Wetland and Aquatic Resources Technical Report – I-270 Corridor Improvements Environmental Impact Statement

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Contents

Acronyms and Abbreviations

Acronym	Definition
AA	Assessment Area
AJD	Approved Jurisdictional Determination
AOI	Area of Interest
BMP	Best Management Practice
BNSF	BNSF Railway
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CPW	Colorado Parks and Wildlife
CSQT	Colorado Stream Quantification Tool
CWA	Clean Water Act
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FACWet	Functional Assessment of Colorado Wetlands
FCI	Functional Capacity Index
FHWA	Federal Highway Administration
GIS	Geographic Information System
HB	Colorado House Bill
I-25	Interstate 25
I-270	Interstate 270
I-70	Interstate 70
I-76	Interstate 76
ITS	Intelligent Transportation Systems
mph	miles per hour
NEPA	National Environmental Policy Act
NWP	Nationwide Permit
NRCS	Natural Resources Conservation Service
OBL	Obligate Wetland
OHWM	Ordinary High-Water Mark
PEM	Palustrine Emergent
PJD	Preliminary Jurisdictional Determination
PSS	Palustrine Scrub-Shrub
RTD	Regional Transportation District

Acronym	Definition
SB	Senate Bill
U.S.	United States
UPL	Uplands
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WOTUS	Waters of the U.S.

1.0 Introduction

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The Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) are preparing an Environmental Impact Statement (EIS) to evaluate potential improvements to the Interstate 270 (I-270) corridor. FHWA and CDOT are the lead agencies for this National Environmental Policy Act (NEPA) process, which was initiated in 2020, initially anticipating an Environmental Assessment. Moving into 2023, CDOT determined a more detailed environmental review was needed and requested that an EIS be prepared.

This technical report evaluates and documents potential impacts to and recommended mitigation measures for wetland and aquatic resources. It supports the analysis and conclusions in the EIS.

1.1 Project Description

I-270 in Colorado is a controlled-access interstate highway with two through lanes in each direction between Interstate 25 (I-25) and Interstate 70 (I-70) in central Denver and Commerce City (Figure 1). It has a posted speed limit of 55 miles per hour (mph). The project limits include the I-270 interchanges with Interstate 76 (I-76), York Street, Vasquez Boulevard, and Quebec Street. The project will tie into the I-25 and I-70 system interchanges, but improvements to these interchanges are part of projects on I-25 and I-70 and will be designed and approved separately.

The purpose of the I-270 Corridor Improvements Project is to implement transportation solutions that modernize the I-270 Corridor to accommodate existing and forecasted transportation demands. The project needs are:

- Traveler safety on the corridor,
- Travel time and reliability on the corridor,
- Transit on the corridor,
- Bicycle and pedestrian connectivity across I-270, and
- Freight operations on the corridor.

In addition to addressing project needs, CDOT, FHWA, and Cooperating and Participating Agencies have established a key project goal: to minimize environmental and community impacts resulting from the project.

Figure 1. I-270 Corridor Improvements Project Limits and Footprint

2.0 Alternatives

CDOT developed a range of potential alternatives for I-270 improvements. The alternatives ranged from no improvements to minimal infrastructure improvements without added highway capacity to alternatives that added one or two travel lanes in each direction, which could be operated as transit, general-purpose, or Express Lanes.

A two-level alternatives evaluation process was used to screen the alternatives based on the project's purpose and need and goal, and two build alternatives were carried forward for detailed analysis in the EIS:

- Three General-Purpose Lanes Alternative
- Two General-Purpose Lanes and One Express Lane that Accommodates Transit Alternative

The No Action Alternative is also fully evaluated as a baseline for comparison.

Additional information on the alternatives development and evaluation process is included in the Alternatives Development Technical Report.

2.1 No Action Alternative

The No Action Alternative evaluates operations of I-270 if a build alternative would not occur along the corridor. It does not address the project Purpose and Need but is carried forward as a baseline for comparison. This alternative would maintain the existing highway configuration of two general-purpose travel lanes in each direction. Bridges and pavement would be maintained and repaired continuously, but underlying infrastructure deficiencies would remain.

The No Action Alternative would include substantial ongoing maintenance and the rehabilitation of 19 existing structures, including seven locations that have structures that are or will be reaching the end of their useful life. The age of the structure, recent bridge inspections, and current ongoing maintenance costs, both planned and emergency maintenance, determine if a structure is or will be reaching the end of its useful life. The seven structure locations along the I-270 corridor that are or will be reaching the end of their useful life are as follows:

- Vasquez Bridge over Sand Creek (E-17-AT)
- York Street Bridge over I-270 (E-17-IC)
- I-270 over South Platte River Eastbound and Westbound Bridges (E-17-IE & E-17-ID)
- I-270 over Burlington Ditch Eastbound and Westbound Bridges (E-17-IG & I-17-IF)
- I-270 over Brighton Boulevard, Union Pacific Railroad (UPRR) and BNSF Railway (BNSF) Eastbound and Westbound Bridges (E-17-II & E-17-IH)
- I-270 over 60th Avenue & BNSF Eastbound and Westbound Bridges (E-17-IK & E-17-IJ)
- I-270 over East 56th Avenue Eastbound and Westbound (E-17-IO & E-17-IN)

The cross section would remain unchanged along I-270 under the No Action Alternative. The No Action Alternative cross sections are shown on Figure 2 and Figure 3.

Figure 2. No Action Alternative (west of Vasquez Boulevard)

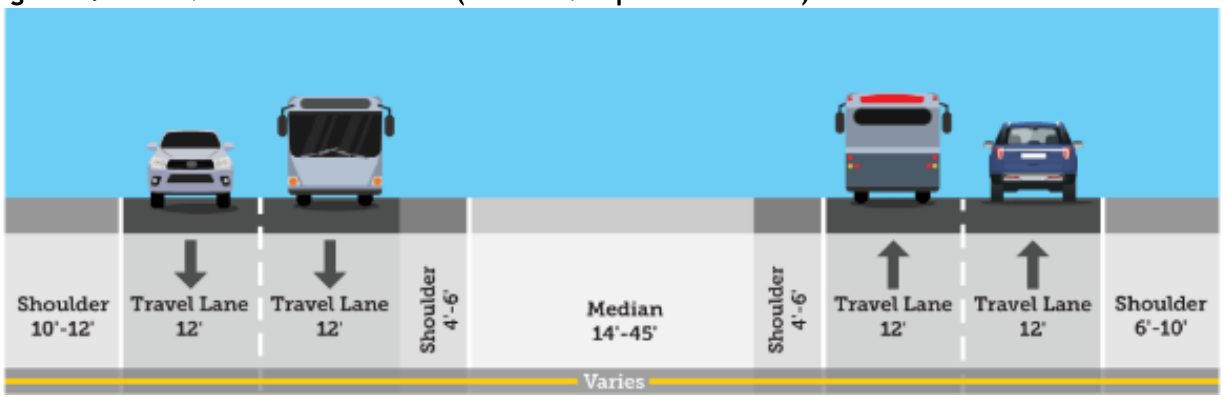
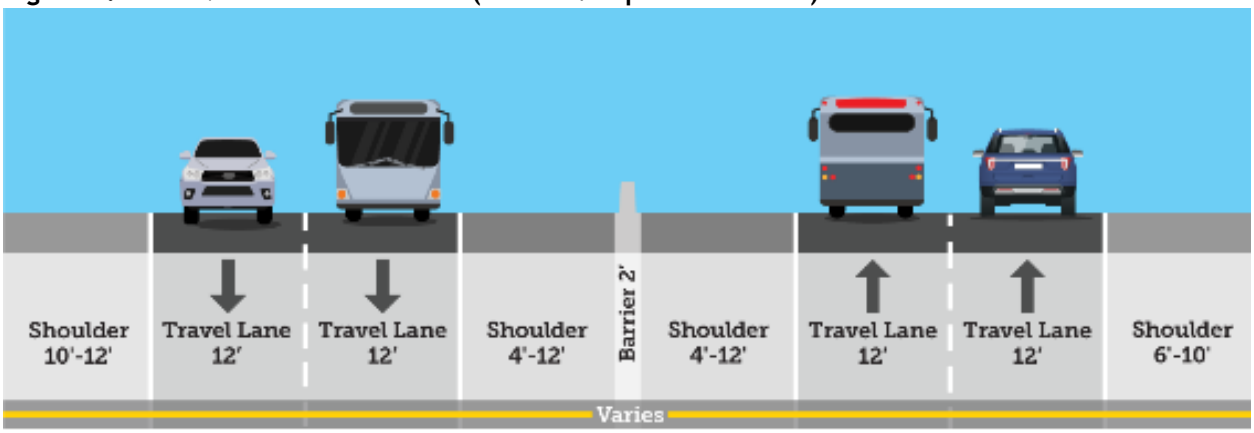


Figure 3. No Action Alternative (east of Vasquez Boulevard)



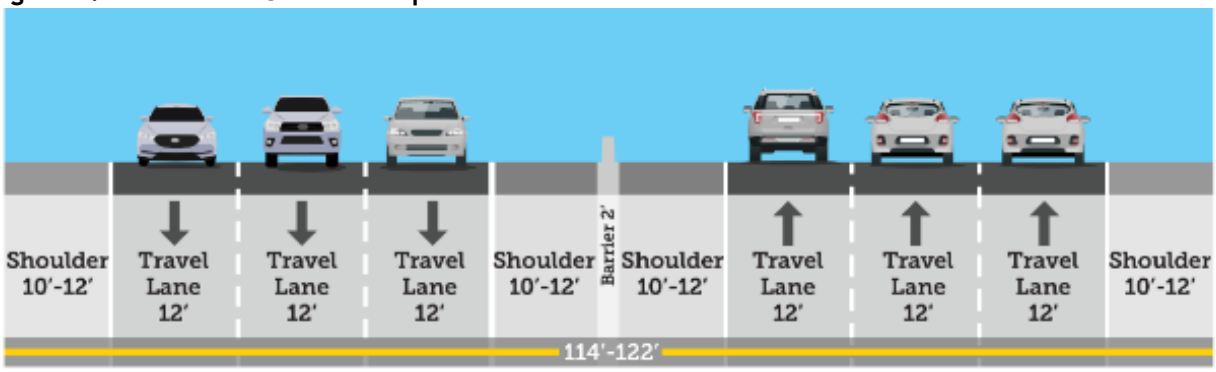
2.2 Build Alternatives

The build alternatives include improving the operational and physical conditions of the I-270 highway; reconfiguring interchanges and ramps; enhancing transit on the corridor; improving bicycle and pedestrian access across I-270; replacing deficient bridges and other infrastructure; and providing modern drainage, water quality, intelligent transportation systems (ITS), and other supporting infrastructure. Both add one new travel lane in each direction and have similar footprints, varying primarily how the additional travel operates.

