

4.21 WETLANDS AND OTHER WATERS

Summary

Wetlands are important biological resources that perform many functions, including groundwater recharge, flood flow attenuation, erosion control, and water quality improvement. They also provide habitat for many plants and animals, including threatened and endangered species.

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (USEPA) based on the presence of wetland vegetation, wetland hydrology, and hydric soils. Many wetlands and other aquatic features, including ephemeral, intermittent, and perennial streams, are considered “waters of the United States (U.S.)” by the USACE and these “jurisdictional” areas are protected under Section 404 of the Clean Water Act (CWA). The CWA requires acquiring a permit from the USACE for any discharge of dredged or fill material into such waters, and only the USACE can determine the jurisdictional status of wetlands and other water features under Section 404.

Although the CWA protects those wetlands and other water features considered jurisdictional by the USACE, Executive Order (EO) 11990 “Protection of Wetlands,” directs all federal agencies to “minimize the destruction, loss or degradation of wetlands.” Thus, impacts to all wetlands in the project area will be considered for mitigation regardless of jurisdictional status under Section 404. As a result of this mitigation approach, the USACE has given a preliminary determination that all wetlands affected by the project are jurisdictional. This preliminary jurisdictional determination was decided upon due to the extent of the wetland impacts along the corridor that required this detailed jurisdictional analysis, and due to the fact all impacted wetlands on Federal Highway Administration (FHWA) projects will be mitigated regardless of what a formal jurisdictional determination would distinguish.

Appendix C, Section 404(b)(1) Evaluation, satisfies the requirements of a Colorado Department of Transportation (CDOT)/FHWA Wetland Finding Report. Based on the information provided in this section and in Appendix C, it is determined that there is no practicable alternative to the proposed new construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such construction.

During early coordination with the USACE, it was determined that the US 36 Corridor Project would require a Section 404(b)(1) evaluation. This evaluation, in conjunction with NEPA regulations, is referred to as the NEPA/Section 404 merger process. The merger process is guided by and supports the requirements of Section 404 of the CWA (Public Law 92-500, as amended), USEPA regulations (40 CFR Part 230 et seq.), and the Memorandum of Agreement among the USACE, FHWA, and CDOT. The merger agreement requires consultation on four key concurrence points: (1) Purpose and Need, (2) Alternatives Selected for Detailed Evaluation, (3) the Preferred Alternative, and (4) Compensatory Mitigation. This merger process has since been updated but this project is still under the older merger agreement under which this project was initiated.

The US 36 Corridor Project obtained USACE approval on Concurrence Points 1 and 2 in a letter dated January 9, 2006. According to the merger, USACE approval of Concurrence Points 3 and 4 is provided through issuing the Section 404 permit for the project. However, the USACE has determined that the mitigation plan provided in this FEIS does not meet the requirements of the Final Rule, and therefore, the USACE cannot issue a Section 404 Permit on the same timeline as the US 36 Corridor FEIS.

CDOT, FHWA and the USACE worked together to develop a process that would allow the US 36 Corridor FEIS to be completed without applying for a Section 404 Permit with the issuance of the FEIS. For the US 36 Corridor Project, where the compensatory mitigation plan provided in the FEIS does not satisfy the requirements of the Final Rule, a diversion from the merger process is necessary. CDOT, FHWA, and the USACE have all agreed that the best approach for the US 36 Corridor Project is to apply for a Section 404 Permit when the final mitigation plan satisfies the requirements of the Final Rule. This diversion from the merger process will allow CDOT and FHWA adequate time to develop the final

mitigation plan for all jurisdictional waters of the U.S. impacted by the Combined Alternative Package (Preferred Alternative). CDOT and FHWA will apply for a Section 404 Individual Permit for the Combined Alternative Package (Preferred Alternative) after the FEIS is completed and likely after a Record of Decision is signed, but before any jurisdictional waters of the U.S. are impacted from construction of the Combined Alternative Package (Preferred Alternative). As individual projects are funded and constructed over time, the Section 404 Permit will be amended to reflect the actual impacts.

CDOT, FHWA, and the USACE provided signed concurrence of the diversion from the merger process in a letter dated August 31, 2009. Although the US 36 Corridor FEIS is diverting from the merger process as outlined above, the USACE has confirmed that the Combined Alternative Package (Preferred Alternative) appears to be the Least Environmentally Damaging Practicable Alternative in a letter dated May 20, 2009. The USACE also issued a Preliminary Jurisdictional Determination for the FEIS (May 8, 2009), stating that all wetlands and other water features in the project area are considered jurisdictional. This decision was made based on CDOT and FHWA's commitment to mitigate for all wetland impacts regardless of jurisdiction.

Approximately 21 acres of wetlands would be impacted by US 36 improvements.

Approximately 71 acres of wetlands occur in the wetland study area, defined as within 300 feet of the centerline of United States Highway 36 (US 36). Approximately 21 acres of wetlands would be disturbed along the US 36 corridor from implementation of the Combined Alternative Package (Preferred Alternative). These wetlands are mostly located in and along natural and man-made drainages, irrigation ditches, stormwater runoff ditches, or in other low-lying areas. Many are immediately adjacent to the roadway, particularly in the Boulder Segment.

Impacts to wetlands and other water features were assessed quantitatively and qualitatively. The following temporary, permanent, direct, and indirect impacts were identified:

- Package 1 would result in no impacts to wetlands or other water features.
- Package 2 (with Option A) would result in the direct, permanent impact of 21.78 acres of wetlands and direct, permanent impact of 4.34 acres of other water features. Option A is described in Section 4.1, Introduction.
- Package 2 (with Option B) would result in the direct, permanent impact of 27.88 acres of wetlands and direct, permanent impact of 4.59 acres of other water features. Option B is described in Section 4.1, Introduction.
- Package 4 (with Option A) would result in the direct, permanent impact of 20.84 acres of wetlands and direct, permanent impact of 4.13 acres of other water features.
- Package 4 (with Option B) would result in the direct, permanent impact of 25.47 acres of wetlands, and direct permanent, impact of 4.35 acres of other water features.
- The Combined Alternative Package (Preferred Alternative) would result in the direct, permanent impact of 21.40 acres of wetlands, and direct, permanent impacts to 2.59 acres of other water features.

The following section describes the wetlands and other water features identified within the project area based on field investigations. More detailed information is available in the *Wetland Technical Memorandum for the US 36 EIS Project* (URS 2004).

Affected Environment

Based on field investigations, approximately 71 acres of wetlands are located in the wetland study area (Table 4.21-1, Summary of Wetlands). The wetlands are mostly located in and along natural and man-made drainages, irrigation ditches, stormwater runoff ditches, or in other low-lying areas. Using a standard classification system (Cowardin et al. 1979), the wetlands can be placed into four groups: palustrine emergent (PEM), palustrine scrub/shrub (PSS), palustrine emergent and palustrine scrub/shrub combination (PEM/PSS), and palustrine forested (PFO).

The wetlands in the study area are mostly located in and along natural and man-made drainages, irrigation ditches, stormwater runoff ditches, or in other low-lying areas.

PEM wetlands are defined as those wetlands that are dominated by erect, rooted, herbaceous plants (Cowardin et al. 1979). These wetlands encompass approximately 59.78 acres in the study area. These wetlands are commonly dominated by cattails (*Typha* spp.), bulrushes (*Scirpus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and various other forbs.

Table 4.21-1: Summary of Wetlands

Segment	Wetland Type ¹ (acres)				Total (acres)
	PEM	PSS	PEM/ PSS	PFO	
Adams	1.42	0.32	0.00	0.00	1.74
Westminster	3.39	1.29	0.74	0.00	5.42
Broomfield	4.37	0.46	0.00	0.00	4.83
Superior/Louisville	5.77	0.28	0.07	0.44	6.56
Boulder	44.83	3.59	3.72	0.00	52.14
Total	59.78	5.94	4.53	0.44	70.69

Source: US 36 Mobility Partnership, 2009.

Notes:

Acres of wetlands shown in this table are existing wetlands within 300 feet of the centerline of United States Highway 36.

¹Wetland type is based on Cowardin et al. (1979).

PEM = palustrine emergent
 PSS = palustrine scrub/shrub
 PEM/PSS = palustrine emergent and palustrine scrub/shrub combination
 PFO = palustrine forested

PSS wetlands are defined as those wetlands that are dominated by woody vegetation less than 20 feet tall (Cowardin et al. 1979). These wetlands encompass approximately 5.94 acres in the study area. These wetlands are commonly dominated by sandbar willow (*Salix exigua*), with other willows (*Salix* spp.), and shrubs.

PEM/PSS wetlands are those wetlands that are composed of equal parts PEM and PSS. If the composition of a wetland is not evenly split (i.e., 50 percent PEM and 50 percent PSS), it is not classified as PEM/PSS. Instead, it is classified as the dominant type. PEM/PSS wetlands encompass approximately 4.53 acres in the study area.

PFO wetlands are defined as those wetlands that are dominated by woody vegetation greater than 20 feet tall (Cowardin et al. 1979). These wetlands encompass approximately 0.44 acre in the study area and are found only at the US 36 crossing of Coal Creek. These wetlands contain an herbaceous layer similar to that described for PEM wetlands with an overstory dominated by peachleaf willow (*Salix amygdaloides*), crack willow (*Salix fragilis*), green ash (*Fraxinus pennsylvanica*), and plains cottonwood (*Populus deltoides*). These trees are rooted both inside and outside of the wetland boundary and create a closed canopy over the wetlands.

