3.15 WATER QUALITY

This section discusses water resources in the project area, existing water quality, and potential impacts to water resources from the No Action Alternative, Existing I-25 Alternative, and Modified I-25 Alternative.

3.15.1 Water Quality Regulations Affecting the Project

The National Pollutant Discharge Elimination System (NPDES) program was established by the U.S. Environmental Protection Agency (EPA) under the Clean Water Act (CWA) to control the discharge of pollutants into waters of the United States. Under the NPDES program, Phase I and Phase II Stormwater Regulations require CDOT to acquire a NPDES permit for its stormwater discharges. The EPA delegates the administration of the NPDES permit program in Colorado to the Colorado Department of Public Health and Environment (CDPHE) under the Colorado Discharge Permit System (CDPS).

Under the CDPS, CDOT has been issued two types of permits:

- CDOT Municipal Separate Storm Sewer Systems (MS4) Discharge Permit
- CDPS General Permit for Stormwater Discharges Associated with Construction Activities

The CDOT MS4 permit covers "state and interstate highways and their rights-of-way (ROW) within the jurisdictional boundary of CDOT served by, or otherwise contributing to discharges to state waters from, municipal separate storm sewers owned or operated by CDOT." As a requirement of the MS4 permit, CDOT is required to "develop and implement a program that ensures that new highway projects and significant highway modifications are reviewed for the need to include permanent stormwater best management practices." In response to this requirement, CDOT established the New Development and Redevelopment Program. According to the criteria established under this program, the New Pueblo Freeway project is a significant highway modification requiring permanent best management practices (BMPs), such as grass swales or detention ponds.

In addition, the New Pueblo Freeway project is within the jurisdictions of the City of Pueblo and Pueblo County, which have also obtained MS4 permits under the CDPS; therefore, CDOT is required to comply with the requirements of the City and County MS4 permits if they are more stringent than CDOT's requirements.

Under the CDPS General Permit for Stormwater Discharges Associated with Construction Activities, CDOT is required to prepare and implement a Stormwater Management Plan (SWMP) to address typical construction issues such as erosion and sediment control. In addition to the SWMP, a construction dewatering discharge permit may be required for groundwater dewatering activities. The post-construction requirements are also governed by CDOT's New Development and Redevelopment Program, which requires consideration of mechanisms to protect water quality on a long-term basis after the construction phase of a project is complete.

The CDPHE's Colorado Water Quality Control Commission is responsible for the establishment of the acceptable water quality standards by water body segment, and standards are assigned to preserve the beneficial uses or improve the water quality of the stream segments. The Water Quality Control Commission is required through Section 303(d) of the CWA to develop a list of water bodies within the state that are not meeting water quality standards or have impaired uses. These waters were identified in Colorado State Regulation 93, *Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List*, updated in April 2010 (CDPHE, 2004). Use classifications for water body segments potentially impacted by the New Pueblo Freeway project are defined in Colorado State Regulation 32, *Classification and Numeric Standards for Arkansas River Basin*, updated in November 2010 (CDPHE, 1982), and are summarized in Exhibit 3.15-1.

3.15.2 Affected Environment

Pollutants entering streams, rivers, and lakes impact the water quality of those water bodies. Pollutant-loaded stormwater runoff from roadways impacts receiving water bodies. Levels of pollutants in roadway runoff are influenced by many factors such as meteorological, hydrological, and geological conditions and land use practices. The quantity of flow is characterized by amount, frequency, intensity, duration, and pattern of precipitation. Increased traffic volumes, congestion, and impervious roadway surfaces lead

to an increase in highway pollutant levels in stormwater runoff. Infrequent precipitation also results in buildup of higher pollutant concentrations (CH2M HILL 2005g; 2011c).

Exhibit 3.15-2 lists potential pollutants resulting from transportation projects that may impact water resources.