2.2.1 Three General-Purpose Lanes Alternative

This alternative would reconstruct I-270 to provide three general-purpose lanes in each direction, as shown in Figure 4.

Figure 4. Three General-Purpose Lanes Alternative



This alternative includes:

Mainline Improvements

- Providing three general-purpose lanes in each direction
- Widening shoulders to meet current standards
- Restriping of the westbound I-270 to northbound I-25 off-ramp to provide dual-exit lane capacity
- Adding emergency turnouts and turnaround
- Adding one continuous auxiliary lane in each direction between the I-76 and Vasquez Boulevard on-ramps and off-ramps

Interchange Improvements

- Adding an eastbound collector ramp to consolidate incoming movements from the I-76 on-ramps
- Separating the westbound I-270 York Street and I-76 off-ramps
- Improving the Vasquez Boulevard interchange design with improved westbound on-ramp acceleration lanes and the eastbound off-ramp deceleration lanes
- Improving the Quebec Street interchange ramp acceleration and deceleration lengths

Bridge Improvements

- Reconstructing bridges that are at, or will be reaching, the end of their useful life. Bridges carrying travel lanes on I-270 include widening to accommodate additional lanes
    - Replacing the existing York Street bridge over I-270 to meet current bridge standards, accommodate an additional travel lane in each direction on York Street, include a 10-foot multi-use path and a 5-foot sidewalk, and enhance lighting
    - Replacing the existing I-270 bridges over the South Platte River Trail to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements on the South Platte River Trail, and enhance lighting
    - Replacing the existing I-270 bridges over the Burlington Ditch to meet current bridge standards, accommodate future bicycle and pedestrian improvements, and enhance lighting

  - Replacing the existing I-270 bridges over Brighton Boulevard to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements on Brighton Boulevard and future bicycle and pedestrian improvements by others, and enhance lighting
  - Replacing the existing I-270 bridges over East 60th Avenue and the BNSF crossing to meet current bridge standards, accommodate future bicycle and pedestrian improvements, and enhance lighting
  - Replacing the existing I-270 bridges over East 56th Avenue to meet current bridge standards, accommodate this project's bicycle and pedestrian improvements, and enhance lighting
  - Replacing the existing Vasquez Boulevard bridge over Sand Creek to meet current bridge standards and accommodate this project's bicycle and pedestrian improvements

Bicycle and Pedestrian Improvements

- Improving the York Street I-270 ramp terminal intersections with crosswalks, curb ramps, and pedestrian indicators at the ramp terminal traffic signals
- Adding a new 5-foot sidewalk on the west side and reconstructing a 6-foot sidewalk on the east side of Brighton Boulevard under I-270
- Reconstructing East 56th Avenue under I-270 and adding an on-street bicycle lane, a 10-foot multi-use path, and 6-foot sidewalk connecting to existing sidewalks
- Improving the intersection at East 56th Avenue and South Sandcreek Drive to include curb ramps, crosswalks, and lighting that meet current standards
- Improving the intersection at East 56th Avenue and Eudora Street to include curb ramps, crosswalks, and lighting that meet current standards
- Adding attached sidewalks on the west side of South Sandcreek Drive. The new sidewalks would be 8 feet wide from Quebec Street to East 47th Avenue Drive and 6 feet wide from East 47th Avenue Drive to East 49th Avenue, with a pedestrian crosswalk across East 47th Avenue Drive connecting the two segments
- Improving wayfinding at key locations, guiding bicyclists and pedestrians to the nearest Regional Transportation District (RTD) bus stops, major road connections, or distances to the next trailhead to avoid out-of-direction travel

Trail Improvements

- Reconfiguring the South Platte River Trail crossing under I-270 to improve bicycle and pedestrian visibility around tight curves and increase vertical clearance from the I-270 overpass
- Improving bicycle and pedestrian visibility on the Sand Creek Trail by straightening out tight curves, adding a center stripe, and enhancing lighting at the Vasquez Boulevard bridge over the Sand Creek Trail
- Adding a multi-use path with bicycle and pedestrian underpasses crossing under two free-flow interchange ramps on the east side of Vasquez Boulevard through the interchange with enhanced lighting
- Adding a multi-use path on the east and west sides of the Vasquez Boulevard bridge over Sand Creek, connecting users from the East 56th Avenue and Vasquez Boulevard intersection to a new connection to the Sand Creek Trail

- Adding a multi-use trail spur, connecting the proposed north-south Vasquez Boulevard multi-use trail to the East 56th Avenue and South Sandcreek Drive intersection
- Adding a multi-use path in the southeast corner of East 56th Avenue and South Sandcreek Drive
- Adding a 10-foot-wide bicycle and pedestrian overpass over I-270 and South Sandcreek Drive approximately halfway between East 56th Avenue and Quebec Street

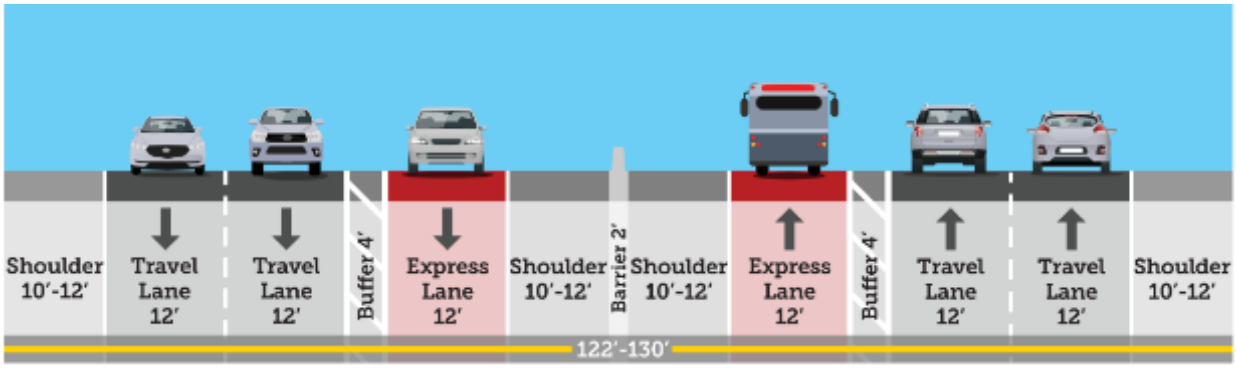
Transit Improvements

- Adding four new bus stops with connecting sidewalks and curb ramps on Quebec Street and South Sandcreek Drive near the I-270/Quebec Street interchange to improve access to RTD routes 88 and 37

2.2.2 Two General-Purpose Lanes and One Express Lane that Accommodates Transit Alternative

This alternative would reconstruct I-270 with two general-purpose lanes and one Express Lane in each direction, as shown in Figure 5. Transit vehicles and high-occupancy vehicles (three or more people) could travel in the Express Lane, free of charge. Other travelers, including freight trucks, who choose to pay a fee could also use the new Express Lane.

Figure 5. Two General-Purpose Lanes and One Express Lane that Accommodates Transit Alternative



This alternative includes:

Mainline Improvements

- Providing two general-purpose lanes and one Express Lane in each direction that accommodates transit
- Remainder of mainline improvements identified in the Three General-Purpose Lanes Alternative

Interchange Improvements

This alternative includes the same interchange improvements identified in the Three General-Purpose Lanes Alternative.

Bridge Improvements

This alternative includes the same bridge improvements identified in the Three General-Purpose Lanes Alternative.

Bicycle, Pedestrian, Trail, and Transit Improvements

This alternative includes the same bicycle, pedestrian, trail, and transit enhancements identified in the Three General-Purpose Lanes Alternative.

3.0 Regulatory Context

Various federal and state laws, executive orders, policies, and regulations are in place to protect wetlands and waterways. Aquatic resources discussed in this report are protected by the following federal and state laws, regulations, and policies.

- **Clean Water Act** - The federal Clean Water Act (CWA) was enacted in 1972 to restore and maintain the chemical, physical, and biological integrity of the United States' (U.S.) waters through the elimination of discharges of pollutants. In support of this goal, the Clean Water Act established permit programs to control discharges into waters of the U.S. (WOTUS) and provided the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE) with regulatory authority to issue permits. Section 404 established a program to regulate the discharge of dredged or fill material into WOTUS, including wetlands and streams, and requires the issuance of a permit for any activities resulting in such discharge, unless an exemption applies.

