As discussed in Section 4.13.1, several public drinking water supply sources have WHPAs located within the Project area, including Barkland Acres Association in Derry (Wells No. 1 and 2), Morningside Drive in Derry (Wells No. 7 and 8), PEU/Springwood Hills in Londonderry (Wells Nos. 16 and 17), and Rand Shephard Hill (Well Nos. 12, 13, and 14). The operators of the Barkland Acres Association, Morningside Drive, and PEU/Springwood Hills public water supplies will be contacted by NHDOT during the final design process.

During final design, private water supply wells will be inventoried using the latest available water well data from NHDES and field verified to the extent possible to determine potential Project encroachment on setback distances specified in NHDES rules. Affected WHPAs will be reviewed during final design with respect to NHDES recommendations (NHDES, 1995) and Project proximity to sanitary protective areas will be determined. If setbacks or other groundwater protection criteria are not met as a result of construction or operation of the Project, it may be appropriate to consider further actions. Mitigating actions may include changes to the stormwater system design consistent with NHDES' recommendations (NHDES, 1995), water quality testing to establish baseline and post-construction water quality, and/or well replacement or compensation for well replacement costs under the NHDOT well replacement program. The NHDOT well replacement program was developed to replace, repair, or pay damages for water supplies that have been affected by construction or maintenance operations on the state highway system, primarily as a result of contamination from road salt. While the program is primarily intended to mitigate road salt contamination of private drinking water supplies, it has also been used to mitigate other adverse effects to private water supplies due to NHDOT actions. NHDOT intends to mitigate any Project related construction or operations damages to private water supplies along state highways through the well replacement program. For private wells along town-maintained roadways any Project-related effects to water supplies will require consideration of well replacement by the town of jurisdiction.

4.14 Aquatic Life and Essential Fish Habitat

4.14.1 Affected Environment

The study area for aquatic life and Essential Fish Habitat (EFH) corresponds to the previously defined study area for surface water and water quality.

Aquatic Life

Lakes and Ponds

Beaver Lake

Beaver Lake, located in Derry, has a history of management for both warm water and cold water fish species by the New Hampshire Fish and Game Department (NHFGD) (Connor and O'Loan, 1993). Beaver Lake is known to have populations of smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), horned pout/brown bullhead (*Ameiurus nebulosus*) white perch (*Morone americana*), yellow perch (*Perca flavescens*), eastern chain pickerel (*Esox niger*), American eel (*Anguilla rostrata*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), brook trout (*Salvelinus fontinalis*), and rainbow trout (*Oncorhynchus mykiss*) (NHFGD, 2016a; NHFGD, 2017). NHFGD manages Beaver Lake for both brook trout and rainbow trout and last completed stocking for these species in 2016 (NHFGD, 2016b). Brook

trout is listed in the NH Wildlife Action Plan as a species of greatest conservation need (NHFGD, 2015a).

Lower Shields Pond and Scobie Pond

Lower Shields Pond and Scobie Pond are located in the northern portion of the study area. Aquatic life data were not available for Lower Shields Pond, whose waters join the outflow from Scobie Pond. TP and chlorophyll levels for Scobie Pond indicate average (mesotrophic) conditions for phytoplankton (NHDES, 2017a). Scobie Pond supports fish species such as largemouth bass, black crappie, golden shiner (*Notemigonus crysoleucas*), bluegill (*Lepomis macrochirus*), smallmouth bass, creek chubsucker (*Erimyzon oblongus*), eastern chain pickerel, yellow bullhead (*Ameiurus natalis*), horned pout/brown bullhead, American eel, pumpkinseed sunfish (*Lepomis gibbosus*), and banded sunfish (*Enneacanthus obesus*) (NHFGD, 2016a; NHFGD, 2017).

Both the banded sunfish and American eel are listed as species of greatest conservation need in the NH Wildlife Action Plan and have also been identified as species of regional conservation concern (NHFGD, 2015a).[19] Additionally, recent surveys indicate that the banded sunfish is more common in southern NH than previously thought (NHFGD, 2015a).