In addition to the classifications above, the *Field Guide to the Wetland and Riparian Plant Associations of Colorado* (Carsey et al. 2003) was used to describe the wetlands. A total of 15 of the plant associations included in the guide (and nine others not included), were identified within the study area. This guide is generally useful to characterize many of the common associations but does not provide a comprehensive list of possible associations. More information on the associations found in the project area can be found in the *Wetland Technical Memorandum for the US 36 EIS Project* (URS 2004).

Table 4.21-1, Summary of Wetlands, shows the acreage of wetlands identified in the study area by segment, followed by a brief discussion of the wetland types. Many of the wetlands identified are immediately adjacent to the roadway. This is especially true along US 36 in the Boulder Segment, where large areas of PEM wetlands occur along both sides of the roadway.

Due to the large size of the project area and the numerous wetlands identified, only those wetlands that are considered highly functional or those that are prominent features in the area are discussed in the following section. However, all of the wetlands are discussed in more detail in the *Wetland Technical Memorandum for the US 36 EIS Project* (URS 2004). Figure 4.21-1, Important Wetland Areas in the Project Area, shows the location of important wetlands discussed later in this section.

Denver Segment

There would not be any wetland impacts in the Denver Segment so wetlands in this segment will not be discussed.

Adams Segment

The Adams Segment contains a total of 1.74 acres of wetlands. The most prominent of these are discussed below.

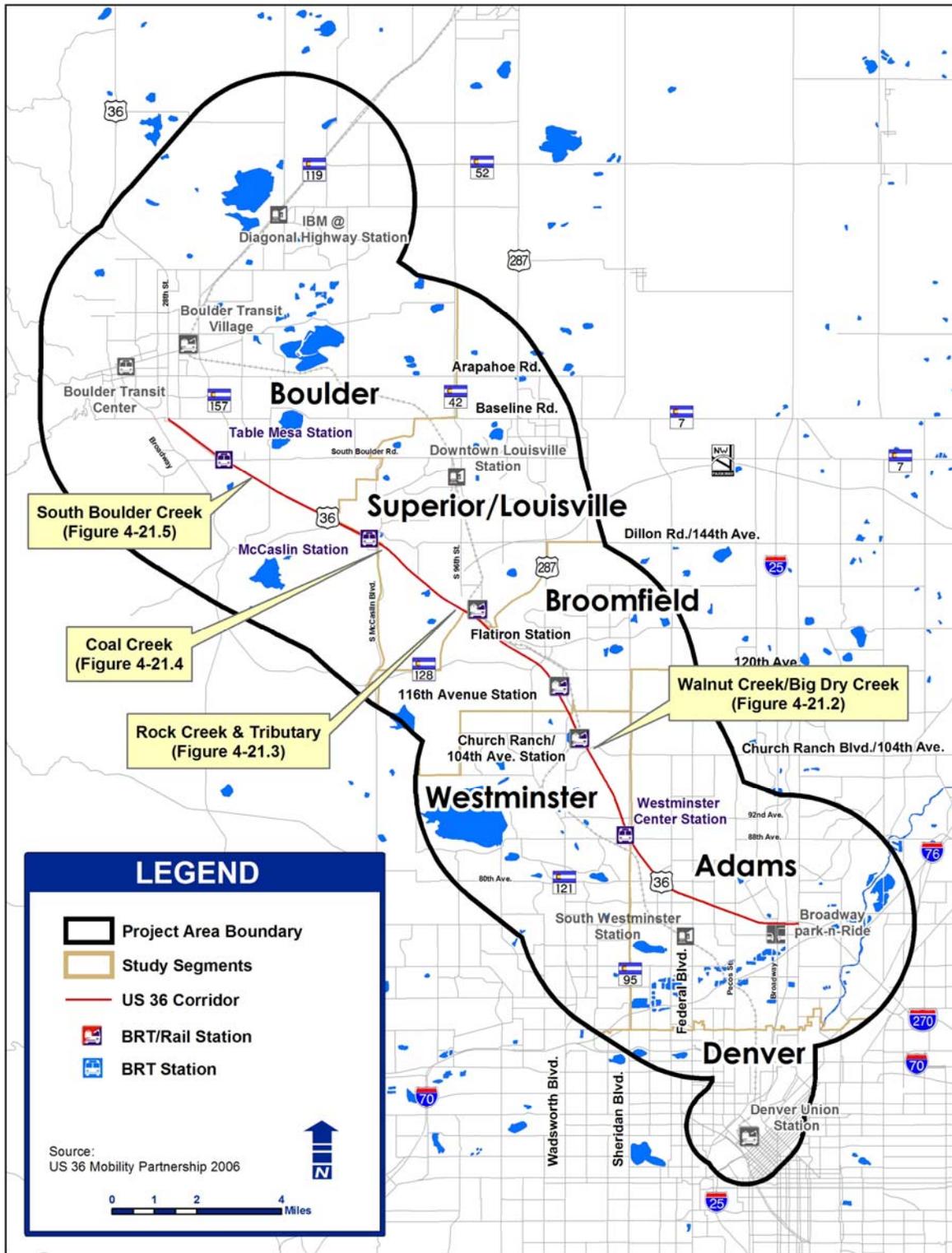
Allen Ditch Area

The Allen Ditch area includes numerous wetlands in the vicinity of Westminster Mall, including three Allen Ditch crossings of US 36 and several stormwater runoff wetlands along US 36 near Sheridan Boulevard. These wetlands are mostly classified as PEM with some pockets of PSS. They are generally dominated by Emory's sedge (*Carex emoryi*), broadleaf cattail (*Typha latifolia*), narrow-leaf cattail (*Typha angustifolia*), soft-stem bulrush (*Scirpus validus*), and sandbar willow. Although these wetlands are generally not highly functional, they encompass 1.42 acres near and within the right-of-way and provide limited water quality improvement, flood flow attenuation, and wildlife habitat.

Other Adams Segment Wetlands

Other wetland areas along US 36 in the Adams Segment include approximately 0.32 acre of numerous small wetlands associated with stormwater runoff.

Figure 4.21-1: Important Wetland Areas in the Project Area



Note: The 116th Avenue Rail Station is not a part of the 2004 FasTracks Program. Additional stations were added in the early planning stages of the US 36 Environmental Impact Statement. Exact rail station locations and additional stations may be reconsidered in the U.S. Army Corps of Engineers/Regional Transportation District Northwest Rail Environmental Assessment/Environmental Evaluation.

Westminster Segment

The wetlands within the Westminster Segment include the Walnut Creek/Big Dry Creek wetlands, which are located at the confluence of the two creeks, and other wetlands associated with irrigation ditches, canals, and stormwater runoff areas.

The Westminster Segment contains a total of 5.42 acres of wetlands. The most prominent of these is discussed below.

Walnut Creek/Big Dry Creek

The confluence of Walnut Creek and Big Dry Creek occurs just south of US 36 (Figure 4.21-2, Walnut Creek/Big Dry Creek at US 36). The wetlands associated with the creeks encompass a total of 0.90 acre in the study area and are mostly PSS (70 percent) with some PEM (30 percent) immediately along the channel. Generally, these wetlands are dominated by sandbar willow, creeping bentgrass (*Agrostis stolonifera*), creeping spikerush (*Eleocharis palustris*), and reed canarygrass (*Phalaris arundinacea*). These wetlands provide water quality improvement, bank stabilization, wildlife habitat, flood flow attenuation, and recreation/education potential. The wetlands are likely considered jurisdictional by the USACE.

Other Westminster Segment Wetlands

Other wetland areas in this segment include approximately 4.52 acres associated with three irrigation ditches or canals, including the Farmers Highline Canal, Niver Canal, and Equity Ditch, and numerous small stormwater runoff and irrigation over/return flow wetlands.

Broomfield Segment

The Broomfield Segment contains a total of 4.83 acres of wetlands. The most prominent of these is discussed below.

Community Ditch

The Community Ditch is one of the most prominent features in the Broomfield Segment.

Although the Community Ditch wetlands at US 36 are small, fringe wetlands that encompass less than 0.1 acre, they have been included in this discussion because the Community Ditch is one of the most prominent features in the Broomfield Segment. The Community Ditch wetlands are 70 percent PEM and 30 percent PSS. Generally, the wetlands are dominated by Emory's sedge, reed canarygrass, and sandbar willow. Although the wetlands provide limited habitat for wildlife, they do provide some flood flow attenuation and bank stabilization. The wetlands associated with the Community Ditch may be considered jurisdictional by the USACE.

Other Broomfield Segment Wetlands

Other wetland areas along US 36 in the Broomfield Segment include approximately 4.73 acres associated with numerous small stormwater runoff and irrigation over/return flow wetlands.

Superior/Louisville Segment

The Superior/Louisville Segment contains a total of 6.56 acres of wetlands. The most prominent of these are discussed below.

Rock Creek and a Tributary to the West

The wetlands in the Superior/Louisville Segment are associated with Rock Creek and its tributary, Coal Creek, and stormwater runoff and irrigation practices.