  The USACE and EPA are responsible for making all final jurisdictional determinations. Under Section 404 of the CWA, the USACE and the EPA reserve the right to determine jurisdictional status on a case-by-case basis (41 Code of Federal Regulations [CFR] 219). On August 29, 2023, EPA and USACE announced a final rule amending the definition of WOTUS to conform with the U.S. Supreme Court ruling under Sackett v. Environmental Protection Agency, No. 21-454. The amended rule removes the "significant nexus" standard that was created under Rapanos v. United States, removes interstate wetlands from the definition of WOTUS, and revises the definition of "adjacent" to mean "having a continuous surface connection." Wetlands that do not have a continuous surface connection to a jurisdictional, traditional, navigable water or tributary are no longer jurisdictional, as well as ephemeral streams that do not have relatively permanent water.

- **33 CFR 328.3(c)(1)** - Definition for wetlands.
- **33 CFR 328.3(c)(4)** - Definition for ordinary high-water mark (OHWM).
- **Colorado House Bill (HB) 24-1379** - This state bill (signed in 2024) directs the Colorado Water Quality Control Division to implement a dredge and fill authorization program and the Water Quality Control Commission to promulgate rules for individual permitting and mitigation by December 31, 2025. Until permitting and mitigation rules are established, the division will:

  - Recognize nationwide and regional general permits issued by the USACE as being valid authorizations to discharge dredged or fill material into state waters (beginning January 1, 2025).
  - Develop and issue temporary authorizations.
  - Develop a statewide general authorization for discharges to isolated state waters.
  - Develop compensatory mitigation requirements.
- **Executive Order (EO) 11990** - Non-jurisdictional wetlands are not subject to permitting by the USACE under Section 404; however, all federal agencies are required to avoid and minimize wetland impacts, to the greatest extent possible, per EO 11990, "Protection of Wetlands". FHWA is responsible for compliance with EO 11990 and provides guidance to avoid and minimize impacts to wetlands in FHWA Technical Advisory T6640.8A. In accordance with EO 11990 and CDOT's Memorandum of Agreement with FHWA (CDOT 2024), CDOT policy requires all wetland impacts to be mitigated, regardless of jurisdictional status.
- **Senate Bill (SB) 40** - SB40 (33-5-101-107, CRS 1973, as amended) requires any agency of the state to obtain wildlife certification from Colorado Parks and Wildlife (CPW) when the agency plans construction in "...any stream or its bank or tributaries...". Compliance with these requirements is discussed in the Biological Resources Report prepared for the project (CDOT, 2020).

3.1 Agency Coordination

At the project onset, CDOT contacted the USACE to inform them of the project and confirm the appropriate agency contact. On May 5, 2023, CDOT contacted the USACE Denver Regulatory Office to initiate coordination on the I-270 EIS. An initial discussion between CDOT and the USACE was held on May 15, 2023.

An approved jurisdictional determination request was submitted to the USACE for all aquatic resources in the project corridor on June 13, 2023, and a site visit with CDOT and USACE staff was conducted on August 22, 2023. Based on discussions between CDOT and the USACE in June 2024, CDOT rescinded the original Approved Jurisdictional Determination (AJD) request on August 22, 2024, and instead submitted a Preliminary Jurisdictional Determination (PJD) request and an updated AJD request.

A PJD is a streamlined process that treats all aquatic resources within the review area that could be jurisdictional, as if they are jurisdictional for purposes of permit processing. The PJD request assumed Relatively Permanent Waters and their adjacent wetlands, including Clear Creek, the South Platte River, Sand Creek, and the Burlington Ditch/O'Brien Canal to be jurisdictional. The AJD request was submitted for aquatic resources assumed to be non-jurisdictional, including aquatic resources that function as stormwater and water quality control, and ditches constructed in uplands (UPL). The purpose of the jurisdictional determination request is to obtain regulatory certainty for the purpose of identifying impacts to Section 404 aquatic resources and eventually to aid in permitting the process prior to construction.

On November 1, 2024, the USACE agreed with the PJD and updated AJD package that CDOT submitted. See Attachment G for the documentation associated with the jurisdictional determination request and response.

4.0 Methods

To identify aquatic resources, which included wetlands and non-wetland waters in the study area, a desktop evaluation was completed with available mapping and aerial images prior to fieldwork, including the National Wetland Inventory Maps (U.S Fish and Wildlife Service [USFWS] 2024), USGS 7.5-minute topographic maps, and Google Earth historic aerial imagery.

Biologists visited and evaluated the approximately 369-acre study area, which is also the project footprint, to delineate aquatic resources. See Figure 1 and Appendix A. While in the field, boundaries of wetlands and surface waters were recorded on tablets by using Collector for ArcGIS. To establish submeter accuracy, Trimble R1 Global Navigation Satellite System and GEODE receivers were paired with these tablets. Photos of wetland areas were taken while in the field (Attachment B).

To formally delineate wetlands and WOTUS within the study area, biologists conducted field surveys during July 2020, with follow-up surveys in early October 2020, December 2020, and May 2024 to account for study area adjustments. The aquatic resource delineation was completed in accordance with the *Corps of Engineers Wetland Delineation Manual* (USACE 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)* (USACE 2010). Wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3(c)(1)). Wetland boundaries were determined by a visible change in vegetation community, soils, topographic changes, and other visible distinctions between wetlands and UPLs.

Wetlands were defined by vegetative, hydrologic, and soil features, and the data were recorded onto field data forms (Attachment C).

Relatively permanent and non-relatively permanent drainages with characteristics of a defined streambed, streambank, OHWM, and other erosional features also were identified. The OHWM identifies lateral jurisdictional limits of non-wetland WOTUS. Federal jurisdiction over non-wetland WOTUS extends to the OHWM, defined in 33 CFR 328.3(c)(4) as "the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." USACE defines "stream bed" as "the substrate of the stream channel between the OHWMs. The substrate may be bedrock or inorganic particles that range in size from clay to boulders."

Vegetation was identified and documented within the strata-specific sampling radii, recommended by USACE (30 feet for trees, 15 feet for shrubs, 5 feet for herbs, and 30 feet for woody vines) (USACE 2010). The wetland indicator status for plant species was referenced

in the "National Wetland Plant List: 2020 wetland ratings" (Lichvar et al. 2020). Species were classified as obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), or UPL. Plant species classified as FAC, FACW, or OBL are considered hydrophytic plants and are wetland indicators. Wetlands were also classified by using the Cowardin classification system (Cowardin et al. 1979).

Hydrology and soil data were also collected at the sampling points. Hydrology indicators may include topographic position, presence of standing water and saturated soil, profile conditions, drainage patterns, water marks, sediment deposits, and oxidized root channels in the upper 18 inches of the soil profile. Wetland soil indicators may include presence of color streaking (mottling), gleying (grayish coloration), reducing conditions, hydrogen sulfide odor, high organic content, and organic matter streaking in the surface layer of sandy soils. Soil pits were hand excavated in potential wetlands to verify indicators of vegetation, wetland hydrology, and hydric soils. Soil "colors" were determined by using a Munsell Soil Book of Color.

In addition, the "Functional Assessment of Colorado Wetlands (FACWet) Method" (Johnson et al. 2013) was completed. The Area of Interest (AOI) encompasses the area that could be directly or indirectly impacted by project activities. Within the AOI, areas of target habitat (wetlands) were defined as Assessment Areas (AA). The targeted habitat for this project included any waters, wetlands, or riparian vegetation. Wetlands were grouped into Assessment Areas (AAs), according to hydrogeomorphic class, wetland type, and location within the AOI. Field observations for each AA were incorporated into FACWet data sheets (Attachment D).

The jurisdictional status of the wetlands and non-wetland waters were evaluated based on the 2023 conforming rule, following the Sackett v. EPA Supreme Court decision. A presumed jurisdictional status was assigned to each feature in accordance with the rule. However, only the USACE and EPA can formally determine the jurisdictional status of the extent of WOTUS. Therefore, an approved jurisdictional determination request was submitted to the USACE for all aquatic resources in the project corridor on June 13, 2023, the results of which are discussed in Section 3.1.

4.1 Analysis Approach

Potential aquatic resource impact areas were determined through Geographic Information System (GIS) evaluation of design data overlaid on the field-delineated aquatic resource data. An analysis for total acres of permanent disturbance and temporary disturbance was conducted for each alternative and compared to the No Action Alternative.

Direct effects/impacts are caused by the action and occur at the same time and place. Examples of direct effects include removal of wetland habitat, crushing of plants, and disruption to wildlife in the study area during construction. Indirect effects/impacts are caused by the action and occur later in time or are farther removed in distance but are still reasonably foreseeable. Examples of indirect effects include changes to water quality, hydrology, and surface water distribution resulting from increased impervious surface, and effects to aquatic and terrestrial wildlife and wetland vegetation that remain years after construction is completed.

Onsite wetland mitigation concepts are based on field observations by CDOT and consulting biologists during wetland investigations and subsequent desktop analysis and mapping.

