eagle from project-generated noise and activity during the

winter months. Between December 1 and April 30, if an eagle is observed perching or roosting in the riparian area, the USFWS recommends a buffer of 0.125 to 0.25 miles depending on the line of sight.

3.25.8 TES Species

Impacts

The bald eagle (*Haliaeetus leucocephalus*) was officially delisted from protection under the ESA on June 28, 2007. For additional information on mitigation, see *Section 3.25.7*.

3.25.9 Wetlands

Impacts

Approximately 0.89 acre of wetlands will be permanently affected by fill actions to expand the roadbed, of which 0.45 acre is jurisdictional. An additional area that includes 5 feet at the edge of the cut-and-fill line was included to ensure that impacts were not underestimated.

Temporary impacts will total 0.09 acre, of which 0.06 acre is jurisdictional. Temporary impacts were calculated within a 10-foot area from the construction footprint (with the 5-foot addition). This area includes impacts from exclusion fence and silt fence construction, dismantling of fences, and culvert work. This area will be reclaimed.

Mitigation Measures

Because the project impacts on jurisdictional wetlands are less than 0.5 acre and affect nontidal waters-wetlands, a Nationwide Permit 14 is appropriate (Carey 2004). Construction measures must conform to the specifications and conditions of the 404 permit issued by USCOE. Site monitoring will occur as specified in the 404 permit to ensure that wetland communities are developing as required by the permit.

Applying CDOT BMPs to construction operations will help minimize construction impacts on wetlands, including the following BMPs in *Standard Specifications for Road and Bridge*

Construction, section 107.25 (Water Quality) and section 208 (Erosion Control):

- ❑ Perimeter fencing will be installed to prevent access to wetlands, silt fencing will be installed to protect wetlands from sedimentation during construction, and erosion control techniques will be used whenever possible to prevent siltation and sedimentation.
- ❑ Should construction access roads and work pads be constructed in wetlands, protective material (fabric or hay) will be used, and topped with aggregate and/or soil fill. When construction is completed, the protective material will be removed with the goal of preserving the original wetland plant community. Any plants damaged will be replaced with species appropriate for the site.
- ❑ The area adjacent to the toe-of-fill will be reclaimed when erosion control materials and fencing are removed.
- ❑ Equipment maintenance areas and fueling locations will be at least 100 feet outside wetlands. Berms will be used and protective (absorbent) material will be available to prevent spills from reaching wetland areas.

3.25.10 Water Quality

Impacts

Potential impacts on water quality include sedimentation associated with erosion due to construction stormwater runoff. Erosion is prevalent when the surface vegetation is disturbed as required for roadway widening. The Meander Alternative alignment was designed so that construction areas of impact would minimize the impact on the riparian zone of the Big Thompson River.

Mitigation Measures

Temporary erosion control and stormwater measures will be implemented during construction activities. Construction mitigation

activities are specified under CDPS permitting, city and county requirements for developments, and CDOT guidelines. CDOT will obtain an NPDES Construction Discharge Permit (CDPS construction permit) from CDPHE for the project.

To comply with CDOT's MS4 CDPS permit and the CDPS construction permit, CDOT requires the development and implementation of a Stormwater Management Plan (SWMP) and an Inspection and Maintenance Program. The SWMP is intended to ensure that the water quality of receiving waters is protected during construction. The SWMP protects receiving waters by including BMPs necessary to provide for erosion, sediment, and general pollution prevention controls.

CDOT will develop a SWMP that details BMPs used for construction during the design phase. The SWMP will be prepared in accordance with the CDOT *Erosion Control and Stormwater Quality Guide, CDOT Standard Specifications 107.25-Water Quality and 208-Erosion Control*. Erosion controls will be designed and implemented to minimize or eliminate downgradient sedimentation and siltation.

Required BMPs include:

- ❑ staging construction to reduce disturbances due to storage, use, and maintenance of construction equipment
- ❑ minimizing access to the construction area
- ❑ temporary seeding of disturbed areas
- ❑ early final grading and phased seeding of completed areas during construction
- ❑ establishing clean water diversion upgradient of the construction areas
- ❑ establishing water quality ponds before construction to intercept construction runoff
- ❑ using soil blankets or mulch/mulch tackifier on temporarily disturbed slopes or slopes that cannot be seeded due to seasonal constraints

3.25.11 Geology and Soils

Impacts

No construction impacts on geology and soils have been identified.

The area contains potential sources for construction borrow materials. Alluvial gravels along the Big Thompson River are a possible source of construction aggregate material. These materials may be encountered where the river passes close to SH 402 between CR 13C and CR 11H. Gravel pits are located north of SH 402.

Mitigation Measures

No mitigation is required based on available information.

3.25.12 Paleontology

Impacts

Important fossils are associated with local outcrops of Pierre Shale and may be found during construction activities in Pierre Shale outcrops.

Mitigation Measures

CDOT's staff paleontologist will examine the project design plans to estimate the extent of disturbance of the Pierre Shale, if any, that may occur during construction. Preconstruction mitigation will be stipulated as appropriate. If any subsurface bones or other fossils are found in the corridor during construction, the CDOT staff paleontologist will be notified immediately to assess their significance.

Impact and Mitigation Summary

3.26 Preferred Alternative – Meander Alternative

The Meander Alternative meets the project purpose and need by improving capacity and addressing safety issues associated with the existing SH 402 alignment.

In addition, alignment of the Meander Alternative has been engineered to minimize potential impacts on human and natural environments while maximizing safety benefits and improving mobility to accommodate 2030 travel demand.

