

project area between the South Platte River and Santa Fe Drive, although the portion that crosses the project area is mostly underground. City Ditch provides irrigation water to Denver's city parks.

Other large water bodies in the vicinity of project area include Chatfield Reservoir, created by an impoundment of the South Platte River, McClellan Reservoir, created by an impoundment of Dad Clark Gulch, and several lakes within the South Platte floodplain that have been created by gravel mining. Smaller bodies of open water in the project area include agricultural irrigation and detention ponds.

Areas of open water include the channels of streams and the High Line Canal, a gravel mine lake, and an apparently permanently ponded detention area, totaling 2.66 acres. These locations are also shown in **Figure 3-39**.

Wetland Functions

Wetland functions are the physical, chemical, and biological processes or attributes vital to the integrity of wetland systems. Wetland functions typically are related to water quality, biodiversity, and hydrological and ecological processes. All wetlands do not perform all functions and wetlands do not perform functions equally.

Wetland values, such as recreation and uniqueness, are attributes not necessarily important to the integrity of wetland systems. However, these attributes are perceived as being valuable to society. Similar to functions, all wetlands do not provide all values and the values that are provided are not provided equally.

Functions of wetlands in the project area were evaluated qualitatively based on best professional judgment. Assignment of functions and values considered the size, quality, and hydrologic aspects of the wetland site. The position of the wetland in the landscape (e.g., in an isolated

depression, on a slope, or adjacent to a stream or lake) was also considered.

Functions and values assessed include those listed in CDOT's Mitigation Site Selection Form. Functions evaluated include groundwater recharge/discharge, flood flow alteration, streambank stabilization, sediment/toxin retention, nutrient removal/transformation, production export, wildlife habitat and/or travel corridor, fish and/or shellfish habitat, and threatened and endangered species concerns. Values evaluated include recreation, education and/or scientific value, uniqueness or heritage value, visual quality and aesthetics, and economic benefits. For each wetland, ratings of low, moderate, high, or non-applicable were assigned for each function and value.

The highest-rated wetlands in the project area are palustrine wetlands that occur along streams and are supported by surface water. Although some of these wetlands include plant species considered noxious weeds (e.g., Canada thistle), they have a high rating for general wildlife habitat because streams and rivers and their associated riparian communities provide diverse habitat types for a variety of species. Ratings are moderate to low for other functions and values because of the restricted nature of the wetlands. For example, flood flow alteration and stream bank stabilization are low in areas with a wetland fringe only one or two feet wide.

Palustrine wetlands located in roadside ditches have low ratings for all functions and values because of their location adjacent to C-470, their generally small size, and high levels of disturbance associated with highway maintenance activities.

3.4.3.2 Environmental Consequences

During the development and design of proposed alternatives, effects to wetlands and waters of the U.S. were avoided and minimized to the extent practicable. Because wetland locations within the project area were identified early in the study process, and delineated prior to the

completion of quantitative screening, measures were taken to avoid wetland effects by varying widths in sensitive areas and using retaining walls to limit encroachment into wetlands where total avoidance was not possible. The sections below discuss potential effects to wetlands and waters of the U.S. for the three alternatives. For more information on wetland effects and mitigation, see the Wetland Finding, located in **Appendix C**.

No-Action Alternative

The No-Action Alternative would not result in any direct effects to wetlands or waters of the U.S., although indirect effects such as water quality degradation due to untreated stormwater runoff would continue at historical levels.

General Purpose Lanes Alternative

Construction of the GPL Alternative would result in both permanent and temporary wetland effects. Permanent effects would result from placing fill in wetlands or waters of the U.S. due to new bridge construction over streams and canals, stormwater drainage outfalls to streams, and fill placement from construction of detentions ponds, roadway, and interchange improvements. Temporary effects would occur from fill placement for temporary construction access roads or work areas in wetlands. When construction of a particular area is completed, the fill would be removed and the wetland area would be re-graded and re-vegetated to restore the original wetland condition.

The GPL Alternative would result in approximately 1.66 acres of permanent effects to wetlands and waters of the U.S. Of these, 0.47 acre is to jurisdictional wetlands and other waters of the U.S.; 1.19 acres are non-jurisdictional. Temporary effects were estimated at 0.29 acre. These effects are summarized in **Table 3-44**.

Indirect effects to wetlands such as changing drainage patterns, increasing runoff volumes, changing wetland hydrology, and increasing delivery of non-point source pollution such as sediment, de-icer, and petroleum products could result from increasing the impervious surface area of the roadway. These effects will be avoided and minimized by implementing construction and post-construction BMPs as described in **Section 3.3.4** on water quality.

Express Lanes Alternative (Preferred Alternative)

As with the GPL Alternative, construction of the EL Alternative would result in both permanent and temporary effects.

The EL Alternative would result in permanent effects to wetlands and waters of the U.S. of approximately 1.81 acres. Of these, 0.50 acre is to jurisdictional wetlands and other waters of the U.S.; 1.34 acres are non-jurisdictional. Temporary effects were estimated at 0.31 acre. These effects are also summarized in **Table 3-44**.

**Table 3-44
Wetland Effects**

	General Purpose Lanes Alternative	Express Lanes Alternative
Wetlands		
Permanent	0.44 acre (jurisdictional) 1.19 acres (non-jurisdictional)	0.47 acre (jurisdictional) 1.34 acres (non-jurisdictional)
Temporary	0.06 acre (jurisdictional) 0.23 acre (non-jurisdictional)	0.04 acre (jurisdictional) 0.27 acre (non-jurisdictional)
Other Waters of the U.S. (permanent)	0.03 acre	0.03 acre

Indirect effects to wetlands such as changing drainage patterns, increasing runoff volumes, changing wetland hydrology, and increasing delivery of non-point source pollution such as sediment, de-icer, and petroleum products could result from increasing the impervious surface area of the roadway. These effects will be avoided and minimized by implementing construction and post-construction BMPs as described in **Section 3.3.4**.

3.4.3.3 Mitigation

Despite making every effort during alternative development and conceptual design to avoid and minimize impacts to Section 404 jurisdictional wetlands and waters of the U.S. and non-jurisdictional wetlands, previously described unavoidable impacts would result from implementing either the GPL or EL Alternative. Section 404 of the CWA requires compensatory mitigation for permanent, direct impacts to Section 404 jurisdictional wetlands and waters of the U.S. Additionally, at the direction of Executive Order 11990, Protection of Wetlands (1977), and Department of Transportation Order 5660.1A, Preservation of the Nation's Wetlands (1978), the FHWA and CDOT also mitigate for permanent, direct impacts to non-jurisdictional wetlands. All compensatory wetland mitigation is done on a 1:1 basis.

The Transportation Equity Act for the 21st Century (TEA-21) and subsequent FHWA wetland regulation 23 CFR 777 states that preference should be given to use of mitigation banks through purchasing credits in a USACE approved mitigation bank. Other factors considered during the mitigation analysis include locally important functions and values of mitigation sites, adequacy and reliability of supportive hydrology, location of mitigation sites, and the timing of mitigation construction. Ultimately, the mitigation analysis determined that locally important functions and values are present along existing stream banks, and the reliability of existing stream flows support adequate hydrology resulting in a high likelihood for long-term wetland sustainability.

Therefore, on-site mitigation will be implemented for impacts to wetlands along existing stream banks. Based on the TEA-21 preference for use of mitigation banks, CDOT will purchase mitigation bank credits to mitigate for non-streamside wetland impacts.

3.4.4 Prime and Unique Farmlands

Chapter 7 of the Code of Federal Regulation, Part 658 requires the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), to identify and locate prime and unique farmland. These farmlands are protected in accordance with the Farmland Protection Policy Act of 1981. Prime farmlands are considered to be of national importance and have been defined as being land with the best combination of physical and chemical characteristics for producing feed, forage, fiber, and oilseed crops, and are available for these uses. Unique farmland is land other than prime farmland that is used for the production of specific, high-value crops.

In addition to the prime and unique lands, the Important Farmland Program encourages the identification of farmland of statewide and local importance. Farmlands of statewide importance, while not protected by law, should be given special consideration when planning and evaluating agricultural resources.

3.4.4.1 Affected Environment

Coordination with the NRCS State Soil Scientist and soil mapping available from the NRCS Web site revealed that while soils indicative of prime and unique farmland and farmland of statewide importance have previously existed within the project area, the C-470 project area is already in an urbanized area, such that the land is not usable for farming. By definition as stated in the Farmland Protection Policy Act implementing regulations, 7 CFR 658.2(a), "'farmland' does not include land already in or committed to urban development," which includes lands identified as an urbanized area.

3.4.4.2 Environmental Consequences

Because prime and unique farmlands and farmlands of statewide importance are not present within the project area, there would be no direct or indirect effects to such lands from the No-Action, GPL, or EL Alternatives.

