

## 3.9 FLOODPLAINS

The regional study area for the proposed action includes many major and minor drainage crossings in six watersheds to the South Platte River. These watersheds (from north to south) include the Cache la Poudre River, Big Thompson River, South Platte River, St. Vrain Creek, Big Dry Creek, and Clear Creek (see **Figure 3.9-1** in **Section 3.9.2**). This section summarizes floodplain resources and evaluations presented in the *Water Quality and Floodplains Technical Report* (FHU, 2008b), which should be referred to for additional information, details, and references.

### 3.9.1 Regulatory Framework

Various governmental policies guide the actions for construction in or near floodplains. These include:

- ▶ Executive Order 11988, Floodplain Management, which requires federal agencies to avoid, to the extent possible, long-term and short-term adverse impacts associated with the modification of floodplains and to avoid floodplain development wherever there is a practicable alternative.
- ▶ FHWA 23 CFR 650, Subpart A, which provides guidelines for floodplain and construction interaction.
- ▶ U.S. DOT Order 5650.2, Floodplain Management and Protection, which prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts in agency actions, planning programs, and budget requests.
- ▶ FEMA policy, which is administered in the regional study area by Denver, Boulder, Adams, Weld, and Larimer counties, along with most cities and towns, which are responsible for regulating development in FEMA-designated floodplains.
- ▶ Additional floodplain and drainage design policies required to be followed are outlined in the CDOT *Drainage Design Manual* (CDOT, 2004), and the CDOT *Erosion Control and Stormwater Quality Guide* (CDOT, 2002b).

An inspection of current FEMA flood insurance rate maps was completed for the regional study area. All major drainageways are in FEMA zones AE, A, or X, which define boundaries of floodplains by varying degrees of detail. Smaller drainages are not defined by FEMA. Each floodplain zone and a list of major drainages in each specific zone is described below.

**Zone AE.** Zone AE is part of the FEMA 100-year flood hazard area where base flood elevations have been determined. Zone AE floodplain areas in the regional study area include Big Dry Creek, Big Thompson River at the BNSF Railway, Boxelder Creek Overflows, Clear Creek, Grange Hall Creek, South Fork to Grange Hall Creek, and Tanglewood Creek. AE Zone areas that also have a floodway delineated are Big Dry Creek, Big Thompson River at the BNSF railway, Grange Hall Creek, South Fork to Grange Hall Creek, and Tanglewood Creek. The new Cache la Poudre and Boxelder Creek Digital Flood Insurance Rate Map (DFIRM) has a

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##### 3.9 Floodplains

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- 3.9.2 Affected Environment
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1 delineated floodway. A floodway is an area of the floodplain that should be reserved (kept free of  
2 obstructions) to allow floodwaters to move downstream.

3 **Zone A.** Zone A is part of the FEMA 100-year flood hazard area where base flood elevations  
4 have not been determined but a shaded, generalized floodplain is shown on the FEMA Flood  
5 Insurance Rate Maps (FIRM). Zone A areas in the regional study area include Big Thompson  
6 River, Little Thompson River, McKay Lake Drainageway, Mustang Run, Niver Creek, Quail  
7 Creek, Sack Creek South, St. Vrain Creek, Shay Ditch, and the South Fork of Preble Creek. US  
8 85 Zone A areas include Second and Third creeks. FEMA's April 1995 publication, *Managing*  
9 *Floodplain Development in Approximate Zone A Areas*, states that although base flood  
10 elevations are not shown in Zone A areas, the community is still responsible for ensuring that  
11 new developments in these areas are constructed using methods that will minimize flood  
12 damage. This often requires obtaining or calculating base (100 year) flood elevations at the  
13 development site.

14 **Zone X.** Zone X is part of the FEMA 500-year flood area, 100-year flood area with average  
15 depths of less than 1 foot, or with drainage areas less than 1 square mile. Zone X areas in the  
16 regional study area include an unnamed tributary to Grange Hall Creek.

## 17 3.9.2 Affected Environment

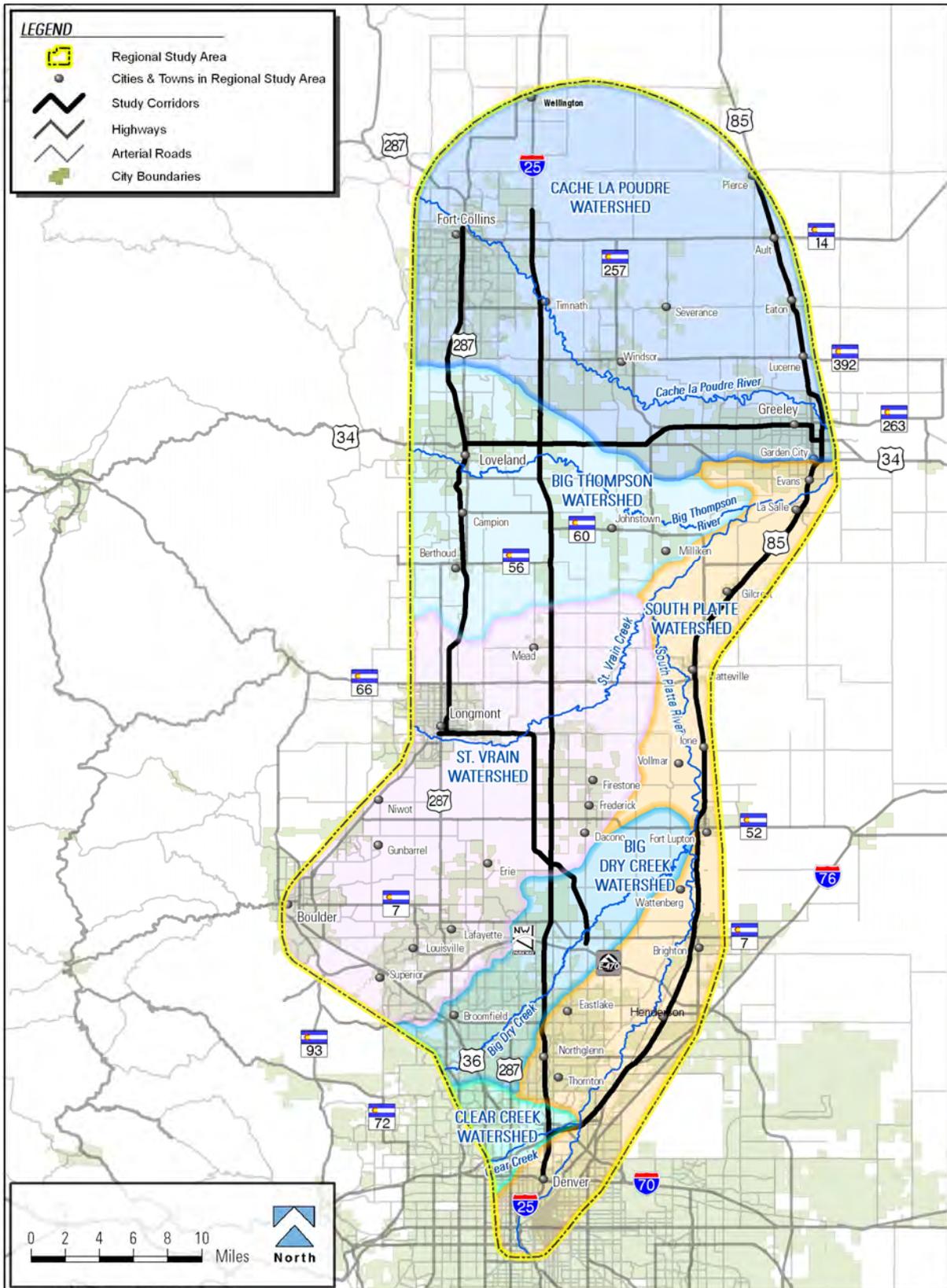
18 The following sections address flood history, floodplains, drainage, and floodplain functions in the  
19 six watersheds. **Figure 3.9-1** delineates the watersheds within the regional study area.