The No Action Alternative would result in continued and worsening mobility and safety concerns.

Table 3-13 provides a summary of impacts for both alternatives.

With the selection of the Meander Alternative, FHWA and CDOT are committed to the mitigation measures listed in Table 3-14 to lessen or eliminate the negative environmental impacts associated with this alternative. Implementation of the Meander Alternative may result in short-term impacts related to construction activities. Table 3-15 describes general mitigation measures that may be used to minimize or eliminate construction impacts.

Table 3-13. Summary of Impacts

Resource	Alternatives Retained for Detailed Environmental Analysis	
	No Action Alternative	Meander Alternative
Socioeconomic	Does not provide adequate capacity for future population and employment.	Provides adequate capacity for future population and employment.
Right-of-Way and Relocations	No additional requirements.	6 homes, 47.58 acres of residential property, no businesses, 7.15 acres of commercial property, and 3 outbuildings (small barns and sheds) for a total of approximately 54.7 acres
Environmental Justice	No disproportionate and adverse impacts on low-income or minority populations. Access and safety problems continue for all populations.	No disproportionate impacts on low-income or minority populations. Improves access and safety for all populations.
Land Use	Does not support current zoning, local policies, and plans.	Consistent with current zoning, local policies, and plans.
Farmland	No impact.	24.2 acres of currently used prime farmland will be converted to SH 402 right-of-way or utility corridor easement. The entire SH 402 corridor is planned for development, and FPPA does not apply.
Visual	No impact.	Changes are expected to be low contrast to the landscape character in the setting. Low impact anticipated after implementation of BMPs and mitigation.
Recreation	No impact.	No impact.
Hazardous Materials/Waste	No impact.	Possible impact from Diamond Shamrock via groundwater under SH 402 and US 287 intersection site. Would require relocation of transformers, could contain PCBs.
Utilities and Services	No impact.	Creation of utility corridor.
Emergency Services	No impact.	No impact.
Historic Preservation	No impact.	Adverse effect on Weber Farm (5LR10725)

Resource	Alternatives Retained for Detailed Environmental Analysis	
	No Action Alternative	Meander Alternative
Archaeology	No impact.	Only BMPs are required as noted: if cultural materials are exposed, the CDOT senior staff archaeologist will be notified immediately to ensure evaluation as required by NHPA and all other applicable state and federal regulations.
Native American Consultation	No impact.	No impact.
Sections 4(f) and 6(f)	No impact.	A determination of adverse effect has been made for the Weber Farm (5LR10725) resulting in a use under Section 4(f). <i>De minimis</i> impacts were found for the following per the FHWA <i>de minimis</i> finding of November 15, 2006: <input type="checkbox"/> Big Thompson Manufacturing Ditch Segment (5LR10726.1) <input type="checkbox"/> Propp Farm (5LR11247) <input type="checkbox"/> Weber Farm East (5LR11249) <input type="checkbox"/> Mountain View Farm (5LR11242)
Noise	Noise levels equal to or in excess of 66 dB(A) at 8 residential locations.	Noise levels equal to or in excess of 66 dB(A) at 11 residential locations; not including 2 residences, which would need to be acquired for improvement to be implemented.
Air Quality	No air quality conformity or analysis is applicable.	No impact; only construction BMPs are required.
Ecology	No habitat loss.	No impact; mitigation and BMPs are required during construction.
Vegetation	No impact	23.7 acres
TES Species	No impact.	No impact; mitigation and BMPs are required during construction.
Wetlands	No impact.	0.89 acre of wetlands permanently impacted.
Floodplains	No impact.	A base flood elevation increase of 0.02 foot.
Water Quality	No impact.	No impact; only construction BMPs are required.
Geology	No impact.	No impact.
Paleontology	No impact.	No impact; only BMPs are required.
Cumulative Impacts	No quantifiable impacts. Does not meet purpose and need.	No quantifiable impacts. Meets purpose and need.

3.27 Mitigation and Benefits Summary

With the selection of the Meander Alternative, FHWA and CDOT are committed to the following mitigation measures to lessen or eliminate negative environmental impacts associated with this alternative. Mitigation measures for the Preferred Alternative are listed in Table 3-14. Mitigation measures and BMPs specific to construction are listed in Table 3-15. For additional information on impacts, see individual resource discussions in this chapter.

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Socioeconomic	No mitigation is required.
Right-of-Way Acquisition and Relocations	Mitigation is required.
Implementation of the Meander Alternative would require acquisition of six homes and three outbuildings (small barns and sheds). The locations of these acquisitions are shown in Figure 3-3. The six residential structures located in close proximity to SH 402 are on properties that would otherwise be most adversely affected by loss of yards, parking, and driveways. For the right-of-way, 47.58 acres of residential property and 7.15 acres of commercial property will need to be acquired. Due to the dispersed rural development pattern that currently exists for most of the project corridor, loss of frontage on SH 402 will most often mean loss of unimproved portions of large tracts.	<p>To minimize unavoidable relocation of residents, measures to further reduce the number of relocations will be implemented as part of final design.</p> <p>CDOT will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act), which provides for uniform and equitable treatment of all persons displaced from their homes, businesses, or farms. The Uniform Act is a form of compensation, not mitigation.</p> <p>The owner of real property acquired for right-of-way will be compensated based on fair market value. Assistance will be provided to any eligible owner or tenant in relocating their business or residence at the time of displacement. Benefits under the Uniform Act to which each eligible owner or tenant might be entitled will be determined on an individual basis and explained in detail.</p> <p>No relocatees will have to move from a dwelling without at least 90 days' written notice. A 90-day notice is not effective for a residential occupant unless a comparable replacement dwelling has been identified. Qualified relocatees receive monetary payments, which may include payments for moving expenses, business in lieu of payments, rent supplements, down payments, or increased interest payments. No person will be displaced by a federally assisted project unless and until adequate replacement housing has been offered to all affected persons, regardless of race, color, religion, sex, national origin, age, or disability. CDOT will assist any eligible owner or tenant to relocate a business or residence at the time of displacement. Benefits under the Uniform Act to which each eligible owner or tenant might be entitled will be determined individually and explained to the parties in detail, along with information about financial options.</p>
Environmental Justice	No mitigation is required.
Land Use	No mitigation is required.
Farmland	No mitigation is required.