3.4.4.3 Mitigation

No mitigation measures for prime and unique farmland are anticipated.

3.4.5 Vegetation

The term vegetation defines the collective plant cover present in an area. Vegetation communities are classified as distinct grouping of individual species that recur in areas with similar physical environmental characteristics (e.g., climate, moisture availability, and soils). Vegetation communities are also defined by the presence of a few dominant species and their physical appearance.

3.4.5.1 Affected Environment

The project area is located in the western most edge of the plains shortgrass ecosystem. Historically, this ecosystem has been dominated by blue grama and buffalo grass. However, because of the high level of human development within the project area, little of this ecosystem remains. Most of the area is a mixture of commercial and residential uses with parks and open space scattered throughout, especially in the western third of the project area.

Humans have influenced the vegetation to one degree or another, from the highly disturbed commercial areas to the woody riparian banks of the South Platte River.

Grasslands

Portions of the project area, primarily in Chatfield State Park and in undeveloped uplands along drainages, support disturbed native grasslands consisting of species such as western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Stipa viridula*), blue grama (*Bouteloua gracilis*), junegrass (*Koeleria macrantha*), side-oats grama (*Bouteloua curtipendula*), and buffalograss

(*Buchloe dactyloides*). Other plants include prickly pear (*Opuntia polyacantha*), yucca (*Yucca glauca*), rabbitbrush (*Chrysothamnus nauseosus*), and fringed sage (*Artemisia frigida*). Non-native grasses such as smooth brome (*Bromus inermis*), annual rye (*Secale cereale*), crested wheatgrass (*Agropyron cristatum*), and noxious weeds such as cheatgrass (*Bromus tectorum*) and field bindweed (*Convolvulus arvensis*) are common within the project area in the C-470 ROW and immediately adjacent areas.

Weeds, such as Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), and field bindweed are also present in varying densities throughout this area. Most of the disturbed native grasslands in the project area have been altered by the combined effects of past agricultural practices and urban development.

Commercial and residential areas, primarily between I-25 and Lucent Boulevard, consist of maintained, irrigated landscape including Kentucky bluegrass (*Poa pratensis*) and planted ornamental trees and shrubs around the buildings.

Riparian Areas

Riparian vegetation within the project area has the highest ecological value of all the vegetation types present. Riparian vegetation is found along most of the principal streams and in drainage ditches, ponds, and other water sources. Riparian areas generally consist of woody vegetation with an understory of grasses and forbs. Dominant vegetation typically includes various species of trees and shrubs including plains cottonwood (*Populus deltoides*), willow (*Salix* spp.), choke-cherry (*Prunus virginiana*), three-leaf sumac (*Rhus trilobata*), and Russian olive (*Elaeagnus angustifolia*) (a non-native weed species). American currant (*Ribes americanum*) occurs in drainages with dense woody vegetation and is listed as rare by the Colorado Natural Heritage Program (CNHP). Most of the riparian areas in the project area, including the South Platte River, provide potential habitat for American currant. Populations of this species are known to occur in

1 South Platte Park, located on the north side of
 2 C-470, just east of Santa Fe Drive interchange in
 3 the South Platte River floodplain.

5 The Colorado Legislature passed Senate Bill 40
 6 (SB40) in order to protect and preserve fish,
 7 fishing waters, and all wildlife resources,
 8 including riparian vegetation associated with the
 9 streams of Colorado. SB40 gives CDOW juris-
 10 diction over impacts to riparian areas and their
 11 associated streams resulting from state agency
 12 projects.

14 **Noxious Weeds**

15 Noxious weeds are non-native plant species that
 16 have been introduced into an environment with
 17 few, if any, natural biological controls. This gives
 18 them a competitive advantage in dominating
 19 and crowding out native plant species and can
 20 threaten the integrity of native plant commu-
 21 nities. Noxious weeds are aggressive, spread
 22 rapidly, reproduce profusely, and resist control
 23 and management measures. Noxious weed infes-
 24 tations can degrade wildlife habitat and forage
 25 for livestock, and are difficult and expensive to
 26 control once they are established. Because of the
 27 adverse environmental effects of weeds, both the
 28 federal and state governments have issued
 29 regulations regarding noxious weeds.

31 Executive Order 13112 directs federal agencies
 32 (including the FHWA) to prevent the intro-
 33 duction of invasive species, control and monitor
 34 invasive species, and restore native species and
 35 habitats that have been invaded. Additionally, in
 36 1990 the State of Colorado passed the Colorado
 37 Noxious Weed Act. As amended in 2003, the Act
 38 requires land managers, in this case CDOT, to
 39 control certain species of noxious weeds. In
 40 order to comply with state and federal regula-
 41 tions, the project area was surveyed for weed
 42 species, and a *Noxious Weed Plan* (March 2005)
 43 was prepared. This plan identifies and priori-
 44 tized the targeted noxious weed species and
 45 provides recommended treatments for control.

51 **3.4.5.2 Environmental Consequences**
 52 **No-Action Alternative**

53 The No-Action Alternative would have no affect
 54 on vegetation in the project area.

55 **General Purpose Lanes Alternative**

56 Direct effects to vegetation resulting from the
 57 GPL Alternative would include construction
 58 activities associated with roadway widening,
 59 intersection reconfiguration, and bridge
 60 construction. Approximately 3.8 acres of riparian
 61 habitat would also be affected. In addition to
 62 herbaceous vegetation, trees and shrubs likely
 63 would be removed during construction. Indirect
 64 effects to vegetation include the introduction or
 65 spread of noxious weeds. Most of the distur-
 66 bance would be to areas mapped as maintained
 67 uplands, which includes the ROW.

69 **Express Lanes Alternative**
 70 **(Preferred Alternative)**

71 Effects to vegetation associated with the EL
 72 Alternative would be very similar to those
 73 associated with the GPL Alternative. Effects as a
 74 result of the EL Alternative may be slightly
 75 greater because of the need for express lane
 76 access ramps at Colorado Boulevard and Quebec
 77 Street. Direct effects to vegetation resulting from
 78 the EL Alternative would include construction
 79 activities associated with roadway widening,
 80 intersection reconfiguration, and bridge
 81 construction. In addition to herbaceous
 82 vegetation, trees and shrubs likely would be
 83 removed during construction. Approximately 4.1
 84 acres of riparian habitat would also be affected.
 85 Indirect effects to vegetation include the intro-
 86 duction or spread of noxious weeds. Most of the
 87 disturbance associated with the EL Alternative
 88 would be to areas mapped as maintained
 89 uplands, which includes the ROW.

91 **3.4.5.3 Mitigation**

92 To minimize the adverse effects of disturbance to
 93 all the vegetation types in the project area as a
 94 result of either action alternative, CDOT's re-
 95 vegetation practices would be followed. Areas
 96 temporarily disturbed during construction
 97 would be seeded immediately after construction
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1 with a native seed mix reviewed and approved
 2 by a CDOT landscape architect. Seeding would
 3 occur during appropriate seasonal timeframes to
 4 ensure that seeds have the opportunity to take
 5 root and germinate. If out of season, the earth
 6 would be temporarily protected from erosion
 7 with mulch and mulch tackifier. Permanent
 8 seeding would occur throughout the project, and
 9 disturbed areas would be completely revegetated
 10 as soon as practicable. Trees adjacent to the
 11 project area that would not be removed would
 12 be protected by erecting plastic barricade fencing
 13 to avoid unintentional damage. Removed trees
 14 would be replaced on at least a one to one basis.

15
 16 In order to facilitate compliance with SB40, the
 17 Colorado Department of Natural Resources and
 18 CDOT entered into a memorandum of
 19 agreement in 2005 that requires CDOW to
 20 “review plans submitted by state agencies
 21 proposing actions with adverse impacts to
 22 streams protected under SB40 and grants SB40
 23 Certification for actions that include appropriate
 24 measures to eliminate or diminish adverse
 25 effects to such streams or their banks or tribu-
 26 taries...” In compliance with the memorandum
 27 of agreement, at least 60 days prior to
 28 construction CDOT would apply to CDOW for
 29 SB40 Certification.