EXHIBIT 3.15-1
Potentially Affected Water Quality Segments in Upper Arkansas and Fountain Creek Sub-basins

Stream	Segment [1]	Segment Description	Water Quality Designations and Use Classifications [2]
Fountain Creek	2b, Fountain Creek Basin	Mainstem of Fountain Creek from a point immediately above the State Highway 47 Bridge to the confluence with the Arkansas River	Warm Water Aquatic Life, Class 2 Recreation, Class E Water Supply Agriculture
Arkansas River	6, Middle Arkansas River Basin	Mainstem of the Saint Charles River from a point immediately above the CF&I diversion canal near Burnt Mill to the confluence with the Arkansas River	Use Protected Warm Water Aquatic Life, Class 2 Recreation, Class E Water Supply Agriculture
Arkansas River	1a, Lower Arkansas River Basin	Mainstem of the Arkansas River from a point immediately above the confluence with Fountain Creek to immediately above the Colorado Canal headgate near Avondale	Use Protected Warm Water Aquatic Life, Class 2 Recreation, Class E Water Supply Agriculture
Tributaries to Fountain Creek	4, Fountain Creek Basin	All tributaries to Fountain Creek that are not within the boundaries of National Forest or Air Force Academy lands, including all wetlands, lakes, and reservoirs, from a point immediately above the confluence with Monument Creek to the confluence with the Arkansas River, except for the specific listings in segments 5, 6, 7a, and 7b.	Use Protected Warm Water Aquatic Life, Class 2 Recreation, Class E Agriculture

Source: CH2M HILL, 2005g; 2011c.

[1] Segment numbering per the Colorado Department of Public Health and Environment's Colorado Water Quality Control Commission.

[2] Water Quality Designation and Use Classification terminology is defined in Colorado State Regulation 31, *The Basic Standards and Methodologies for Surface Water*, dated January 1, 2011. Specific uses are defined as follows:

Use Protected: These surface waters have been determined by the Water Quality Control Commission to not warrant the special protection provided by the outstanding waters designation or the antidegradation review process.

Warm Water Aquatic Life, Class 2: These surface waters are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

Recreation, Class E: These surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.

Water Supply: These surface waters are suitable or intended to become suitable for potable water supplies.

Agriculture: These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and are not hazardous as drinking water for livestock.

EXHIBIT 3.15-2
Potential Contaminants from Transportation Projects that may Impact Water Resources

Source	Pollutants
CONSTRUCTION PHASE	
Adhesives	Phenols, formaldehydes, asbestos, benzene, and naphthalene
Cleaners	Metals, acids, alkali, and chromium
Plumbing	Lead, copper, zinc, and tin
Painting	VOCs, metals, phenolics, and mineral spirits
Wood	BOD, formaldehyde, copper, and creosote
Demolition	Asbestos, aluminum, zinc, dusts, lead
Masonry/concrete demolition	Acids, sediment, metals, and asbestos
Yard operations and maintenance	Oils, grease, coolants, benzene and derivatives, vinyl chloride, metals, BOD, sediment, disinfectants, sodium arsenate, dinitro compounds, rodenticides, and insecticides
Landscaping and earthmoving	Pesticides, herbicides, fertilizers, BOD, alkali, metals, sulfur, and aluminum sulfate
Materials storage	Spills, leaks, dust, and sediment
OPERATION PHASE	
Leaks, spills, accidents	Oil, gasoline, diesel, grease, VOCs, chemicals, and other potentially hazardous materials
Vehicle traffic	Oils, grease, gasoline, diesel, benzene and derivatives, aromatic hydrocarbons, coolants, rust (iron), heavy metals (lead, zinc, iron, chromium, cadmium, nickel, copper), rubber, and asbestos
Winter sanding	Sediment
Deicing	Calcium, sodium, magnesium, and chloride
Landscape maintenance	Herbicides, pesticides, fertilizers, BOD, alkali, metals, sulfur, and aluminum sulfate
Adhesives	Phenols, formaldehydes, asbestos, benzene, and naphthalene
Cleaners	Metals, acids, alkali, and chromium
Painting	VOCs, metals, phenolics, and mineral spirits

Source: CDOT, 2008.
BOD = biological oxygen demand VOC = volatile organic compound