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Visual	Mitigation is required.
<p>The Meander Alternative would be constructed in an area of relatively open views from dispersed rural residences and existing developments. With the exception of the widened highway and grading associated with cut-and-fill slopes, few new structural elements are proposed as part of this alternative (such as signal or street lights, retaining walls, bridges, and signage). New signalized intersections would be added at CR 11H, CR 9E, and CR 7 (Charlotte Court). Cut-and-fill slopes required to accommodate the proposed project would range in height from 0 to 15 feet (average 4 feet). Landform changes associated with the Meander Alternative would be most noticeable in foreground and near middleground distance zones. Changes are expected to be subordinate to the landscape character in the setting, with low visual impacts after implementation of BMPs and mitigation measures.</p>	<p>BMPs and mitigation measures to reduce or eliminate potential visual resource impacts of construction of the Meander Alternative include the following:</p> <ol style="list-style-type: none"> 1. All disturbed slopes will be treated for erosion control and revegetated as appropriate, using native grasses and forbs. Shrubs will be included when feasible. 2. Sensitive grading techniques will blend grading with the natural terrain. Cut-and-fill slopes will be blended with the surrounding terrain to the greatest extent possible by means of slope rounding, layback, and warping techniques. BMPs for reducing slope modification and landform contrast will be developed individually for cut-and-fill slopes. Cut slopes are more easily modified than fill slopes by using slope layback, slope rounding, and slope warping techniques. These techniques will be implemented as follows: <ul style="list-style-type: none"> • Slope rounding: used at the top of all cuts except in rock. • Slope layback: degree of layback would influence motorists' visual impression and would be crucial in establishing vegetation and preventing erosion. With the gentle nature of the terrain in the project area, cut-and-fill slopes could be laid back up to a 4:1 ratio. • Slope warping: used to achieve a more natural-looking transition between two unlike surfaces by varying the pitch of the cut slopes. This provides greater variation in slope faces and allows for vegetation. This technique involves both vertical and horizontal slope rounding as a more natural extension of landform surface configurations. 3. Removal of native cottonwoods will be avoided wherever practicable, and revegetation BMPs implemented as noted in Section 3.17, Ecology.
Recreation	No resources or impacts have been identified.

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Hazardous Materials/Waste	Mitigation is required.
<p>Proximity of the LUST site at the Diamond Shamrock station and its hydrogeological upgradient location mean there is the potential that fuel-contaminated groundwater may have migrated to areas under the intersection of US 287 and SH 402 into the area of impact for the Meander Alternative. Utilities adjacent to SH 402 containing transformers would be relocated.</p>	<p>Ongoing review of semi-annual groundwater monitoring reports for the Diamond Shamrock LUST site is recommended. These reports will indicate the extent of groundwater contamination and potential offsite migration of contaminants. Pre-characterization of soils and groundwater for project personnel health and safety, materials management, and dewatering is required before disturbance of subsurface soils or groundwater by highway construction activities. Depending on the results of the pre-characterization test, coordination with various agencies and permitting may be required. If the test samples are deemed hazardous, a materials management plan will be developed describing the specifics of the hazardous waste permitting and compliance issues.</p> <p>If any of the transformers test positive for PCBs, the utility company of ownership will be responsible for handling and disposal.</p> <p>If additional hazardous materials are encountered before or during construction of the Meander Alternative, CDOT's <i>Section 250, Environmental Health and Safety Management</i> specification will be used. If necessary, a health and safety plan will be prepared and implemented to mitigate potential health and safety hazards to workers and the public.</p>
Utilities and Services	Mitigation is required.
<p>Proximity of major utilities to the existing SH 402 edge of pavement would necessitate relocation of some of these utilities. A 25-foot utility corridor easement on the south side of the Meander Alternative is proposed to accommodate existing south side utilities and new utilities. Utilities currently on the north side of SH 402 will not be moved into the 25-foot utility corridor easement along the south side. These utilities will be relocated further north and will remain within the SH 402 footprint defined by the 160-foot to 175-foot cross section. CDOT would purchase this easement and grant utility permits to the various utility companies that need to locate facilities within this easement. Utility relocation costs are estimated at approximately \$1 million, based on conceptual design. Final design will allow more exact cost estimates.</p>	<p>BMPs will be required to minimize any erosion or sediment disturbance that may be associated with utility construction within the CDOT easement. Coordination with the county and local utility owners will minimize disruption of service.</p>
Emergency Services	Mitigation is required.
<p>Better LOS associated with the addition of another travel lane, shoulders, and a center turn lane would be expected to improve traffic flow and response time.</p>	<p>Emergency services will be coordinated with the appropriate authorities during construction.</p>