30
 31 In compliance with Executive Order 13112 and
 32 the Colorado Noxious Weed Act, the Weed
 33 Management Plan prepared for the project
 34 would be implemented. The plan includes a
 35 variety of species-specific control methods based
 36 on the size of the populations and the
 37 surrounding landscape. Some of these methods
 38 include cutting and removing the noxious
 39 weeds, mowing vegetation in the ROW, and
 40 using carefully selected herbicides targeted for
 41 the particular species and growth stage. The
 42 weed management plan includes the following
 43 steps to control weeds in the project area:
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- Cleaning of all construction vehicles prior to entering the construction site 51-53
- Limiting disturbance to existing vegetation during construction as much as practicable 54-56
- Seeding topsoil stockpiles with annual oats, if it remains stockpiled for more than one month 57-59
- Using only certified weed-free mulch 60-62
- Surveying the construction area before, during, and immediately after construction 63-65
- Preparing a detailed Integrated Weed Management Plan within ten days of each survey targeted for the specific noxious weed populations found on the site 66-70
- Implementing the Integrated Weed Management Plan within ten days after receipt of the plan 71-74

75 Following construction, the site would be
 76 monitored for the need for follow-up weed
 77 control at least twice over the first growing
 78 season.
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3.5 EFFECTS AND PROPOSED MITIGATION SUMMARY 80-81

82 **Table 3-45** table summarizes the effects for the
 83 No-Action Alternative, GPL Alternative, and EL
 84 Alternative, as discussed in **Sections 3.2** through
 85 **3.4** of this chapter. Indirect effects are discussed
 86 in greater detail in the respective resource
 87 sections. Cumulative effects are discussed in
 88 **Section 3.6.**
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90 **Table 3-46** summarizes the mitigation measures
 91 that would be part of the Preferred Alternative.
 92 These potential measures are described in detail
 93 in the respective sections of **Chapter 3.**
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**Table 3-45
Direct Effects Summary**

Resource	No-Action Alternative Effects	General Purpose Lanes Alternative Effects	Express Lanes Alternative Effects
Housing and Community Facilities	No effects to housing or community facilities	No effects to housing or community facilities	No effects to housing or community facilities
Environmental Justice	No effects to minority or low-income populations	Effects to Wolhurst include right-of-way acquisition, higher noise levels, improved capacity at adjacent intersections, change in visual character with retaining walls/noise walls and flyover at Santa Fe. These effects are not disproportionately high and adverse	Effects to Wolhurst include right-of-way acquisition, higher noise levels, improved capacity at adjacent intersections, change in visual character with retaining walls/noise walls and flyover at Santa Fe. These effects are not disproportionately high and adverse
Economics	Increased cost of travel time due to congestion may affect business location and home rental/purchase decisions	Construction activity would increase temporary employment opportunities; local construction material purchases would benefit local economic income; economic cost of congestion would decrease; retail health would benefit from decreased congestion	Construction activity would increase temporary employment opportunities; local construction material purchases would benefit local economic income; economic cost of congestion would decrease; retail health would benefit from decreased congestion
Land Use	No change in land use pattern. Alternative would continue to support land use patterns that are compatible with local land use plans	No change in land use pattern. Alternative would continue to support land use patterns that are compatible with local land use plans	No change in land use pattern. Alternative would continue to support land use patterns that are compatible with local land use plans
Parks and Recreation	Increased traffic would increase noise levels at adjacent parks and recreation areas; access would become more difficult and time consuming with increased congestion	Noise levels at Chatfield State Park would increase; southbound right-in, right-out access to Chatfield State Park permit office would be eliminated; improved signal timing and intersection operation at Santa Fe Drive/ Blakeland Drive would provide improved access to permit office; new retaining walls would alter views from inside Chatfield State Park looking north; culvert that the High Line Canal trail passes through under C-470 would be lengthened, with no changes to the trail; 0.16 acres acquired from Links Golf Course	Noise levels at Chatfield State Park would increase; southbound right-in, right-out access to Chatfield State Park permit office would be eliminated; improved signal timing and intersection operation at Santa Fe Drive/ Blakeland Drive would provide improved access to permit office; new retaining walls would alter views from inside Chatfield State Park looking north; culvert that the High Line Canal trail passes through under C-470 would be lengthened, with no changes to the trail; 0.19 acres acquired from Links Golf Course
Right-of-Way	No right-of-way acquisition	16.68 acres, 49 partial parcel acquisition	20.25 acres, 55 partial parcel acquisition

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Table 3-45
Direct Effects Summary (continued)

Resource	No-Action Alternative Effects	General Purpose Lanes Alternative Effects	Express Lanes Alternative Effects
Transportation and Traffic	Limited available capacity on C-470 would constrain traffic getting to/from the adjacent local arterials and lengthen the peak period	Travel patterns would remain the same as existing conditions. Operations and travel times on mainline C-470 would improve. Several arterial intersections would experience increased traffic that would require mitigation to improve operations. Safety on C-470 would be improved due to reduced congestion and geometric improvements	Travel patterns would change slightly due to the express lanes ingress and egress locations. Increased traffic would likely occur in neighborhoods and around access ramps at the following locations: Kipling Parkway, Wadsworth Boulevard, Lucent Boulevard, and Colorado Boulevard. Operations and travel times on mainline would improve along the express lanes while general purpose lanes would operate at the same level as existing conditions. Several arterial intersections would experience increased traffic that would require mitigation to improve operations. Safety on C-470 would be improved due to reduced congestion and geometric improvements for the express lanes
Air Quality	Carbon monoxide, ozone, and particulate matter levels would be within EPA-approved emission budgets	Carbon monoxide, ozone, and particulate matter levels would be within EPA-approved emission budgets	Carbon monoxide, ozone, and particulate matter levels would be within EPA-approved emission budgets
Highway Noise	21 locations would exceed CDOT Noise Abatement Criteria by the year 2025	43 locations would exceed CDOT Noise Abatement Criteria by the year 2025	42 locations would exceed CDOT Noise Abatement Criteria by the year 2025
Water Quality	135 acres of existing impervious surface area; limited opportunity to decrease highway run-off into adjacent water sources	165 acres of additional impervious surface area; implementing MS4 requirements would improve water quality of highway run-off into adjacent water sources	187 acres of additional impervious surface area; implementing MS4 requirements would improve water quality of highway run-off into adjacent water sources
Hydrology and Hydraulics	No effects to hydrology or hydraulics	Culvert east of Spring Creek and bridge over South Platte River replaced and enlarged; both would provide increased flow capacity. More impervious surface area would cause increased runoff volume and peak flow rates from highway	Culvert east of Spring Creek and bridge over South Platte River replaced and enlarged; both would provide increased flow capacity. More impervious surface area cause increased runoff volume and peak flow rates from highway
Floodplains	No effects to floodplains	Minor changes to flood elevations (under 1 foot)	Minor changes to flood elevations (under 1 foot)
Historic Resources	No historic properties affected	No adverse effects to City Ditch and High Line Canal	No adverse effects to City Ditch and High Line Canal

Table 3-45
Direct Effects Summary (continued)

Resource	No-Action Alternative Effects	General Purpose Lanes Alternative Effects	Express Lanes Alternative Effects
Section 4(f) Properties	No effects to Section 4(f) properties	De minimis effect to City Ditch	De minimis effect to City Ditch
Archaeological Resources	No effects to archaeological resources	No effects to archaeological resources	No effects to archaeological resources
Paleontological Resources	No effects to paleontological resources	No known effects to paleontological resources	No known effects to paleontological resources
Geology and Soils	No geologic effects	Geologic and soil conditions that may effect project design and construction include: expansive soils and bedrock, corrosive soils, steeply dipping bedrock, collapsible soils, and unstable slopes. Effects would be in the form of excavation, construction disturbance, and exposure of previously buried and stable geological and soils units to precipitation, air, and weathering	Geologic and soil conditions that may effect project design and construction include: expansive soils and bedrock, corrosive soils, steeply dipping bedrock, collapsible soils, and unstable slopes. Effects would be in the form of excavation, construction disturbance, and exposure of previously buried and stable geological and soils units to precipitation, air, and weathering
Hazardous Materials	No effects to hazardous material sites	Four hazardous material sites may cause potential soil and groundwater exposure during construction excavation	Four hazardous material sites may cause potential soil and groundwater exposure during construction excavation
Prime and Unique Farmlands	No effects to prime and unique farmland	No prime and unique farmland effects	No prime and unique farmland effects
Visual and Aesthetic Character	No visual effects	Changes to visual character include barrier median, wider typical section, retaining walls/noise walls, and flyover at Santa Fe	Changes to visual character include additional overhead signage, barrier median, wider typical section, retaining walls/noise walls, braided ramp at Quebec, T-ramp at Colorado, and flyover at Santa Fe
Utilities	No utility effects	Various utility lines would require relocation	Various utility lines would require relocation
C-470 Trail	No affect to the existing trail. Existing at-grade street crossings would remain. Existing surface condition deficiencies would remain.	7.5 miles of trail would be moved outward and reconstructed to allow for the roadway widening. Distance shifted varies from 0 to 167 feet, but is generally 45-50 feet. The trail would be closer to private property by this distance. Existing at-grade street crossings would remain. The sections of relocated trail would have a new wearing surface	8.1 miles of trail would be moved outward and reconstructed to allow for the roadway widening. Distance shifted varies from 0 to 167 feet, but is generally 45-50 feet. The trail would be closer to private property by this distance. Existing at-grade street crossings would remain. The sections of relocated trail would have a new wearing surface