5.0 Existing Conditions

5.1 General Site Conditions

5.1.1 Vegetation

Three broad wetland categories were delineated and mapped within the study area, including herbaceous palustrine emergent (PEM) wetlands associated with natural riparian areas, palustrine scrub-shrub (PSS) wetlands associated with natural riparian areas, and PEM wetlands associated with stormwater hydrology. Typical hydrophytic vegetation characterizing these wetland types as well as the transitional upland communities are described below:

- **Riparian PEM:** PEM wetland areas generally associated with relatively permanent hydrologic regime on natural streams within the study area are generally dominated by one or more of the following species: broadleaf cattail (*Typha latifolia*; OBL), Baltic rush (*Juncus balticus*; FACW), and inland saltgrass (*Distichlis spicata*; FACW).
- **Riparian PSS:** PSS wetlands within the study area generally associated with natural streams are dominated by narrowleaf willow (*Salix exigua*; FACW) and plains cottonwood (*Populus deltoides*; FAC). Understories contain cattails and Emory's sedge (*Carex emoryi*; OBL).
- **Stormwater PEM:** PEM wetlands associated with stormwater hydrology, including roadside swales and stormwater facilities within the study area, are generally dominated by one or more of the following species: broadleaf cattail (*Typha latifolia*; OBL), inland saltgrass (*Distichlis spicata*; FACW), and Fuller's teasel (*Dipsacus fullonum*; FACU).
- **Upland Transition:** The upland transition is typically dominated by a mixture of grasses and forbs, including salt grass, blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), smooth brome (*Bromus inermis*), buffalo grass (*Bouteloua dactyloides*), sand dropseed (*Sporobolus cryptandrus*), side oats grama (*Bouteloua curtipendula*), and downy brome (*Bromus tectorum*).

Dominant vegetation observed throughout the study area primarily consisted of native and non-native grasses (that is, blue grama, western wheatgrass, smooth brome, and forbs, including curly dock [*Rumex crispus*] and sweet clover [*Melilotus officinalis* spp]). Narrowleaf willow, plains cottonwood, and Siberian elm (*Ulmus pumila*) are also present within the study area.

5.1.2 Hydrology and Geomorphology

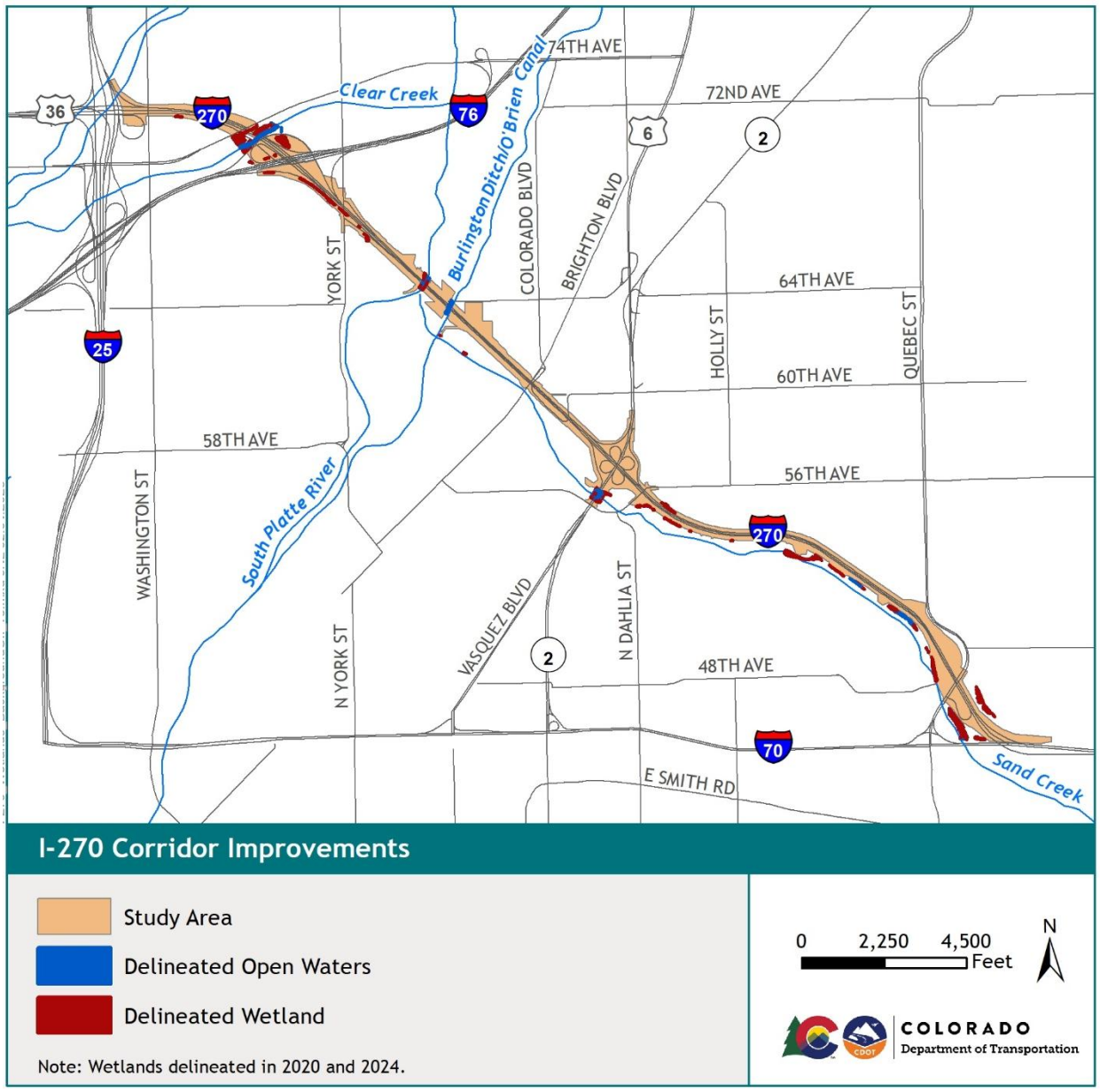
The study area is within the Middle South Platte–Cherry Creek Watershed (HUC 10190003) (U.S. Geological Survey [USGS] 2020a). Major drainages and delineated wetlands show on Figure 6 (see Appendix A for more details). Sand Creek flows northwest along the western side of I-270 before joining the South Platte River in the northern portion of the study area. Much of Sand Creek is heavily incised with steep, unstable banks, likely a result of the

urbanized nature of the watershed which leads to intense stormwater flows in a naturally unstable riparian area, characterized by deep unconsolidated sandy alluvium. Notably, a major flood event in September 2013 (approximately 14,000 cubic feet per second), which was approximately 14 times greater than the normal annual peak discharge event (approximately 1,000 cubic feet per second) (USGS 2020b), likely exacerbated and accelerated this channelization. This single event likely scoured the channel, creating floodplain terraces now disconnected from normal high-water events. As such, some former floodplain wetlands now have deficient hydrology to support wetlands, leading to stressed riparian habitat and invasion of weed species, notably teasel and Canada thistle. Dense patches of narrowleaf willow abut Sand Creek, providing areas of wetland and riparian habitat. However, many of the willow stands are stressed (for example, lacking foliage, and weedy understory) in part because of the channel actively incising.

Clear Creek flows northeast under I-270 near the northern terminus of the study area before intersecting the South Platte River. Like Sand Creek, Clear Creek is entrenched and significantly affected by encroachment of urban development and flashy stormwater runoff events. Only a short section of Clear Creek passes through the study area, where three large bridge structures span the waterway. The floodplain, which appears to be disconnected from natural seasonal flooding, contains a large riparian wetland complex modified by past borrow pits and dominated by narrowleaf willow and mature plains cottonwood trees (*Populous deltoides* ssp *monilifera)*. The wetland complex is somewhat cut off from natural floods by an existing berm and recreational trail. However, the complex does drain through culverts connecting the wetlands to Clear Creek.

The South Platte River flows north (under and perpendicular to I-270) near the center of the study area. The South Platte River is a highly manipulated stream, subject to altered flow regime because of water diversions; storage projects; treatment facilities; residential, commercial, and industrial use; and urban runoff. The I-270 bridges over the South Platte (E-17-ID and E-17-IE) are high bridges just downstream of a major wastewater treatment facility that discharges into the river. Through the study area, embankments of the South Platte River are very steep, which limit the riparian and wetland zone to a narrow strip at the OHWM of the stream.

Figure 6. Aquatic Resources Overview Map



The study area contains many human-made roadside ditches, swales, and stormwater detention basins associated with runoff and drainage from I-270 and adjacent infrastructure. These stormwater wetland features are not considered to be jurisdictional waters when they are constructed in UPLs, drain-only uplands, and have no continuous surface connection to a downstream traditional navigable water. Other sources of hydrology include stock ponds, stormwater runoff occurring as sheet flow across the interstate, and stormwater directed into permanent water quality features. These sources of hydrology also contribute to the formation and support of roadside drainage and water quality facility wetlands in portions of the study area.

5.1.3 Soils

There are 13 soil types mapped within the study area (Natural Resources Conservation Service [NRCS] 2018). These soil types are presented in Table 1. Soils of wetlands in the study area typically consist of loams, sandy loams, loamy sands, and clay loams. Of the 13 soil types present in the study area, one type (the Sandy alluvial land [7.7 percent]) is classified as hydric (NRCS 2018).

Table 1. Soil Types within the Study Area

Soil Key[1]	Soil Name	Hydric Rating
AsB	Ascalon sandy loam, sandy substratum, 0 percent to 3 percent slopes	No
BoD	Blakeland loamy sand, 3 percent to 9 percent slopes	No
Lv	Loveland soils	No
Lw	Loamy alluvial land, moderately wet	No
MISLD	Gravel pits	No
NuA	Nunn clay loam, 0 percent to 1 percent slopes	No
NuB	Nunn clay loam, 1 percent to 3 percent slopes	No
Sm	Sandy alluvial land	Yes[2]
Tc	Terrace escarpments	No
TuB	Truckton loamy sand, 1 percent to 3 percent slopes	No
TuD	Truckton sandy loam, 3 percent to 9 percent slopes	No
VoA	Vona sandy loam, 1 percent to 3 percent slopes	No
VoB	Vona sandy loam, 1 percent to 3 percent slopes	No

5.2 Wetlands

Numerous wetland areas were identified within the study area by using soil type, vegetation, and hydrologic indicators. The study area boundaries show on Figure 6 and Figure 7. Wetlands are generally associated with watercourses that flow through the study area and permanent stormwater facilities or highway drainage features, such as roadside swales. Wetlands were grouped to simplify the discussion. Wetland groupings were based on hydrogeomorphic class, wetland type, and location within the AOI. The following sections discuss each wetland grouping. Table 2 lists delineated wetlands within the study area. Table 3 lists non-wetland waters (non-vegetated channels and open water features) delineated within the study area. An overview of wetlands in the study area shows on Figure 6 and Figure 7. Detailed wetland boundaries show in the Wetland Delineation Mapbook of Attachment A.