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Historic Preservation	Mitigation is required.
<p>FHWA and CDOT, in consultation with the SHPO, concluded that this project widening will result in the following under Section 106 of the NRHP (see Appendix A for all Section 106 correspondence):</p> <ul style="list-style-type: none"> <input type="checkbox"/> No adverse effect <ul style="list-style-type: none"> • Big Thompson Manufacturing Ditch Segment (5LR10726.1) (see SHPO letter June 29, 2005, and again on September 13, 2006) • Propp Farm (5LR11247) (see SHPO letter August 22, 2006) • Weber Farm East (5LR11249) (see SHPO letter May 26, 2006, and again on September 13, 2006) • 5LR11242 Mountain View Farm (see SHPO letter August 22, 2006) <input type="checkbox"/> Adverse effect <ul style="list-style-type: none"> • Weber Farm (5LR10725) 	<p>The SHPO was consulted on the impacts of the project. The following mitigation is recommended.</p> <p>A Memorandum of Agreement to resolve adverse effects on this property was executed on February 9, 2007 (see Appendix A).</p> <p>The Weber Farm (5LR10725) was recorded prior to construction so that there is a permanent record of its present appearance and history. Recordation consisted of Level II Documentation as determined in consultation with the SHPO and according to the standards established in Office of Archaeology and Historic Preservation Form #1595. The SHPO accepted the Level II Documentation on May 7, 2007 (see Appendix A). Copies of the documentation also will be sent to a local archive designated by the SHPO.</p>
Archaeology	Mitigation could be required.
Implementation of the Meander Alternative would not affect any known archaeological or prehistoric properties.	If cultural materials are exposed, the CDOT senior staff archaeologist will be notified immediately to ensure evaluation as required by NHPA and all other applicable state and federal regulations.
Native American Consultation	No mitigation is required.
Sections 4(f) and 6(f)	Mitigation is required.
<p>Five Section 4(f) NRHP eligible historic properties have been identified for this project. Four will have no adverse effects under Section 106 of the NRHP and, therefore, will have <i>de minimis</i> impacts under Section 4(f) as per the FHWA <i>de minimis</i> finding of November 15, 2006:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Big Thompson Manufacturing Ditch Segment (5LR10726.1) <input type="checkbox"/> Propp Farm (5LR11247) <input type="checkbox"/> Weber Farm East (5LR11249) <input type="checkbox"/> Mountain View Farm (5LR11242) <p>A determination of adverse effect has been made for the Weber Farm (5LR10725) resulting in a use under Section 4(f).</p>	<p>Analysis of Avoidance Alternatives found that there were no prudent or feasible alternatives to the Meander Alternative. The following measures will be taken to minimize harm:</p> <p>Regarding the alignment of the Meander Alternative, measures to minimize crossing the Big Thompson Manufacturing Ditch Segment (5LR10726.1) include crossing a portion of the ditch that has low integrity. Those measures being used in association with the Meander Alternative to minimize harm to both the Weber Farm East (5LR11249) and the Propp Farm (5LR11247) result in the identification of only a utility easement across the front of these properties. Those measures being used in association with the Meander Alternative to minimize harm to the Mountain View Farm (5LR11242) include the avoidance of loss of any historic buildings. Only a modern feedlot frontage and bank of trees that is not part of the historic landscape will be affected.</p> <p>Even with a reduction in right-of-way through portions of the Weber Farm (5LR10725), there is no prudent and feasible action alternative that alleviates the use of this historic property. The SHPO was consulted and mitigation is described under Historic Preservation above.</p>
Noise	No mitigation is feasible or reasonable.
Air Quality	No mitigation is required.

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Ecology	Mitigation is required.
<p>Vegetation Permanent impacts on vegetation from the Meander Alternative were estimated at 23.7 acres. More acreage would be temporarily affected by construction activities but will be reclaimed after construction is completed in individual areas.</p> <p>Wildlife Few direct or indirect impacts on wildlife are associated with the Meander Alternative. Mitigation for impacts includes CDOT BMPs specified under Vegetation above. Clearing of vegetation should be done between September and April to reduce the effects on nesting activities and to comply with Migratory Bird Act requirements.</p>	<p>Vegetation replacement will be coordinated with landowners (city of Loveland and private property), and agricultural land mitigation will be based on crops or pastures disturbed for project implementation. Native species will be used to the greatest extent feasible, depending on designated land use, and will be specified for CDOT rights-of-way. Riparian trees will be replaced on a 1:1 basis; all other trees will be replaced when feasible.</p> <p>Techniques used by CDOT to stabilize and minimize erosion and to revegetate areas are outlined in detail in <i>Standard Specifications for Road and Bridge Construction</i> (1999), part of CDOT BMPs.</p> <p>The following measures are designed to reduce direct and indirect impacts on vegetation and to control soil erosion and noxious weeds:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Specification 207 covers salvaging and stockpiling topsoils for reuse in reclamation. No imported topsoil will be allowed. Topsoil heavily infested with noxious weeds will be removed from the site or buried under a minimum of 5 feet of fill. <input type="checkbox"/> Specification 208 directs contractors to permanently stabilize (that is, cover disturbed areas with final seed and mulch as indicated in plans) each 17-acre increment of the project immediately after grading is finished for that section. <input type="checkbox"/> Specifications 208 and 216 cover other mechanical erosion prevention methods (besides seeding, for example) and include use of soil retention blankets, placement of bales in drainages, use of silt fence, berms/diversions, slope drains, storm drain protection, check dams, channel stabilization, sediment traps or basins, and sandbag barriers. <input type="checkbox"/> Specification 212 covers seeding. <input type="checkbox"/> Specification 213 covers mulching seeded and other bare soil areas. <input type="checkbox"/> Specification 214 covers planting. <input type="checkbox"/> Specification 217 covers herbicide treatments, if needed for weed control. <p>A weed management plan has been developed and a weed survey was conducted to locate and map weed populations that may be spread by construction activities. Required construction contractor practices to minimize new weed infestations and control the spread of current weed populations are described in detail in <i>Appendix E, Noxious Weed Management Plan</i>.</p> <p>Practices include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> application of appropriate herbicides <input type="checkbox"/> requirement that construction vehicles arrive to the construction site free of soil or vegetative plant parts capable of containing noxious weed seed/plant parts <input type="checkbox"/> storage of weed-free topsoil and restriction on importation of topsoil <input type="checkbox"/> use of only weed-free mulch for reclamation in accordance with the Weed Free Forage Act, CRS Title 35, Article 27.5 <input type="checkbox"/> monitoring and care of revegetation sites will be accomplished by the ADPS permit requirements <input type="checkbox"/> restrictions on mowing and cutting weeds when seeds are ripe for dispersal