Rock Creek and its tributary parallel US 36 for approximately 1.2 miles before Rock Creek crosses US 36 (Figure 4.21-3, Rock Creek at US 36 and a Tributary to the West). The wetlands associated with the creek and its tributaries encompass a total of 4.40 acres within the study area. These are mostly fringe PEM wetlands along the easternmost portions of the creek, where there is a defined channel and large 100 percent PEM wetlands that fill the entire channel in the westernmost portions of its tributary. The easternmost portions of the wetland are dominated by broadleaf cattail, creeping spikerush, reed canarygrass, and cloaked bulrush (*Scirpus pallidus*), with scattered sandbar willow, and leadplant (*Amorpha fruticosa*). The westernmost portions are dominated by mostly broadleaf cattail, narrowleaf cattail, Nebraska sedge (*Carex nebrascensis*), sandspurry (*Spergularia media*), and Kentucky bluegrass (*Poa pratensis*). These wetlands provide general wildlife habitat, water quality improvement, bank stabilization, flood flow attenuation, and recreation/education potential. The wetlands are likely considered jurisdictional by the USACE.

Coal Creek

Coal Creek crosses US 36 and its wetlands encompass 0.56 acre (Figure 4.21-4, Coal Creek at US 36). The wetlands are classified as 70 percent PFO and 30 percent PEM, with all of the PFO located on the north side of the highway. The understory vegetation in the PFO area is similar to that of the PEM wetlands and is dominated by creeping spikerush, woolly sedge (*Carex lanuginosa*), creeping bentgrass, soft-stem bulrush, and cloaked bulrush. The overstory is dominated by peachleaf willow, green ash, plains cottonwood, Russian olive (*Elaeagnus angustifolia*), and Siberian elm (*Ulmus pumila*). These wetlands provide general wildlife habitat, water quality improvement, bank stabilization, flood flow attenuation, and recreation/education potential. The wetlands are likely considered jurisdictional by the USACE.

Other Superior/Louisville Segment Wetlands

This segment includes approximately 1.63 acres of wetlands associated with stormwater runoff and irrigation practices.

Figure 4.21-3: Rock Creek at US 36 and a Tributary to the West

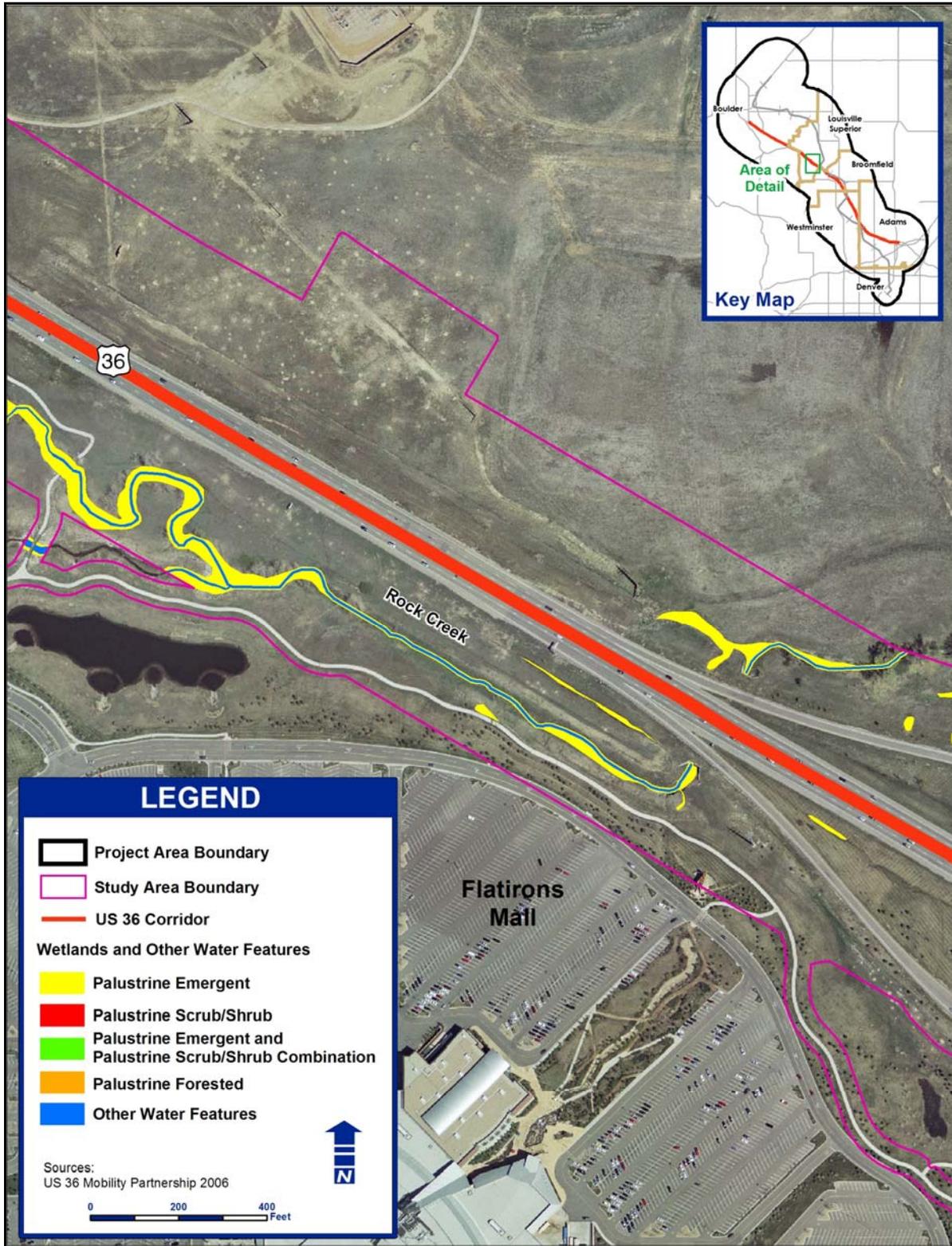
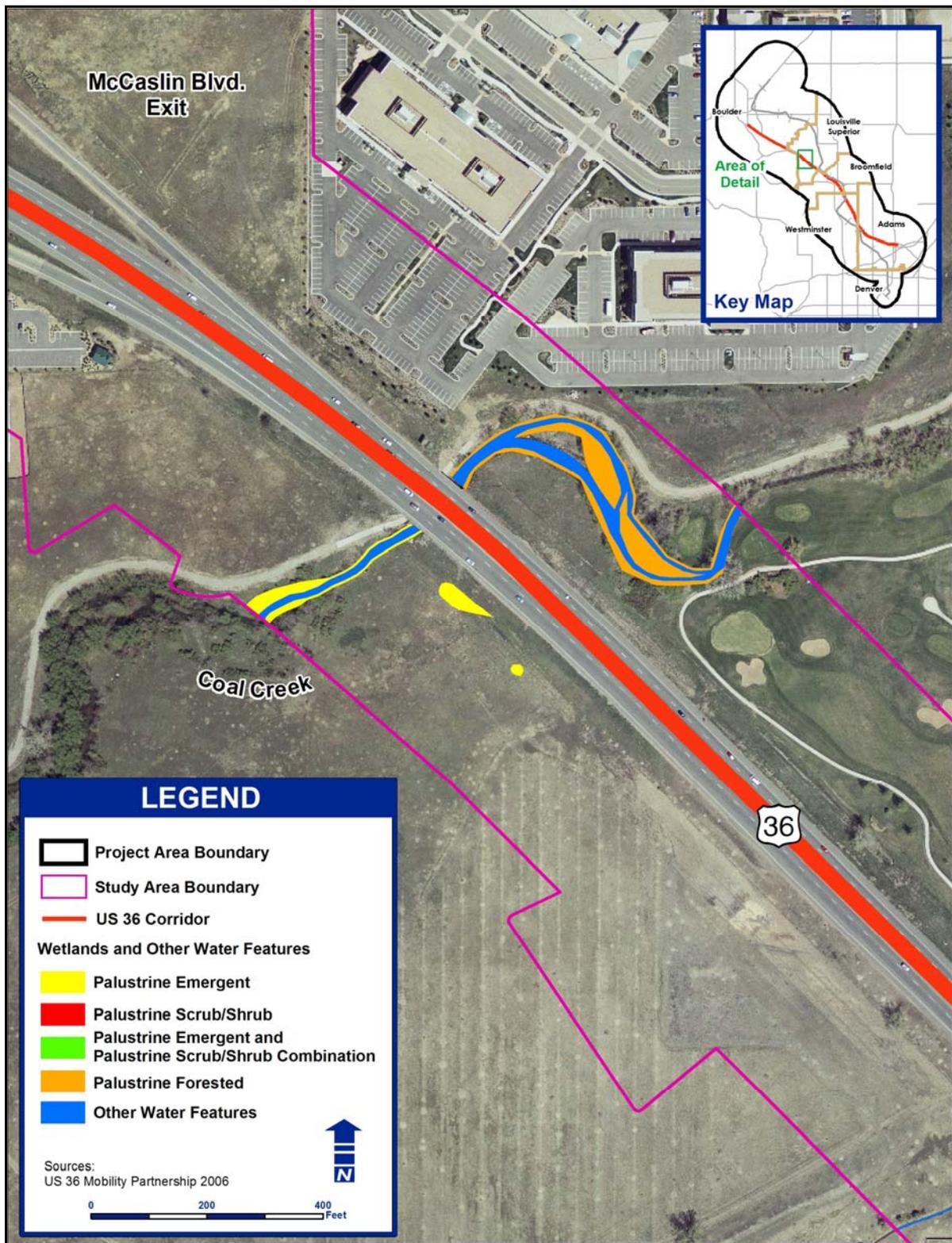


Figure 4.21-4: Coal Creek at US 36



Boulder Segment

The Boulder Segment contains a total of 52.14 acres of wetlands. The most prominent of these are discussed below.