[1]Source: NRCS 2018
[2]Generic soil unit was not described; it was assumed to be hydric based onsite observations and physiological landscape position.

5.2.1 Wetlands Associated with Clear Creek

Approximately 2.6 acres of wetlands were along embankments and the historic floodplain of Clear Creek which is the primary source of hydrology for these wetlands. Wetlands are a combination of PEM, dominated by herbaceous vegetation, and PSS, which support at least 30 percent shrub canopy (Cowardin et al. 1979). Current wetland plants at these wetlands included Emory's sedge (OBL), broadleaf cattail (OBL), Fuller's teasel (FACU), wild mint (*Mentha arvensis;* FACW), poison hemlock (*Conium maculatum*; FACW), and leafy spurge (*Euphorbia esula*; UPL); narrowleaf willow (FACW) defines the shrub community; and plains cottonwood (FAC) and Siberian elm (UPL) dominate the tree canopy, where present. Hydric soil indicators in these wetlands included sandy redox and 2.5 centimeters of mucky peat (USACE 2010). Wetland hydrology indicators included surface water, high-water table, saturation, drainage patterns, and geomorphic position (USACE 2010). Because Clear Creek is a jurisdictional waterway, wetlands adjacent to the stream, or with an apparent surface connection to Clear Creek, are assumed to be federally jurisdictional.

5.2.2 Wetlands Associated with Sand Creek

Approximately 4.3 acres of wetlands were along portions of Sand Creek which is the primary source of hydrology for these wetlands. Wetlands are a combination of PEM and PSS wetlands. Current wetland plants at these wetlands included graminoids, such as inland saltgrass (FACW), foxtail barley (*Hordeum jubatum*; FAC), common three-square (*Schoenoplectus pungens*; OBL), meadow foxtail (*Alopecurus pratensis*; FACW), red fescue (*Festuca rubra*; OBL), Emory's sedge (OBL), Baltic rush (FACW), reed canary grass (*Phalaris arundinacea*; FACW); herbaceous plants, such as Canada thistle (*Cirsium arvense*; FAC), Indian hemp (*Apocynum cannabinum*; FAC), pepperweed (*Lepidium perfoliatum;* FAC), Fuller's teasel (FACU), broadleaf cattail (OBL), and sweet clover (UPL); a shrub community dominated by narrowleaf willow (FACW), snowberry (*Symphoricarpos occidentalis*; FACU), and Woods' rose (*Rosa woodsii*; FACU); and plains cottonwood (FAC) dominates the tree canopy, where present. Hydric soil indicators in these wetlands included hydrogen sulfide, thick dark surface, sandy redox, and redox dark surface (USACE 2010). Wetland hydrology indicators included high-water table, saturation, surface water, geomorphic position, hydrogen sulfide smell, oxidized rhizospheres on living roots, drift deposits, and drainage patterns (USACE 2010). Because Sand Creek is a federally jurisdictional waterway, wetlands adjacent to this creek, including stream bank wetlands and floodplain wetlands with clear surface connectivity, are assumed to be federally jurisdictional.

5.2.3 Wetlands Associated with the South Platte River

Approximately 0.1 acres of wetlands were along portions of the South Platte River, which is the primary source of hydrology for these wetlands. Wetlands are a combination of PEM and PSS wetlands (Cowardin et al. 1979). Current wetland plants at these wetlands included graminoids, such as inland saltgrass (FACW), foxtail barley (FAC), common three-square (OBL), meadow foxtail (FACW), pepperweed (FAC), red fescue (OBL), Emory's sedge (OBL), Baltic rush (FACW), reed canary grass (FACW); herbaceous plants, such as Canada thistle (FAC), Fuller's teasel (FACU), and broadleaf cattail (OBL), Indian hemp (FAC), and sweet

clover (UPL); a shrub community dominated by narrowleaf willow (FACW), snowberry (FACU), and Woods' rose (FACU); and plains cottonwood (FAC) dominate the tree canopy, where present. Hydric soil indicators in these wetlands included hydrogen sulfide, thick dark surface, sandy redox, and redox dark surface (USACE 2010). Wetland hydrology indicators included high-water table, saturation, surface water, geomorphic position, hydrogen sulfide smell, oxidized rhizospheres on living roots, drift deposits, and drainage patterns (USACE 2010). Because the South Platte River is a jurisdictional waterway, wetlands adjacent to, or with clear surface connectivity to these surface waters, are assumed to be federally jurisdictional as well.

5.2.4 Wetlands Associated with Stormwater Drainage Infrastructure

Approximately 4.0 acres of wetlands associated with highway drainage are in roadside ditches and low spots along I-270 and various roads that run parallel to and along I-270. From paved surfaces, stormwater runoff is the primary source of hydrology for these wetlands. Wetlands were primarily PEM (Cowardin et al. 1979). Some of these wetlands were a combination of PEM and PSS (Cowardin et al. 1979), but the shrub component is minimal. Current wetland plants at these wetlands included graminoids, such as inland saltgrass (FACW), Baltic rush (FACW), Emory's sedge (OBL), common spike rush (*Eleocharis palustris*; OBL), reed canary grass (FACW), foxtail barley (FAC), and common three-square (OBL); herbaceous plants are Fuller's teasel (FACU), broadleaf cattail (OBL), Indian hemp (FAC), and Canada thistle (FAC); and narrowleaf willow (FACW) dominates the shrub canopy, where present. The most common hydric soil indicator in these wetlands was redox dark surface (USACE 2010). Other hydric soil indicators included depleted matrix, 2.5-centimeter mucky peat, sandy redox, thick dark surface, and hydrogen sulfide odor (USACE 2010). The most common wetland hydrology indicators included saturation, drift deposits, salt crust, and geomorphic position (USACE 2010). Other wetland hydrology indicators included high-water table, surface soil cracks, inundation visible on aerial imagery, and drainage patterns (USACE 2010). Generally, these wetlands are considered to be federally non-jurisdictional features because they are constructed in UPLs, drain only uplands, and lack a continuous surface connection to a downstream traditional navigable water.

Table 2. Summary of Delineated Wetlands

Wetland Name	Cowardin Class	Federal Jurisdiction	Wetland Description	Square Feet	Acres[1]
W001[2]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	8,658	0.199
W002[2]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	25,841	0.593
W003[2]	PEM	Non-jurisdictional	Roadside stormwater swale constructed in UPL	10,027	0.230
W010[2]	PSS	Non-jurisdictional	Artificially created wetland located 750 feet from Sand Creek on opposite side of I-270 and Sand Creek Dr.	55,175	1.267
W020[2]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	21,632	0.497
W023[3]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	277	0.006
W025[3]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	3,441	0.079
W027[3]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	16,591	0.381
W028[4]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	47,123	1.082
W030[4]	PSS	Jurisdictional	Wetland adjacent to small tributary to Sand Creek, located in Sand Creek floodplain	245	0.006
W031[5]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	4,242	0.097
W032[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	98	0.002
W050[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	18,008	0.413
W051[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	7,137	0.164

Wetland Name	Cowardin Class	Federal Jurisdiction	Wetland Description	Square Feet	Acres[1]
W052[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	4,015	0.092
W053[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	351	0.008
W070[5]	PEM	Non-jurisdictional	Roadside swale	11,874	0.273
W100[6]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	2,474	0.057
W195[8]	PSS	Jurisdictional	Wetland on fringe of constructed depressional feature with potential surface connection to Clear Creek	583	0.013
W200[8]	PEM	Jurisdictional	Stormwater swale in Clear Creek floodplain	7,848	0.180
W205[8]	PSS	Jurisdictional	Wetland located within the historic Clear Creek floodplain on the opposite side of Clear Creek Greenway trail. Possible surface connection to Clear Creek.	26,314	0.604
W210[8]	PSS	Jurisdictional	Wetland located within the historic Clear Creek floodplain on the opposite side of Clear Creek Greenway trail. Possible surface connection to Clear Creek.	61,952	1.422
W215[8]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Clear Creek	1,103	0.025
W216[8]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Clear Creek	9,512	0.218
W220[8]	PSS	Jurisdictional	Depressional feature in Clear Creek floodplain with surface connection to Clear Creek	1,086	0.025
W230[7]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to South Platte River	325	0.007
W231[7]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to South Platte River	3,248	0.075