The major water bodies located in the project area are the Arkansas River, Fountain Creek, and Runyon Lake. Smaller water bodies include Salt Creek, Saint Charles Reservoir Nos. 1 and 2, Bessemer Ditch, and several unnamed ephemeral (intermittent depending on precipitation) tributaries that cross under I-25. These water bodies are all part of the Arkansas River Basin. Within the Arkansas River Basin, the project area is located in the Upper Arkansas River watershed and in the lower Fountain Creek watershed. The Upper Arkansas watershed occupies approximately 3,671 acres, and the Fountain Creek watershed occupies approximately 2,595 acres. The City of Pueblo occupies the lower end of the Fountain Creek watershed and the lower end of the Upper Arkansas watershed. The Water Quality Control Commission divides watersheds into “segments” for the purpose of classifying surface water uses and establishing water quality standards. Exhibit 3.15-1 lists the segments of each watershed that would be potentially affected by the New Pueblo Freeway project.

The project area is also located within the Lower Groundwater Basin. Agriculture is the primary use of groundwater in the Lower Groundwater Basin, although there are some domestic and municipal uses as well. Generally, the groundwater quality of the Lower Groundwater Basin degrades downstream, from good in the upper portion to poor in the lower portion, and is only marginally useful for irrigation and livestock watering due to salinity. Limited groundwater monitoring data were available for the project area.

Domestic-use water supplies that may be potentially impacted are the St. Charles Mesa Water District and, to a lesser extent, Pueblo Water Works. The source of water for the St. Charles Mesa Water District is a combination of surface water from the Arkansas River and Bessemer Ditch, as well as groundwater. Sources of drinking water provided by Pueblo Water Works include rivers, lakes, streams, and reservoirs originating in the mountains near Leadville, Colorado. The majority of point-source pollutants (discernible, confined, and discrete pollutant sources) near Pueblo are located outside the project area and, therefore, would not be impacted by the project.

The following stream segments in the project area are included in the Colorado State Regulation 93, *Colorado's Section 303(d) List of Water-Quality-Limited Segments Requiring Total Maximum Daily Loads* (CDPHE, 2004) (as of March 2010):

- Fountain Creek Basin Segment 2b
- Lower Arkansas River Basin Segment 1a
- Middle Arkansas River Basin Segment 6
- Fountain Creek Basin Segment 4

These segments have been listed because the existing level of dissolved selenium, dissolved sulfate, or *E. coli* is higher than the State standard; however, none of these constituents has been shown as a pollutant of concern associated with highway runoff by CDPHE. These stream segments have been listed as impaired, but there are no Total Maximum Daily Load (TMDL) requirements for these segments.

Further details on water quality in the project area may be found in the *Water Quality Technical Memorandum, New Pueblo Freeway* (CH2M HILL, 2005g; 2011c).

3.15.3 Methodology

For the proposed New Pueblo Freeway project, the FHWA Driscoll Model was used to estimate potential water quality impacts from pollutants associated with roadway runoff. Site-specific information is entered into the computer model, and the model computes the magnitude and frequency of concentrations of pollutants. The model compares the once-in-3-year concentration to the acute toxicity value defined by the EPA. The comparison indicates whether a water quality problem is likely.

A calculation was performed in accordance with methodology contained in the *Federal Highway Administration Evaluation and Management of Highway Runoff* (FHWA, 1996) to determine the total annual amount of pollutants (annual mass load) that could be expected as a result of the project.

3.15.4 Environmental Consequences

3.15.4.1 No Action Alternative

Under the No Action Alternative, water quality in the project area would continue to degrade due to the projected increase in highway traffic volumes. Traffic volume increases in the project area would result in increased congestion along I-25, which would increase contaminant concentrations in the highway runoff being released into area surface waters, further degrading water quality in the project area. In addition, there are no structural water quality facilities in place to address the existing and expected increase in future pollutant loadings from I-25 in the Pueblo area. As a result, further water quality degradation would be anticipated in the Arkansas River and Fountain Creek, as well as in the surrounding wetlands and other nearby surface waters.

3.15.4.2 Build Alternatives

Water quality impacts are discussed in order of three segments (1, 2, and 3), a departure from the North Area, South Area, and Central Area discussed in other resource sections. Exhibit 3.15-3 presents the geographic areas for the water quality analysis segments compared to the North, South, and Central study areas.