South Boulder Creek Area

The South Boulder Creek area includes a total of 51.39 acres of wetlands (Figure 4.21-5, South Boulder Creek Area Along US 36). The wetlands include most of those between the Davidson Ditch and Foothills Parkway. These wetlands are classified as mostly PEM (90 percent) with some PSS (10 percent). Most of these wetlands are very diverse and are dominated by Emory’s sedge, wiregrass (*Juncus balticus*), Nebraska sedge, Wood’s rose (*Rosa woodsii*), daggerleaf rush (*Juncus ensifolius*), woolly sedge, Kentucky bluegrass, switchgrass (*Panicum virgatum*), creeping spikerush, teasel (*Dipsacus fullonum*), and sandbar willow.

The South Boulder Creek area wetlands include most of those between Davidson Ditch and Foothills Parkway.

These wetlands provide threatened and endangered species habitat, general wildlife habitat, water quality improvement, bank stabilization, flood flow attenuation, and recreation/education potential.

Other Boulder Segment Wetlands

Other wetland areas along US 36 in this segment include approximately 0.78 acre associated with stormwater runoff and irrigation over/return flow.

Other Water Features

Other water features include any non-vegetated aquatic features, including ephemeral, intermittent, and perennial waterways; irrigation ditches; ponds; reservoirs; and any other features that are predominately open water.

Other water features include any non-vegetated aquatic features, including waterways, irrigation ditches, ponds, reservoirs, and other open water areas.

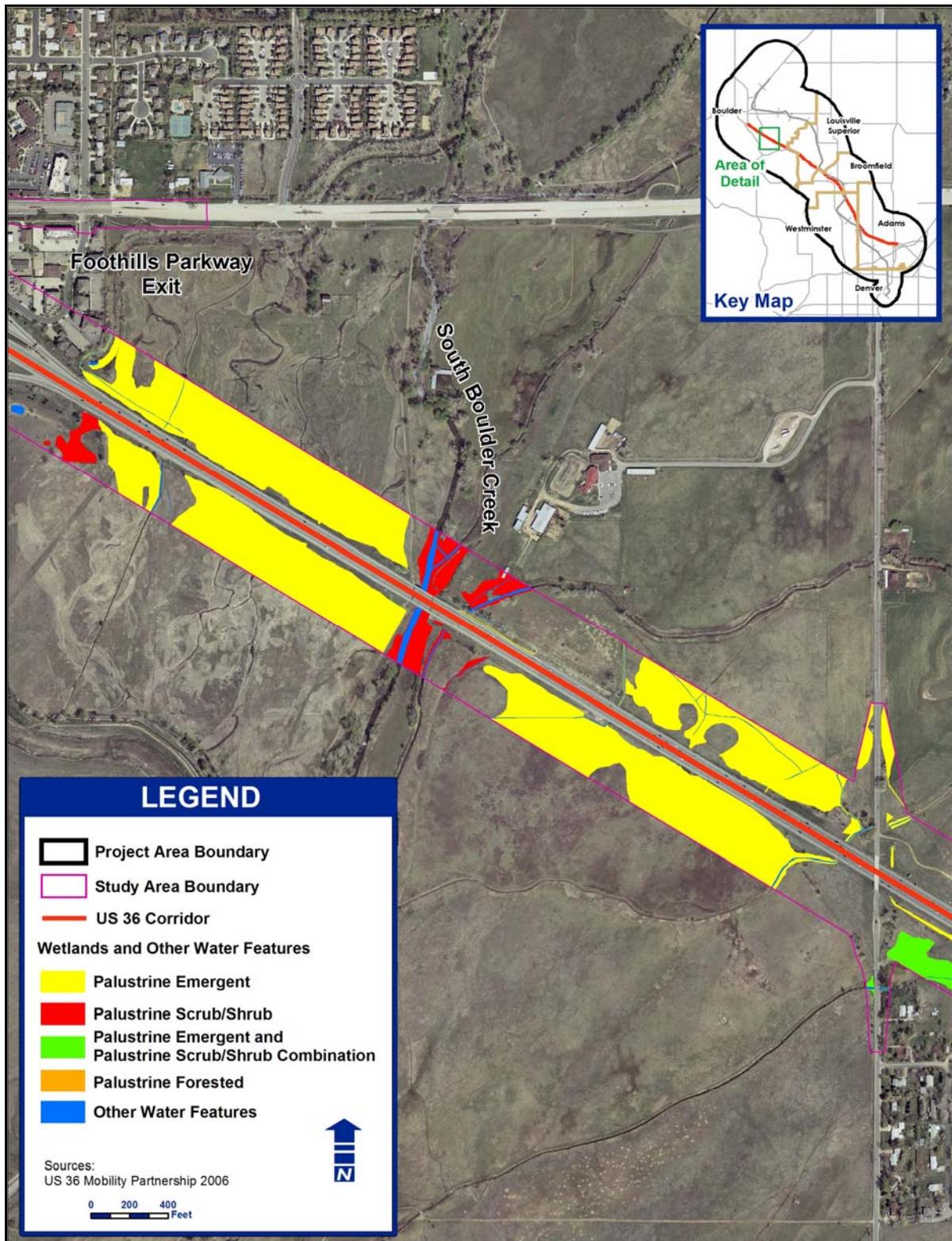
Based on field investigations, approximately 11.35 acres of other water features are located in the study area. These are mostly irrigation ditches, natural waterways, and small ponds or reservoirs. A summary of other water features is shown in Table 4.21-2, Summary of Other Water Features.

Table 4.21-2: Summary of Other Water Features

Segment	Other Water Features (acres)			Total (acres)
	Irrigation Ditches	Natural Waterways	Ponds and Reservoirs	
Adams	0.00	0.44	0.23	0.67
Westminster	1.02	0.59	0.00	1.61
Broomfield	0.41	0.52	3.23	4.16
Superior/Louisville	1.36	0.16	0.38	1.90
Boulder	1.33	1.44	0.24	3.01
Total	4.12	3.15	4.08	11.35

Source: US 36 Mobility Partnership, 2009.

Figure 4.21-5: South Boulder Creek Area Along US 36



Denver Segment

There would not be any impacts to other water feature in the Denver Segment, so other water features in the Denver Segment will not be discussed.

Adams Segment

This segment contains 0.67 acre of other water features including the Allen Ditch, an unnamed stormwater pond, and two other water features.

Westminster Segment

This segment contains 1.61 acres of other water features. The most prominent of these features is two irrigation ditches (Allen Ditch and the Farmers Highline Canal), two natural drainages (Big Dry Creek and Walnut Creek), Lower Church Lake, and one other water feature associated with stormwater runoff.

Broomfield Segment

This segment contains 4.16 acres of other water features. The most prominent of these features is two irrigation ditches (the Dry Creek Valley Ditch and Community Ditch), two large stormwater ponds associated with the Interlocken development, and several other water features associated with stormwater and irrigation-related runoff/collection.

Superior/Louisville Segment

This segment contains 1.90 acres of other water features. The most prominent of these features is three natural drainages (Rock Creek, Coal Creek, and a tributary to Rock Creek), a stormwater pond, and several unnamed irrigation ditches.

Boulder Segment

This segment contains 3.01 acres of other water features. The most prominent of these features is three irrigation ditches (Davidson Ditch, Goodhue Ditch, and South Boulder Canyon Ditch), a natural drainage (South Boulder Creek), and several irrigation ditches and ponds.

Impact Evaluation

This section describes the methodology used to determine impacts to wetlands and other water features for each package.

Methodology

The entire study area was walked or driven between May and July 2004 to identify wetlands and other water features. Wetlands were identified based on the presence of hydrophytic (wetland) vegetation and wetland hydrology. Hydric soils were assumed to be present in all areas. Due to the extent of the study area, this method was approved for the Final Environmental Impact Statement (FEIS) by CDOT, the USACE, and the other agencies involved in the project. However, before physical work near any of the wetlands within the project area, formal wetland delineations would be completed.

To assist in evaluating the functions of wetlands within the project area, a modified version of the Montana Department of Transportation, Environmental Services/*Montana Wetland Field Evaluation Form and Instructions* (Berglund 1999) was used to determine the functions of the wetlands within the project area. This method was used because it is efficient and concise, and is generally relevant to this region. More detailed information regarding wetland functions can be found in the *Wetland Technical Memorandum for the US 36 EIS Project* (URS 2004).

Impacts to wetlands and other water features were assessed both quantitatively and qualitatively, and are discussed in terms of temporary and permanent impacts.

Temporary impacts are common to all of the build packages and are associated with construction activities. The affected areas would be restored to the original conditions (or better) after construction.

Temporary impacts include those wetlands and other water features that would experience temporary modification of functions, but would be returned to their pre-construction (or better) condition after construction. These impacts are common to all of the build packages and associated with construction activities, including removing vegetation, exposing soil (potentially resulting in sedimentation, erosion, and noxious weed invasion), constructing access roads, and placing silt fence or other temporary erosion control structures. These impacts would be relatively minor and localized.

Permanent impacts include those wetlands and other water features that would be destroyed or would have their function permanently altered as a result of the project. These impacts can be direct or indirect.