Hoods Pond

Hoods Pond is located in the central portion of the study area. Hoods Pond exhibits a high amount of DO in its bottom waters (NHDES, 2017a), a condition that is considered supportive of fish populations, and has a satisfactory pH for aquatic organism survival. Chlorophyll and TP levels are reported to be excessive, although available data are limited to a single sampling event in August of 1997. Plant abundance is reported to be sparse, and the Hoods Pond waters are classified as having moderate algal production (NHDES, 2017a). Hoods Pond is listed as a warm water fishery (AECOM, 2012) and reportedly supports brook trout, eastern chain pickerel, horned pout/brown bullhead, and bluegill (NHFGD, 2016a). NHFGD stocks Hoods Pond with eastern brook trout (NHFGD, 2016b). Because Hoods Pond is impaired by cyanobacteria, a phosphorus TMDL study was recently conducted that concluded that an 80 percent reduction in phosphorus loading would be needed to meet water quality objectives (AECOM, 2012).

Wheeler Pond

Wheeler Pond is located immediately east of I-93 Exit 4. It receives waters from small tributary streams that flow along I-93 near Trolley Car Lane, as well as the Exit 4 interchange. Wheeler Pond outlets through a weir at a driveway entrance to a local commercial business, and the unnamed outlet stream flows under NH 102 before discharging into Beaver Brook. Aquatic life data were not available for Wheeler Pond.

Streams

The study area contains several streams and brooks, both named and unnamed, including Shields Brook, Beaver Brook, Little Cohas Brook, a small section of West Running Brook, and Flat Rock Brook. It also includes several unnamed drainages and tributaries.

[19] Species of regional concern are those species identified by the Northeast Wildlife Diversity Technical Committee as a regional concern and does not include those species already listed as endangered or threatened.

Shields Brook

Shields Brook captures waters from Rainbow Lake (located north of the study area), Lower Shields Pond, Scobie Pond, and their accompanying tributaries. Hoods Pond and Horns Pond are impoundments located along Shields Brook. The stream meanders through some of the more highly developed portions of the study area, including the commercial and industrial areas along NH 28 near the Derry/Londonderry town line. Downstream of NH 28, Shields Brook flows into Hoods Pond before flowing through Horns Pond and downtown Derry, to its confluence with Beaver Brook. Shields Brook supports horned pout/brown bullhead, bluegill (*Lepomis macrochirus*), common white sucker, creek chubsucker (*Erimyzon oblongus*), brook trout, fallfish (*Semotilus lumbee*), smallmouth bass, banded sunfish, and redfin pickerel (NHFGD, 2017). Surveys conducted in 2000 and 2005 also documented the presence of pumpkinseed sunfish in Shields Brook (NHFGD, 2017). The banded sunfish and redfin pickerel are both listed as species of greatest conservation need in the NH Wildlife Action Plan (NHFGD, 2015a; 2017). Shields Brook supports 35 macroinvertebrate species. Habitat data show that, overall, Shields Brook exhibits low habitat quality (NHDES, 2000b).

Beaver Brook

Wheeler Pond; Shields Brook, including associated tributaries and ponds; Horns Pond; and Beaver Lake all drain into Beaver Brook, the major surface water feature in the study area. Sampling in Beaver Brook in Londonderry conducted in 2000 identified eight species of finfish, including common white sucker, pumpkinseed sunfish, fallfish, blacknose dace (*Rhinichthys atratulus*), golden shiner, common shiner, silvery minnow (*Hybognathus nuchalis*), and yellow bullhead (*Ameiurus natalis*) (NHFGD, 2017). Farther downstream, and outside the study area in Pelham, sampling conducted in Beaver Brook in 2006 documented the same species observed in Beaver Brook within Londonderry, as well as creek chubsucker (NHFGD, 2017). In both Derry and Windham species documented included American eel (*Anguilla rostrata*), horned pout/brown bullhead, eastern chain pickerel, largemouth bass, smallmouth bass, and redbreast sunfish (*Lepomis auritus*). The American eel is listed as species of greatest conservation need in the NH Wildlife Action Plan (NHFGD, 2015a). At a monitoring station located south of the study area, Beaver Brook was classified as having overall optimal fish and macroinvertebrate habitat; 31 insect species were also documented. However, Beaver Brook's Index of Biotic Integrity only narrowly exceeds the benchmark criterion for the southern NH bioregion (NHDES, 2000b). NHFGD stocks Beaver Brook in Derry and Londonderry with rainbow trout and eastern brook trout (NHFGD, 2016a).