EXHIBIT 3.15-3
Comparison of Segments versus Areas in the Water Quality Assessment

Segments	Areas
1: SH 47 (milepost 102) to 1st Street	North: 29th Street (milepost 101) to Ilex
2: 1st Street to Northern Avenue	Central: Ilex Street to Nevada Avenue
3: Northern Avenue to south of Pueblo Boulevard (milepost 94)	South: Nevada Avenue to Pueblo Boulevard (milepost 94)

Source: CDOT Project Team, 2010.

The increase in impervious surface (as well as several other parameters, such as the mean annual rainfall volume and the average number of storm events per year) was used to predict the increase in pollutant loads associated with the additional highway runoff created by the Build Alternatives. In general, pollutant loads increased in direct relation to the increase in impervious surface.

Prior to mitigation, pollutants found in highway runoff would be expected to increase over existing levels between a range of approximately 72 percent (Segment 1) and 86 percent (Segment 2) under the Existing I-25 Alternative. Pollutants would be expected to increase between a range of approximately 65 percent (Segment 3) to 91 percent (Segment 2) over existing levels under the Modified I-25 Alternative. The largest increase in pollutants is estimated in Segment 2 for both the Existing I-25 Alternative and the Modified I-25 Alternative (86 and 91 percent, respectively).

Pollutants not associated with highway runoff (such as selenium) would continue to impact water quality unless measures are taken to limit the amount of pollutants entering area receiving waters.

Given the increase in pollutant loads resulting from the additional impervious surfaces, there would be a potential for pollutant levels to be elevated above water quality standards during storm events, without mitigation. Although mass pollutant loads are predicted to increase both during and after construction, implementation of the recommended BMPs discussed in Section 3.15.4 is expected to reduce the amount of pollutants actually entering area receiving waters. As a result, the impacts to area water quality are expected to be minimal.

Construction activities for the Build Alternatives may result in erosion and sediment control issues if earthwork for paving or construction of structures results in bare surfaces. These surfaces are highly susceptible to erosion from rain and wind because they lack the protection that established vegetation provides. Erosion and sediment control issues during construction will be managed through the development and implementation of a site-specific SWMP (see Section 3.15.4).

Exhibit 3.15-4 provides a summary of the quantitative analysis conducted to determine the increase in annual mass loading rates from the project area for each project segment and alternative. Annual mass loading results are expressed in kilograms per year. Site characteristics and values for some parameters from FHWA were used directly in equations to determine discharge flow rate, runoff volume, and pollutant mass loading rate. Loading analysis has shown that there is a potential for lead, copper, and zinc concentrations to be elevated above the water quality standard during storm events under both Build Alternatives without mitigation.

A segment-by-segment discussion of the impacts of the additional pollutant loadings to the receiving streams listed in Exhibit 3.15-4 is provided below.

Segment 1

The alignment of I-25 is the same under both Build Alternatives in Segment 1, with an approximate increase of 26 acres of impervious surface (from 36 to 62 acres, a 72 percent increase) as a result of I-25 improvements. As such, the increase in urban runoff and associated pollutants to Fountain Creek would also increase by 72 percent without mitigation.

EXHIBIT 3.15-4
Expected Annual Mass Loading of Pollutants from Highway Runoff for the No Action Alternative and Build Alternatives Prior to Mitigation

Pollutants	Parameters Analyzed							
	Total Suspended Solids	Total Organic Carbon	Chemical Oxygen Demand	Nitrate + Nitrite	Phosphorus (as PO_4)	Total Copper	Total Lead	Total Zinc
Average Event Mean Concentration[1] (mg/L)	174	31	140	0.93	0.49	0.066	0.49	0.40
ANNUAL MASS LOADING OF NO ACTION ALTERNATIVE (KG/YR)								
Segment 1 (kg/yr)	8,379	1,493	6,741	45	24	3	24	19
Segment 2 (kg/yr)	5,201	927	4,185	28	15	2	15	12
Segment 3 (kg/yr)	8,661	1,543	6,969	46	24	3	24	20
ANNUAL MASS LOADING OF EXISTING I-25 ALTERNATIVE (KG/YR)								
Segment 1	14,686	2,617	11,816	78	41	6	41	34
Segment 2	9,720	1,732	7,821	52	27	4	27	22
Segment 3	15,204	2,709	12,233	81	43	6	43	35
ANNUAL MASS LOADING OF MODIFIED I-25 ALTERNATIVE (KG/YR)								
Segment 1	14,686	2,617	11,816	78	41	6	41	34
Segment 2	9,979	1,778	8,029	53	28	4	28	23
Segment 3	14,310	2,549	11,514	76	40	5	40	33