Wetland Name	Cowardin Class	Federal Jurisdiction	Wetland Description	Square Feet	Acres[1]
W232[7]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to South Platte River	779	0.018
W233[7]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to South Platte River	1,029	0.024
W300[8]	PEM	Non-jurisdictional	Constructed stormwater settling basin—associated with highway construction and runoff	56,694	1.302
W320[8]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Clear Creek	15,883	0.365
W330[8]	PEM	Non-jurisdictional	Roadside swale constructed in a UPL—associated with highway construction and runoff	3,071	0.070
W340[8]	PEM	Non-jurisdictional	Roadside swale constructed in a UPL—associated with highway construction and runoff	1,320	0.030
W401[9]	PEM	Non-jurisdictional	Roadside ditch constructed in a UPL—associated with highway construction and runoff	2,902	0.067
W410[8]	PEM	Non-jurisdictional	Roadside ditch constructed in a UPL—associated with highway construction and runoff	2,728	0.063
W420[8]	PEM	Non-jurisdictional	Roadside ditch constructed in a UPL—associated with highway construction and runoff	19,732	0.453
W430[8]	PEM	Non-jurisdictional	Roadside ditch constructed in a UPL—associated with highway construction and runoff	4,259	0.098
W440[7]	PEM	Non-jurisdictional	Roadside ditch constructed in a UPL—associated with highway construction and runoff	333	0.008
W450[7]	PEM	Non-jurisdictional	Depressional wetland adjacent to roadside ditch constructed in a UPL	6,811	0.156
W501[5]	PSS	Jurisdictional	Wetland swale located in the Sand Creek floodplain and with direct surface connection to Sand Creek	494	0.011
W502[5]	PSS	Jurisdictional	Wetland swale located in the Sand Creek floodplain and with direct surface connection to Sand Creek	1,226	0.028
W503[5]	PSS	Jurisdictional	Wetland swale located in the Sand Creek floodplain and with direct surface connection to Sand Creek	1,412	0.032

Wetland Name	Cowardin Class	Federal Jurisdiction	Wetland Description	Square Feet	Acres[1]
W504[5]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	2,608	0.060
W505[5]	PSS	Jurisdictional	Wetland located at stormwater outfall located adjacent to and with direct surface connection to Sand Creek	819	0.019
W506[4]	PSS	Jurisdictional	Wetland located at stormwater outfall located adjacent to and with direct surface connection to Sand Creek	351	0.008
W507[6]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	121	0.003
W508[5]	PEM	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	3,900	0.090
W510[5]	PEM	Jurisdictional	In-Channel wetland island, within the OHWM of Sand Creek	1,542	0.035
W511[3]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	1,833	0.042
W512[4]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	174	0.004
W513[4]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	1,255	0.029
W514[4]	PSS	Jurisdictional	Wetland adjacent to and with direct surface connection to Sand Creek	636	0.015
			Subtotal Jurisdictional	**306,166**	**7.029**
			Subtotal Non-jurisdictional	**174,926**	**4.016**
			Total	**481,092 square feet**	**11.044 acres**

Wetland acreages reported in Table 2 are approximate and have been rounded to the nearest thousandth place.
Wetland is shown in Attachment A on page 8.
Wetland is shown in Attachment A on page 7.
Wetland is shown in Attachment A on page 6.
Wetland is shown in Attachment A on page 5.
Wetland is shown in Attachment A on page 4.
Wetland is shown in Attachment A on page 3.
Wetland is shown in Attachment A on page 2.
Wetland is shown in Attachment A on page 1.

Table 3. Summary of Delineated Non-Wetland Waters

Feature Name	Feature Type (Cowardin Class)	Federal Jurisdiction	Approx. OHWM Width (feet)	Description of Non-Wetland Water	Square Feet	Acres[1]
OW001[2] (Sand Creek)	R3AB	Jurisdictional	80	Sand Creek	65,855	1.512
OW025[3] (Sand Creek)	R3AB	Jurisdictional	60	Sand Creek	25,683	0.590
OW027[3](Sand Creek)	R3AB	Jurisdictional	55	Sand Creek	2,243	0.051
OW030[4]	R3RB	Jurisdictional	5	Unnamed relatively permanent stream, natural bottom, tributary and direct nexus with Sand Creek	516	0.012
OW050[5] (Sand Creek)	R3AB	Jurisdictional	100	Sand Creek	54,500	1.251
OW150[7](O'Brien Canal)	R3RB	Jurisdictional	50	Burlington Ditch/O'Brien Canal	21,247	0.488
OW195[8]	L2AB	Jurisdictional	40	Gravel pit—associated with infrastructure construction	4,345	0.100
OW215[8] (Clear Creek)	R3AB	Jurisdictional	80	Clear Creek	60,202	1.382
OW230[7] (South Platte River)	R3AB	Jurisdictional	110	South Platte River	46,607	1.070
OW310[8]	R6	Non-jurisdictional	3	Non-relatively permanent stormwater ditch	131	0.003
				Subtotal Jurisdictional	**281,198**	**6.455**
				Subtotal Non-jurisdictional	**131**	**0.003**
				Total	**281,329 square feet**	**6.458 acres**

Wetland acreages reported in Table 3 are approximate and have been rounded to the nearest thousandth place.
Wetland is shown in Attachment A on page 8.
Wetland is shown in Attachment A on page 7.
Wetland is shown in Attachment A on page 6.
Wetland is shown in Attachment A on page 5.
Wetland is shown in Attachment A on page 4.
Wetland is shown in Attachment A on page 3.

Wetland is shown in Attachment A on page 2.
Wetland is shown in Attachment A on page 1.

5.3 FACWet Methodology to Determine Functional Capacity

Delineated wetlands are grouped into AAs to analyze the functional capacity of the wetlands, per CDOT's FACWet methodology. AAs are typically based on hydrogeomorphic class, wetland type, and location within the AOI. The AOI typically includes the study area and a 25-meter buffer; however, for this project the AOI is limited to the project designated study area, because the study area serves the same purpose as the AOI. Maps of each AA are provided with the data forms of Appendix D. FACWet scores were recorded as Functional Capacity Indexes (FCI). FCI score values were interpreted, as noted in Table 4.

Table 4. Functional Capacity Indices Descriptions

FCI Score	Functional Category	Interpretation
1.0–0.9	Reference Standard	AA is functioning at or near its Reference Standard capacity.
<0.9–0.8	Highly Functioning	AA retains all of its natural functions. While the capacity of some or all have been altered somewhat, the function of the wetland is still fundamentally sound.
<0.8–0.7	Functioning	The capacity of some or all of the AAs functions has been markedly altered, but the wetland still provides the types of functions associated with its habitat type.
<0.7–0.6	Functioning Impaired	The functioning of the wetland has been severely altered. Certain functions may be nearly extinguished or they may be grossly altered to be more representative of a different class of wetland (e.g., a fen converted to a depressional system). Despite the profound changes, the AA still supports wetland habitat.
<0.6	Non-functioning	AA no longer possesses the basic criteria necessary to support wetland conditions.

Source: Johnson et al. 2013

Wetlands have been grouped into 10 AAs, according to hydrogeomorphic class, associated water body, and proximity. FACWet data sheets are presented in Attachment D. Stressors and scores are summarized in Table 5. Stressors include deleterious, anthropogenic alterations that affect key physical and vegetation attributes that drive wetland functioning.

In summary, all the study area wetlands were classified as either "functioning impaired" (five AAs) or "functioning" (five AAs). No wetlands were classified as highly functioning, reference standard, or non-functioning. Total FCI scores ranged from 0.64 to 0.72, with most of the lowest FCI scores being low short-term and long-term water storage scores and most of the highest FCI scores being sediment retention and shoreline stabilization. Roadside stormwater wetlands, such as those in AA-1-1, AA1-2, and AA-1-3 had the lowest FCI scores (all score 0.64: functioning impaired); whereas, floodplain wetlands along Clear Creek (AA-CC-2), the South Platte River (AA-SP-1), and Sand Creek (AA-SC-1, AA-SC-2, AA-SC-3) had the highest FCI scores (range 71–72: functioning).

Table 5. Stressors and Functional Capacity Indices Scores

AA ID	Associated Surface Water	Wetland Identification	Stressor Discussion	Total FCI Score	Low FCI Score	High FCI Score
AA-CC-1	Artificial wetlands adjacent to Clear Creek	W195, W200, W205, W210	Urban/commercial/industrial setting, situated under I-270 overpass, adjacent to I-270/Interstate 76 (I-76) interchange and Clear Creek bike path and park. Listed impacts confine and contribute to stress of AA.	0.68	0.64 (Short- and Long-term Water Storage)	0.73 (Support of Characteristic Wildlife Habitat)
AA-CC-2	Clear Creek	W215, W216, W220, W320	Urban/commercial/industrial setting, situated under I-270 overpass, adjacent to I-270/I-76 interchange and Clear Creek bike path and park. Listed impacts confine and contribute to stress of AA.	0.72	0.70 (Support of Characteristic Fish/aquatic Habitat, Short- and Long-term Water Storage, Nutrient/Toxicant Removal)	0.74 (Sediment Retention/Shoreline Stabilization)
AA-I-1	Runoff from highway and associated infrastructure	W401	Urban/commercial/industrial setting, adjacent to, created by, and confined by I-270.	0.64	0.63 (Sediment Retention/Shoreline Stabilization)	0.65 (Support of Characteristic Fish/aquatic Habitat, Production Export/Food Chain Support)
AA-1-2	Runoff from highway and associated infrastructure	W300, W330, W340, W410, W420, W430, W440, W450	Urban/commercial/industrial setting, adjacent to, created by, and confined between major transportation corridors.	0.64	0.63 (Sediment Retention/Shoreline Stabilization)	0.66 (Production Export/Food Chain Support)