### 20 3.9.2.1 CACHE LA POUDRE WATERSHED

21 The Cache la Poudre River has experienced major flooding seven times since 1844. The most  
22 damage was caused by the 1904 flood. The 100-year flood width is about 1,300 feet near I-25.  
23 The Boxelder Creek and Cache la Poudre River floodplains are complicated and interconnected  
24 in the I-25 area. Recently, portions of these drainages were re-mapped by FEMA to better reflect  
25 the current extents of flooding. Flooding occurs in the I-25 right-of-way at Boxelder Creek, the  
26 Cache la Poudre River, Fossil Creek, Swede Lake Outlet, and several minor crossings. Spring  
27 Creek overtops the BNSF railway in Fort Collins where the proposed commuter rail route would  
28 cross. The Spring Creek floodplain at the BNSF railway has a width of 2,000 feet.

29 The Cache la Poudre Bridge at I-25 is undersized, causing 33 percent of the 100-year flows to  
30 split and pass south toward Harmony Road. The master plan for the City of Fort Collins is to  
31 keep this split flow intact, since the entire 100-year flow cannot pass into the main channel  
32 without exceeding FEMA's allowable rise. Fort Collins has future plans to raise Harmony Road  
33 and install a culvert or bridge to pass these overflows. South of Harmony Road, the overflows  
34 eventually spill east over I-25 and return to the Cache la Poudre River. Other physical limitations  
35 included a large bridge span, sedimentation problems, and regulatory limitations for no rise in the  
36 water surface west of I-25.

1 Figure 3.9-1 Watershed Boundaries



1 Boxelder Creek improvements include two separate projects that are being considered to better  
2 convey Boxelder Creek flows and control much of the existing flooding. The Boxelder Creek  
3 Regional Alliance proposes to build a new Boxelder Creek conveyance channel east of I-25. The  
4 second plan, which may occur later, is being sponsored by Fort Collins. It would direct Boxelder  
5 flows along the west side of I-25. Even though the Alliance improvements would occur first, the  
6 two projects are complimentary. The conveyance channel to be built as part of the Alliance  
7 project is also needed to collect and convey localized stormwaters from the areas north of  
8 Timnath.

9 According to CDPHE, the floodplain's primary functions are for agriculture, recreation, and warm-  
10 water aquatic life. Additional uses include conveyance of stormwater, riparian habitat, and water  
11 quality maintenance.

### 12 **3.9.2.2 BIG THOMPSON WATERSHED**

13 The Big Thompson River has experienced major flooding eight times since 1864. The worst  
14 flooding occurred in 1976 when a cloudburst caused extensive flooding and took 139 lives.

15 At I-25, Big Thompson River has a 3,100-foot wide floodplain and Little Thompson River has a  
16 700-foot wide floodplain. Bridges at either location are not expected to be overtopped during a  
17 100-year storm. The Little Thompson frontage road bridge on the east side of I-25 is a steel-truss  
18 bridge, which was built in 1938. Along the BNSF railway corridor, there is a crossing of Big  
19 Thompson River where a 3,600-foot wide floodplain exists and one at Little Thompson River  
20 where an 800-foot wide floodplain exists.

21 Flooding occurs at eight tributary crossings in this watershed. An un-named tributary to Big  
22 Thompson River crosses under US 34 on the east side of I-25. The Centerra development at the  
23 northeast corner of this interchange has increased the flows in this tributary and is relying on  
24 detention located in the CDOT right-of-way. The detention area has served as inadvertent  
25 detention in the past and the developer wants to take advantage of this area for additional  
26 development detention.

27 According to CDPHE, the floodplain's primary functions are for agriculture and warm-water  
28 aquatic life. Additional uses are for conveyance of stormwater, riparian habitat, and water quality  
29 maintenance.

### 30 **3.9.2.3 SOUTH PLATTE WATERSHED**

31 Second and Third creeks have had five recorded floods since 1948. During these floods, most  
32 damage was limited to crops and livestock. A severe flood during 1984 resulted in one death.  
33 US 85 is overtopped by Second Creek at 136th Avenue, and by Third Creek at 144th Avenue.  
34 Floodplains for these two drainages are interconnected and have a combined 6,800-foot width at  
35 US 85. Both areas are in FEMA Zone A.

36 According to CDPHE, the floodplain's primary functions are for agriculture and warm-water  
37 aquatic life. Additional uses are for conveyance of stormwater, riparian habitat, and water quality  
38 maintenance.

### 39 **3.9.2.4 ST. VRAIN WATERSHED**

40 St. Vrain Creek has experienced major flooding 10 times since 1864. The worst flooding  
41 occurred in 1941 when a cloudburst and snowmelt combination caused extensive flooding. The  
42 100-year flood width is about 3,700 feet near I-25 and 7,000 feet wide where it crosses the  
43 commuter rail corridor along SH 119. I-25 flooding also occurs at seven tributary crossings in this  
44 watershed. St. Vrain Creek riprap channel drops were built near the east and west right-of-way

1 lines of I-25 to improve the stream's conveyance. The Colorado Division of Wildlife (CDOW) has  
2 concerns that these drops are too steep and fish migration is impaired.

3 A total of 7,000 feet of SH 119 is overtopped by the combined flooding from the St. Vrain Creek  
4 and Idaho Creek. Existing structures are absent adjacent to SH 119 where the proposed  
5 commuter rail route would cross these drainages.

6 According to CDPHE, the floodplain's primary functions are for recreation and warm-water  
7 aquatic life. Additional uses are for conveyance of stormwater, riparian habitat, and water quality  
8 maintenance.

### 9 **3.9.2.5 BIG DRY CREEK WATERSHED**

10 Big Dry Creek has few records of flooding due to its numerous reservoirs and recent agricultural  
11 past. The 100-year flood width is about 1,500 feet near I-25 and 574 feet wide near the  
12 commuter rail corridor.

13 The Big Dry Creek crossing at I-25 is marginally adequate for passing stormwaters. Flooding  
14 occurs at the tributaries at Little Dry Creek and the Tributary to Little Dry Creek, McKay Lake  
15 Drainageway, Mustang Run, Preble Creek and South Fork Preble Creek, Sack Creek South,  
16 Shay Ditch, and Tanglewood Creek.

17 According to CDPHE, the floodplain's primary functions are for recreation and warm-water  
18 aquatic life. Additional uses are for conveyance of stormwater, riparian habitat, and water quality  
19 maintenance.

### 20 **3.9.2.6 CLEAR CREEK WATERSHED**

21 Clear Creek has experienced major flooding 12 times since 1864. The worst flooding occurred in  
22 1965 when a cloudburst and snowmelt combination caused extensive damage. The 100-year flood  
23 width is about 3,700 feet near I-25. I-25 is not overtopped by Clear Creek. Tributary crossings at  
24 Niver Creek and Niver Creek Tributary L have flooding within the I-25 right-of-way.

25 According to CDPHE, the floodplain's primary functions are for agriculture and warm-water  
26 aquatic life. Additional uses are for conveyance of stormwater, riparian habitat, and water quality  
27 maintenance.

## 28 **3.9.3 Environmental Consequences**

29 This section describes the consequences of the No-Action Alternative and two build packages  
30 with regard to floodplains. For Packages A and B, consequences are discussed by component to  
31 allow for the possibility that the Preferred Alternative could include components from each of  
32 these packages. Specific floodplain impacts are identified and mitigation measures to address  
33 adverse impacts are described. Additional measures to mitigate impacts associated with bridge  
34 construction and roadway fill encroachment on flood fringe areas are discussed in **Section 3.9.4**  
35 *Mitigation Measures*.

36 None of the crossings would have a significant encroachment on the floodplain. A significant  
37 encroachment is defined by FHWA as a transportation encroachment, and any direct support of  
38 a likely base floodplain development that would involve one or more of the following construction  
39 or flood related impacts:

- 40 ▶ A significant potential for interruption or termination of a transportation facility that is needed  
41 for emergency vehicles or provides a community's only evacuation route.
- 42 ▶ A significant risk.
- 43 ▶ A significant adverse impact on natural and beneficial floodplain values.