Other Tributaries to Beaver Brook

Numerous tributaries exist within the study area, including West Running Brook and several small, unnamed streams that drain to Beaver Lake near the northeastern corner of the study area. The NHDES 2018 Upper Beaver Brook Watershed 305(b) Assessment Summary Report indicates that West Running Brook is rated poor for aquatic life. According to the NH Aquatic Restoration Mapper GIS tool, which is supported by the Statewide Asset Data Exchange System database, Cat-O'Brook north (Tributary E), Cat-O'Brook South, Manter Brook, and the unnamed stream west of I-93 that parallels Trolley Car Lane are rated as probably supporting aquatic life, although there is reduced passage or no stream passage for all of these streams at one or more road crossings in the Project area.

Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265; 16 U.S.C. 1801 et seq.) established requirements for identifying and protecting EFH.[20] In NH, the final determination of what areas constitute EFH is the responsibility of the New England Fisheries Management Council (NEFMC). Under the regulations, any federal agency that funds, permits, or initiates an activity potentially affecting designated EFH is required to consult with the National Marine Fisheries Service (NMFS).

Correspondence from NMFS to FHWA (letter dated November 18, 2016, Appendix A) stated that the Project area did not contain areas identified as EFH; therefore, no EFH conservation recommendations would be made for the proposed action.

4.14.2 Environmental Consequences

Aquatic Life

No Build Alternative

The No Build Alternative would not require any new disturbance or additional paved surfaces. Therefore, any new impacts on aquatic life, above and beyond those already occurring, would be as a result of continued development within the watersheds of the perennial streams, and from increasing traffic volumes.

Build Alternatives

Development projects, including roadways, may result in impacts on adjacent water bodies and the areas surrounding water bodies. These impacts can affect the physical, chemical, and biological features of a water body, including streams, and may include:

- Alteration of stream geomorphology (i.e., channelization of the stream, changes in patterns of erosion and deposition);
- Loss of structural complexity of existing stream banks;
- Changes to existing stream hydraulics;
- Loss or reduction in the complexity of stream flows (e.g., changes in the ratio of ripples to pools);
- Shading caused by bridges, culverts, and other engineered structures;
- Reduction in shading due to vegetation clearing;
- Changes in water temperature and DO levels; and
- Increases in pollutant loads from runoff (e.g., Na, Cl, metals) with acute and chronic effects.

[20] The 1996 amendments to the Magnuson-Stevens Act were promulgated by the Sustainable Fisheries Act (Public Law 104-297). Under the regulations, EFH is defined to include those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity.

Any combination of these potential impacts can result in the loss or degradation of existing habitat for aquatic life. The following analysis focuses on anticipated direct effects to aquatic life associated with each Build Alternative, as expressed by the number of proposed stream crossings and linear feet of physical disturbance to streams. No direct impacts to waterbodies (i.e., ponds or lakes) would occur under any of the alternatives.

In addition to the direct impact information presented, indirect impacts to streams can also occur as a result of construction activities and normal operations of roadways. Indirect impacts may result from increased pollutant loading from stormwater runoff, sedimentation, and vegetation removal. Section 4.11-1 provides a pollutant loading analysis.

A total of 9 perennial and 11 intermittent or ephemeral stream segments would be affected by one or more of the Build Alternatives. Impacts to these streams would occur as a result of constructing a new bridge or culvert crossing, extending an existing culvert or bridge; or potentially relocating the alignment of an existing stream. For comparison, all impacts are identified as "Crossings."

Table 4.14-1 compares linear feet of stream impact for the five Build Alternatives. Linear impacts are measured as impacts to the centerline of the stream, and stream crossings are identified in Figure 4.14-1. The stream impact values for the preferred alternative, which has been identified as the preferred alternative, have been refined based on a more detailed design. In addition to the stream crossings discussed below, there are wetland crossings, both existing and proposed, that involve culverts to carry flow that is not channelized. These impacts are identified in Section 4.12-1, *Wetlands and Vernal Pools*. Stream impact totals are summarized for each Alternative in Table 4.14-2. Alternative F would involve the least total impact on stream channels, because all of the improvements would be on existing alignment. The preferred alternative has slightly greater impacts than Alternative B, but Alternative B would have more impacts from new crossings on new alignment. Alternatives C and D would not have any new stream crossings, but Alternatives C and D would involve wetland crossings as described in Section 4.12.