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
	In addition to the above required practices, sensitive areas such as riparian habitat, woodlands, and wetlands in the vicinity of project construction activities will be fenced to prevent vegetation damage from construction machinery. Construction access will be limited to fenced areas to curtail erosion, weed invasions, and damage to habitats.
TES Species	No mitigation is required.
Wetlands	Mitigation is required.
<p>Approximately 0.89 acre of wetlands will be permanently affected by fill actions to expand the roadbed, of which 0.45 acre is jurisdictional. An additional area that includes 5 feet at the edge of the cut-and-fill line was included to ensure that impacts were not underestimated.</p> <p>Wetlands associated with a stock pond (Site 2, 0.23 acre) and an alkali seep (Site 4, 0.44 acre) would incur the largest losses from construction of the Meander Alternative.</p> <p>Temporary impacts will total 0.09 acre, of which 0.06 acre is jurisdictional. Temporary impacts were calculated within a 10-foot area from the construction footprint (with the 5-foot addition). This area includes impacts from exclusion fence and silt fence construction, dismantling of fences, and culvert work. This area will be reclaimed.</p>	<p>CDOT BMPs include mitigation for all jurisdictional and nonjurisdictional wetlands permanently affected by construction projects, including replacement with created wetland areas or enhancement of existing areas to achieve a replacement-to-loss ratio of 1:1. Temporary disturbances of wetland areas can be mitigated by reclamation and revegetation with appropriate species. Topsoil from disturbed wetlands can be salvaged and reused for mitigation purposes unless infested with noxious weeds.</p> <p>Mitigation measures to offset impacts on wetlands during construction are addressed by BMPs that control erosion and minimize sedimentation in wetlands adjacent to construction sites.</p> <p>General mitigation techniques include replacement plantings for native riparian species, especially trees and shrubs, between the river terrace and the highway toe-of-fill.</p> <p>Should construction access roads and work pads be constructed in wetlands, protective material (fabric or hay) will be used, and topped with aggregate and/or soil fill. When construction is completed, the protective material will be removed with the goal of preserving the original wetland plant community. Any plants damaged will be replaced with species appropriate for the site.</p> <p>A number of potential wetland mitigation sites have been identified during the environmental assessment process. Possible locations along SH 402 include the vicinity of Sites 2, 3, and 6.</p> <p>Should it not be possible to create replacement sites in these areas, mitigation of wetland losses are proposed at the Big Thompson Ponds State Wildlife Area (SWA), which is approximately 0.5 mile north of SH 402 near I-25. The mitigation concepts for these sites are described in <i>Appendix B, Wetland Finding Report</i>.</p> <p>Along SH 402, wetlands could be expanded by approximately 0.45 acre to account for losses of jurisdictional wetlands. Plant species such as bulrush, burreed, and sedges are suggested for this area to increase the wetland community diversity from primarily cattail-dominated marsh.</p> <p>Nonjurisdictional wetland loss (approximately 0.44 acre) will be replaced at the Big Thompson Ponds SWA. Should potential wetland replacement sites along SH 402 not provide an adequate solution due to lack of landowner cooperation or lack of a suitable site, jurisdictional wetland loss can also be mitigated at the Big Thompson Ponds SWA.</p>