1 **3.9.3.1 NO-ACTION ALTERNATIVE**

2 The No-Action Alternative would impact floodplains in areas where currently planned roadway  
3 improvements are planned. Existing conditions, described in **Section 3.9.2**, would continue.  
4 Probable improvements in floodplain areas are shown on **Figure 3.9-2**.

5 In summary, probable No-Action Alternative improvements in floodplain areas would include:

- 6 ▶ SH 1 to SH 14 (H1) improvements: rehabilitation of one drainage structure.
- 7 ▶ SH 14 to SH 60 (H2) improvements: rehabilitation of three drainage structures.
- 8 ▶ SH 60 to E-470 (H3) improvements: rehabilitation of two drainage structures.
- 9 ▶ E-470 to US 36 (H4): no drainage improvements are planned.

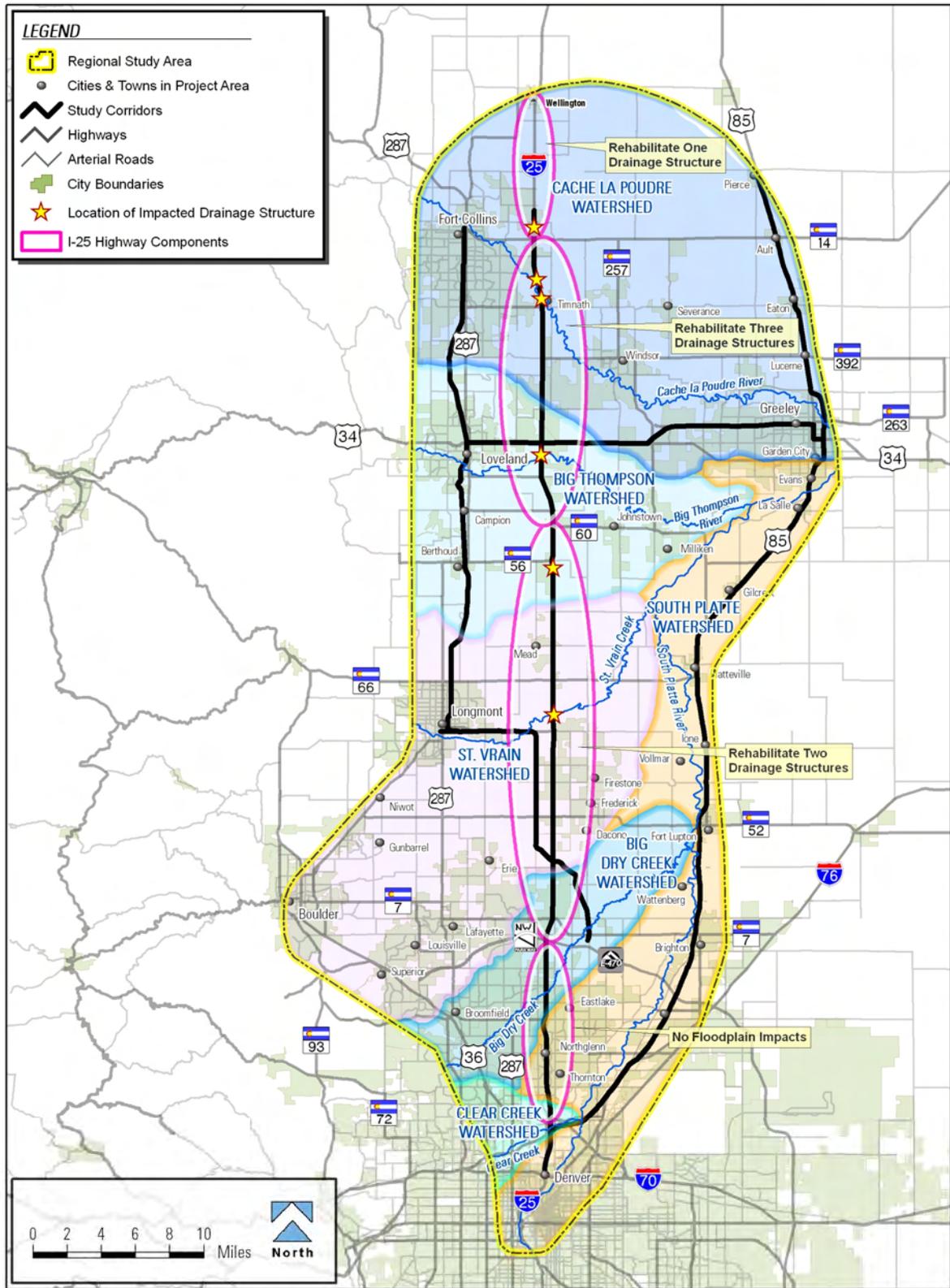
10 **3.9.3.2 PACKAGE A**

11 Package A includes construction of additional general purpose and auxiliary lanes on I-25, and  
12 the implementation of commuter rail and bus service. This alternative was described in detail in  
13 **Chapter 2 Alternatives**. **Table 3.9-1** summarizes the consequences to floodplains of each  
14 component of Package A and provides a comparison with Package B floodplain impacts.

15 *Highway Components*

16 Package A highway components would impact floodplains. Most drainage crossings are too  
17 small to pass the required flows under I-25 and would need to be replaced. In areas where the  
18 structures are sufficient to pass the required flows, the increased width of I-25 would necessitate  
19 their being lengthened. The specific components that would result in the greatest encroachment  
20 on floodplains are general purpose lane (GPL) improvements from SH 14 to SH 60 (A-H2)  
21 (4.9 acres) and GPL improvements from SH 60 to E-470 (A-H3) (4.6 acres). Any replacement or  
22 lengthening of a drainage structure, whether it is a bridge or culvert, would impact the floodplain.  
23 Specific consequences related to each highway component are shown in **Table 3.9-1** and on  
24 **Figure 3.9-3**.

1 Figure 3.9-2 Floodplain Impacts for the No-Action Alternative



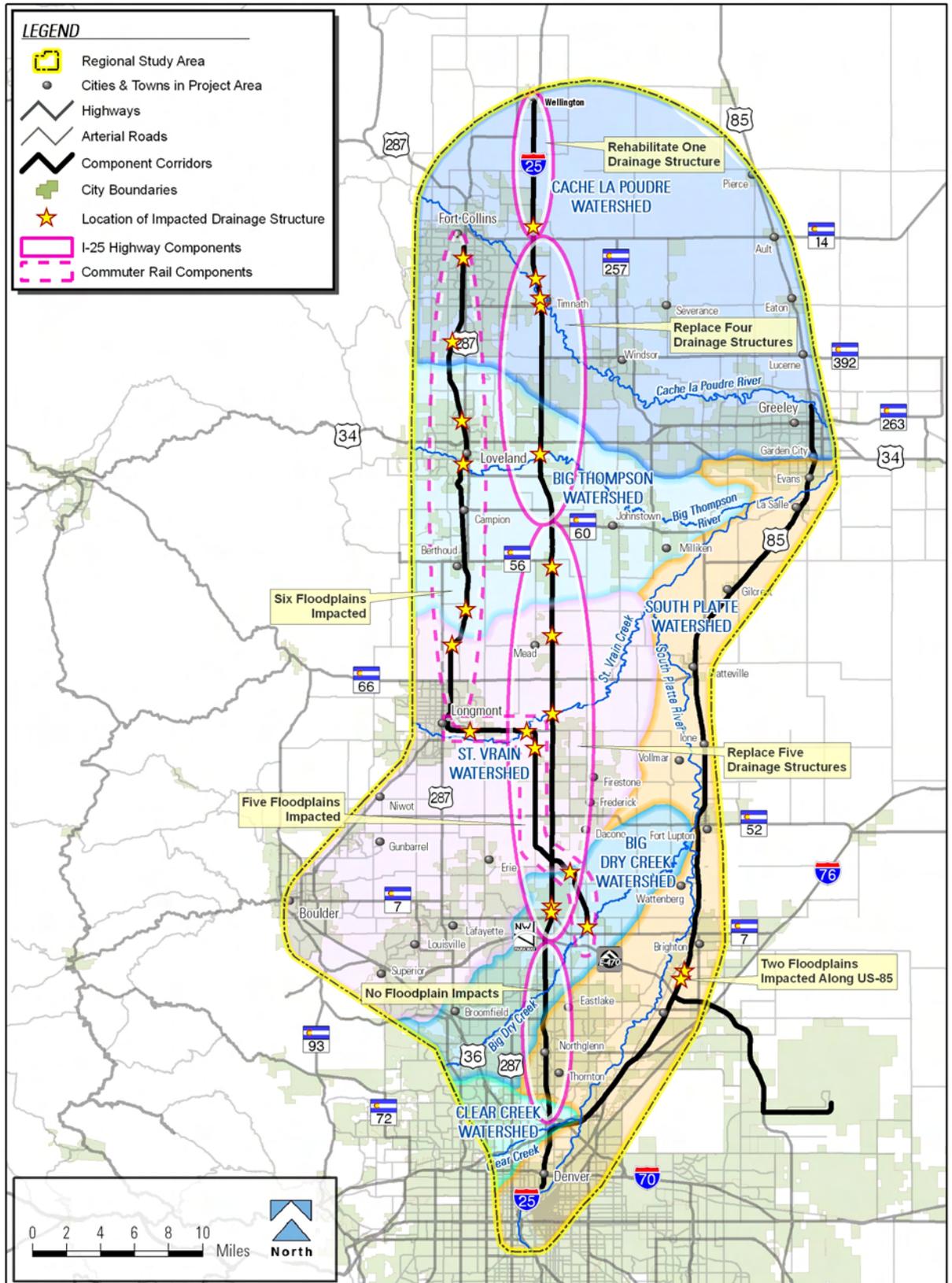
1 Table 3.9-1 Estimated Area of Impacts to Floodplains