AA ID	Associated Surface Water	Wetland Identification	Stressor Discussion	Total FCI Score	Low FCI Score	High FCI Score
AA-1-3	Runoff from highway and associated infrastructure	W070	Urban/commercial/industrial setting, adjacent to, created by, and confined by I-270.	0.64	0.63 (Sediment Retention/Shoreline Stabilization)	0.66 (Support of Characteristic Fish/Aquatic Habitat, Production Export/Food Chain Support)
AA-SP-1	South Platte River	W230, W231, W232, W233	Urban/commercial/industrial setting, situated under I-270 overpass, adjacent to Colorado Front Range bike path and park. Downstream of water treatment facility. Listed impacts confine and contribute to stress of AA.	0.71	0.69 (Nutrient/Toxicant Removal)	0.73 (Sediment Retention/Shoreline Removal)
AA-SC-1	Sand Creek	W100 and W507	Urban/commercial/industrial setting, adjacent to, created by, and confined by I-270.	0.72	0.70 (Support of Characteristic Fish/aquatic Habitat, Short- and Long-term Water Storage, Nutrient/Toxicant Removal)	0.74 (Support of Characteristic Wildlife Habitat, Sediment Retention/Shoreline Stabilization)
AA-SC-2	Sand Creek	W050, W051, W052, W053, W508, W510	Urban/commercial/industrial setting, situated under HWY-85 overpass, adjacent to I-270 and Colorado Front Range bike path and park land. Listed impacts confine and contribute to stress of AA.	0.71	0.70 (Support of Characteristic Fish/aquatic Habitat, Short- and Long-term Water Storage, Nutrient/Toxicant Removal)	0.72 (Sediment Retention/Shoreline Stabilization)

AA ID	Associated Surface Water	Wetland Identification	Stressor Discussion	Total FCI Score	Low FCI Score	High FCI Score
AA-SC-3	Sand Creek	W001, W002, W003, W020, W023, W025, W027, W028, W030, W031, W032, W504, W506, W512, W514	Urban/commercial/industrial setting, adjacent to I-270 and Colorado Front Range bike path and park land. Listed impacts confine and contribute to stress of AA.	0.72	0.70 (Support of Characteristic Fish/aquatic Habitat, Short-term and Long-term Water Storage, Nutrient/Toxicant Removal)	0.74 (Sediment Retention/Shoreline Stabilization)
AA-SC-4	Artificial wetlands on opposite side of I-270 from Sand Creek	W010	Wetland created by enhancements in stormwater basin. Adjacent to and stressed by highway and shopping center.	0.66	0.64 (Short-term and Long-term Water Storage)	0.73 (Support of Characteristic wildlife habitat)

Source: Jacobs

6.0 Impacts Assessment

This project will result in permanent and temporary impacts to wetlands and non-wetland waters (for example, unvegetated stream channels and ponds). This report discusses all impacts to wetlands and non-wetland waters, regardless of USACE jurisdictional status, because CDOT policy requires that all wetland impacts be mitigated.

Impacts to aquatic resources were quantified with ArcGIS software by overlaying the conceptual project design onto boundaries of delineated aquatic resources and calculating the intersecting wetland areas with proposed construction activities. This involved using the proposed cut and fill lines, as well as construction access, and staging areas to establish the limits of disturbed areas for impacts. Impacts to aquatic resources delineated within the study area are summarized in Attachment E.

The impact footprint would be the same for both action alternatives, including the Three General-Purpose Lanes Alternative and the Two General-Purpose Lanes and One Express Lane that Accommodates Transit Alternative. Each action alternative, as well as the No Action Alternative, is described below. However, the impacts discussion for each of the action alternatives have been combined into one impact section because locations and degree of impacts are expected to be practically the same, with no measurable differences.

6.1 No Action Alternative

Transportation projects that would occur under the No Action Alternative likely would have minor impacts to aquatic resources, but these impacts would require additional information on the design for future transportation projects. This information is currently unavailable, and therefore impacts under the No Action Alternative are undeterminable.

6.2 Three General-Purpose Lanes Alternative

The following project design and construction elements of the Three General-Purpose Lanes Alternative may result in permanent or temporary impacts to wetlands and non-wetland waters:

- Roadway widening and associated roadway embankment to accommodate the following:
    - Two additional highway travel lanes
    - An auxiliary lane between York Street and Vasquez Boulevard
    - Roadway shoulder widening
- Replacement of Vasquez Boulevard bridge over Sand Creek
- New bridge piers on I-270 bridge over South Platte River
- Drainage and water quality ponds in vicinity of I-76 interchange build
- Drainage outlet scour protection on Sand Creek
- Construction access and staging

6.3 Two General-Purpose Lanes and One Express Lane that Accommodates Transit Alternative

The following project design and construction elements of the Two General-Purpose Lanes and One Express Lane that Accommodates Transit may result in permanent or temporary impacts to wetlands and non-wetland waters:

- Roadway widening and associated roadway embankment to accommodate the following:
    - Two additional highway travel lanes
    - An auxiliary lane between York Street and Vasquez Boulevard
    - Roadway shoulder widening
- Replacement of Vasquez Boulevard bridge over Sand Creek
- New bridge piers on I-270 bridge over the South Platte River
- Drainage and water quality ponds in vicinity of I-76 interchange
- Drainage outlet scour protection on Sand Creek
- Construction access and staging

6.4 Impacts Associated with Both Build Alternatives

Based on preliminary design concepts, permanent wetland impacts are anticipated to be 2.668 acres, and temporary wetland impacts are anticipated to be 1.628 acres (Table 6). Permanent impacts to non-wetland waters are anticipated to be 0.258 acres and temporary impacts to non-wetland waters are anticipated to be 2.413 acres (Table 7).

The build alternatives have been designed so that most of the impacts will occur in lower functioning wetlands that fall into the "functioning impaired" category. For example, 2.302 acres of functioning impaired wetlands (FCI scores ranging from 0.64 to 0.68) will be permanently impacted whereas only 0.359 acres of "functioning" wetlands (FCI scores ranging from 0.71 to 0.72) will be permanently impacted. This means that of the total permanent impacts, 13 percent of those impacts will occur in functioning wetlands, and 87 percent will occur in functioning impaired wetlands. The build alternatives will disproportionately result in more temporary impacts to functioning wetlands compared to functioning impaired wetlands. However, temporarily impacted wetlands are expected to recover following construction and after revegetation and restoration measures. In total, 1.344 acres of functioning wetlands will be temporarily impacted (84 percent of the total temporary impacts); whereas, only 0.251 acres of functioning impaired wetlands will be temporarily impacted (16 percent of the total temporary impacts).

Permanent impacts to presumed jurisdictional WOTUS are anticipated to be 0.367 acres of wetland and 0.258 acres of non-wetland waters, for a total of 0.625 acres (21 percent of the project's total wetland and non-wetland waters permanent impacts); therefore, while temporary impacts to presumed jurisdictional WOTUS are anticipated to be 1.534 acres of wetlands and 2.413 acres of non-wetland waters, for a total of 3.947 acres (94 percent of the project's total wetland and non-wetland waters temporary impacts). It should be noted that no single water crossing (bridges) would incur permanent impacts to presumed jurisdictional

WOTUS greater than 0.5 acres. There would be no permanent WOTUS impacts at Clear Creek (I-270 mainline bridges), 0.067 acres of permanent impacts at the South Platte River (I-270 mainline bridges), no permanent impacts at the Burlington Ditch/O'Brien Canal (I-270 mainline bridges), and 0.191 acres permanent impacts at Sand Creek (Vasquez Boulevard Bridge). These anticipated impacts, which will be refined as project design progresses, are the result of necessary grading to accommodate the widened highway, temporary impacts due to construction and staging equipment, as well as permanent impacts associated with infrastructure, such as bridges, culverts, and utilities (see Attachment E).

Impacts to aquatic resources may also occur as a result of an increase in impervious surface (i.e. paved roadways and paths) including changes to downstream water quality, hydrology, and surface water distribution. This may result in effects to aquatic and terrestrial wildlife and wetland vegetation that remain years after construction is completed.

Table 6. Summary of Wetland Impacts

Associated Surface Water	Cowardin Classification	Temporary Impacts (acres)	Permanent Impact (acres)	Federal Jurisdictional Status
Clear Creek	PEM and PSS	0.549	0.000	Jurisdictional
Sand Creek	PEM and PSS	0.969	0.264	Jurisdictional
South Platte River	PSS	0.016	0.103	Jurisdictional
Stormwater Wetlands[1]	PEM	0.094	2.301	Non-jurisdictional
Total Federally Jurisdictional	**NA**	**1.534**	**0.367**	**NA**
Total Federally Non-Jurisdictional	**NA**	**0.094**	**2.301**	**NA**
Grand Total	**NA**	**1.628**	**2.668**	**NA**

Source: AtkinsRéalis
NA = not applicable
[1] Stormwater Wetlands include stormwater-related wetland features such as roadside ditches and water quality facilities.

Table 7. Summary of Non-Wetland Waters Impacts

Associated Surface Water	Temporary Impacts (acres)	Permanent Impacts (acres)	Federal Jurisdictional Status
Sand Creek	1.033	0.191	Jurisdictional
South Platte River	0.767	0.067	Jurisdictional
Clear Creek	0.22	0.0	Jurisdictional
Burlington Ditch/O'Brien Canal	0.393	0.0	Jurisdictional
Total	**2.413**	**0.258**	**Jurisdictional**

Source: AtkinsRéalis

For projects requiring a Clean Water Act Section 404 permit, in 2020 the USACE released Colorado Mitigation Procedures (COMP Version 2.0 2020) which outlines the process for compensatory wetland and stream mitigation evaluations and provides statewide consistency in making compensatory mitigation determinations. In accordance with COMP, the USACE also developed the Colorado Stream Quantification Tool (CSQT Version 1.0 2020), a spreadsheet-based calculator to determine compensatory mitigation debits and the corresponding credits needed to offset the loss of stream functions. Projects that result in permanent stream loss of 3/100th of an acre (0.03ac) or greater will need to complete a CSQT assessment to determine the anticipated functional change between the existing (current) and proposed (post-project) conditions. At the Corps' discretion, projects that result in functional losses may need to purchase stream mitigation credits from a mitigation bank. The applicability and completion of CSQT will be determined during final design.