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
	<p>Because the project impacts on jurisdictional wetlands are less than 0.5 acre and affect nontidal waters-wetlands, a Nationwide Permit 14 is appropriate (Carey 2004). Finalization of wetland mitigation site location and design of mitigation are required to obtain the Nationwide Permit 14 approval. Monitoring of mitigation sites will be specified in the USCOE permit.</p>
<p>Floodplains</p>	<p>No mitigation is required.</p>
<p>Water Quality</p>	<p>Mitigation is required.</p>
<p>Potential impacts of the Meander Alternative include increased highway stormwater runoff because of a nearly 31-acre increased potential for highway runoff pollutants due to a projected 140 percent increase in traffic by year 2030. Increased highway runoff has the potential to impact the Big Thompson River with increased sediments, roadway deicers, metals from vehicle wear, particulates from vehicle exhaust, and petroleum products related to motor vehicles. The potential for hazardous materials spills would continue to exist with this alternative.</p> <p>The urban section of the Meander Alternative includes a complete curb and gutter drainage system and will increase highway runoff to the municipal sewer system that discharges to the Big Thompson River. However, the city's continuing drainage improvements and city and CDOT MS4 permit compliance and monitoring are expected to provide adequate protection to the river's water quality. Permit compliance includes mitigation requirements discussed in <i>Section 3.21.5</i>. In addition, the city's <i>Storm Drainage Criteria</i> and <i>Master Drainage Plan</i> include regional strategies to address growth and development effects on water quality.</p> <p>The rural section of the Meander Alternative will increase highway runoff to roadway ditches and swales. Some highway runoff in combination with other runoff will eventually discharge into the Big Thompson River. Because the rural section of SH 402 is included in the city's GMA, the city's <i>Storm Drainage Criteria</i> and <i>Master Drainage Plan</i> would be applicable tools to address growth and development effects on water quality. Larimer County's MS4 permit is currently in effect for the rural section, and the city and CDOT MS4 permits should also be considered for the rural section in light of future planning. Permit compliance includes mitigation requirements discussed in <i>Section 3.21.5</i>.</p> <p>With the continuation of city, county, and CDOT stormwater programs, the increased highway runoff associated with the Meander Alternative is not expected to have an impact on designated uses of the Big Thompson River in the project area. Mitigation activities required by CDPS permits and city and county land use codes will minimize water quality impacts due to increased highway runoff and the associated increase in highway runoff pollutants resulting from the Meander</p>	<p>City and county land use codes protect the river floodplain area from development activities. CDPS permits, city and county land use codes and storm drainage criteria, and CDOT guidance will generally specify mitigation activities. CDOT will comply with and obtain all necessary permits for protection of water resources, including CDPS and dewatering permits as necessary.</p> <p>Best management practices (BMPs) for temporary and permanent erosion control will be implemented with the construction of the Meander Alternative to minimize the impact of disturbance on receiving waters. The CDOT project design team will seek to minimize soil disturbance impacts on irrigation ditches and other drainages in the study area as part of the final design process. In addition, the 4:1 slopes created by placement of fill materials will be reseeded to reduce erosion and sedimentation.</p> <p>Long-term drainage from highway projects may require permanent BMPs under applicable permitting to protect receiving waters from erosion, sedimentation, and other contaminants. City, county, and CDOT MS4 permits currently cover the entire project corridor. In addition, the <i>City of Loveland Storm Drainage Criteria</i>, updated in 2002, will apply to the entire project corridor and is within the city's <i>Master Drainage Plan</i> area. Drainage criteria and MS4 permits (both city and CDOT) would generally require regional and/or onsite detention that includes 100 percent capture volume for the first 0.5 inch of runoff and 80 percent capture of total suspended solids to the "maximum extent practicable" (note that project-specific requirements will vary). Other permanent BMP options such as maintenance programs, sediment traps, and flow control structures might also be implemented under MS4 requirements.</p> <p>CDOT is obligated under its MS4 permit to "...develop and implement comprehensive planning procedures and controls to reduce the discharge of pollutants after construction is completed, from areas of new highway development and significant redevelopment and associated drainages..." Project plans for the Meander Alternative will be evaluated under the criteria of the MS4 for the need to include permanent stormwater BMPs. This review will occur as early as possible during the final design process and will be guided by the CDOT MS4 <i>New Development Program</i> guidelines and procedures and the <i>CDOT Erosion Control and Stormwater Quality Guide</i>. This guide provides design and maintenance criteria for permanent BMPs. Based on the results of the design review process and in coordination with the city and county, CDOT will incorporate permanent BMPs to</p>

Table 3-14. Mitigation Measures for Preferred Alternative—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Alternative.	<p>the maximum extent practicable and/or apply maintenance and administrative controls that provide equivalent protection for receiving waters. During final design, highway deicing and long-term maintenance and safety policy will be evaluated to determine the applicability of permanent controls.</p> <p>The fact that CDOT, the city of Loveland, and Larimer County are all MS4 entities with separate permits will warrant interagency coordination due to potential issues of overlapping authority. This coordination will help prevent duplication of effort. According to CDPHE, a permitted MS4 entity would not be required to impose their program requirements on CDOT projects due to the MS4's limited authority to regulate CDOT, nor would an MS4 be responsible for regulating activities outside its jurisdiction. Coordination among CDOT, the city, and the county will occur during the project design phase to determine specific permanent BMPs for the project.</p>
Geology	No mitigation is required.
Paleontology	No mitigation is required.
A scientifically significant fossil locality (extremely rare, second known occurrence in the Pierre Shale bedrock unit in western North America) has been discovered in this Pierre Shale exposure. No impacts on this fossil locality are expected to occur based on conceptual design for the Meander Alternative.	<p>If during design it is determined that any of the construction activities resulting from the proposed project will affect the Pierre Shale outcrop, CDOT will mitigate effects by preconstruction salvage of a representative sample of the fossils present at that locality.</p> <p>See Table 3-15 for construction mitigation.</p>
Construction Costs	No mitigation is required.

Table 3-15. Mitigation Measures for Construction—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Visual Resources	Mitigation is required.
Although construction impacts are short term, they usually result in some of the most noticeable visual contrast. Construction operations are highly visible activities: excavation, equipment, dust, and traffic are likely to attract the most attention. Impacts on visual resources during construction may result from removal of vegetation required to accommodate the proposed project, disrupting landscape frontages of residences and businesses.	The short-term highly visible construction equipment related activities cannot be mitigated. Dust impacts are discussed under <i>Section 3.25.6, Air Quality</i> . Access and traffic-related impacts are discussed under <i>Section 3.25.3, Access/Traffic Control/Emergency Services</i> . Permanent revegetation will be completed in disturbed areas and is further discussed in <i>Section 3.25.7, Ecology and Noxious Weeds</i> .
Hazardous Materials/Waste	Mitigation is required.
Use of heavy equipment during construction activities may result in inadvertent spillage or leakage of fuel, oil, grease, or chemicals.	Releases will be contained and disposed of in accordance with CDOT BMPs and all applicable laws and regulations. Known contaminated sites will be characterized and cleaned up before construction. Leaks and spills will be prevented, contained, and remediated according to all applicable laws and requirements. A Materials Management Plan may be required. If hazardous materials are encountered before or during construction, CDOT's <i>Section 250, Environmental Health and Safety Management</i> specification will be used. If necessary, a health and safety plan will be prepared and implemented to mitigate the potential health and safety hazards to workers and the public.