Package A			Package B		
Component	Component Description	Impacted Area (acres)	Component	Component Description	Impacted Area (acres)
<b>Package A Highway Components</b>			<b>Package B Highway Components</b>		
A-H1	Safety Improvements: SH 1 to SH 14	1.3	B-H1	Safety Improvements: SH 1 to SH 14	1.3
A-H2	GPL Improvements: SH 14 to SH 60	4.9	B-H2	Tolled Express Lanes: SH 14 to SH 60	6.0
A-H3	GPL Improvements: SH 60 to E-470	4.6	B-H3	Tolled Express Lanes: SH 60 to E-470	5.0
A-H4	Structure Upgrades: E-470 to US 36	0	B-H4	Tolled Express Lanes: E-470 to US 36	1.2
<i>Total Package A Highway Impacts:</i>		<i>10.8</i>	<i>Total Package B Highway Impacts:</i>		<i>13.5</i>
<b>Package A Transit Components</b>			<b>Package B Transit Components</b>		
A-T1	Commuter Rail: Fort Collins to Longmont	1.7	B-T1	BRT: Fort Collins/ Greeley to Denver	0
A-T2	Commuter Rail: Longmont to North Metro	0.2	B-T2	BRT: Fort Collins/ Greeley to DIA	0
A-T3	Commuter Bus: Greeley to Denver	0.1			
A-T4	Commuter Bus: Greeley to DIA	0			0
<i>Total Package A Transit Impacts:</i>		<i>2.0</i>	<i>Total Package B Transit Impacts:</i>		<i>0</i>
<b>Total Package A Impacts:</b>		<b>12.8</b>	<b>Total Package B Impacts:</b>		<b>13.5</b>

2 BRT – Bus Rapid Transit

GPL – General Purpose Lane

1 Figure 3.9-3 Package A Floodplain Impacts



2

1 Specific consequences related to each Package A highway component would be as follows:

- 2 ▶ Safety improvements involving floodplains from SH 1 to SH 14 (A-H1) would be limited to the
- 3 No-Action Alternative improvements involving rehabilitation of one drainage structure.
- 4 ▶ GPL improvements from SH 14 to SH 60 (plus auxiliary lanes between Harmony Road and
- 5 SH 60; A-H2) widening would encroach on to three floodplains and would require the
- 6 replacement of four major drainage structures.
- 7 ▶ GPL improvements from SH 60 to E-470 (A-H3) widening would encroach on to four
- 8 floodplains and would require the replacement of five major drainage structures.
- 9 ▶ Structure upgrades from E-470 to US 36 (A-H4) would be limited to the No-Action Alternative,
- 10 which would have no floodplain impacts.

11 **Boxelder Creek** floodplains are mapped from the northern project limits to its confluence with  
12 the Cache la Poudre River. The creek runs parallel to I-25 to the east for several miles before it  
13 crosses under I-25. There are several overflow areas along I-25 before the Boxelder crosses I-  
14 25. There are five structures at these locations. These structures would either be replaced in  
15 kind, extended in kind, or a new larger structure would be needed. These improvements would  
16 have the following floodplain impacts:

- 17 ▶ Improving the capacity of the drainage structures would decrease the amount of ponding east
- 18 of I-25 but could increase the chance of downstream flooding to the west of I-25.
- 19 ▶ Natural vegetation around the drainage structures would be disturbed during construction.

20 **Boxelder Creek** crosses under I-25 near mile post 269, flowing from east to west. The current  
21 structure would be replaced in kind. This improvement would have the following floodplain  
22 impacts:

- 23 ▶ There should be minimal or no changes to the floodplain limits. There may be local changes
- 24 due to the new structure, but this should not affect flooding upstream or downstream of the
- 25 structure.
- 26 ▶ Natural vegetation around the drainage structure would be disturbed during construction.

27 **The Cache la Poudre River** crosses under I-25 near mile post 266, flowing from west to east.  
28 The current bridge would be replaced with a wider one along the new alignment of I-25 to match  
29 the new typical section. Determination of the replacement structure type would be made by  
30 CDOT, FEMA, and adjacent jurisdictions. These improvements would have the following impacts  
31 on the floodplain:

- 32 ▶ There should be minimal or no changes to the floodplain limits. There may be local changes
- 33 due to the new structure and new structure location, but this should not affect flooding
- 34 upstream or downstream of the structure.
- 35 ▶ Natural vegetation around the drainage structure would be disturbed during construction.
- 36 ▶ Surrounding wetlands would be disturbed during construction and destroyed by the new
- 37 structure location.

38 **The Cache la Poudre River** 100-year flows split just west of I-25. The majority of the 100-year flow  
39 heads east to the existing I-25 bridge, causing overtopping of the interstate. The remaining flows  
40 pass to the south crossing Harmony Road before flooding I-25 at the I-25 and Kechter Road  
41 crossroads. There are no structures at this location currently. Four concrete box culverts (CBCs)  
42 would be added to this area, one in each quadrant of the crossroads. These improvements would  
43 have the following impacts to the floodplain:

1 ▶ The floodplain limits would change with the new structures. I-25 should not be overtopped  
2 anymore and the flows would become more channelized. There could be an increase in  
3 downstream flooding due to the more concentrated flows.

4 ▶ Natural vegetation surrounding the roadway would be disturbed during construction.

5 ▶ Surrounding wetlands could be disturbed during construction.

6 **The Big Thompson River** crosses under I-25 near mile post 257, flowing from west to east. The  
7 current bridge would be replaced with a new wider bridge due to widening of I-25. This  
8 improvement would have the following floodplain impacts:

9 ▶ There should be minimal or no changes to the floodplain limits. There may be local changes  
10 due to the widening of the bridge, but this should not affect flooding upstream or downstream  
11 of the structure.

12 ▶ Natural vegetation surrounding the structure would be disturbed during construction.

13 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the  
14 widening of the structure.

15 **The Little Thompson River** crosses under I-25 near mile post 250, flowing from west to east.  
16 The current bridge would be replaced with a new wider bridge and shifted to accommodate  
17 widening of I-25 and a new alignment. These improvements would have the following floodplain  
18 impacts:

19 ▶ There should be no or minimal changes to the floodplain. There may be local changes due to  
20 the widening and shifting of the bridge, but this should not affect flooding upstream or  
21 downstream of the structure.