Table 3-45
Direct Effects Summary (continued)

Resource	No-Action Alternative Effects	General Purpose Lanes Alternative Effects	Express Lanes Alternative Effects
Construction	No construction effects	Short-term construction effects include noise, vibration, visual change, temporary soil disturbance. Possible diversion of traffic to arterial streets during construction would degrade operations of several intersections which do not have adequate reserve capacity	Short-term construction effects include noise, vibration, visual change, temporary soil disturbance. Possible diversion of traffic to arterial streets during construction would degrade operations of several intersections which do not have adequate reserve capacity
Wildlife	No wildlife habitat effects or additional opportunity for wildlife crossings	Minor habitat loss for mule deer and elk; additional travel lanes would increase difficulty for wildlife movement across the highway; foraging behaviors for raptors may be temporarily affected; minor reduction to raptor foraging habitat; swallow nests under existing bridges would be disturbed; 12.5 acres of Black-tailed prairie dog habitat would be eliminated; minor, temporary disturbance to aquatic resources during construction; additional wildlife movement opportunity under improved South Platte River bridge	Minor habitat loss for mule deer and elk; additional travel lanes would increase difficulty for wildlife movement across the highway; foraging behaviors for raptors may be temporarily affected; minor reduction to raptor foraging habitat; swallow nests under existing bridges would be disturbed; 14.3 acres of Black-tailed prairie dog habitat would be eliminated; minor, temporary disturbance to aquatic resources during construction; additional wildlife movement opportunity under improved South Platte River bridge
Threatened and Endangered Species	No threatened/endangered species habitat effects	Loss of black-tailed prairie dog colonies would result in a minor reduction to bald eagle prey and habitat loss for the burrowing owl	Loss of black-tailed prairie dog colonies would result in a minor reduction to bald eagle prey and habitat loss for the burrowing owl
Wetlands and Waters of the U.S.	No wetland effects	0.44 acre permanent effects (jurisdictional)	0.47 acre permanent effects (jurisdictional)
		0.06 acre temporary effects (jurisdictional)	0.04 acre temporary impact (jurisdictional)
		1.19 acre permanent effects (non-jurisdictional)	1.34 acre permanent effects (non-jurisdictional)
	0.23 acre temporary effects (non-jurisdictional)	0.27 acre temporary effects (non-jurisdictional)	
	No open water waters of the U.S. effects	0.03 acre of jurisdictional open water effects	0.03 acre of jurisdictional open water effects
Vegetation	No vegetation effects	3.81 acres riparian habitat	4.10 acres riparian habitat

**Table 3-45
Direct Effects Summary (continued)**

Resource	No-Action Alternative Effects	General Purpose Lanes Alternative Effects	Express Lanes Alternative Effects
Cumulative Effects	Cost of congestion will continue to increase with congestion, with greater influence on business and residential location decisions; gradual noise level increases would remain unmitigated; increased pollutant levels from stormwater runoff from C-470 would remain untreated, though these are not likely to cause a change in local stream water quality classification	Cumulative effects to the Wolhurst Community would not be disproportionately high and adverse; gradual noise level increases would affect adjacent properties, some of which would be mitigated by this project; compliance with MS4 permit requirements for water quality would result in positive cumulative effects for affected drainage basins; gradual change and growth in the C-470 Corridor would continue to contribute to changes to the visual character, however, most of this change has occurred from past actions; gradual degradation of isolated wildlife habitat would continue until the Corridor is fully built out; cumulative effects to wetlands would result from those unmitigated effects of other projects, since C-470 effects would be fully mitigated; the vegetative landscape would continue to gradually convert from native ground cover to urban coverage	Cumulative effects to the Wolhurst Community would not be disproportionately high and adverse; gradual noise level increases would affect adjacent properties, some of which would be mitigated by this project; compliance with MS4 permit requirements for water quality would result in positive cumulative effects for affected drainage basins; gradual change and growth in the C-470 Corridor would continue to contribute to changes to the visual character, however, most of this change has occurred from past actions; gradual degradation of isolated wildlife habitat would continue until the Corridor is fully built out; cumulative effects to wetlands would result from those unmitigated effects of other projects, since C-470 effects would be fully mitigated; the vegetative landscape would continue to gradually convert from native ground cover to urban coverage

**Table 3-46
Mitigation Summary**

Resource	Mitigation Measures
Housing and Community Facilities	No mitigation measures are necessary
Environmental Justice	<ul style="list-style-type: none"> ■ Replacement noise barrier along Wolhurst southern border, maximum 20 feet height; retaining wall/noise wall along flyover ramp north of Wolhurst entrance ■ Landscaping elements would include trees and berms along flyover. A landscaped median would be added to the community entrance to minimize U-turns at this location ■ Aesthetic treatments to retaining wall/noise wall on northern portion of flyover ■ All aesthetic treatment and landscaping would be selected with input from Wolhurst residents through a public process that would be conducted during final design ■ Additional community involvement opportunities provided during design and construction

Table 3-46
Mitigation Summary (continued)

Resource	Mitigation Measures
Economics	No mitigation measures are necessary
Land Use	No mitigation measures are necessary
Park and Recreation	<ul style="list-style-type: none"> ■ If construction activity on the culvert for the High Line Canal trail requires temporary trail detours, advance notice would be posted and presented to trail user groups ■ Right-of-way acquisition at the Links Golf Course would be purchased in accordance with the Uniform Relocation and Assistance and Real Property Acquisition Policies Act; CDOT would coordinate with golf course owners during final design to further minimize necessary property acquisition
Right-of-Way	<ul style="list-style-type: none"> ■ Avoidance and minimization measures would include retaining walls, curbs, barriers, and steeper side-slopes and back-slopes ■ CDOT would continue to work with affected property owners during final design to keep them informed of the process prior to property acquisition ■ All right-of-way acquisitions would be purchased under the Uniform Relocation Assistance and Real Property Acquisition Policy Act, as amended
Transportation and Traffic	<ul style="list-style-type: none"> ■ Intersection improvements would be necessary at several arterial intersections for the GPL and EL Alternatives to mitigate the increase in traffic and congestion ■ Interchange modifications at the I-25 interchange would be necessary to mitigate operational deficiencies
Air Quality	No mitigation measures are necessary
Highway Noise	<ul style="list-style-type: none"> ■ Of the 28 residential and 15 commercial impact locations, noise mitigation is recommended for the following 13 residential locations: ■ Chatfield Bluffs Neighborhood – noise wall ■ Meadowbrook Heights Neighborhood – 3 noise walls ■ Chatfield Avenue Neighborhoods – noise wall ■ Columbine Hills Neighborhood – noise wall and berm ■ Wolhurst Adult Community – Replacement noise wall and retaining wall/ noise wall on northern portion of Santa Fe Drive interchange flyover ■ Bluffs Apartments – noise wall ■ Highlands Ranch – Broadway to University Boulevard – noise wall ■ Canyon Ranch and Copper Canyon Apartments – 2 noise walls ■ Highlands Ranch – west of Colorado Boulevard – 2 noise walls ■ Province Center Neighborhood – noise berm ■ Gleneagles Village Neighborhood – noise wall and berm ■ Palomino Park Apartments – noise wall ■ Crest Apartments – safety barrier

**Table 3-46
Mitigation Summary (continued)**

Resource	Mitigation Measures
Highway Noise (continued)	<ul style="list-style-type: none"> ■ Mitigation is not recommended for any of the impacted commercial receptors because none of these appear to have active outdoor use. If it is determined that outdoor use does occur or the property owner desires noise mitigation at impacted commercial sites, CDOT's feasible and reasonable test would be applied to determine if mitigation meets the approved criteria ■ The Highlands Ranch neighborhood from Broadway to University will undergo a final design noise analysis to determine if noise mitigation at that time will be feasible and reasonable ■ Noise mitigation recommendations would be reviewed during final design to determine final feasibility, reasonableness, and dimensions for each location
Water Quality	<ul style="list-style-type: none"> ■ Grassed swales and vegetated filter strips would be used to pre-treat runoff waters wherever possible along the corridor. Swales would be used to carry runoff from the roadway the outfall from storm sewer systems to the receiving waters ■ CDOT would continue their non-structural BMP practices such as limiting the use of deicer, discontinuing the use of fertilizer, and timely sweeping of roadways after snow events ■ Extended detention basins (water quality ponds) would be used to achieve all MS4 requirements and incorporated into the design to meet the MS4 requirements of the EPA ■ 53 water quality ponds are designed at strategic locations throughout the corridor ■ In addition to water quality ponds, curb and gutter, a closed storm sewer, and grassed swales would be included in the alternative to control stormwater runoff and improve water quality in areas where ponds are not feasible
Hydrology and Hydraulics	<ul style="list-style-type: none"> ■ Efforts would be made during final design to match pond shapes to existing contour lines as much as possible to achieve a natural appearance ■ The culvert east of Spring Creek would be replaced with an 84-inch diameter reinforced concrete pipe culvert to allow adequate passage of the estimated 100-year frequency design flows ■ Water quality ponds are included in the alternative as permanent BMPs to improve water quality of storm runoff
Floodplains	<ul style="list-style-type: none"> ■ Retaining walls are included in the design at Dad Clark Gulch and Willow Creek to minimize encroachment into the floodplain and to keep roadway fill out of the drainageway
Historic Resources	No mitigation measures are necessary
Section 4(f) Properties	No mitigation measures are necessary
Archaeological Resources	No mitigation measures are necessary
Paleontological Resources	<ul style="list-style-type: none"> ■ CDOT is committed to having a qualified paleontologist on-site during major construction excavation to monitor for buried paleontological resources where known fossiliferous deposits are mapped, but not exposed presently at the ground surface