Table 3-15. Mitigation Measures for Construction—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Access/Traffic Control/Emergency Services	Mitigation is required.
Short-term disruption of residence and business access may occur during construction.	Although traffic movement along SH 402 may be affected during construction, these impacts will be controlled by application of standard highway construction practices for traffic management. Highway construction practices would be coordinated with local emergency service providers to ensure that construction does not disrupt emergency assistance.
Archaeology	Mitigation is required.
Buried cultural materials may be exposed during construction.	If cultural materials are exposed, the CDOT senior staff archaeologist will be notified immediately to ensure evaluation as required by NHPA and all other applicable state and federal regulations.
Noise	Mitigation is required.
Construction will generate noise and vibration from diesel-powered excavation equipment such as dump trucks and bulldozers, backup alarms on certain equipment, compressors, and pile drivers. Construction noise levels at offsite receptor locations would usually depend on the loudest piece or two of equipment operating at the same time. Noise levels from diesel-powered equipment range from 80 to 95 dB(A) at a distance of 50 feet. Impact equipment such as rock drills and pile drivers can generate even more noise.	Contractors will be encouraged to schedule construction activities during daytime hours to minimize and mitigate noise impacts. Weekend work will be discouraged, with the exception of activities best suited to off-peak hours. Temporary construction noise impacts will be reduced by requiring contractors to use well-maintained equipment (with particular attention to mufflers), adapt work hours, monitor noise during work hours, and make use of measures such as temporary noise barriers where applicable. The construction project will follow applicable sections of the <i>Ordinance Concerning Noise Levels in Unincorporated Larimer County</i> (No. 97-03).
Air Quality	Mitigation is required.
Possible construction impacts on air quality include fugitive dust that can result in elevated levels of particulates less than 10 microns without appropriate BMP mitigation.	BMPs will be implemented to reduce the project's potential for impact due to particulates less than 10 microns during construction, including: <input type="checkbox"/> spraying exposed soil and soil surfaces with water, wetting agents, and/or soil binding agents <input type="checkbox"/> covering trucks carrying fine materials <input type="checkbox"/> minimizing mud tracking from the construction area <input type="checkbox"/> controlling speed limits for trucks traveling on roads with high silt loading in the construction area

Table 3-15. Mitigation Measures for Construction—Meander Alternative

Resources and Impacts	Mitigation or Benefits
Ecology	Mitigation is required.
<p>Temporary impacts on species may include disturbances from construction activities, noise, and increased human presence in the area during construction.</p> <p>Bald eagles could use the adjacent riparian area for winter roosting. Some trees may be taken during project construction.</p>	<p>Techniques used by CDOT to stabilize and minimize erosion and to revegetate areas are outlined in detail in <i>Standard Specifications for Road and Bridge Construction</i> (1999), part of CDOT BMPs.</p> <p>The following measures are designed to reduce direct and indirect impacts on vegetation and to control soil erosion and noxious weeds:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Specification 207 covers salvaging and stockpiling topsoils for reuse in reclamation. No imported topsoil will be allowed. Topsoil heavily infested with noxious weeds will be removed from the site or buried under a minimum of 5 feet of fill. <input type="checkbox"/> Specification 208 directs contractors to permanently stabilize (that is, cover disturbed areas with final seed and mulch as indicated in plans) each 17-acre increment of the project immediately after grading is finished for that section. <input type="checkbox"/> Specifications 208 and 216 cover other mechanical erosion prevention methods (besides seeding, for example) and include use of soil coverings, placement of bales in drainages, use of silt fence, berms/diversions, slope drains, storm drain protection, check dams, channel stabilization, sediment traps or basins, and sandbag barriers. <input type="checkbox"/> Specification 212 covers seeding. <input type="checkbox"/> Specification 213 covers mulching seeded and other bare soil areas. <input type="checkbox"/> Specification 214 covers planting. <input type="checkbox"/> Specification 217 covers herbicide treatments, if needed for weed control. <p>A weed management plan has been developed, and a weed survey was conducted to locate and map weed populations that may be spread by construction activities. Required construction contractor practices to minimize new weed infestations and control the spread of current weed populations are described in detail in <i>Appendix E, Noxious Weed Management Plan</i>. Practices include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> application of appropriate herbicides <input type="checkbox"/> inspection of construction vehicles and use of designated equipment cleaning areas <input type="checkbox"/> storage of weed-free topsoil and restriction on importation of topsoil <input type="checkbox"/> use of only weed-free mulch for reclamation in accordance with the Weed Free Forage Act, CRS Title 35, Article 27.5 <input type="checkbox"/> monitoring and care of revegetation sites for three years <input type="checkbox"/> restrictions on mowing and cutting when seeds are ripe for dispersal <p>In addition to the above required practices, sensitive areas such as riparian habitat, woodlands, and wetlands in the vicinity of project construction activities will be fenced to prevent vegetation damage from construction machinery. Construction access will be limited to fenced areas to curtail erosion, weed invasions, and damage to habitats.</p> <p>Additional evaluations and surveys, if warranted, will be conducted prior to construction for any new TES species identified subsequent to the current study.</p>