22 ▶ Natural vegetation surrounding the structure would be disturbed during construction.

23 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the  
24 widening and shifting of the structure.

25 **North Creek** crosses under I-25 near mile post 245, flowing from west to east. The existing CBC  
26 would be replaced in kind, but it would probably be extended due to the new alignment of the  
27 ramps and frontage road. This improvement would have the following floodplain impacts:

28 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
29 due to extending the CBC, but this should not affect flooding upstream or downstream of the  
30 structure.

31 ▶ Natural vegetation surrounding the structure would be disturbed during construction.

32 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to extending  
33 the CBC.

34 **Little Dry Creek** crosses under I-25 near mile post 231, flowing from west to east. The existing  
35 CBC would be replaced in kind. This improvement would have the following floodplain impacts:

36 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
37 due to replacing the CBC, but this should not affect flooding upstream or downstream of the  
38 structure.

39 ▶ Natural vegetation surrounding the structure would be disturbed during construction.

40 ▶ Surrounding wetlands would be disturbed during construction.

41 **Preble Creek** crosses under I-25 near mile post 229, flowing from west to east. The existing 60"  
42 reinforced concrete pipe is very inadequate for the 100-year flows. A larger structure is needed to  
43 pass these flows. This improvement would have the following floodplain impacts:

- 1 ▶ Improving the structure at I-25 would decrease the flooding west of I-25 where the flow backs up.
- 2 This could increase the chance of flooding downstream because of the improved structure
- 3 capacity. The floodplain would change in this area because of a new larger structure.
- 4 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 5 ▶ Surrounding wetlands would be disturbed during construction.

### 6 *Transit Components*

7 Package A transit components would impact floodplains where crossings occur and where the  
8 commuter rail and commuter bus routes require widening that encroaches on to floodplains. The  
9 commuter rail route from Fort Collins to Longmont would cross six floodplains and the route from  
10 Longmont to North Metro would cross five floodplains. Commuter bus service along the US 85  
11 queue jumps would impact two floodplains between Greeley and Denver. Commuter bus service  
12 to DIA would cross four floodplains, but would not impact any of them. None of the bus stations,  
13 bus and commuter rail maintenance facilities, rail stations, or associated parking facilities would  
14 impact a floodplain.

15 **Spring Creek** crosses under the BNSF railroad, the proposed alignment for the commuter rail,  
16 approximately 0.15 miles south of Prospect Road. The existing CBC is inadequate, but adding  
17 two 60" reinforced concrete pipes (RCP) would help pass the full 100-year flows. These  
18 improvements would have the following impacts to the floodplain:

- 19 ▶ The railroad is currently overtopped by the 100-year flows. Adding the pipes could alleviate  
20 this problem. However, there could be an increase in downstream flooding because the flows  
21 would be more concentrated through the pipes as opposed to spilling over the railroad.
- 22 ▶ Natural vegetation around the drainage structures would be disturbed during construction.

23 **Fossil Creek** crosses under the BNSF railroad five times between Fossil Creek Drive and south  
24 of Trilby Road. The floodplain has been mapped by the City of Fort Collins in this area. At these  
25 crossings, three of the structures would be replaced with larger structures, and two new  
26 structures would be added. These improvements would have the following impacts to the  
27 floodplain:

- 28 ▶ At three of the five crossings, Fossil Creek overtops the railroad. The new structures could  
29 alleviate this problem. They could also reduce ponding on the upstream sides of the railroad.  
30 Increasing the capacity of the crossing structures could cause more flooding downstream  
31 however. Because Fossil Creek snakes back and forth around the railroad, more detailed study  
32 would be needed to determine the full changes to the floodplain. Channel improvements and  
33 downstream studies may be needed in the future.
- 34 ▶ Natural vegetation around the drainage structures would be disturbed during construction.
- 35 ▶ Current mapping only shows wetlands at two locations. At both of these locations, the  
36 wetlands would be disturbed during construction.

37 **Dry Creek** crosses under the BNSF railroad near the Loveland Plaza Mobile Home Park. The  
38 existing CBC is inadequate. This could be solved by adding several 96" RCP or replacing the CBC  
39 with a larger structure. These improvements would have the following impacts to the floodplain:

- 40 ▶ A larger structure or the added pipes could decrease ponding upstream of the railroad but could  
41 increase the chance of flooding downstream of the railroad.
- 42 ▶ Natural vegetation around the drainage structures would be disturbed during construction.
- 43 ▶ Surrounding wetlands would be disturbed during construction.

1 **The Big Thompson River** crosses under the BNSF railroad approximately 1/3 of a mile south of  
2 West 1<sup>st</sup> Street. The existing bridge is not overtopped and would be extended in kind. This would  
3 have the following impacts to the floodplain:

- 4 ▶ There should be minimal or no changes to the floodplain limits. There may be local changes due  
5 to extending the existing bridge, but this should not affect flooding upstream or downstream of  
6 the structure.
- 7 ▶ Natural vegetation around the drainage structure would be disturbed during construction.
- 8 ▶ Surrounding wetlands would be disturbed during construction and could possibly be destroyed  
9 due to the bridge extension.

10 **The Little Thompson River** crosses under the BNSF railroad approximately 1/3 of a mile south of  
11 County Road 6c. The existing bridge is not overtopped and would be extended in kind. This would  
12 have the following impacts to the floodplain:

- 13 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
14 due to extending the existing bridge, but this should not affect flooding upstream or downstream  
15 of the structure.
- 16 ▶ Natural vegetation around the drainage structure would be disturbed during construction.
- 17 ▶ Surrounding wetlands would be disturbed during construction and could possibly be destroyed  
18 due to the bridge extension.

19 **Spring Gulch** crosses under the BNSF railroad just south of 17<sup>th</sup> Avenue. The new commuter rail  
20 would cross Spring Gulch again along SH 119. The existing pipe at the railroad is inadequate. A  
21 larger structure is needed to pass the 100-year flows. At the new crossing, a bridge is proposed as  
22 well. These improvements would have the following impacts to the floodplain:

- 23 ▶ A larger structure at the railroad crossing and an adequately sized structure at the new commuter  
24 rail crossing should maintain or improve the floodplains at these locations. There could be a  
25 chance of increased flooding between these two bridges in Longmont, but this area is only  
26 mapped to a Zone X level of detail currently.
- 27 ▶ Natural vegetation around the drainage structures would be disturbed during construction.

28 **The St. Vrain Creek** would cross under the proposed commuter rail approximately 1.5 miles  
29 west of I-25 along SH 119. The proposed bridge would be very wide because of the wide,  
30 shallow floodplain in this area. This improvement would have the following impacts to the  
31 floodplain:

- 32 ▶ The new commuter rail bridge would be adjacent to the older SH 119 bridge. The SH 119  
33 structure would have to be replaced to limit flooding at the new rail crossing.
- 34 ▶ Natural vegetation around the drainage structures would be disturbed during construction.
- 35 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the new  
36 bridge.

1 **Idaho Creek** would cross under the proposed commuter rail approximately 0.66 miles west of I-  
2 25 along SH 119. A wide bridge is proposed for this crossing as well, because the St. Vrain  
3 floodplain encompasses Idaho Creek. This improvement would have the following impacts to the  
4 floodplain:

- 5 ▶ Adding a bridge at the commuter rail crossing at the St. Vrain floodplain and at Idaho Creek  
6 could change the floodplain upstream of SH 119. The current wide shallow floodplain may  
7 split into two flows that join together again downstream of SH 119. More detailed study would  
8 be needed in the future to determine the full extent of the changes to the floodplain. There  
9 would probably not be an increase in the flooding downstream of the proposed commuter rail  
10 due to the new bridges.
- 11 ▶ Natural vegetation around the drainage structures would be disturbed during construction.

12 **Little Dry Creek** would cross under the proposed commuter rail approximately 0.15 miles south  
13 of Weld County Road 8 and 0.8 miles east of I-25. A new bridge is proposed at this crossing.  
14 This would have the following impacts to the floodplain:

- 15 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
16 due to the new structure, but this should not affect flooding upstream or downstream of the  
17 structure.
- 18 ▶ Natural vegetation around the drainage structures would be disturbed during construction.
- 19 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the new  
20 bridge.