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Table 3-46
Mitigation Summary (continued)

Resource	Mitigation Measures
Geology and Soils	<ul style="list-style-type: none"> ■ Structure design for areas with expansive soils, bedrock, or collapsible soils would include foundation systems and floor slabs types appropriate to mitigate the effects of soil conditions ■ Structural retaining walls, such as soil nail walls, ground anchors, mechanically stabilized earth (MSE) walls, cantilever walls, or reinforced soil slopes would be built to stabilize slopes when cut or fill slopes require steep gradients greater than 3 horizontal to 1 vertical, or where potential slope failures may occur due to the presence of water and loose material ■ Expansive subgrade soils under pavement sections would be stabilized with chemicals (lime), removed and recompacted, or removed and replaced with imported structural fill of better quality to minimize soil heaving ■ Embankment material would be stabilized by over excavation prior to embankment placement, or additional loading with a thicker section of embankment material ■ Highway drainage plan would divert surface and subsurface water to prevent ponding of water on or immediately adjacent to pavement areas and retaining walls. All landscape sprinkler heads and lines adjacent to pavement areas would be frequently checked for leaks and maintained in good working order. Slopes and other stripped areas would be protected against erosion by re-vegetation or other methods ■ A stormwater management plan would be developed and implemented that include BMPs to minimize potential soil erosion, and include prescriptions for monitoring of conditions before and after the completion of work (and for immediate post-restoration site stabilization). Measures that would be required are typical of erosion control procedures used in highway construction projects
Hazardous Materials	<ul style="list-style-type: none"> ■ CDOT would identify long-term impacts such as treatment of contaminated soil or groundwater ■ CDOT would conduct soils and groundwater testing for all hazardous materials sites prior to ROW acquisition to determine potential risk. Sampling and laboratory analysis would be required for sites ranked as high potential for concern ■ Engineering controls would be employed at the time of construction to remove contaminated materials from the site and to contain materials from impacting at other locations ■ Where bridge, building, guardrails or sign alteration or demolition would be required, an asbestos hazardous materials survey and a lead paint survey would be conducted, per Section 250 of CDOT Standard Specifications and other relevant OSHA, state and federal regulatory requirements
Visual and Aesthetic Character	<ul style="list-style-type: none"> ■ CDOT would maintain standard architectural treatments to maintain visual consistency for the C-470 Corridor, as described in the CDOT Region Visual Design Standards. Overhead toll collection devices and signage would follow a region-wide standard, set by the CTE prior to or during final design ■ CDOT would work with adjacent jurisdictions such as Douglas County, Lone Tree, Highlands Ranch, and Littleton to incorporate architectural upgrades to structural elements at selected interchanges, while maintaining standard unifying elements with the rest of the C-470 Corridor. Interchange treatment upgrades could include textured walls, landscaping, and bridge identification markings

**Table 3-46
Mitigation Summary (continued)**

Resource	Mitigation Measures
Visual and Aesthetic Character (continued)	<ul style="list-style-type: none"> ■ The largest retaining wall would be a tiered construction to provide a visual break in wall height ■ Additional community input would be obtained during final design to gain public acceptance of these treatments ■ CDOT would work with Wolhurst residents to incorporate colors and textures on the noise walls surrounding the community
Utilities	<ul style="list-style-type: none"> ■ Utility impacts would be identified in detail during final design. Private utility companies are responsible for relocating the utility lines that occur within the existing ROW. ■ CDOT would relocate publicly owned utility lines and those impacted outside the existing ROW ■ Safety precautions would ensure contained release of potential airborne asbestos
C-470 Trail	<ul style="list-style-type: none"> ■ The GPL Alternative would require reconstruction of 7.5 miles of trail, while the EL Alternative would require reconstruction of 8.1 miles of trail ■ Grade separated trail crossings would be provided at the Santa Fe Drive interchange, Colorado Boulevard, and Quebec Street
Construction	<ul style="list-style-type: none"> ■ CDOT is committed to sustainable construction practice, such as reusing materials and recycling, waste minimization, water and energy conservation, and other measures which can minimize the cumulative effects of the project through resource conservation ■ Minor improvements at several arterial intersections would be performed. These are generally restriping on minor accel/decel lane lengthenings to improve traffic operations ■ CDOT would require the contractor to develop detailed construction phasing and an associated traffic control plan for all phases of work, including emergency vehicle access; prohibit long-term closures; develop detour signing plan for arterial street system; restrict concurrent work on adjacent interchanges; restrict daytime closures; and follow CDOT Region 6 Lane Closure Strategy ■ Water Quality -Temporary BMPs would be used during construction to prevent erosion, sediment, and nutrient loading in the watershed ■ Noise - Enforce more restrictive work hours, use alternative construction methods, and require noise monitoring and mitigation plan ■ Dust - Since the majority of air emissions during construction would be fugitive dust (PM₁₀) from the excavation of soil and backfill. All contractors would be required to obtain a construction permit and develop a fugitive emissions particulate emissions control plan to be implemented during construction in accordance with the Colorado Air Quality Control Commission Regulation No. 1, Part 3D, and Regulation No. 3, Applicable Permit Requirements ■ Visual - Throughout the final design and construction phases of this project, CDOT would work with the involved cities and counties as well as the public stakeholders to minimize temporarily undesirable obstructed views

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Table 3-46
Mitigation Summary (continued)

Resource	Mitigation Measures
Construction (continued)	<ul style="list-style-type: none"> ■ Vibration - CDOT would attempt to minimize vibration causing operations during nighttime in residential areas ■ C-470 trail – Detour routes would be provided to avoid closing the trail. Minimum two week notice prior to trail detours would be posted and presented to trail user groups
Wildlife	<ul style="list-style-type: none"> ■ New bridge over the South Platte River would provide a wider crossing under C-470 including a natural substrate on the east side of the river to better accommodate wildlife movement. Post-construction replacement vegetation under the bridge would serve to attract ungulates to cross under C-470 ■ Existing chain link fence that extends from the South Platte River along the north and south side of C-470 would be replaced to serve as deer fence ■ Project area would be re-surveyed prior to construction to identify raptor or other bird nests within 1/3 mile of the project. If nests are found, construction activity would be restricted within 1/3 mile of the raptor nests during breeding season ■ Bird nests found under existing bridges would be removed during the non-nesting season. Alternately, netting would be installed under bridges to prevent nests from being constructed ■ Design plans would attempt to avoid and minimize impacts to prairie dog colonies. Some prairie dogs would be relocated; others would be removed in accordance to CDOT policy
Threatened and Endangered Species	<ul style="list-style-type: none"> ■ Prior to construction, the project area and its vicinity would be re-surveyed for bald eagle nests. CDOT would install perching posts for hunting roosts, nesting platforms to encourage eagle nesting, and improve habitat for other bald eagle prey sources by planting vegetation to serve as groundcover. Some prairie dogs would also be relocated within the eagles' three-mile foraging area ■ The project area would also be surveyed for burrowing owl presence, following CDOW survey techniques. If burrowing owls were present, construction would be planned to avoid impacting those areas between March 1 and October 31 ■ CDOT would work with the USFWS and CDOW to develop any additional mitigation measures if seasonal restrictions on construction were not practicable
Wetlands	<ul style="list-style-type: none"> ■ Wetland impacts will be mitigated on a 1:1 basis ■ When wetland functions and values can be maintained or enhanced, onsite mitigation is preferred ■ Impacts to wetlands adjacent to streams will be mitigation onsite, as close to the affected location as possible ■ Impacts to wetlands not adjacent to streams will be mitigated through purchase of USACE-approved mitigation bank credits
Prime and Unique Farmlands	No mitigation measures are necessary
Vegetation	<ul style="list-style-type: none"> ■ CDOT's re-vegetation practices would be followed to minimize the adverse effects of disturbance to all the vegetation types in the project area ■ A Noxious Weed Management Plan has been developed for the C-470 Corridor, as part of this EA. CDOT would implement this plan prior to construction
Cumulative Effects	No mitigation measures are necessary

3.6 CUMULATIVE EFFECTS

Regulations implementing NEPA require federal agencies to consider direct, indirect, and cumulative effects of a proposed federal action on the social, physical, and biological environment. Direct and indirect effects are discussed earlier in this C-470 EA. Cumulative effects are discussed in this section.