Table 4.14-1. Summary of Direct Stream Channel Disturbance Associated with Build Alternatives

Crossing	Flow Regime[a]	Watershed Size (Acres)[b]	Location	Activity Description	Linear Feet of Stream Channel Impact by Alternative[c]				
					A	B	C	D	F
1	Intermittent[d] Wheeler Pond Tributary	269	New access ramp W of I-93 at southern Exit 4A interchange -71°20'56" 42°53'4"	Relocate stream channel to west for southbound off-ramp construction. Use reference reach stream morphology data for stream simulation.	1,930	511	0	0	0
2	Perennial, Shields Brook	3,767	N. High St–between Ferland Drive and Franklins St -71°19'54 42°53'23"	Extend culvert north to accommodate Connector Road; re-align tributary stream for hydraulic compatibility; restore channels, banks, and wetlands.	269	0	0	0	0
3	Intermittent	148	Tsienneto Road–Approx. 200 ft west of Scenic Drive -71°18'26" 42°54'27"	Extend culvert to accommodate road widening.	42	0	0	22	0
4	Intermittent	30	Tsienneto Road–between Scenic Drive and Jeff Lane -71°18'21" 42°54'31"	Extend culvert to accommodate road widening.	35	0	0	13	0
5	Perennial Unnamed (Tributary E)	850	Tsienneto Road–250 ft west of NH 102 -71°18'10 42°54'37	Replace culverts with bridge; include weir to maintain marsh. Grade banks to direct flows and revegetate.	73	0	13	0	0
6	Perennial, Unnamed	1,061	NH 102–700 ft south of Tsienneto Road -71°18'9 42°54'29	Extend culvert to accommodate road widening.	0	0	8	0	0

Crossing	Flow Regime[a]	Watershed Size (Acres)[b]	Location	Activity Description	Linear Feet of Stream Channel Impact by Alternative[c]				
					A	B	C	D	F
7	Intermittent	35	New access ramp–E of I-93 at southern interchange -71°20'56 42°53'11	Extend culvert under new I-93 northbound off-ramp and southbound on-ramp, and Connector Road.	190	109	0	0	0
8	Intermittent	19	New alignment–500 ft E of I-93 71°20'51" 42°53'15"	Construct new stream crossing/relocate stream for connector road.	291	333	0	0	0
9	Intermittent	25	New alignment 960 ft W of Franklin Street Ext. -71°20'18" 42°53'26"	Construct new stream crossing for connector road.	0	124	0	0	0
10	Intermittent	Undeter-mined[e]	New alignment–1,550 ft W of Franklin Street Ext. -71°20'24" 42°53'21"	Construct new stream crossing for connector road.	0	51	0	0	0
11	Ephemeral[a]	Undeter-mined[e]	New alignment–300 ft N of Madden Drive -71°20'9" 42°53'21"	Stream relocation.	77	0	0	0	0
12	Perennial, Shields Brook	3,118	New alignment–540 ft W of Franklin Street Ext. -71°20'16" 42°53'30"	Construct new bridge crossing for connector road.	0	214	0	0	0
13	Perennial, Shields Brook	1,155	NH 28– (W branch) -71°20'40" 42°54'0"	Extend culvert for connector road.	0	0	476	476	0
14	Perennial, Shields Brook	1,629	NH 28– (E branch) -71°20'32" 42°53'57"	Extend culvert for connector road.	0	0	65	65	0

Crossing	Flow Regime[a]	Watershed Size (Acres)[b]	Location	Activity Description	Linear Feet of Stream Channel Impact by Alternative[c]				
					A	B	C	D	F
15	Perennial, Unnamed	826	NH 102–500 feet east of I-93 Exit 4 -71°20'17" 42°52'21"	Extension of existing culvert carrying water from Wheeler Pond.	0	0	0	0	61
16	Perennial, Shields Brook	4,157	NH 102–between Griffin St and Storer Ct -71°19'49" 42°52'44"	Extend culvert for connector road.	0	0	0	0	52
17	Intermittent	Undeter-mined[e]	NH 102–100 ft E of Hood Road 71°19'4" 42°53'14"	Extend culvert for connector road.	0	0	0	0	17
18	Perennial	278	NH 102 -100 ft S of Hoodkroft Drive -71°18'53" 42°53'22"	Extend culvert for connector road.	0	0	0	0	23
70	Intermittent	65	New access ramp W of I-95 -71°20'56" 42°53'4"	Stream relocation.	40	0	0	0	0
71	Intermittent	20	-71°20'53" 42°53'10"	Construct new stream crossing/relocate stream for connector road.	24	0	0	0	0

[a] Flow regime based on observation and watershed size. In the absence of long-term monitoring for streams in the Project area, streams with watersheds smaller than 200 acres were assumed to be intermittent, and larger than 200 acres were assumed to be perennial. Ephemeral streams had no measurable watershed and had physical characteristics meeting the NHDES definition of ephemeral streams.