21 **Big Dry Creek** crosses under the UPRR approximately 0.5 miles north of SH 7 and 2.33 miles  
22 east of I-25. The current bridge is not overtopped and it is recommended that this structure be  
23 extended in kind. This would have the following impacts to the floodplain:

- 24 ▶ There should be minimal or no changes to the floodplain limits. There may be local changes  
25 due to extending the existing structure, but this should not affect flooding upstream or  
26 downstream of the structure.
- 27 ▶ Natural vegetation around the drainage structures would be disturbed during construction.
- 28 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the new  
29 bridge.

30 **Second Creek** has floodplains with designation Zone A at the intersection of US 85 and East  
31 136<sup>th</sup> Avenue. This is a location of a proposed queue jump for the commuter bus. Tapers  
32 and a shoulder would be added to northbound US 85 turn and to eastbound 136<sup>th</sup>. This  
33 would have the following impacts to the floodplain:

- 34 ▶ The additional pavement could increase flows and cause some local changes to the  
35 floodplain limits.
- 36 ▶ Vegetation would be disturbed and destroyed during construction.

37 **First Creek** has floodplains with designation Zone A at the intersection of US 85 and East  
38 104<sup>th</sup> Avenue. This is a location of a proposed queue jump for the commuter bus. Tapers  
39 and a shoulder would be added to southbound US 85 and to westbound 104<sup>th</sup>. This would  
40 have the following impacts to the floodplain:

- 41 ▶ The additional pavement could increase flows and cause some local changes to the  
42 floodplain limits.
- 43 ▶ Vegetation would be disturbed and destroyed during construction.

### 3.9.3.3 PACKAGE B

Package B includes construction of tolled express lanes on I-25, and the implementation of bus rapid transit service. This alternative was described in detail in **Chapter 2 Alternatives**. **Table 3.9-1** summarizes the consequences of each component of Package B and provides a comparison with Package A.

#### *Highway Components*

Package B highway components would impact floodplains. Most of the drainage crossings are too small to pass the required flows under I-25 and would need to be replaced. In areas where the structures are sufficient to pass the required flows, the increased width of I-25 would necessitate their being lengthened. The specific component that would result in the greatest encroachment on floodplains includes the tolled express lanes from SH 14 to SH 60 (B-H2) (6.0 acres). Areas along the bus routes would not require new drainage structures. Any replacement or lengthening of a drainage structure, whether it is a bridge or a culvert, would impact the floodplain. Specific consequences related to each Package B highway component are shown on **Figure 3.9-4** and would be as follows:

- ▶ Safety improvements involving floodplains from SH 1 to SH 14 (B-H1) would be limited to the No-Action Alternative, which includes the rehabilitation of one drainage structure.
- ▶ Tolled express lanes from SH 14 to SH 60 (B-H2) would encroach on to three floodplains and would require the replacement of four major drainage structures.
- ▶ Tolled express lanes from SH 60 to E-470 (B-H3) would involve widening that would encroach on to four floodplains and require the replacement of five major drainage structures.
- ▶ Tolled express lanes from E-470 to US 36 (B-H4) would involve widening that would encroach on to five floodplains and require the replacement of six major drainage structures.

Floodplain impacts to the floodplains of Boxelder Creek, the Cache la Poudre River, the Big Thompson River, the Little Thompson River, North Creek, St. Vrain Creek, Little Dry Creek and Preble Creek would be slightly greater than those for Package A due to the wider highway section.

**St. Vrain Creek** crosses under I-25 near mile post 242. The existing bridge would be replaced with a new wider bridge to match the widening of I-25 in this area. This would have the following impacts to the floodplain:

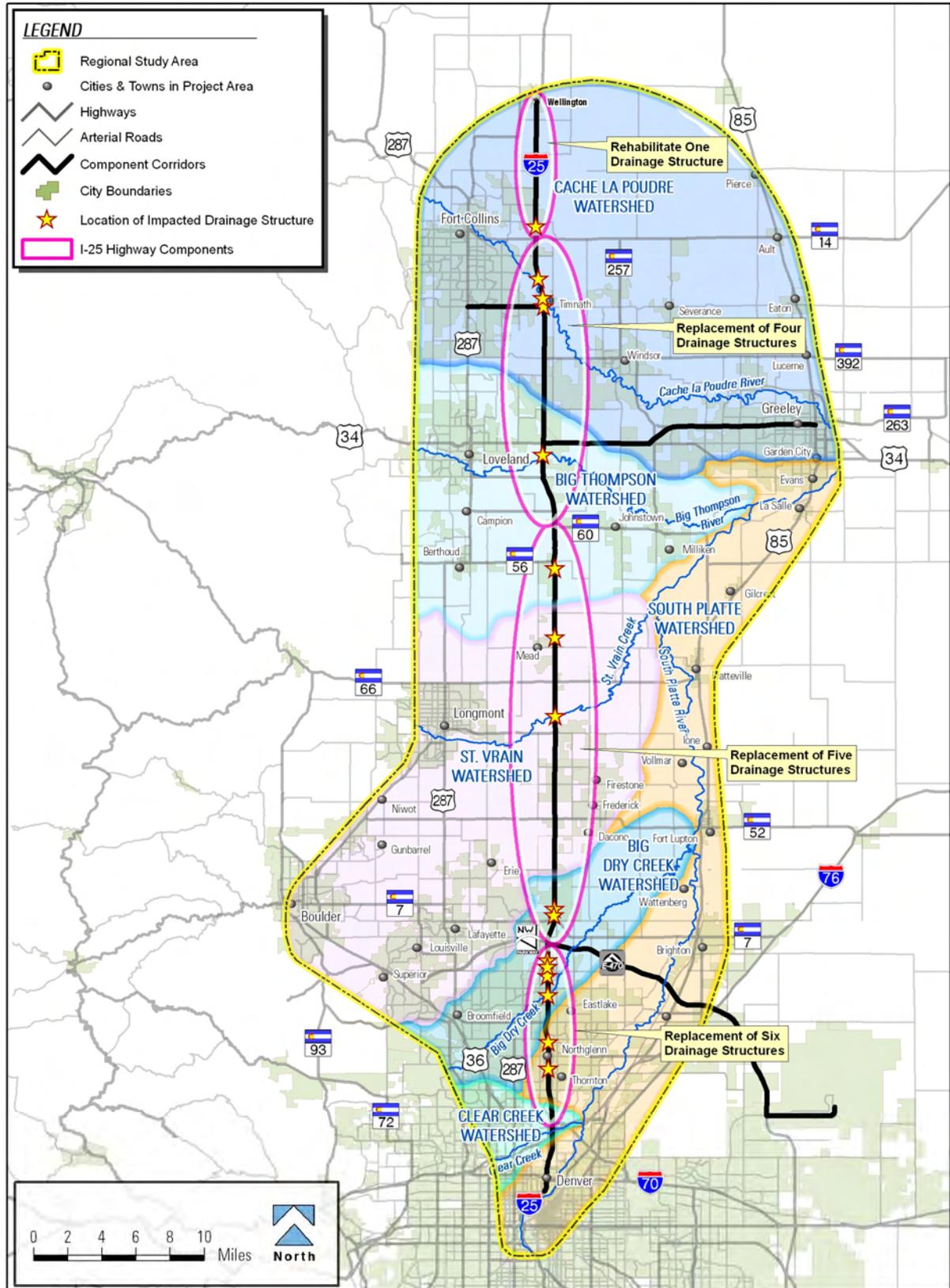
- ▶ There should be minimal or no changes to the floodplain limits. There may be local changes due to the widening of the bridge, but this should not affect flooding upstream or downstream of the structure.
- ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the widening of the structure.

**The South Fork of Preble Creek** crosses under I-25 near mile post 229, flowing from west to east. The existing CBC would be replaced with a larger CBC. This would have the following floodplain impacts:

- ▶ A larger structure might eliminate some of the spreading of the floodplain upstream of I-25. Flooding could be increased downstream of I-25, however, due to the increased capacity of the structure.