Cumulative effects result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time.

If an individual study has no direct or indirect effects upon a resource, then it also has no cumulative effects upon that resource. According to federal guidance, cumulative effects analysis should focus on resources that are important and relevant.

Table 3-47 summarizes the project effects that were identified in this chapter, providing a rationale for the selection of affected resources that are appropriate for cumulative effects assessment.

On the basis of this screening approach, eleven resources or issues were selected for cumulative effects assessment: environmental justice, economics, transportation, air quality, highway noise, water quality, visual/aesthetic character, wildlife, threatened/endangered species, wetlands, and vegetation. Effects to parks and recreation resources do not merit mitigative action, and therefore were not considered for cumulative effects.

3.6.1 Affected Environment

Important in the consideration of cumulative effects is the selection of the temporal scope (time frame) and spatial (geographic) scope of the analysis. These selections identify the context

from which relevant past, present, and reasonably foreseeable actions can be identified.

Past, present, and reasonably foreseeable actions are considered in this analysis. The past year of 1980 was selected for this EA because construction of the existing freeway began at that time, with the first section completed in 1985 and the entire C-470 facility completed in 1990. The reasonably foreseeable future for this analysis is the design year 2025.

Topographic and geopolitical factors place different limits on the area of influence of the C-470 Corridor EA for different resources such as air, water, wildlife, and the human environment. Therefore, the geographic scope for C-470 cumulative effects analysis is variable, dependent on the resource affected by the project. The appropriate geographic scope for cumulative effects analysis for resources and issues pertinent to C-470 are listed below in **Table 3-48**.

Past, present, and reasonably foreseeable actions affecting the C-470 project area are summarized in **Table 3-49**. Additional detail on cumulative effects can be found in the *Cumulative Effects Technical Report* (March 2005).

3.6.2 Environmental Consequences

Cumulative effects are discussed by alternative, with respect to the various resources that would experience direct and/or indirect effects that require mitigation.

3.6.2.1 No-Action Alternative

As indicated in **Table 3-47**, the No-Action Alternative has the potential for cumulative effects with respect to traffic, air quality, highway noise, and water quality. These issues are discussed in the following sections.

Traffic

Under the No-Action Alternative, traffic on C-470 would increase as the result of continued urban development, combined with improvements to connecting facilities (I-25 and Santa Fe Drive). An increase in VMT is expected on C-470

Table 3-47
Identification of Resources for Cumulative Effects

Resource/Issue	Alternative			Cumulative Effects Screening
	No Action	EL	GPL	
Environmental Justice		✓	✓	Considered for cumulative effects
Economics	✓	✓	✓	Considered for cumulative effects
Land Use				No effects
Parks and Recreation		✓	✓	Not considered for cumulative effects
Right-of-Way		✓	✓	No businesses or residences taken
Transportation/traffic	✓	✓	✓	Considered for cumulative effects
Air Quality	✓	✓	✓	Considered for cumulative effects
Highway Noise	✓	✓	✓	Considered for cumulative effects
Water Quality	✓	✓	✓	Considered for cumulative effects
Historic Resources				No adverse effects
Archaeological Resources				No effects
Paleontological Resources				No effects
Geology and Soils		✓	✓	Limited on-site construction effects
Hazardous Materials		✓	✓	Limited on-site construction effects
Prime/Unique Farmlands				No effects
Visual/Aesthetic Character		✓	✓	Considered for cumulative effects
Utilities		✓	✓	Limited construction effects
C-470 Trail		✓	✓	Relocation
Construction		✓	✓	Limited construction effects
Wildlife		✓	✓	Considered for cumulative effects
Threatened/Endangered Species		✓	✓	Considered for cumulative effects
Wetlands		✓	✓	Considered for cumulative effects
Vegetation		✓	✓	Considered for cumulative effects

in the project area, resulting in severe congestion on mainline C-470 during peak periods. Other present and future planned transportation improvements identified in the region, listed in **Table 3-49**, would improve mobility on nearby facilities. However, these actions would facilitate more traffic flow to C-470, leaving a bottleneck in the transportation network.

Air Quality

Increasingly congested conditions in the future would result in excess air pollution emissions from C-470 traffic, but these emissions have been assessed together with all other emissions in the airshed, and the results are within allowable emissions budgets. Therefore, no cumulative effects with regard to air quality are anticipated.

Highway Noise

Under the No-Action Alternative, due to local and regional growth and improvements to other transportation facilities, 21 locations along C-470 would experience traffic noise in excess of federal and state noise abatement criteria. Past, present, and future actions have also contributed to a gradual increase in noise levels along the Corridor. However, noise mitigation would not be provided at these identified noise impact locations as part of the No-Action Alternative.

Water Quality

With respect to water quality, the No-Action Alternative would not increase the amount of impervious surface within the C-470 right-of-way, but increased traffic would result in increased loading of vehicle-generated water pollutants in stormwater runoff from C-470. This runoff is not captured and treated before discharge in accordance with modern standards because C-470 was built before the current stormwater management requirements went into effect. The receiving waters in the C-470 project area are not impaired at this time, and the increased traffic on C-470 is unlikely to cause a change in local stream classification. Discharges from new development and other foreseeable projects in the area would be minimized by compliance with MS4 permit requirements and thus are unlikely to have a cumulative effect on water quality in the affected drainage basins.

3.6.2.2 General Purpose Lanes Alternative

The GPL Alternative would have cumulative effects with respect to the resources identified in **Table 3-48**. These impacts are discussed in the following sections.

**Table 3-48
Areas of Analysis For Cumulative Effects**

Resource/Issue	Area of cumulative effects analysis
Environmental Justice	Wolhurst Community at C-470/Santa Fe Drive
Transportation/traffic	C-470, connecting roads, and nearby parallel arterials
Air Quality	DRCOG regional airshed and microscale receptors within the C-470 corridor
Highway Noise	Approximately 500 feet either side of C-470
Water Quality	South Platte River and its tributaries within the C-470 corridor
Visual/Aesthetic Character	Viewsheds affected by the C-470
Wildlife	Habitats and movement corridors contiguous to C-470
Threatened/Endangered Species	Habitats and movement corridors contiguous to C-470
Wetlands	Wetlands in the C-470 corridor, including those associated with the South Platte River and its tributaries
Vegetation	Vegetated area contiguous to C-470



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Table 3-49
Past, Present and Reasonably Foreseeable Future Actions

Action	Effects
Past (since approximately 1980)	
Chatfield State Park opened in 1975	Altered flow of South Platte River; replaced prairie with lake ecosystem; attracted vehicular recreation trips from throughout the region
Existing C-470 built in 1980s, opened 1990	Provided main east-west transportation link for high-growth area, replacing prairie habitat and hampering wildlife movement; introduce highway noise to the area; increased vehicle-related air pollution emissions;
Urban growth along C-470, 1980 to 2000 (includes Highlands Ranch development and many others, adding 100,000 residents; as well as the region's largest shopping mall (Park Meadows opened in 1996) and other retail development	Replaced prairie with urban land uses, displacing wildlife and hampering wildlife movement; increased impervious surface, contributing to water pollution; generated major traffic increases and increased air pollution emissions.
E-470 connected to C-470 in 1991	Increased C-470 through traffic, contributing to air and water pollution within the C-470 corridor
Present (2005)	
Road improvements on I-25 (e.g., TREX project) and Santa Fe Drive	When completed, the newly added capacity will enable more vehicles to get to and from C-470, potentially worsening C-470 corridor congestion.
Ongoing urban development along C-470: <ul style="list-style-type: none"> ■ Multi-family housing at C-470/Colorado Boulevard ■ Rezoning at C-470/Santa Fe Drive from agricultural to commercial 	Will generate additional vehicular trips on C-470 and nearby arterial streets thereby increasing noise as well as air and water pollution
Future (to approximately 2025)	
Continued urban development and increased redevelopment along C-470 Corridor	Will generate additional traffic on C-470 and nearby arterial streets, displace remaining fragmented prairie habitat and associated wildlife; increase impervious surface; air and water pollution
RTD "FasTracks" light rail extension to Highlands Ranch	Projected to serve 3,400 to 4,000 trips daily in 2025; may slightly reduce air quality emissions within the corridor
DRCOG Metro Vision planned improvements: <ul style="list-style-type: none"> ■ Widen I-25 from C-470 to Castle Rock ■ Widen US 85 from C-470 to Castle Rock ■ C-470 interchanges at Alameda, Yale, and I-70 	Will carry additional traffic to/from the C-470 corridor and indirectly to nearby arterial streets