[1] Source: FHWA, 1996.
ha = hectares
kg/yr = kilograms per year
I-25 = Interstate 25
mg/L = milligrams per liter

Segment 2

Existing I-25 Alternative

The Existing I-25 Alternative would increase the amount of impervious area in Segment 2 by approximately 19 acres, from 22 acres to 41 acres. This 86-percent increase in impervious surface also represents an approximate 86-percent increase in pollutant levels without mitigation.

Modified I-25 Alternative

The Modified I-25 Alternative would increase the amount of impervious area in Segment 2 by approximately 20 acres, from 22 acres to 42 acres. This 91-percent increase in impervious surface also represents an approximate 91-percent increase in pollutant levels without mitigation.

Segment 3

Existing I-25 Alternative

The Existing I-25 Alternative would increase the amount of impervious area in Segment 3 by approximately 28 acres, from 37 acres to 65 acres. This 76-percent increase in impervious surface also represents an approximate 76-percent increase in pollutant levels without mitigation.

Modified I-25 Alternative

The Modified I-25 Alternative would increase the amount of impervious area in Segment 3 by approximately 24 acres, from 37 acres to 61 acres. This 65-percent increase in impervious surface also represents an approximate 65-percent increase in pollutant levels without mitigation.

3.15.4.3 Indirect Effects

Construction of either Build Alternative would result in an increase in stormwater runoff from additional impervious areas. Mitigation of runoff through the BMPs that are part of the design would limit the indirect effect on water resources. With increased stormwater runoff treatment, a net indirect benefit might be achieved over time for water quality in the project area.

3.15.5 Mitigation

Unless otherwise specified, the following mitigations apply to both the Existing I-25 Alternative and the Modified I-25 Alternative.

The mitigation measures proposed under the Build Alternatives would capture and treat 100 percent of all stormwater runoff from roadway and impervious surfaces within the CDOT ROW. The percent of pollutant removal from captured roadway runoff will be calculated during final design when structural BMPs are determined. BMPs will be selected such that there is no increase in pollutant loading as a result of the New Pueblo Freeway project.

- CDOT will construct water quality ponds adjacent to I-25 in compliance with the CDPS MS4 permit requirements to enhance water quality in the project area; 17 ponds will be constructed under the Existing I-25 Alternative and 16 ponds will be constructed under the Modified I-25 Alternative. The sizing and design of these ponds will be refined during final design. Ownership and maintenance of the water quality ponds is detailed in the Memorandum of Understanding signed between CDOT and the City in March 2010 (see Appendix F). Under the Modified I-25 Alternative, one of the detention ponds is designed to capture runoff solely from City streets.
- Pond volumes will be based on detaining and treating only the flows originating within the project area (onsite basins and side streets), while allowing the offsite basins to pass through undetained. Stormwater runoff from offsite basins will be conveyed through the proposed drainage system without flow attenuation or stormwater quality treatment. Allowable release rates also will affect pond volumes. Although criteria allows for the release at pre-development rates, preliminary design assumes release at the more conservative historic rates; the size of the ponds will be refined during final design, which may result in smaller pond sizes.