[b] Watershed sizes based on Streamstats basin delineation: https://streamstats.usgs.gov/ss/.

[c] Linear disturbance estimates based on preliminary design information.

[d] Based on NHDOT observations in 2014 for the Stream Crossing Assessment report, the classification of this stream as intermittent for the I-93 Project, and additional Normandeau photos of dry streambed in 2010, the Wheeler Pond tributary classification was changed from perennial to intermittent.

[e] Unable to determine watershed size using Streamstats.

Table 4.14-2. Stream Channel Impacts by Alternative

Impact Metric	Alternative				
	A	B	C	D	F
Number of New Stream Crossings/Impacts	5	5	0	0	0
Number of Proposed Improvements of Existing Stream Crossings	5	3	4	4	4
Total Number of Stream Impacts	**10**	**8**	**4**	**5**	**4**
Linear Feet New Stream Crossings	2,362	1,217	0	0	0
Linear Feet Improvements of Existing Stream Crossings	609	124	562	577	153
Total Linear Feet of Stream Disturbance	**2,971**	**1,341**	**562**	**577**	**153**

Alternative A

The preferred alternative would result in direct impacts on streams at 10 different locations (Table 4.14-2). This includes four streams where an extension of an existing culvert would be required, totaling 536 linear feet of disturbance (Table 4.14-1). Of these four existing crossing extensions, the most substantial crossing would be an extension of the culvert where North High Street/Folsom Road crosses Shields Brook (Crossing 2), which would create 269 linear feet of stream channel impact. The other three existing stream crossings are an extension of a culvert crossing under I-93 (Crossing 7) and two crossings under Tsienneto Road (Crossings 3 and 4). The culverts at crossing 5, a perennial stream under Tsienneto Road, would be replaced by a bridge to relieve flooding issues. The 73 linear feet of impact would essentially create more stream channel habitat.

Stream impacts from new alignment would occur in five locations: west of I-93 where 1,930 linear feet of perennial stream would be relocated and restored (Crossing 1), two streams east of I-93 on new alignment where 315 linear feet of intermittent stream channel would be impacted, on new alignment north of Madden Road where 77 linear feet of an ephemeral stream channel would be impacted, and west of I-93 at the new access ramp/southern Exit 4A interchange where 40 linear feet of an intermittent channel would be impacted.

Under NHDES wetland rules, impacts to the banks of perennial streams, not just the channel, must also be calculated and mitigation provided unless the crossing improvements are restored and considered self-mitigating. There are 684 linear feet of bank impacts associated with the two perennial stream crossings (Shields Brook and Tributary E).

Alternative B

Alternative B would result in direct impacts to streams at eight locations. This includes five new stream crossings: three intermittent streams on new alignment west of Franklin Street Extension (Crossings 8, 9, and 10) and stream relocation impacts to Crossing 1. The largest new crossing would be a 210-foot long bridge over Shields Brook just west of the Franklin Street Extension/B Street intersection (Crossing 12).

Three existing culvert crossings, one under I-93 in the proposed southern Exit 4A interchange area (Crossing 7), a second along the Tsienneto Road just west of its intersection with NH 102 (Crossing 5), and a third on NH 102 south of Tsienneto Road would be extended. The total linear

disturbance of streams associated with Alternative B, including stream relocations, would be 1,341 feet. Bank impacts would also occur but have not been calculated for this alternative.

Alternative C

Alternative C would require direct impacts to four stream segments, all of which are extensions of existing crossings. The largest stream impact would be to Beaver Brook, which has two tributaries that meet just south of Rockingham Road (NH 28) (Crossings 13 and 14). The western tributary flows parallel to the road for about 420 feet, which would have to be relocated to accommodate the roadway widening. Alternative C would also require an extension to the culvert carrying a perennial stream into Beaver Lake under NH 102 (Crossing 6). As with Alternatives A and B, there would be impacts on the crossing carrying a perennial stream from the prime wetland on the north side of Tsienneto Road into the stream channel on the south side (Crossing 5). Bank impacts would also occur but have not been calculated for this alternative.