Environment Justice

The Wolhurst Community, consisting of 272 households located in the northwest quadrant of the Santa Fe Drive interchange, would be directly affected by the GPL Alternative in a number of ways as discussed in Section 3.2.2.2. Access to this low-income neighborhood is provided from Santa Fe Drive, on which traffic has increased due to rapid urban growth in the corridor. Additionally, Santa Fe Drive is expected to be widened to the south (US 85 from C-470 to Castle Rock), as indicated in Table 3-49. A planned RTD light rail extension on the east side of Santa Fe Drive will cross C-470 nearby, but not affect Wolhurst. The cumulative effects of all these actions were taken into account to project future traffic volumes at the Santa Fe Drive interchange, which were used as the basis for the interchange design. The interchange design in turn affected visual, noise and air quality impacts. Five public meetings regarding the C-470 project were held at Wolhurst, giving residents ample opportunity to express their concerns, review and comment on alternatives, and to have input into the selection of appropriate mitigation measures. Based on consideration of all these factors, it has been concluded that the cumulative effects upon the Wolhurst Community are not disproportionately high and adverse.

Economics

The GPL Alternative would result in reduced congestion costs due to decreased travel time. This in turn would improve retail health, by providing shoppers a less congested route to shopping destinations. The long-term cumulative effects to the economy from additional growth and other transportation system improvements would result in an improved economic condition, reflecting a return on investment in the local communities and strong economic growth.

Traffic

This alternative would accommodate more than a doubling of current traffic on C-470. Additional capacity under this alternative would provide

for acceptable traffic operations on C-470, as compared to the severe congestion expected under the No-Action Alternative. The predicted future traffic levels take into account the past, present and future effects of other actions, including the widening of I-25 and Santa Fe Drive, which will carry more traffic to C-470.

Air Quality

Analysis of air pollution emissions and localized concentrations within the project area was undertaken for the GPL Alternative. This analysis takes into account the effects of past, present and future development, including planned future transportation improvements in the fiscally constrained and air quality conforming *DRCOG 2030 Metro Vision Regional Transportation Plan*. The results show that predicted future emissions would be within allowable emissions budgets. These budgets were developed, taking into account emissions from both transportation-related and non-transportation sources, and are part of EPA-approved plans that demonstrate continued attainment of NAAQS. Predicted microscale concentrations for this alternative are also well within applicable air quality standards. Therefore, no substantial cumulative effects with regard to air quality are anticipated for the GPL Alternative.

Highway Noise

Noise analysis was conducted for adjacent properties along the C-470 corridor based on the GPL Alternative conceptual design and the C-470 projected future traffic volumes that reflect the impacts of past, present and reasonably foreseeable projects. The results of this analysis indicate an expected average noise increase of approximately four decibels (a doubling of noise levels), causing noise levels to exceed abatement threshold levels at 28 residential locations. Note that typically more than one home is impacted at each of these locations. Noise mitigation would be provided at locations where it is found to be both reasonable and feasible, but would not be provided at locations where these criteria are not met. The cumulative effect would be a general increase in noise along the C-470 Corridor.

Water Quality

Large-scale conversion of undeveloped land to urban uses in the C-470 corridor have increased the amount of impervious surfaces within the drainage basin that includes the South Platte River and its tributaries. This has resulted in increased stormwater runoff and increased loading of various water pollutants, including total suspended solids. Increased vehicle travel in the corridor has also increased the concentration of vehicle-related heavy metals in the water. Although none of the surface waters in the study area are officially listed as impaired, the South Platte River stream segment from Bowles Avenue to the Burlington Ditch is on Colorado's Monitoring and Evaluation list for copper.

The GPL Alternative would increase the amount of impervious surface area in the corridor from 135 to 300 acres, and would carry a higher volume of vehicle traffic, but would include important water quality mitigation measures. Compliance with MS4 permit requirements for new development and other foreseeable projects would result in positive cumulative effects for the affected drainage basins.

Visual/Aesthetic Character

The visual character of the C-470 Corridor has been altered dramatically over the past 25 years with the construction of C-470 itself and the urban development that has surrounded it. However, much of the development is offset 300 to 500 feet from the roadway, producing a very open corridor driving experience for the motorist. Various drainages, open spaces and Chatfield State Park also contribute to this visual effect.

The GPL Alternative would introduce additional lanes and a new barrier on C-470 and include modifications to freeway entrance and exit ramps where necessary for safe merging operations. More lanes and more traffic would result in a more urban feel for the motorist, and would also make the roadway more visually apparent from nearby properties. Due to the distance

separating C-470 from much of the adjacent development, this would change the midground view (not the foreground or the background) for most views toward the highway.

Over time, continued urban growth would fill up some of the last remaining undeveloped parcels along the corridor, but the overall visual character would not change greatly from the existing situation. One notable exception would be the construction of an RTD light rail bridge over C-470 just east of Santa Fe Drive. The effects of the GPL Alternative would thus be greater than the changes associated with other actions.

Wildlife

Wildlife habitat has been affected greatly over the past 25 years by the conversion of prairie lands to a freeway surrounded by urban land uses. However, as noted in the visual effects discussion, much of the development is offset from C-470 and there are various drainages, open spaces and Chatfield State Park immediately adjacent to the roadway. These areas are important to wildlife habitat, especially the drainages which also serve as movement corridor for wildlife.

Over time, urban development would fill up the last empty parcels in the Corridor, reducing the limited amount of already fragmented habitat that remains today. In addition to the 12.5 acres of affected black-tailed prairie dog habitat, other past, present, and future actions have and will continue to eliminate habitat suitable for these animals.

Increased traffic with the GPL Alternative would make at-grade crossing of C-470 more difficult for wildlife in the future than it is today. This effect represents minimal change from current conditions and is small in comparison to the effects of continued habitat loss and fragmentation due to continuing urban development. A project benefit would be enhanced wildlife movement opportunity due to improvement of the C-470 bridge over the South Platte River.

The overall cumulative effect would be continued slow degradation of isolated wildlife habitat within an urban area.

Threatened/Endangered Species

Recent urbanization of the area surrounding C-470 has had the greatest effect on the bald eagle, largely due to loss of large trees that serve as nesting and roosting habitat. However, Chatfield State Park and the South Platte River continue to provide viable riparian habitat with open prairie, many trees along the river banks, and open water with available prey, allowing bald eagles to thrive in this rapidly urbanizing environment. Although ongoing urban development will continue to eliminate prairie dog habitat that serves as a portion of the eagles’ prey, preservation of the existing parklands within the project area continue to serve as protected habitat for this important species. MS4 stormwater requirements for other projects would likely maintain or improve the water quality for existing drainages, ensuring water based prey species would continue to be available. The cumulative effect of improvements to C-470 on the bald eagle would largely be a result of past and future urban development, with C-470 improvements playing a much smaller role in the overall effect.

Wetlands

Rapid urban development over time has diminished the number and degraded the quality of wetlands within the C-470 corridor over time. However, further degradation would slow appreciably as the area approaches build-out, and remaining wetlands are protected to various degrees under various federal laws and regulations. MS4 stormwater management requirements apply to CDOT and the various governmental jurisdictions within the study area, providing some protection from further degradation as a result of governmental projects as well as continued urban development.

Of the 29.1 acres of wetlands delineated within the study area, the GPL Alternative would result in permanent impacts to 0.44 acre of jurisdic-

tional and 1.19 acres of non-jurisdictional wetlands, as well as temporary impacts to 0.06 acre jurisdictional and 0.23 acre non-jurisdictional wetlands. Compensatory mitigation would likely occur within the project area, resulting in no net loss. The overall cumulative affect of this alternative plus other reasonably foreseeable actions would be the affect of those other actions, such as continued minimal wetland losses from the current wetland inventory.

Vegetation

The landscape of the entire C-470 corridor has changed dramatically over the past 25 years, being converted from prairie to urban land uses, including introduction of non-native grasses and trees. The areas immediately adjacent to C-470 consist largely of disturbed grassland which CDOT maintains as a clear zone for accident prevention. Maintenance includes periodic mowing and roadside trash pickup. Additionally, like any other major roadway, the existing C-470 facility is a conduit for the potential spread of noxious weeds, resulting from the transport of seeds by vehicles traveling from other regions.