Direct impacts would be the result of earthwork, including cut-and-fill areas for the roadway and the installation of concrete, riprap, or other materials. These impacts are quantifiable and are presented in the following text by package and segment.

Direct impacts to wetlands would be the result of earthwork and the installation of construction-related materials.

Indirect permanent impacts include sedimentation, erosion, noxious weed invasion, and the loss of vegetation due to shadowing from a bridge.

Indirect permanent impacts to wetlands include sedimentation, erosion, noxious weed invasion, and the loss of vegetation due to shadowing from a bridge.

Other than shadowing, these impacts are not quantifiable, are common to all of the build alternatives, and are briefly discussed below.

Impacts to wetlands from erosion would typically be most pronounced in those wetlands along the roadway edge where there is increased flow frequency, volume, and velocity due to the increase in impermeable surface in the immediate area. Sedimentation impacts would be most pronounced in areas that receive and retain/detain surface runoff for longer periods of time.

Although noxious weed invasions typically occur in areas of exposed soil with full or partial sun, some noxious weeds are known to invade well-vegetated areas. In general, construction activities can provide a long-term vector for noxious weed invasion by exposing large areas of soil, and by transporting various kinds of materials that may contain weed seeds. Although there are few noxious weed species that regularly occur within wetland areas, some species, such as Canada thistle (*Cirsium arvense*), are commonly found along the perimeter of wetlands. Additionally, areas of exposed soil in nearby non-wetlands could be invaded and could provide an additional seed source for an invasion in wetland locations.

The loss of wetland vegetation as a result of bridge shadowing is dependent on the orientation (east/west versus north/south), height, and width of the bridge. The most pronounced loss of vegetation as a result of shadowing is from low, wide bridges oriented in an east-west direction. This is the only quantifiable indirect impact to wetlands and has been included in the impact calculations presented below.

Based on conceptual roadway plans, the quantitative analysis for direct permanent impacts involved overlaying assumed highway configurations and disturbance limits for each package and its options onto the wetland and other water features maps. Any areas of overlap were considered direct permanent disturbance. These “footprints” of disturbance include all cut-and-fill (and bridge shadow) areas plus a 15-foot buffer for construction access and other currently unknown impacts. Table 4.21-3, Summary of Direct Permanent Wetland Impacts by Build Package, and Table 4.21-4, Summary of Direct Permanent Impacts to Other Water Features by Build Package, list the acres of direct impact to wetlands and other water features (respectively), from Packages 2 and 4 and the Combined Alternative Package (Preferred Alternative).

Table 4.21-3: Summary of Direct Permanent Wetland Impacts by Build Package

Segment	Wetland Type ¹ (acres)				Total (acres)
	PEM	PSS	PEM/ PSS	PFO	
Package 2 – Options A and B					
Denver	0.00	0.00	0.00	0.00	0.00
Adams	1.00	0.26	0.00	0.00	1.26
Westminster	2.30	0.27	0.45	0.00	3.02
Broomfield	3.53	0.35	0.00	0.00	3.88
Superior/Louisville	1.58	0.08	0.00	0.11	1.77
Boulder (Option A)	10.57	1.24	0.52	0.00	12.33
Boulder (Option B)	15.90	2.01	0.52	0.00	18.43
Package 2 Option A Total	18.98	2.20	0.97	0.11	22.26
Package 2 Option B Total	24.31	2.97	0.97	0.11	28.36
Package 4 – Options A and B					
Denver	0.00	0.00	0.00	0.00	0.00
Adams	0.95	0.26	0.00	0.00	1.21
Westminster	2.39	0.44	0.19	0.00	3.02
Broomfield	2.71	0.19	0.00	0.00	2.90
Superior/Louisville	1.08	0.08	0.00	0.12	1.28
Boulder (Option A)	11.08	1.08	0.93	0.00	13.09
Boulder (Option B)	15.02	1.92	0.78	0.00	17.72
Package 4 Option A Total	18.21	2.05	1.12	0.12	21.50
Package 4 Option B Total	22.15	2.89	0.97	0.12	26.13
Combined Alternative Package (Preferred Alternative)					
Denver	0.00	0.00	0.00	0.00	0.00
Adams	0.78	0.26	0.00	0.00	1.04
Westminster	1.80	0.90	0.20	0.00	2.90
Broomfield	2.91	0.36	0.00	0.00	3.27
Superior/Louisville	1.14	0.08	0.00	0.10	1.32
Boulder	10.76	1.41	0.70	0.00	12.87 ²
Combined Alternative Package (Preferred Alternative) Total	17.39	3.01	0.90	0.10	21.40

Source: US 36 Mobility Partnership, 2009.

Notes:

¹Wetland type is based on Cowardin et al. (1979) as discussed earlier.

²The subtotal by wetland type is different than the subtotal in the text below due to rounding.

- PEM = palustrine emergent
- PSS = palustrine scrub/shrub
- PEM/PSS = palustrine emergent and palustrine scrub/shrub combination
- PFO = palustrine forested

Table 4.21-4: Summary of Direct Permanent Impacts to Other Water Features by Build Package

Segment	Other Water Features ¹ (acres)			
	Irrigation Ditches	Natural Waterways	Ponds and Reservoirs	Total
Package 2 – Options A and B				
Denver	0.00	0.00	0.00	0.00
Adams	0.17	0.00	0.23	0.40
Westminster	0.18	0.11	0.00	0.29
Broomfield	0.39	0.01	2.42	2.82
Superior/Louisville	0.09	0.33	0.00	0.42
Boulder (Option A)	0.41	0.24	0.00	0.65
Boulder (Option B)	0.49	0.29	0.12	0.90
Package 2 Option A Total	1.24	0.69	2.65	4.58
Package 2 Option B Total	1.32	0.74	2.77	4.83
Package 4 – Options A and B				
Denver	0.00	0.00	0.00	0.00
Adams	0.15	0.00	0.23	0.38
Westminster	0.16	0.11	0.00	0.27
Broomfield	0.37	0.00	2.27	2.64
Superior/Louisville	0.09	0.29	0.00	0.38
Boulder (Option A)	0.47	0.24	0.00	0.71
Boulder (Option B)	0.53	0.28	0.12	0.93
Package 4 Option A Total	1.24	0.64	2.50	4.38
Package 4 Option B Total	1.30	0.68	2.62	4.60
Combined Alternative Package (Preferred Alternative)				
Denver	0.00	0.00	0.00	0.00
Adams	0.05	0.00	0.00	0.05
Westminster	0.12	0.29	0.00	0.41
Broomfield	0.41	0.00	0.35	0.76
Superior/Louisville	0.07	0.29	0.00	0.36
Boulder	0.40	0.29	0.32	1.01
Combined Alternative Package (Preferred Alternative) Total	1.05	0.87	0.67	2.59

Source: US 36 Mobility Partnership, 2009.

Note:

¹ The length of impact to the most prominent natural waterways can be found in Table 4.21-5, Summary of Impacts to the Prominent Natural Linear Other Water Features by Build Package.

Table 4.21-5, Summary of Impacts to the Prominent Natural Linear Other Water Features by Build Package, represents the total length of the waterway within the “footprint” of impact explained above.

Table 4.21-5: Summary of Impacts to the Prominent Natural Linear Other Water Features by Build Package

Prominent Natural Waterways	Impact (linear feet)				
	Combined Alternative Package (Preferred Alternative)	Package 2		Package 4	
		Option A ¹	Option B ¹	Option A ¹	Option B ¹
Denver Segment					
None	0	0	0	0	0
Adams Segment					
None	0	0	0	0	0
Westminster Segment					
Walnut/Big Dry Creek	1,611	305	305	288	288
Broomfield Segment					
None	0	0	0	0	0
Superior/Louisville Segment					
Rock Creek	268	286	286	240	240
Coal Creek	147	170	170	154	154
Boulder Segment					
South Boulder Creek	227	227	309	227	270

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

¹Option A and Option B are described in Section 4.1, Introduction.

Package 1: No Action

No impacts to wetlands would occur under Package 1 except as described under the Cumulative Impacts subsection.

Package 2: Managed Lanes/Bus Rapid Transit

Direct Impacts

Wetlands

Package 2 with Option A would result in the direct permanent impact of 22.26 acres of wetlands, including 18.98 acres of PEM, 2.20 acres of PSS, 0.97 acre of PEM/PSS, and 0.11 acre of PFO. Approximately 55 percent of these impacts (12.33 acres) would be in the Boulder Segment (the lowest percent of all packages, as well as the lowest wetland impact in this segment of all packages), with the remaining 45 percent divided among the other segments. Package 2 with Option B would result in the direct permanent impact of 28.36 acres of wetlands, including 24.31 acres of PEM, 2.97 acres of PSS, 0.97 acre of PEM/PSS, and 0.11 acre of PFO. Approximately 65 percent of these impacts (18.43 acres) would be in the Boulder Segment, with the remaining 35 percent divided among the other segments. Most of the impacts would be the result of the placement of fill for widening the roadway. The following text briefly describes the impacts to the wetlands discussed in the Affected Environment section.

Denver Segment

There would not be any wetland impacts in the Denver Segment.

Adams Segment

Approximately 1.26 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.23 acre of impact to the Allen Ditch wetlands, and 1.03 acres of impact to 10 other wetlands.