Table 3-15. Mitigation Measures for Construction—Meander Alternative

Resources and Impacts	Mitigation or Benefits
	<p>Should bald or golden eagles be observed at that time, recommendations to avoid or minimize impacts are as follows:</p> <ol style="list-style-type: none"> 1. Avoid unnecessary damage to the riparian area, especially cutting large trees. 2. If bald eagles frequent the area, construction should be scheduled between March 1 and November 30 to avoid disturbance. If this is not possible, then follow #3. 3. Avoid harassment of the eagle from project-generated noise and activity during the winter months. Between December 1 and April 30, if an eagle is observed perching or roosting in the riparian area, the USFWS recommends a buffer of 0.125 to 0.25 miles depending on the line of sight.
TES Species	Mitigation is not required.
Wetlands	Mitigation is required.
<p>Approximately 0.89 acre of wetlands will be permanently affected by fill actions to expand the roadbed, of which 0.45 acre is jurisdictional. An additional area that includes 5 feet at the edge of the cut-and-fill line was included to ensure that impacts were not underestimated.</p> <p>Temporary impacts will total 0.09 acre, of which 0.06 acre is jurisdictional. Temporary impacts were calculated within a 10-foot area from the construction footprint (with the 5-foot addition). This area includes impacts from exclusion fence and silt fence construction, dismantling of fences, and culvert work. This area will be reclaimed.</p>	<p>Because the project impacts on jurisdictional wetlands are less than 0.5 acre, and affect nontidal waters-wetlands, a Nationwide Permit 14 is appropriate (Carey 2004). Construction measures must conform to the specifications and conditions of the 404 permit issued by USCOE. Site monitoring will occur as specified in the 404 permit to ensure that wetland communities are developing as required by the permit.</p> <p>Applying CDOT BMPs to construction operations will help minimize construction impacts on wetlands, including the following BMPs in <i>Standard Specifications for Road and Bridge Construction</i>, section 107.25 (Water Quality) and section 208 (Erosion Control):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Perimeter fencing will be installed to prevent access to wetlands, silt fencing will be installed to protect wetlands from sedimentation during construction, and erosion control techniques will be used whenever possible to prevent siltation and sedimentation <input type="checkbox"/> Should construction access roads and work pads be constructed in wetlands, protective material (fabric or hay) will be used, and topped with aggregate and/or soil fill. When construction is completed, the protective material will be removed with the goal of preserving the original wetland plant community. Any plants damaged will be replaced with species appropriate for the site. <input type="checkbox"/> The area adjacent to the toe-of-fill will be reclaimed when erosion control materials and fencing are removed. <input type="checkbox"/> Equipment maintenance areas and fueling locations will be at least 100 feet outside wetlands. Berms will be used and protective (absorbent) material will be available to prevent spills from reaching wetland areas.

Table 3-15. Mitigation Measures for Construction—Meander Alternative

Resources and Impacts	Mitigation or Benefits
<p style="text-align: center;">Water Quality</p>	<p style="text-align: center;">Mitigation is required.</p>
<p>Potential impacts on water quality include sedimentation associated with erosion due to construction stormwater runoff. Erosion is prevalent when the surface vegetation is disturbed as required for roadway widening.</p>	<p>Temporary erosion control and stormwater measures will be implemented during construction activities. Construction mitigation activities are specified under CDPS permitting, city and county requirements for developments, and CDOT guidelines. CDOT will obtain an NPDES Construction Discharge Permit (CDPS construction permit) from CDPHE for the project.</p> <p>To comply with CDOT's MS4 CDPS permit and the CDPS construction permit, CDOT requires the development and implementation of a Stormwater Management Plan (SWMP) and an Inspection and Maintenance Program. The SWMP is intended to ensure that the water quality of receiving waters is protected during construction. The SWMP protects receiving waters by including BMPs necessary to provide for erosion, sediment, and general pollution prevention controls.</p> <p>CDOT will develop a SWMP that details BMPs used for construction during the design phase. The SWMP will be prepared in accordance with the <i>CDOT Erosion Control and Stormwater Quality Guide, CDOT Standard Specifications 107.25-Water Quality and 208-Erosion Control</i>. Erosion controls will be designed and implemented to minimize or eliminate downgradient sedimentation and siltation.</p> <p>Required BMPs include:</p> <ul style="list-style-type: none"> <input type="checkbox"/> staging construction to reduce disturbances due to storage, use, and maintenance of construction equipment <input type="checkbox"/> minimizing access to the construction area <input type="checkbox"/> temporary seeding of disturbed areas <input type="checkbox"/> early final grading and phased seeding of completed areas during construction <input type="checkbox"/> establishing clean water diversion upgradient of the construction areas <input type="checkbox"/> establishing water quality ponds before construction to intercept construction runoff <input type="checkbox"/> using soil blankets or mulch/mulch tackifier on temporarily disturbed slopes or slopes that cannot be seeded due to seasonal constraints
<p style="text-align: center;">Geology and Soils</p>	<p style="text-align: center;">No mitigation is required.</p>
<p style="text-align: center;">Paleontology</p>	<p style="text-align: center;">Mitigation is required.</p>
<p>Important fossils are associated with local outcrops of Pierre Shale and may be found during construction activities in Pierre Shale outcrops.</p>	<p>CDOT's staff paleontologist will examine project design plans to estimate the extent of disturbance of the Pierre Shale, if any, that may occur during construction. Preconstruction mitigation will be stipulated as appropriate. If any subsurface bones or other fossils are found in the corridor during construction, the CDOT staff paleontologist will be notified immediately to assess their significance.</p>