- 
- 1 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 2 **Mustang Run** crosses under I-25 near mile post 227, flowing from west to east. The existing  
3 structure is an 18" corrugated metal pipe that would be replaced with a CBC. This would have  
4 the following floodplain impacts:
- 5 ▶ A larger structure would probably reduce upstream ponding behind I-25. Immediately  
6 downstream of the structure ponding could increase behind a levee at Bull Canal. It is  
7 unlikely that flooding would increase downstream of the Bull Canal levee.
- 8 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 9 ▶ Surrounding wetlands could be disturbed during construction.
- 10 **Shay Ditch** crosses under I-25 near mile post 227, flowing from west to east. The existing  
11 pipe would be replaced with a CBC. This would have the following floodplain impacts:
- 12 ▶ Ponding upstream of I-25 would probably be reduced, but there could be an increased  
13 chance of flooding downstream of I-25.
- 14 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 15 ▶ Surrounding wetlands could be disturbed during construction.

1 Figure 3.9-4 Package B Floodplain Impacts



1 **Big Dry Creek** crosses under I-25 near mile post 225, flowing from west to east. The existing  
2 bridge would be replaced in kind and extended to match the widening of I-25. This would  
3 have the following floodplain impacts:

- 4 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
5 due to extending the bridge, but this should not affect flooding upstream or downstream of the  
6 structure.
- 7 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 8 ▶ Surrounding wetlands would be disturbed during construction and destroyed due to the  
9 extension of the bridge.

10 **Niver Creek** crosses under I-25 near mile post 219, flowing from west to east. The existing CBC  
11 would be replaced and could be extended. This would have the following floodplain impacts:

- 12 ▶ There should be minimal or no changes to the floodplain limits. There could be local changes  
13 due to possibly extending the structure, but this should not affect flooding upstream or  
14 downstream of the structure.
- 15 ▶ Natural vegetation surrounding the structure would be disturbed during construction.
- 16 ▶ Surrounding wetlands would be disturbed during construction and possibly destroyed due to  
17 extending the CBC.

### 18 *Transit Components*

19 Package B transit components would not have a floodplain impact that would be in addition to  
20 that described under highway components. None of the bus routes, bus stations, bus  
21 maintenance facilities, or associated parking facilities would impact floodplains.

### 22 *Indirect Effects to Floodplains*

23 Improved structures at floodplain crossings can result in indirect effects to properties beyond the  
24 regional study area. Improved crossings convey floodwaters more efficiently because much of  
25 the original inadvertent detention caused by the highway embankment is removed. Greater flows  
26 pass through the new structure and are conveyed through downstream areas. These higher  
27 flows can cause increased flooding and potential damage to downstream properties. It is  
28 CDOT's policy that new structures are to be sized to pass the upstream flows through the  
29 highway right-of-way. The design flows are to be based on the current level of development, and  
30 are not to assume that any inadvertent detention facilities will lower them. Inadvertent detention  
31 facilities can include railroad embankments, irrigation canals, and ponds, which might be  
32 removed in the future.

## 33 **3.9.4 Mitigation Measures**

34 Impacts to floodplains would occur with bridge construction or where roadway fill would encroach  
35 onto the flood fringe areas. Mitigation measures that will be employed include:

- 36 ▶ The 100-year FEMA design flows will be used for freeboard determinations, scour design,  
37 and to ensure that flow velocities are acceptable.
- 38 ▶ The 500-year design flows will be used to further assess the scour design and set the depths  
39 of piles or caissons.
- 40 ▶ The design will consider the maximum allowable backwater as allowed by FEMA.
- 41 ▶ Degradation, aggregation, and scour are to be determined. Adequate counter measures will  
42 be selected using criteria established by the *National Cooperative Highway Research*  
43 *Program Report 568* (TRB, 2006)

- 1 ▶ The design will be such that minimal disruption to the ecosystem will occur.
- 2 ▶ The design will consider costs for construction and maintenance.
- 3 ▶ A bridge deck drainage system that controls seepage at joints will be considered. If possible,
- 4 bridge deck drains will be piped to a water quality feature before being discharged into a
- 5 floodplain.
- 6 ▶ The designs will comply with federal, state, and local agency requirements.

7 Floodplain impacts would include increasing the sizes of bridges, culverts, and other drainage  
8 facilities in order to better convey floodwaters. In most cases, larger drainage structures would  
9 not disturb the existing low flow channel areas where riparian habitat is located. The overbanks  
10 adjacent to the low flow channels are generally expanded with the newer structures in order to  
11 pass the higher flows. Enlarged overbank areas are generally revegetated with a diverse planting  
12 in order to enhance the habitat.

13 Upstream flood risks should decrease with an enlarged drainage structure. Downstream flood  
14 risks can increase due to the improved conveyance of the stormwaters. It is CDOT policy to size  
15 a drainage structure based on FEMA flows, to obey the Natural Flow Rule of Colorado, and to  
16 hold others to the same standard (CDOT Drainage Design Manual, 2004, Sec.2.5.2 and 12.1.1).  
17 The standard flood for CDOT and FEMA is the 100-year flood. Impacts to downstream areas  
18 must be assessed at the time of preliminary and final design by using detailed hydraulic  
19 methods. All improvements are to follow the guidelines described in **Section 3.9.1 Regulatory**  
20 *Framework*.

### 21 **3.9.4.1 PACKAGE A**

22 **Boxelder Creek** floodplains east of I-25 would be impacted. The following measures will be taken  
23 to mitigate floodplain impacts to the extent practicable:

- 24 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the  
25 same standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be  
26 followed.
- 27 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
28 structural BMPs during each phase of construction to avoid potential pollutants from entering  
29 state waters.
- 30 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
31 and specifications.
- 32 ▶ If wetlands are disturbed, the mitigation approach described in **Section 3.8 Wetlands** will be  
33 followed.
- 34 ▶ SB 40 requirements will be met for applicable areas.

35 **Boxelder Creek** floodplains at I-25 would be impacted. The following measures will be taken to  
36 mitigate floodplain impacts to the extent practicable:

- 37 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
38 structural BMPs during each phase of construction to avoid potential pollutants from entering  
39 state waters.
- 40 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
41 and specifications.

42 **The Cache la Poudre** floodplains at I-25 would be impacted. The following measures will be taken to  
43 mitigate floodplain impacts to the extent practicable:

- 1 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
2 structural BMPs during each phase of construction to avoid potential pollutants from entering  
3 state waters.
- 4 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
5 and specifications.
- 6 ▶ Wetland mitigation will be conducted in accordance with the mitigation approach described in  
7 **Section 3.8.**
- 8 ▶ SB 40 requirements will be met for applicable areas.

9 **The Cache la Poudre River** split flow floodplains at I-25 would be impacted. The following  
10 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 11 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the same  
12 standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.
- 13 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
14 structural BMPs during each phase of construction to avoid potential pollutants from entering  
15 state waters.
- 16 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
17 and specifications.
- 18 ▶ If wetlands are disturbed, the mitigation approach described in **Section 3.8** will be followed.
- 19 ▶ SB 40 requirements will be met for applicable areas.

20 **The Big Thompson River** floodplains would be impacted at I-25. The following measures will be  
21 taken to mitigate floodplain impacts to the extent practicable:

- 22 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
23 structural BMPs during each phase of construction to avoid potential pollutants from entering  
24 state waters.
- 25 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
26 and specifications.
- 27 ▶ Wetland mitigation will be conducted in accordance with the mitigation approach described in  
28 **Section 3.8.**
- 29 ▶ SB 40 requirements will be met for applicable areas.

30 **The Little Thompson River** floodplains would be impacted at I-25. The following measures will  
31 be taken to mitigate floodplain impacts to the extent practicable:

- 32 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
33 structural BMPs during each phase of construction to avoid potential pollutants from entering  
34 state waters.
- 35 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
36 and specifications.
- 37 ▶ Wetland mitigation will follow the approach described in **Section 3.8.**
- 38 ▶ SB 40 requirements will be met for applicable areas.