Westminster Segment

Approximately 3.02 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.23 acre of impact to the wetlands associated with Walnut/Big Dry Creek, and 2.79 acres of impact to 13 other wetlands.

Broomfield Segment

Approximately 3.88 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes approximately 0.06 acre of impact to the Community Ditch wetlands, and 3.82 acres of impact to 26 other wetlands.

Superior/Louisville Segment

Approximately 1.77 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and implementation of other project features. This includes 0.86 acre of impact to the wetlands associated with Rock Creek and its tributary to the west, 0.08 acre of impact to Coal Creek wetlands, and 0.83 acre of impact to 15 other wetlands.

Boulder Segment

For Option A, approximately 12.33 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.70 acre of impact to the South Boulder Creek area wetlands and 11.63 acres of impact to 20 other wetlands.

For Option B, approximately 18.43 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.89 acre of impact to the South Boulder Creek area wetlands and 17.54 acres of impact to 20 other wetlands.

The South Boulder Road/Cherryvale Road bikeway alternative would impact 0.22 acre of wetlands compared to 0.50 acre of impact as a result of the US 36 bikeway (the Combined Alternative Package [Preferred Alternative] has the US 36 bikeway as the chosen bikeway alternative and this should be considered when comparing impacts).

Other Water Features

Package 2 with Option A would result in the direct permanent impact of 4.58 acres of other water features, including 1.24 acres of irrigation ditches, 0.69 acre of natural waterways, and 2.65 acres of ponds and reservoirs. Approximately 62 percent of these impacts would be in the Broomfield Segment with 14 percent in the Boulder Segment, 9 percent in the Adams Segment, 9 percent in the Superior/Louisville Segment, and 6 percent in the Westminster Segment. However, Package 2 would impact ponds and reservoirs in the Broomfield Segment more than the other two packages, with Package 4 only impacting 0.15 acre less than Package 2, but with the Combined Alternative Package (Preferred Alternative) impacting more than 2 acres less than Package 2 by pulling in the impacts all along the US 36 alignment. Additionally, both Package 2 and Package 4 would impact ponds and reservoirs in the Adams Segment, while the Combined Alternative Package (Preferred Alternative) does not impact any of these features. Under Package 2 with Option B, the impact change in the Boulder Segment would result in the direct permanent impact of 4.83 acres of other water features, including 1.32 acres of irrigation ditches, 0.74 acre of natural waterways, and 2.77 acres of ponds and reservoirs; this represents an increase in all three resource

Most of the direct, permanent impacts to other water features would be the result of the placement of fill for widening the roadway.

categories over Option A. Approximately 58 percent of these impacts would be in the Broomfield Segment, with 19 percent in the Boulder Segment, 8 percent in the Adams Segment, 9 percent in the Superior/Louisville Segment, and 6 percent in the Westminster Segment. Most of the impacts would be the result of the placement of fill for widening the roadway. The following text briefly describes the impacts to the other water features discussed in the Affected Environment section.

Denver Segment

There would be no impacts to other water features in the Denver Segment.

Adams Segment

Approximately 0.40 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.13 acre of impact to the Allen Ditch, 0.23 acre of impact to an unnamed stormwater pond, and 0.04 acre to two other water features.

Westminster Segment

Approximately 0.29 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.09 acre of Allen Ditch, 0.09 acre to the Farmers Highline Canal, 0.11 acre (305 linear feet) to Walnut/Big Dry Creek, and less than 0.01 acre of impact to one other water feature. There would be no impact to Lower Church Lake.

Broomfield Segment

Approximately 2.82 acres of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impact to 0.32 acre of an unnamed ditch, 0.28 acre to an old farm pond and ditch, 0.10 acre to Community Ditch, 0.01 acre to a tributary to Rock Creek, and 2.11 acres of impact to two stormwater ponds.

Superior/Louisville Segment

Approximately 0.42 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.11 acre (388 linear feet) of Rock Creek, 0.22 acre (209 linear feet) of Coal Creek, and 0.09 acre to three other water features.

Boulder Segment

For Option A, approximately 0.65 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impact to 0.05 acre of the Davidson Ditch, 0.02 acre of the Goodhue Ditch, 0.06 acre of South Boulder Canyon Ditch, 0.23 acre of South Boulder Creek, and 0.29 acre to 10 other water features. There would be no impact to the Upper Bear Canyon Ditch.

For Option B, approximately 0.90 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impact to 0.08 acre of South Boulder Canyon Ditch, 0.28 acre of South Boulder Creek, and 0.54 acre to 15 other water features. There would be no impact to the Upper Bear Canyon Ditch.

Indirect Impacts

All Segments

All of the build packages would result in some temporary and indirect impacts. Temporary impacts to wetlands include trampling, vegetation damage, and temporary draining of an area. Indirect impacts to wetlands include sedimentation, erosion, noxious weed invasion, and the loss of vegetation due to shadowing from bridges. In general, these impacts are not quantifiable. It is likely that these impacts would lead to some reduction in wetland quality.

Package 4: General-Purpose Lanes, High-Occupancy Vehicle, and Bus Rapid Transit

Direct Impacts

Wetlands

Package 4 with Option A would result in the direct, permanent impact of 21.50 acres of wetlands, including 18.21 acres of PEM, 2.05 acres of PSS, 1.12 acres of PEM/PSS, and 0.12 acre PFO. Approximately 61 percent of these impacts would be in the Boulder Segment, 14 percent in the Westminster Segment, 13 percent in the Broomfield Segment, 6 percent in the Superior/Louisville Segment, and 6 percent in the Adams Segment. Package 4 with Option B would result in the direct, permanent impact of 26.13 acres of wetlands, including 22.15 acres of PEM, 2.89 acres of PSS, 0.97 acre of PEM/PSS, and 0.12 acre PFO. Approximately 68 percent of these impacts would be in the Boulder Segment, 12 percent in the Westminster Segment, 11 percent in the Broomfield Segment, 4 percent in the Superior/Louisville Segment, and 5 percent in the Adams Segment. In the Boulder Segment, the impacts of Options A and B would be more than Package 2, Option A; the impacts of Package 2, Option A would be slightly less than the Combined Alternative Package (Preferred Alternative) for this segment. Most of the impacts would be the result of the placement of fill for widening the roadway. The following text briefly describes the impacts to the wetlands discussed in the Affected Environment section.

Denver Segment

There would not be any wetland impacts in the Denver Segment.

Adams Segment

Approximately 1.21 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.21 acre of impact to the Allen Ditch area wetlands, and 1.00 acre of impact to 10 other wetlands.

Westminster Segment

Approximately 3.02 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.23 acre of impact to the wetlands associated with Walnut/Big Dry Creek, and 2.79 acres of impact to 13 other wetlands.

Broomfield Segment

Approximately 2.90 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes approximately 0.04 acre of impact to the Community Ditch wetlands, and 2.86 acres of impact to 22 other wetlands.

Superior/Louisville Segment

Approximately 1.28 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.41 acre of impact to the wetlands associated with Rock Creek and its tributary to the west, 0.16 acre of impact to Coal Creek wetlands, and 0.71 acre of impact to 16 other wetlands.

Boulder Segment

For Option A, approximately 13.09 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.70 acre of impact to the South Boulder Creek area wetlands, and 12.39 acres of impact to 20 other wetlands.

For Option B, approximately 17.72 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.81 acre of impact to the South Boulder Creek area wetlands, and 16.91 acres of impact to 20 other wetlands.

The Cherryvale Road/South Boulder Road bikeway alignment would result in fewer wetland impacts (0.22 acre) than the US 36 bikeway alignment (0.50 acre).

Other Water Features

Package 4, Option A would result in the direct, permanent impact of 4.38 acres of other water features (less than Package 2 but more than the Combined Alternative Package [Preferred Alternative]), including 1.24 acres of irrigation ditches, 0.64 acre of natural waterways, and 2.50 acres of ponds and reservoirs. Approximately 60 percent of these impacts would be in the Broomfield Segment, with 16 percent in the Boulder Segment, 9 percent in the Adams Segment, 9 percent in the Superior/Louisville Segment, and 6 percent in the Westminster Segment.

Package 4 Option B would result in the direct, permanent impact of 4.60 acres of other water features (less than Package 2, Option B, but more than the Combined Alternative Package [Preferred Alternative]), including 1.30 acres of irrigation ditches, 0.68 acre of natural waterways, and 2.62 acres of ponds and reservoirs. Approximately 57 percent of these impacts would be in the Broomfield Segment, with 20 percent in the Boulder Segment, 8 percent in the Adams Segment, 8 percent in the Superior/Louisville Segment, and 6 percent in the Westminster Segment. Most of the impacts would be the result of the placement of fill for widening the roadway. The following text briefly describes the impacts to the other water features discussed in the Affected Environment section. Impacts to hydrology in all the segments are discussed in Section 4.20, Water Resources: Water Quality and Floodplains.

Denver Segment

There would be no impacts to other water features in the Denver Segment.

Adams Segment

Approximately 0.38 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.12 acre of impact to the Allen Ditch, 0.22 acre of impact to an unnamed stormwater pond, and 0.04 acre to two other water features.

Westminster Segment

Approximately 0.27 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.09 acre of Allen Ditch, 0.07 acre to the Farmers Highline Canal, 0.11 acre (288 linear feet) to Walnut/Big Dry Creek, and less than 0.01 acre of impact to one other water feature. There would be no impact to Lower Church Lake.