  The determination of which local streets contribute flow to the drainage system was based on the proposed roadway grades. All streets that could drain into the system without excessive pipe depths were accepted into the system.
- CDOT will develop Tier 1 BMPs because the project is considered a significant highway modification and the receiving waters are classified as sensitive waters (listed on 303(d) high quality use classification or existence of threatened or endangered species). Tier 1 BMPs require that 100 percent of the required water quality capture volume be provided for by the BMPs.
- CDOT will design and construct permanent BMPs (such as culverts, riprap, and catch basins) within the guidelines set by the CDOT New Development and Redevelopment Program. All highway runoff will be collected and treated to the level required by the New Development and Redevelopment Program. An adequate storm drainage system for the existing and proposed improvements near the interchange will be developed to prevent high levels of sediment and pollutants from being carried into wetlands, natural drainageways, and irrigation ditches. Devices such as catch basin insert filtration systems will be incorporated for lead, zinc, copper, and selenium removal. These BMPs could prevent impacts to aquatic life through bioaccumulation of metals. Suitable permanent BMPs include retention and detention ponds with sedimentation facilities, enlarged detention basins, constructed wetlands, grass swales and buffers, and innovative vault-type structures where space is limited. These permanent BMPs can be constructed, where appropriate, to intercept, divert, and collect surface runoff and convey accumulated runoff to an acceptable outlet point (see BMP EC 11 in the *CDOT Erosion Control and Stormwater Quality Guide* [ECSQG] [CDOT, 2002].
- CDOT will use an interconnected system of 14 onsite dry detention facilities and 10 offsite basins for reducing peak runoff flow rates and will utilize a conveyance network for routing flows along their existing flow paths either to the Arkansas River or Fountain Creek. Because Tier 1 BMPs are required, extended detention basins were selected because they can be used in conjunction with a peak flow control drainage system.
- Non-structural BMPs (such as pesticide and fertilizer application guidelines) and anti-icing and deicing guidelines will be employed to improve water quality in conjunction with BMP implementation. Other non-structural BMPs (such as water quality signage adjacent to the receiving streams and irrigation ditches) will be considered for implementation.
- In accordance with CDOT's CDPS General Permit for Stormwater Discharges Associated with Construction Activities, the following BMPs will be employed to mitigate both short-term and permanent impacts to water bodies as a result of the proposed project:
  - CDOT will adhere to NPDES regulations for stormwater quality, including obtaining a CDPS stormwater construction discharge permit and Section 402 dewatering permit, during construction.

- All work performed on the project will be performed in accordance with appropriate CDOT specifications.
- CDOT will develop a SWMP in accordance with appropriate CDOT specifications that will detail the BMPs to be used for construction. Specific BMPs from the *CDOT ECSQG* (CDOT, 2002) are outlined below:
  - CDOT will revegetate adjacent disturbed slopes with native plant species to protect exposed soils from erosion (see BMP EC 1, ECSQG). This will be used for temporary or permanent cover for disturbed areas and to improve wildlife habitat and aesthetics.
  - Where temporary or permanent seeding operations are not feasible due to seasonal constraints, CDOT will stabilize slopes with topsoil, soil amendment, seed, mulch, or other CDOT-approved methods to protect soils and slopes from erosion, thereby preventing adverse impacts to aquatic and wildlife habitat (see BMP EC 2, ECSQG).
  - CDOT will use erosion control (that is, soil retention) blankets as appropriate on newly seeded slopes to control erosion and promote the establishment of vegetation as well as protect channels against erosion from concentrated runoff (see BMP EC 5, ECSQG).
  - Where appropriate, CDOT will utilize temporary berms or diversions to protect the sensitive areas in the project area (see BMP EC 8, ECSQG) from impacts related to concentrated flows. Additional erosion control measures such as silt fences and erosion bales can be implemented, but with care and not as the sole erosion control system at the construction site. Erosion bales will be free of noxious weeds (see BMP SC 1 and 3, ECSQG).
  - CDOT will use erosion bales as sediment barriers and filters along the toe-of-fills adjacent to surface waterways and drainages and at the cross-drain inlets, where appropriate, with additional reinforcement and in conjunction with other erosion control measures such as temporary berms (see BMP SC 1, ECSQG).
  - Where appropriate, CDOT will use silt fences to intercept sediment-laden runoff before it enters a water body (such as a wetland), but only in conjunction with other erosion control measures such as temporary berms (see BMP SC 3, ECSQG).
  - Where appropriate, CDOT will use slope drains (or embankment protectors) to convey concentrated runoff from the top to the bottom of disturbed slopes (see BMP EC 7, ECSQG). Slope and cross drain outlets will be constructed to trap sediment.
  - CDOT will use check dams, where appropriate, to slow the velocity of water through roadside ditches and swales, thereby deterring erosion and harmful impacts to aquatic life (see BMP EC 9, ECSQG).