39 **North Creek** floodplains would be impacted at I-25. The following measures will be taken to  
40 mitigate floodplain impacts to the extent practicable:

- 41 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
42 structural BMPs during each phase of construction to avoid potential pollutants from entering  
43 state waters.

- 1 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
2 and specifications.
- 3 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 4 ▶ SB 40 requirements will be met for applicable areas.
- 5 **Preble Creek** floodplains would be impacted at I-25. The following measures will be taken to  
6 mitigate floodplain impacts to the extent practicable:
- 7 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the same  
8 standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.
- 9 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
10 structural BMPs during each phase of construction to avoid potential pollutants from entering  
11 state waters.
- 12 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
13 and specifications.
- 14 ▶ SB 40 requirements will be met for applicable areas.
- 15 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 16 **Spring Creek** floodplains would be impacted at the commuter rail corridor. The following  
17 measures will be taken to mitigate floodplain impacts to the extent practicable:
- 18 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the same  
19 standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.
- 20 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
21 structural BMPs during each phase of construction to avoid potential pollutants from entering  
22 state waters.
- 23 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
24 and specifications.
- 25 ▶ SB 40 requirements will be met for applicable areas.
- 26 **Fossil Creek** floodplains would be impacted at the commuter rail corridor. The following  
27 measures will be taken to mitigate floodplain impacts to the extent practicable:
- 28 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the same  
29 standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.
- 30 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
31 structural BMPs during each phase of construction to avoid potential pollutants from entering  
32 state waters.
- 33 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
34 and specifications.
- 35 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 36 ▶ SB 40 requirements will be met for applicable areas.
- 37 **Dry Creek** floodplains would be impacted at the commuter rail corridor. The following measures  
38 will be taken to mitigate floodplain impacts to the extent practicable:
- 39 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the  
40 same standard (CDOT Drainage Design Manual, 2004, **Section 2.5.2** and **12.1.1**), will be  
41 followed.

- 1 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
2 structural BMPs during each phase of construction to avoid potential pollutants from entering  
3 state waters.
- 4 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
5 and specifications.
- 6 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 7 ▶ SB 40 requirements will be met for applicable areas.

8 **The Big Thompson River** floodplains would be impacted at the commuter rail corridor. The  
9 following measures will be taken to mitigate floodplain impacts to the extent practicable:

- 10 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
11 structural BMPs during each phase of construction to avoid potential pollutants from entering  
12 state waters.
- 13 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
14 and specifications.
- 15 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 16 ▶ SB 40 requirements will be met for applicable areas.

17 **The Little Thompson River** floodplains would be impacted at the commuter rail corridor. The  
18 following measures will be taken to mitigate floodplain impacts to the extent practicable:

- 19 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
20 structural BMPs during each phase of construction to avoid potential pollutants from entering  
21 state waters.
- 22 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
23 and specifications.
- 24 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 25 ▶ SB 40 requirements will be met for applicable areas.

26 **Spring Gulch** floodplains would be impacted at the commuter rail corridor. The following  
27 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 28 ▶ CDOT policy, which is to obey the Natural Flow Rule of Colorado and to hold others to the same  
29 standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.
- 30 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
31 structural BMPs during each phase of construction to avoid potential pollutants from entering  
32 state waters.
- 33 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
34 and specifications.
- 35 ▶ SB 40 requirements will be met for applicable areas.

1 **Idaho Creek** floodplains would be impacted at the commuter rail corridor. The following  
2 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 3 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
4 structural BMPs during each phase of construction to avoid potential pollutants from entering  
5 state waters.
- 6 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
7 and specifications.
- 8 ▶ SB 40 requirements will be met for applicable areas.

9 **Little Dry Creek** floodplains would be impacted at the commuter rail corridor. The following  
10 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 11 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
12 structural BMPs during each phase of construction to avoid potential pollutants from entering  
13 state waters.
- 14 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
15 and specifications.
- 16 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 17 ▶ SB 40 requirements will be met for applicable areas.

18 **Big Dry Creek** floodplains would be impacted at the commuter rail corridor. The following  
19 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 20 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
21 structural BMPs during each phase of construction to avoid potential pollutants from entering  
22 state waters.
- 23 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
24 and specifications.
- 25 ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- 26 ▶ SB 40 requirements will be met for applicable areas.

27 **Second Creek** floodplains would be impacted at a commuter bus queue jump. The following  
28 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 29 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
30 structural BMPs during each phase of construction to avoid potential pollutants from entering  
31 state waters.
- 32 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
33 and specifications.
- 34 ▶ SB 40 requirements will be met for applicable areas.

35 **First Creek** floodplains would be impacted at a commuter bus queue jump. The following  
36 measures will be taken to mitigate floodplain impacts to the extent practicable:

- 37 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
38 structural BMPs during each phase of construction to avoid potential pollutants from entering  
39 state waters.
- 40 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
41 and specifications.
- 42 ▶ SB 40 requirements will be met for applicable areas.

### 3.9.4.2 PACKAGE B

Floodplain impacts and mitigation measures to the floodplains of Boxelder Creek, the Cache la Poudre River, the Big Thompson River, the Little Thompson River, North Creek, Little Dry Creek, and Preble Creek would be slightly greater than those for Package A because of the wider highway section.

**The St. Vrain River** floodplains would be impacted at I-25. The following measures will be taken to mitigate floodplain impacts to the extent practicable:

- ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-structural BMPs during each phase of construction to avoid potential pollutants from entering state waters.
- ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards and specifications.
- ▶ Wetland mitigation will follow the approach described in **Section 3.8**.
- ▶ SB 40 requirements will be met for applicable areas.

**The South Fork of Preble Creek** floodplains would be impacted at I-25. The following measures will be taken to mitigate floodplain impacts to the extent practicable:

- ▶ The flows released downstream of I-25 will not be more than the present 100-year flows. Downstream capacity should be designed for the present 100-year flow conditions according to CDOT.
- ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-structural BMPs during each phase of construction to avoid potential pollutants from entering state waters.
- ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards and specifications.
- ▶ SB 40 requirements will be met for applicable areas.

**Mustang Run** floodplains would be impacted at I-25. The following measures will be taken to mitigate floodplain impacts to the extent practicable:

- ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-structural BMPs during each phase of construction to avoid potential pollutants from entering state waters.
- ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards and specifications.
- ▶ If wetlands are disturbed, wetland mitigation will follow the approach described in **Section 3.8**.
- ▶ SB 40 requirements will be met for applicable areas.

**Shay Ditch** floodplains would be impacted at I-25. The following measures will be taken to mitigate floodplain impacts to the extent practicable:

- ▶ The flows released downstream of I-25 will not be more than the present 100-year flows. Downstream capacity should be designed for the present 100-year flow conditions according to CDOT.
- ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-structural BMPs during each phase of construction to avoid potential pollutants from entering state waters.

- 
- 1 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
2 and specifications.
- 3 ▶ If wetlands are disturbed, wetland mitigation will follow the approach described in  
4 **Section 3.8.**
- 5 ▶ SB 40 requirements will be met for applicable areas.
- 6 **Big Dry Creek** floodplains would be impacted at I-25. The following measures will be taken to  
7 mitigate floodplain impacts to the extent practicable:
- 8 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
9 structural BMPs during each phase of construction to avoid potential pollutants from entering  
10 state waters.
- 11 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
12 and specifications.
- 13 ▶ Wetland mitigation will follow the approach described in **Section 3.8.**
- 14 ▶ SB 40 requirements will be met for applicable areas.
- 15 **Niver Creek** floodplains would be impacted at I-25. The following measures will be taken to  
16 mitigate floodplain impacts to the extent practicable:
- 17 ▶ Sediment and erosion will be controlled by implementing appropriate structural and non-  
18 structural BMPs during each phase of construction to avoid potential pollutants from entering  
19 state waters.
- 20 ▶ Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards  
21 and specifications.
- 22 ▶ Wetland mitigation will follow the approach described in **Section 3.8.**
- 23 ▶ SB 40 requirements will be met for applicable areas.

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