Alternative D

Alternative D would result in direct impacts to approximately 575 linear feet of stream bed at five existing crossing locations, including the Shields Brook crossings that would be impacted by Alternative C (Crossings 13 and 14). Three crossings on Tsienneto Road would also be expanded for this Alternative (Crossing 3, 4, and 5). Bank impacts would also occur but have not been calculated for this alternative.

Alternative F

Alternative F would result in direct impacts at approximately 152 linear feet of stream bed at four separate crossing locations, all of which are on NH 102. The first crossing is about 100 linear feet north of the intersection between Nashua Road and Action Boulevard. This stream originates from Wheeler Pond and would require extension of the culvert and impacts on a drainage swale that leads from the adjacent parking lot. The existing crossing over Shields Brook would be extended, as would intermittent and perennial stream crossings that flow into the golf course south of NH 102. Bank impacts would also occur but have not been calculated for this alternative.

4.14.3 Mitigation

Mitigation for stream impacts would be provided as part of the wetland mitigation package. Some of the stream crossings, such as Crossing 2 (Shields Brook) will be widened in accordance with requirements in NHDES Administrative Rules Env-Wt 900 et seq., Stream Crossings. Crossing 1 (Wheeler Pond Tributary) would require further relocation of a stream that is permitted to be relocated, in part, by the ongoing I-93 widening project. The rules provide that mitigation is not required for any crossing that is "self-mitigating." Sufficient information has been collected from this stream to restore habitat and stream morphology, and therefore this would be considered a self-mitigating impact. Crossings that provide improved hydraulic capacity and aquatic organism passage may also be considered self-mitigating, if sufficient baseline data are collected. Stream impacts that are not self-mitigating would be mitigated through a payment to the NHDES ARM fund at NHDES, potentially preservation of land for conservation, or culvert projects associated with the SPIP. The SPIP is a partnership with NHDOT and NHDES that would use mitigation funds to address culverts within the Project watershed that have inadequate aquatic organism passage, structural condition, and/or aquatic

organism passage. NHDOT is evaluating several stream crossings for applicability under this program. Participation in the SPIP would be expected to lower the ARM fund payment accordingly.

The in-lieu fee amount and conserved land, if any, would be in accordance with NH RSA 482-A:28 and NHDES Wetland Rules and with federal Section 404 guidelines in 40CFR (b)(1)J. The ARM fund calculator determines the ARM fund payment based on the linear feet of direct perennial and intermittent stream channel impacts, plus the linear feet of both banks for perennial streams. Self-mitigating stream crossings and relocations are omitted from the ARM fund calculator. Table 4.12-7 includes the estimated ARM fund payment for stream impacts associated with the preferred alternative.

4.15 Floodplains

A floodplain is defined as the land along waterbodies that is inundated with water during floods. The Federal Emergency Management Agency (FEMA) oversees Flood Insurance Rate Mapping (FIRM) maps, which depict floodplains, floodways, and base flow elevations in some areas. The 100-year floodplain is the area with a 1 percent chance of flooding each year. FEMA defines the floodway as the channel of the stream, plus any additional floodplain areas, that must be kept free from encroachment so that the 100-year flood can be carried without an increase in flood elevation greater than 1 foot.

Beneficial floodplain functions include flood attenuation, water quality maintenance, groundwater recharge, riparian plant and wildlife habitat, natural beauty, open space, and agriculture. Absent appropriate design of fill placement and the hydraulic capacity of structures (e.g., culverts and bridges), roadway construction in floodplains can potentially raise flood elevations.

Federal Executive Order 11988, *Floodplain Management*, directs federal agencies to "take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains…." FHWA has established regulations to implement the requirements of Executive Order 11988 (23 CFR § 650.101-117). The purpose of the FHWA regulations is to prevent hazardous development on floodplains, avoid construction on floodplains when practicable, minimize the impacts of FHWA actions on floodplains, and protect and restore beneficial floodplain functions. FHWA requires an "Only Practicable Alternative Finding" when the preferred alternative identified in the Final EIS would result in a significant encroachment on a floodplain. 23 CFR 650.105(q) defines a "significant encroachment" as a highway encroachment and any direct support of floodplain development that would involve one or more of the following construction- or flood-related impacts:

- A significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route.
- A significant risk attributable to the encroachment.
- A significant adverse impact on natural and beneficial floodplain values.

Floodplains crossed by or near the Build Alternatives are based on the FEMA FIRM data and shown in Figure 4.15-1.