7.0 Mitigation Measures

7.1 Avoidance and Minimization Measures

This project will be designed to avoid and minimize impacts. As project design is refined, project biologists and designers will work together to avoid and minimize impacts to wetlands and surface waters by reducing and refining the project footprint where possible. Proposed staging areas will also be situated to avoid and minimize impacting wetlands and surface waters. A project-specific stormwater management plan will be developed to address the potential for construction-related soil erosion and sedimentation. Construction fencing, signage, or other visual barriers will be installed to protect against the possibility of incidental construction-related impacts. Where excavation in wetlands must occur, wetland topsoil will be salvaged and stockpiled for restoration wherever possible (Table 8).

7.2 Mitigation of Permanent Wetland Impacts

Per Section 404 of the CWA, impacts to wetlands must be avoided, minimized to the extent practicable, and compensated for when impacts are unavoidable. CDOT policy requires all wetland impacts to be mitigated, regardless of jurisdictional status. All mitigation plans for impacted existing wetlands within the study area will be developed in coordination with CDOT biologists and in accordance with CDOT and FHWA mitigation policy. Mitigation for impacts to

jurisdictional wetlands will be subject to compliance with Section 404 permit conditions and standards. Mitigation for non-jurisdictional wetlands will be held to similar standards and monitoring protocol but may support roadside water quality as a primary function and purpose. In addition, any mitigation for waters of the state will follow Regulation 87 requirements.

The study area was evaluated for the potential for on-site mitigation for permanent impacts to wetlands. Several preliminary wetland mitigation concepts have been developed to mitigate unavoidable wetland loss. Wetland mitigation may combine one or more of the on-site wetland mitigation concepts but may also involve the purchase of wetland bank credits. The preliminary on-site mitigation concepts are summarized in Attachment F.

7.3 Mitigation of Temporary Wetland Impacts

The project will mitigate for temporary impacts by restoring areas to pre-existing conditions, including the revegetation of wetlands, which will be detailed in a landscape or mitigation specific plan set. As appropriate, the revegetation plans for restoration of temporary impacts will include considerations for soil conditions, hydrology, and surface elevations to ensure full restoration of the affected resource. Revegetation will include reseeding temporarily impacted wetlands with a native wetland seed mix, planting willow stakes or other native plant material, or otherwise using a combination of revegetation methods based on site conditions as appropriate for the specific location. The project may further minimize temporary impacts, and restoration effort, by preserving and covering wetlands with geotextile fencing and temporary fill that need to be crossed but are not otherwise filled or excavated. This may be accomplished by trimming shrubs to the ground (rather than grubbing, excavating, or removing the root mass), then covering soil and trimmed vegetation in the access areas with wetland tracking pads made from layers of weed-free straw and geotextile. The spread of noxious weeds will be minimized by reseeding with native species in both wetland and upland areas that are disturbed by construction, in accordance with Sections 207, 212, and 217 of the CDOT Standard Specifications. Noxious weed spread will also be minimized by implementing the project's noxious weed management plan.

Table 8 shows a summary of the impacts and mitigations for both build alternatives.

Table 8. Summary of Impacts and Mitigation – Build Alternatives

Activity Triggering Mitigation	Location of Activity	Impact	Mitigation Commitment	Responsible Branch	Timing/Phase That Mitigation Will Be Implemented
General construction activities	Study Area	Direct impacts to wetlands and other non-wetland waters	Obtain a CWA Section 404 Permit from the USACE prior to the start of construction and/or obtain a Colorado Department of Public Health and Environment (CDPHE) Regulation 87 authorization. A series of NWPs are anticipated to permit the proposed work, including, but not limited to, NWP 14 for linear transportation projects and NWP 3 for the repair, rehabilitation, or replacement of serviceable structures.	CDOT Engineering and Environmental, and Contractor	Pre-Construction and Construction
General construction activities	Study Area	Direct impacts to wetlands and non-wetland waters	Consult with CDPHE under Regulation 87. Depending on the impacts and construction timeline, a temporary or permanent authorization may be required.	CDOT Engineering and Environmental	Pre-Construction
General construction activities	Study Area	Ground disturbance impacting wetlands and surface waters	During final design, avoid and minimize impacts to wetlands and surface waters by reducing and refining the project footprint, where possible. Where excavation in wetlands must occur, wetland topsoil will be salvaged and stockpiled for restoration wherever possible	CDOT Engineering and Environmental	Final Design

Activity Triggering Mitigation	Location of Activity	Impact	Mitigation Commitment	Responsible Branch	Timing/Phase That Mitigation Will Be Implemented
General construction activities	Study Area	Potential for direct impacts to wetlands and non-wetland waters	Mitigate for temporary impacts by restoring areas to pre-existing conditions. Permanent impacts will be mitigated through on-site compensatory mitigation, off-site mitigation, purchase of wetland bank credits, or use of a separate strategy to both federally jurisdictional and non-jurisdictional wetlands at a minimum of a one-to-one ratio.	CDOT Engineering and Environmental, and Contractor	Pre-Construction and Construction
General construction activities	Study Area	Potential for direct impacts to wetlands and non-wetland waters	Equipment shall be refueled within a designated refueling containment area away from wetlands. The refueling containment area shall be located greater than 100 horizontal feet away from wetlands and other sensitive environmental areas. Electric vehicles shall be used for construction, where reasonable and feasible.	CDOT Engineering and Contractor	Construction
General construction activities	Study Area	Potential for direct impacts to wetlands and non-wetland waters	Construction fencing and appropriate sediment control best management practices (BMPs) will be used to mark wetland boundaries and sensitive habitats during construction.	CDOT Engineering and Contractor	Pre-Construction and Construction
General construction activities	Study Area	Potential for direct impacts to wetlands and non-wetland waters	Seed and mulch disturbance areas adjacent to wetlands to reduce erosion and promote revegetation, plant supplemental vegetation, as needed.	CDOT Engineering and Contractor	Construction and Post-Construction

Activity Triggering Mitigation	Location of Activity	Impact	Mitigation Commitment	Responsible Branch	Timing/Phase That Mitigation Will Be Implemented
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	Work occurring in and near wetlands during construction activities will be monitored by CDOT environmental staff or their designee to ensure protection of wetlands.	CDOT Engineering and Environmental, and Contractor	Construction
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	Prohibit construction equipment from entering the Ordinary High Water Mark (OHWM), except where identified on design plans.	CDOT Engineering Contractor	Construction
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	Closely monitor construction activities to ensure that additional fill is not placed within the OHMW.	CDOT Engineering and Contractor	Construction
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	A specification and detail will be developed and included in plans and project special provisions for the use of timber mats or geo-textile/straw to minimize temporary impacts to wetlands from construction equipment traversing wetland areas.	CDOT Engineering and Environmental, and Contractor	Final Design and Construction

Activity Triggering Mitigation	Location of Activity	Impact	Mitigation Commitment	Responsible Branch	Timing/Phase That Mitigation Will Be Implemented
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	Locate construction staging and materials stockpiling at least 50 horizontal feet from the edge of wetlands or open water, when possible. No staging will be allowed in wetlands.	CDOT Engineering and Contractor	Pre-Construction and Construction
General construction activities	Study Area	Potential for direct and/or indirect impacts to wetlands and non-wetland waters	Ensure BMPs and containment structures are in place for work conducted within and adjacent to the OHWM and mapped wetlands to prevent concrete washout and other potential pollutants from reaching open water and wetlands.	CDOT Engineering and Contractor	Pre-Construction and Construction
General construction activities	Study Area	Ground disturbance promoting noxious weed growth	Follow Sections 207, 212, and 217 of the CDOT Standard Specifications to avoid and minimize potential for noxious weed spread.	CDOT Engineering and Contractor	Pre-Construction and Construction

8.0 Required Permits and Consultation

Section 404 permitting will be required for this project. It is likely that a series of Nationwide Permits (NWP) will be used to permit the proposed work (less than 0.50 acres of permanent impacts to WOTUS at single project locations, such as bridges), including, but not limited to, NWP 14 for linear transportation projects and NWP 3 for maintenance (repair, rehabilitation, or replacement) of serviceable structures. Each NWP will constitute a separate and complete action, per the USACE definition. The project is within the USACE Omaha District. Each district must permit project activities within their respective jurisdictional boundaries. Coordination with USACE is ongoing.

Consultation with CDPHE will also be required for this project under Regulation 87. Depending on impacts and construction timeline, a temporary or permanent authorization may be required.

Table 9 shows the permits that will be required for aquatic resources. These permits are also referenced in the mitigation summary table.

Table 9. Required Permits by Agency and Project Phase

Agency	Permit/Consultation	Phase
EPA	Section 404 permit review and comment	NEPA
USACE	Jurisdictional Determination	NEPA
USACE	Pre-Construction Notification and/or Section 404 Permit (individual or nationwide)	Final design
CDPHE	Regulation 87- Temporary or Permanent Authorization	Final Design

9.0 References

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Attachments

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Attachment A. Aquatic Resources Delineation Mapbook

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Attachment B. Photographic Log

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Attachment C. Wetland Determination Data Sheets

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Attachment D. FACWet Maps and Data Sheets

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Attachment E. Aquatic Resources Impact Mapbook

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Attachment F. I-270 Preliminary Wetland Mitigation Concepts

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Attachment G. Jurisdiction Determination Documentation

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