Broomfield Segment

Approximately 2.64 acres of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.32 acre of an unnamed ditch, 0.27 acre to an old farm pond and ditch, 0.08 acre to Community Ditch, and 1.97 acres of impact to two stormwater ponds.

Superior/Louisville Segment

Approximately 0.38 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.06 acre (167 linear feet) of Rock Creek, 0.23 acre (253 linear feet) of Coal Creek, and 0.09 acre to three other water features.

Boulder Segment

For Option A, approximately 0.71 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features (more than Package 2, Option A, but less than the Combined Alternative Package [Preferred Alternative]). This includes impacts to 0.07 acre of the Davidson Ditch, 0.04 acre of the Goodhue Ditch, 0.06 acre of South Boulder Canyon Ditch, 0.23 acre (2,621 linear feet) of South Boulder Creek, and 0.31 acre to 10 other water features.

For Option B, approximately 0.93 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features (more than Package 2, Option A, but less than the Combined Alternative Package [Preferred Alternative]). This includes impacts to 0.07 acre of the Davidson Ditch, 0.04 acre of the Goodhue Ditch, 0.07 acre of South Boulder Canyon Ditch, 0.26 acre (2,490 linear feet) of South Boulder Creek, and 0.49 acre to 12 other water features. There would be no impact to the Upper Bear Canyon Ditch.

Indirect Impacts

All Segments

All of the build packages would result in some indirect impacts. Indirect impacts to wetlands include sedimentation, erosion, noxious weed invasion, and the loss of vegetation due to shadowing from bridges. In general, these impacts are not quantifiable. It is likely that these impacts would lead to some reduction in wetland quality.

Combined Alternative Package (Preferred Alternative): Managed Lanes, Auxiliary Lanes, and Bus Rapid Transit

Direct Impacts

Wetlands

The Combined Alternative Package (Preferred Alternative) would result in the direct, permanent impact of 21.00 acres of wetlands, including 17.39 acres of PEM, 3.01 acres of PSS, 0.90 acre of PEM/PSS, and 0.10 acre PFO. Approximately 5 percent of these impacts would be in the Adams Segment, 14 percent in the Westminster Segment, 15 percent in the Broomfield Segment, 6 percent in the Superior/Louisville Segment, and 60 percent in the Boulder Segment. Most of the impacts would be the result of the placement of fill for widening the roadway.

Acres of wetland impacts for the Combined Alternative Package (Preferred Alternative) are provided in Table 4.21-3, Summary of Direct Permanent Wetland Impacts by Build Package. Table 4.21-6, Comparison of Direct Permanent Wetland Impacts by Build Package, shows whether the Combined Alternative Package (Preferred Alternative) total impact numbers represent an increase or a decrease (in acres) when compared to the total impacts associated with Packages 2 and 4.

Table 4.21-6: Comparison of Direct Permanent Wetland Impacts by Build Package

Segment	Combined Alternative Package (Preferred Alternative) (acres)	Package 2 (acres)	Package 2 Difference (acres)	Package 4 (acres)	Package 4 Difference (acres)
Denver	0	0	0	0	0
Adams	1.04	1.26	-0.22	1.21	-0.17
Westminster	2.90	3.02	-0.12	3.02	-0.12
Broomfield	3.27	3.88	-0.61	2.90	+0.37
Superior/Louisville	1.32	1.77	-0.45	1.28	+0.04
Boulder Option A	12.87 ²	12.33	+0.54	13.09	-0.22
Boulder Option B ¹	12.87 ²	18.43	-5.56	17.72	-4.85
Total Option A	21.40 ¹	22.26	-0.86	21.50	-0.10
Total Option B	21.40 ¹	28.36	-6.96	26.13	-4.73

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

Totals may not equal the sum of the subtotals due to rounding.

¹There is no separate Option A and Option B for the Combined Alternative Package (Preferred Alternative), so these numbers reflect the one total under the Combined Alternative Package (Preferred Alternative).

²The subtotal by wetland type is different than the subtotal in the text below due to rounding.

+ = the Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to

- = the Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

The comparison shows that wetland impacts associated with the Combined Alternative Package (Preferred Alternative) are generally less than impacts associated with Packages 2 and 4, although more in a couple of segments. The Combined Alternative Package (Preferred Alternative) would result in a decrease of wetland impacts when compared to the four options in Packages 2 and 4 combined. The following text briefly describes the impacts to the wetlands discussed in the Affected Environment section.

Denver Segment

There would not be any wetland impacts in the Denver Segment.

Adams Segment

Approximately 1.04 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.11 acre of impact to the Allen Ditch area wetlands, and 0.93 acre of impact to 10 other wetlands.

Westminster Segment

Approximately 2.90 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.13 acre of impact to the Allen Ditch area of wetlands, 0.69 acre of impact to the wetlands associated with Walnut Creek/Big Dry Creek, and 2.08 acres of impact to 13 other wetlands.

Broomfield Segment

Approximately 3.27 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes approximately 0.04 acre of impact to the Community Ditch wetlands, and 3.23 acres of impact to 22 other wetlands.

Superior/Louisville Segment

Approximately 1.32 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.28 acre of impact to the wetlands associated with Rock Creek and its tributary to the west, 0.15 acre of impact to Coal Creek wetlands, and 0.89 acre of impact to 16 other wetlands.

Boulder Segment

Approximately 12.88 acres of wetlands would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.76 acre of impact to the South Boulder Creek area wetlands, and 12.12 acres of impact to 20 other wetlands.

Other Water Features

The Combined Alternative Package (Preferred Alternative) would result in the direct, permanent impact of 2.59 acres of other water features.

The Combined Alternative Package (Preferred Alternative) would result in the direct, permanent impact of 2.59 acres of other water features. Approximately 29 percent of these impacts would be in the Broomfield Segment, with 2 percent in the Adams Segment, 16 percent in the Westminster Segment, 14 percent in the Superior/Louisville Segment, and 39 percent in the Boulder Segment. Most of the impacts would be the result of the placement of fill for widening the roadway. The following text briefly describes the impacts to the other water features discussed in the Affected Environment section. Impacts to hydrology in all the segments are discussed in Section 4.20, Water Resources: Water Quality and Floodplains.

Acres of impacts to other water features for the Combined Alternative Package (Preferred Alternative) are provided in Table 4.21-4, Summary of Direct Permanent Impacts to Other Water Features by Build Package. Table 4.21-7, Comparison of Impacts to Other Water Features by Build Package, shows whether the Combined Alternative Package (Preferred Alternative) total impact numbers represent an increase or a decrease (in acres) when compared to the total impacts associated with Packages 2 and 4.

Table 4.21-7: Comparison of Impacts to Other Water Features by Build Package

Segment	Combined Alternative Package (Preferred Alternative) (acres)	Package 2 (acres)	Package 2 Difference (acres)	Package 4 (acres)	Package 4 Difference (acres)
Denver	0.00	0.00	0.00	0.00	0.00
Adams	0.05	0.40	-0.35	0.38	-0.33
Westminster	0.41	0.29	+0.12	0.27	+0.14
Broomfield	0.76	2.82	-2.06	2.64	-1.88
Superior/Louisville	0.36	0.42	-0.06	0.38	-0.02
Boulder Option A	1.01	0.65	+0.36	0.71	+0.30
Boulder Option B	1.01	0.90	+0.11	0.93	+0.08
Total Option A	2.59¹	4.58	-1.99	4.38	-1.79
Total Option B	2.59¹	4.83	-2.24	4.60	-2.01

Source: US 36 Mobility Partnership, 2009.

Notes:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

¹There is no separate Option A and Option B for the Combined Alternative Package (Preferred Alternative), so these numbers reflect the one total under the Combined Alternative Package (Preferred Alternative).

+ = the Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to

- = the Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

The comparison shows that impacts to other water features associated with the Combined Alternative Package (Preferred Alternative) are substantially less than the impacts associated with Packages 2 and 4. The Combined Alternative Package (Preferred Alternative) would result in a decrease of impacts to other water features when compared to all four options in Packages 2 and 4. The following text briefly describes the impacts to the other water features discussed in the Affected Environment section.

Denver Segment

There would be no impacts to other water features in the Denver Segment.

Adams Segment

Approximately 0.05 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes 0.04 acre of impact to the Allen Ditch and 0.01 acre to two other water features.

Westminster Segment

Approximately 0.41 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.06 acre of Allen Ditch, 0.06 acre to the Farmers Highline Canal, 0.29 acre (288 linear feet) to Walnut Creek/Big Dry Creek, and less than 0.01 acre of impact to one other water feature. There would be no impact to Lower Church Lake.

Broomfield Segment

Approximately 0.76 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.31 acre of an unnamed ditch, 0.08 acre to an old farm pond and ditch, 0.31 acre to Community Ditch, and 0.06 acre of impact to two stormwater ponds.

Superior/Louisville Segment

Approximately 0.36 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.02 acre of Rock Creek, 0.22 acre of Coal Creek, and 0.12 acre to three other water features.

Boulder Segment

Approximately 1.01 acre of other water features would be permanently impacted in this segment as a result of the placement of fill for highway widening and other project features. This includes impacts to 0.06 acre of the Davidson Ditch, 0.02 acre of the Goodhue Ditch, 0.02 acre of South Boulder Canyon Ditch, 0.16 acre of South Boulder Creek, and 0.84 acre to 10 other water features including the pond on the University of Colorado, Boulder South Campus near the Table Mesa Drive interchange.