Added to these overall trends, the GPL Alternative would result in impacts to 3.8 acres of riparian habitat, minimized to the extent feasible in accordance with the provisions of Colorado Senate Bill 40. Soil disturbance during construction would create the potential for introduction of noxious weeds, although CDOT would mitigate for this effect by re-vegetating with a native seed mix and implementation of a weed management plan.

The cumulative effects of the GPL Alternative together with other past, present and reasonably foreseeable actions would be continued gradual conversion of the corridor to a more urban type of vegetation, with the future change being minimal in comparison to the changes that have occurred in the past.



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3.6.2.3 Express Lanes Alternative (Preferred Alternative)

The EL Alternative may have cumulative effects with respect to all of the resources identified in **Table 3-48**. These impacts are discussed in the following sections.

Environmental Justice

The Wolhurst Community, consisting of 272 households located in the northwest quadrant of the Santa Fe interchange, would be directly affected by the EL Alternative in a number of ways as discussed in **Section 3.2.2.2**. Access to this low-income neighborhood is provided from Santa Fe Drive, on which traffic has increased due to rapid urban growth in the corridor. Additionally, Santa Fe Drive is expected to be widened to the south (US 85 from C-470 to Castle Rock), as indicated in **Table 3-49**. A planned RTD light rail extension on the east side of Santa Fe Drive will cross C-470 nearby, but not affect Wolhurst. The effects of all these actions were taken into account to project future traffic volumes at the Santa Fe Drive interchange, which were used as the basis for the interchange design. The interchange design in turn affected visual, noise and air quality impacts. Five public meetings regarding the C-470 project were held at Wolhurst, giving residents ample opportunity to express their concerns, review and comment on alternatives, and to have input into the selection of appropriate mitigation measures. Based on consideration of all these factors, it has been concluded that the cumulative effects upon the Wolhurst Community are not disproportionately high and adverse.

Economics

The distinction between the GPL and EL Alternatives from an economic perspective is the personal choice for commuters to pay the time cost associated with congestion or monetary cost for tolls in the express lanes. Like the GPL Alternative, the EL Alternative would positively affect retail health. Cumulatively, past, present, and future actions would result in an improved economic condition, reflecting a return on

investment in the local communities and strong economic growth.

Traffic

The EL Alternative would accommodate a substantial increase of traffic on C-470. Provision of additional capacity under this alternative would provide for acceptable traffic operations on C-470, as compared to the severe congestion expected under the No-Action Alternative. The predicted future traffic levels consider the effects of other transportation actions, including the widening of I-25 and Santa Fe Drive, which would be able to carry more traffic to C-470.

Air Quality

Analysis of air pollution emissions and localized concentrations within the project area was undertaken for the EL Alternative. This analysis takes into account the effects of past, present and future development, including planned future transportation improvements in DRCOG's fiscally constrained and air quality conforming RTP. The results show that predicted future emissions would be within allowable emissions budgets. These budgets were developed, taking into account emissions from both transportation-related and non-transportation sources, and are part of EPA-approved plans that demonstrate continued attainment of NAAQS. Predicted microscale concentrations for this alternative are also well within applicable air quality standards.

Highway Noise

Noise analysis was conducted for areas along the C-470 corridor based on the EL Alternative conceptual design and the C-470 projected future traffic volumes that reflect the impacts of past, present and reasonably foreseeable projects, as noted above. The results of this analysis indicate an expected average noise increase of approximately four decibels (a doubling of noise levels), causing noise levels to exceed abatement threshold levels at 25 residential locations. Note that typically more than one home is impacted at each of these locations. Noise mitigation would be provided at locations where it is found to be both reasonable and feasible, but would not be

provided at locations where these criteria are not met. The cumulative effect would be a general increase in noise along C-470 throughout the study corridor.

Water Quality

The EL Alternative would increase the amount of impervious surface area in the corridor from 135 to 322 acres, and would carry a higher volume of vehicle traffic, but would include important water quality mitigation measures. The tough mitigation requirements of CDOT's statewide stormwater control permit (MS4 program) require application of water quality Best Management Practices that would not only address the incremental effects of added pavement and higher traffic, but address all stormwater runoff from the roadway, thus also addressing the contribution of the existing roadway. The net result of the project is expected to be a net improvement in the quality of the water that is discharged from the roadway system to receiving waters in the drainage basin. Based on this beneficial project outcome, the cumulative result is that water quality in the drainage basin is not expected to become impaired in the reasonably foreseeable future.

Visual/Aesthetic Character

In addition to the effects on visual character that were discussed for the GPL Alternative, the EL Alternative would also introduce roadway elements pertaining to toll collection operations. Specifically, this would include lane barriers to separate the express lanes from the general purpose lanes, equipment to detect electronic payment transponders, and signage and merging treatments to facilitate motorists getting into and out of the express lanes at limited locations.

A further difference between the EL Alternative and the GPL Alternative is the provision of access ramps for the tolled express lanes at Colorado Boulevard. Colorado Boulevard would have no access to C-470 under either the GPL or the No-Action Alternative.

As with the GPL Alternative, the EL Alternative would have more lanes and more traffic than C-470 has today, resulting in a more urban feel for the motorist. The addition of toll-related design features and Colorado Boulevard access ramps would accentuate this for the EL Alternative.

Wildlife

The EL Alternative has similar effects to those discussed for the GPL Alternative, with slightly greater habitat loss. Improvements to the bridge over the South Platte River would also continue to benefit wildlife movement under C-470. The cumulative effect on wildlife from the EL Alternative represent minimal change to habitat loss compared to the effects of continued urban development.

Wetlands

The effects to wetlands in the project area would be slightly more for the EL Alternative than the GPL Alternative. However, compensatory mitigation would be provided for these effects. Therefore, the overall cumulative affect to wetlands would be the result of unmitigated actions from the past, present or future.

Threatened/Endangered Species

The effects to the bald eagle as a result of the EL Alternative would be slightly greater than the GPL Alternative due to a slightly larger effect to black-tailed prairie dog habitat. However, the mitigation measures would provide additional prey habitat, nesting, and roosting opportunities for the eagles. Therefore, the cumulative effects to the bald eagle would largely be a result of past and future urban development, with C-470 improvements playing a much smaller role in the overall effect.

Vegetation

The cumulative effects for the EL Alternative together with other past, present, and reasonably foreseeable actions would be continued, gradual conversion of the corridor to include less natural vegetation, with the introduction of landscaping elements and non-native grasses and trees.

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1 Future change to vegetation would likely be
 2 minimal in comparison to the changes that have
 3 occurred from past actions.

5 3.6.3 Mitigation

6 No cumulative effects were identified that would
 7 require mitigation above and beyond actions
 8 addressing direct and indirect effects. The GPL
 9 Alternative and EL Alternative would result in
 10 benefits that would not normally occur under
 11 the No-Action Alternative including:

- 13 ■ Improved traffic flow on C-470, addressing
 14 the cumulative traffic demands resulting
 15 from continued urban development and
 16 the improvement of major connecting
 17 roadways (I-25 and Santa Fe Drive)
- 18 ■ Improved water quality in C-470
 19 stormwater drainage, because original
 20 C-470 construction was not regulated by
 21 modern MS4 stormwater control require-
 22 ments. Both the GPL or EL Alternative
 23 would improve the quality of stormwater
 24 drainage
- 25 ■ Reduced noise for locations having noise
 26 effects but would not receive mitigation
 27 under the No-Action Alternative. Thus,
 28 either of the action alternatives would
 29 mitigate for increased C-470 traffic demand
 30 that is attributable to foreseeable future
 31 actions (ongoing urban development
 32 plus improvements to major connecting
 33 roadways)
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51 Sustainable practices incorporated into the
 52 project planning, construction, and maintenance
 53 can minimize resource impacts. As part of its
 54 environmental ethic and policy, CDOT
 55 encourages its staff, consultants, and contractors
 56 to identify and utilize opportunities and
 57 methods to reduce the impact of projects and
 58 programs on environmental resources through
 59 innovative programs and by providing flexibility
 60 in project planning and construction for the use
 61 of sustainable processes and materials. This may
 62 include such concepts as natural resource
 63 conservation, waste minimization, materials
 64 reuse, minimal use of native virgin materials,
 65 conservation and efficient use of water and
 66 energy, air pollution prevention, preference for
 67 “green” purchasing including recycled,
 68 minimally processed and packaged items, and
 69 preference for locally-available resources. CDOT
 70 encourages the identification and incorporation
 71 of proven alternative materials that are as long
 72 or longer-lasting, and which require the same or
 73 less amount of maintenance, as long as such
 74 materials do not impact CDOT’s ability to meet
 75 its primary obligations for providing a safe and
 76 efficient transportation system.