Table 4.21-8, Comparison of Impacts to the Prominent Natural Linear Other Water Features by Build Package, shows whether the Combined Alternative Package (Preferred Alternative) total impact numbers represent an increase or a decrease (in linear feet) when compared to the total impacts associated with Packages 2 and 4.

Table 4.21-8: Comparison of Impacts to the Prominent Natural Linear Other Water Features by Build Package

Prominent Natural Waterways	Impact (additional linear feet over existing)				
	Combined Alternative Package (Preferred Alternative) (acres)	Package 2 (acres)	Package 2 Difference (acres)	Package 4 (acres)	Package 4 Difference (acres)
Denver Segment					
None	0	0	0	0	0
Adams Segment					
None	0	0	0	0	0
Westminster Segment					
Walnut Creek/Big Dry Creek	1,611	305	+1,306	288	+1,323
Broomfield Segment					
None	0	0	0	0	0
Superior/Louisville Segment					
Rock Creek	34	52	49	6	+28
Coal Creek	98	121	23	105	7
Boulder Segment					
South Boulder Creek Options A and B ¹	284	284	0	284	0

Source: US 36 Mobility Partnership, 2009.

Note:

There are no impacts under Package 1 (No Action) so these are not outlined in this table.

¹Options A and B are described in Section 4.1, Introduction. At this crossing, there are no differences between the packages in terms of structural width requirements – about 100 feet would be added. Additional streamside impacts included in the 284 acres would be a result of the bikeway that crosses US 36 at this point.

- + = the Combined Alternative Package (Preferred Alternative) impacts are more than the package it is being compared to
- = the Combined Alternative Package (Preferred Alternative) impacts are less than the package it is being compared to

Indirect Impacts

All Segments

The Combined Alternative Package (Preferred Alternative) would result in some indirect impacts. Indirect impacts to other water features include water quality degradation from sedimentation, erosion, and noxious weed invasion. There could also be possible indirect impacts to the hydrology in areas where other water features are affected. In general, these impacts are not quantifiable. It is likely that these impacts would lead to some reduction in wetland quality.

Mitigation

The Combined Alternative Package (Preferred Alternative) was modified during development to avoid and minimize impacts to wetlands wherever possible. These modifications included:

- The removal of the median stations that minimized the amount of land needed in places along the corridor.
- The addition of retaining walls on US 36 in the South Boulder Creek Area (Boulder Segment), at Coal Creek (Superior/Louisville Segment), and at the Allen Ditch (Adams Segment).
- The reconfiguration of the Table Mesa Drive interchange at US 36 (Boulder Segment).
- The relocation of several stormwater ponds along US 36 in the Boulder and Broomfield segments.
- The redesign of the US 36 crossing of Rock Creek in the Superior/Louisville Segment.
- The realignment of the bikeway in several locations in the Broomfield and Westminster segments.
- The redesign of the 88th Avenue and Sheridan Boulevard improvements along US 36 (Adams Segment).

Additional avoidance and minimization measures will be implemented during preliminary and final design.

Compensatory Mitigation

Per the USACE and USEPA Compensatory Mitigation for Losses of Aquatic Resources Final Rule (Final Rule) (40 Code of Federal Regulations [CFR] Part 230) (Final Rule) (2009), the USACE is taking an “environmentally preferable” approach to the mitigation of impacts to waters of the U.S. The Final Rule states that the USACE will “assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed” when making mitigation determinations, and “compensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular ... permit.”

Per Section 404 of the CWA, impacts to wetlands and other water features must be avoided, minimized, or mitigated (in order of preference). Although the Act requires compensatory mitigation only for those wetlands and other water features considered jurisdictional by the USACE, it is FHWA policy to mitigate all wetland impacts (jurisdictional and non-jurisdictional). A Preliminary Jurisdictional Determination was issued by the USACE stating that all wetlands and other water features in the project area are considered jurisdictional. This decision was made based on CDOT and FHWA commitment to mitigate for all wetland impacts regardless of jurisdiction. All impacted wetlands and other water features will be mitigated in accordance with current USACE mitigation policies and the conditions of the USACE Section 404 Permit, as well as work with municipalities regarding their requirements for wetland impact mitigation in their jurisdiction.

A conceptual compensatory mitigation plan for this project was prepared to support the FEIS. A more detailed mitigation plan that meets the requirements of the Final Rule will be prepared after completion of the FEIS, and will be submitted along with an application for a Section 404 Individual Permit before any jurisdictional waters of the U.S. are impacted from construction of the Combined Alternative Package (Preferred Alternative). More details on the Section 404 permitting process and the associated National

The Combined Alternative Package (Preferred Alternative) was modified to avoid and minimize impacts to wetlands wherever possible.

Per Section 404 of the CWA, impacts to wetlands and other water features must be avoided, minimized, or mitigated.

Environmental Policy Act of 1969 (NEPA)/Section 404 merger process are provided in the NEPA/Section 404 Merger Process subsection.

All mitigation for the wetlands along the US 36 corridor will be done in accordance with CDOT, FHWA (23 CFR 777), Regional Transportation District, and Federal Transit Administration policy.

The overall goals of any compensatory mitigation are to replace acreage of wetlands directly impacted by the project, and to replace those wetland functions lost.

The overall goals of any compensatory mitigation are to replace acreage of wetlands directly impacted by the project, and to replace those wetland functions lost, per the Final Rule. The Transportation Equity Act for the 21st Century included a preference for the use of wetland mitigation banking to the extent that a local mitigation bank exists, contains enough credits to offset the impacts, and is federally approved. In cases of wetland creation or enhancement, a compensatory mitigation site would include the delivery of water, grading, excavating, and planting herbaceous and woody vegetation.

The mitigation plan developed for submittal with the Section 404 permit application will be developed in accordance with the Final Rule, and will describe all phases of wetland mitigation, including site layout, shallow groundwater monitoring well installation, construction details, and success monitoring. Specifically, the plan will include:

- Plan preparation and approval.
- Objectives of the plan.
- Site selection that considers watershed needs and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation.
- A Site Protection Instrument, including a description of legal arrangements and site ownership that will be used to ensure long-term protection of the compensatory mitigation project site.
- Baseline information describing the ecological characteristics of the proposed compensatory mitigation site.
- Determination of mitigation credits.
- Mitigation work plan including, but not limited to:
 - a detailed base map outlining the exact location of the site(s),
 - a detailed grading plan based on the well data collected,
 - a detailed planting plan that shows methods for establishing the desired plant communities including different planting zones, the placement of herbaceous plant stock (collected on-site if possible), willow cuttings (collected on-site if possible), trees, and other shrubs; a detailed seed and plant mix including an upland seed mix with grasses, forbs, and shrubs to be used in adjacent areas; specifications that, when available, collection and direct transplant of wetland plugs shall also be utilized for the mitigation area; and information on the sources and quantities of seed and plants to be used.
 - plans to control invasive plant species,
 - details on the source(s) of wetland hydrology, including connections to existing waters and uplands,
 - erosion control and soil stabilization measures, and
 - details on construction methods, timing, and sequencing.
- A maintenance plan to ensure the continued viability of the resource once initial construction is completed.

- Performance standards that are ecologically based.
- A detailed success monitoring plan.
- A long-term management plan describing how the mitigation project will be managed after performance standards have been achieved.
- An adaptive management plan to address unforeseen changes in site conditions.
- Financial assurances.
- Other applicable information that, in this case, could include the Programmatic Biological Assessment and Biological Opinion.

For CDOT/FHWA mitigation through creation, when practicable, final site selection would be based on the installation of groundwater monitoring wells for the purpose of assessing groundwater flow in the area. Wells should be monitored for a minimum of 1 year. Well data would be collected frequently during the growing season. The number of wells and placement would be determined in coordination with USACE and CDOT Region 6 and headquarters staff. The well data would be used to determine if the site is suitable and, if needed, the wells would be monitored during final design.

The success monitoring for any site will include the requirements defined by the USACE in the Final Rule and details for the short- and long-term management and maintenance of the site. The success of the site is typically determined by the USACE and is based on compliance with the success criteria written into the Section 404 Permit.

Additional Mitigation Measures

In addition to the aforementioned mitigation, the specific mitigation measures listed in Table 4.21-9, Mitigation Measures – Wetlands and Other Waters, will further minimize adverse impacts to wetlands and other water features.

Table 4.21-9: Mitigation Measures — Wetlands and Other Waters

Impact	Impact Type	Mitigation Measures
Loss of wetlands due to the placement of dredged or fill material	Construction	<ul style="list-style-type: none"> • Wetland mitigation to include banking, establishment, restoration, enhancement, and/or preservation. Banking, establishment and restoration is typically at a 1:1 ratio.
Sedimentation and erosion of wetlands and other water features	Construction	<ul style="list-style-type: none"> • BMPs will be implemented during all phases of construction to reduce impacts from sedimentation and erosion, including the use of berms, brush barriers, check dams, erosion control blankets, filter strips, sandbag barriers, sediment basins, silt fences, straw-bale barriers, surface roughening, and/or diversion channels. • When practicable, construction in waterways will be performed during low-flow or dry periods. • Flowing water will be diverted around active construction areas. • No fill material will be stored in wetlands or other water features. • No unpermitted discharges will be allowed.

Source: US 36 Mobility Partnership, 2009.

Note:

BMP = best management practice

