

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.

4.15.1 Affected Environment

The study area for floodplains includes those floodplains within 500-feet of the Build Alternatives. Several 100-year floodplains are crossed by or near each Build Alternative. These floodplains are typically associated with the major watercourses and their tributaries. Topography is the major influence on the extent of floodplains bordering the various drainageways. Table 4.15-1 summarizes the floodplain areas near the alignments for the Build Alternatives.

Table 4.15-1. 100-Year Floodplains near the Build Alternatives

Alternative	Waterbody Name	Nearest Road
A	Shields Brook	North High Street
	Unnamed Tributary to Beaver Lake	Tsienneto Road Chester Road (NH 102)
B	Shields Brook	Franklin Street
	Unnamed Tributary to Beaver Lake	Tsienneto Road Chester Road (NH 102)
C	Shields Brook	Rockingham Road (NH 28)
	Unnamed Tributary to Beaver Lake	Tsienneto Road Chester Road (NH 102)
D	Shields Brook	Rockingham Road (NH 28)
	Unnamed Tributary to Beaver Lake	Tsienneto Road Chester Road (NH 102)
F	Horne's Brook	Broadway (NH 102)
	Beaver Brook	Broadway (NH 102)

Beaver Brook runs southwest from the outlet of Beaver Lake through an area known as “The Meadows” in Derry. The floodplain area is associated with many smaller watercourses and tributaries in the area, including West Running Brook, and a small tributary that originates from Crystal Spring to the south. It passes through narrow channels designed to accommodate former mill operations in the eastern portion of Derry near NH 28 Bypass and then continues over flat, expansive areas that include the Hoodcroft Golf Course. Much of the golf course area is within the 100-year floodplain. The brook meanders through residential and commercial areas in Derry, crosses under I-93, and continues through several residential developments in Londonderry before reaching Kendall Pond.

Shields Brook, which runs from Lower Shields Pond to Hoods Pond, bisects the study area and has a large floodplain area in many locations. The floodplain for this brook is at its widest at the outlet from Lower Shields Pond and south of NH 28 near the industrialized areas off A and B Streets on the Derry/Londonderry town line. An expansive floodplain also lies north of NH 28 and southwest of Scobie Pond. This floodplain is associated with a tributary of Shields Brook and a large wetland complex that drains to Shields Brook via a culvert under NH 28.

Horne’s Brook originates at Horne’s Pond in Derry and flows in a southerly direction before emptying into Beaver Brook. The floodplain for this brook is relatively narrow and crosses under Broadway (NH 102) and South Avenue before joining Beaver Brook near Fordway Street.

The unnamed tributary to Beaver Lake flows south-southeast into Beaver Lake and is crossed by Tsienneto Road and Chester Road (NH 102). The floodplain for this tributary is about 35 feet near the intersection of Tsienneto and Chester Roads and expands to about 120 feet wide near the confluence with Beaver Lake.

4.15.2 Environmental Consequences

No Build Alternative

Because the No Build Alternative does not involve new construction, there would be no impacts on FEMA-mapped floodplains or floodways.

Build Alternatives

Table 4.15-2 summarizes the potential impacts on 100-year floodplains and floodways by Build Alternative. The primary area of impact for Build Alternatives A, B, C, and D would be on the floodplain for Shields Brook (Figure 4.15-1). The preferred alternative would cross the Shields Brook floodplain near the existing Folsom Road/Madden Road crossing and Alternative B would cross the floodplain near the Londonderry/Derry town line. Alternatives C and D would cross the Shields Brook floodplain and the floodplain for a small tributary to Shields Brook where these streams cross beneath NH 28. Build Alternatives A, B, C, and D would also result in floodplain impacts near the eastern end of the alignment, near the intersection of Tsienneto Road and NH 102, where a small tributary of Beaver Lake flows under Tsienneto Road (Figure 4.15-1). Alternative F would cross the floodplain for Horne’s Brook at the existing NH 102 crossing. In addition, Alternative F would require a minor impact on the floodplain along Beaver Brook along the east side of NH 102 near Hoodcroft Golf Course (Figure 4.15-1).

Table 4.15-2. Floodplain and Floodway Impacts by Build Alternative

Alternative	Floodway (acres)	100-Year Floodplain (acres)
A	0.15	0.45
B	0.20	0.90
C	0.45	1.87
D	0.45	1.84
F	0.06	0.31

4.15.3 Floodplain Finding

Impacts to floodplains are regulated under Executive Order 11988, *Floodplain Management*, and FHWA’s regulation *Location and Hydraulic Design of Encroachments on Floodplains* (23 CFR 650A). The preferred alternative would have less impact on floodplains than Alternatives B, C, and D. Alternative F would have less impact on floodplains than the preferred alternative;

however, Alternative F is not practicable because it would not address the transportation need for the Project.

The preferred alternative floodplain impacts do not constitute a “significant encroachment” because they would not involve modifications that would result in an interruption of an emergency vehicle or evacuation route, significant risk to human life or property, or a notable adverse impact on “natural and beneficial floodplain values.” The minor encroachments required by the preferred alternative would be further minimized as part of the hydraulic analyses in the final design of the Project in compliance with local floodplain regulations and 23 CFR § 650 A.

Because a significant encroachment would not occur, a formal “only practicable alternative finding” per 23 CFR § 650.113 is not required.

4.15.4 Mitigation

With any Build Alternative selected, detailed hydraulic analyses would be completed during final design to avoid and/or minimize impacts on the floodway, and in particular to avoid raising the base flood elevation in accordance with local floodplain regulations (such as Derry’s floodplain development regulation requiring that base flood elevations not increase by more than 1 foot cumulatively). Mitigation commitments for wetlands and stream crossing protection would serve to mitigate Project impacts to beneficial floodplain values.

4.16 Plant Communities and Wildlife

The Fish and Wildlife Coordination Act (16 USC 661-666, as amended by PL 89-72) requires applicants of federally funded or federally permitted projects to consult USFWS and NHFGD throughout the course of the Project. USFWS and NHFGD can issue recommendations to avoid, mitigate, or compensate for impacts to fish and wildlife resources within the study area. The study area for assessing plant communities and wildlife resources encompasses approximately 26 square miles within western portions of Derry and eastern Londonderry in western Rockingham County, NH (Figures 4.16-1 and 4.16-2).

Wildlife habitats are in large part determined by land cover types and land use. These variables within the Project footprint and the surrounding landscape were assessed using the land cover data provided by the 2015 NH Wildlife Action Plan (NHFGD, 2015a), a document and data sets developed by NHFGD to provide information for wildlife conservation prioritization and planning. The NH Wildlife Action Plan land cover data are available as a GIS data layer from GRANIT. It identifies mixed forest types (Appalachian Oak-Pine and Hemlock-Harwood-Pine) as the dominant cover types in the Project study area. The study area is shown in Figure 4.16-1 and includes the plant communities and wildlife habitat near the alternatives that may be affected by the Project. The analysis of plant community types within these cover types and associated wildlife habitat was augmented using publicly available aerial photography (Google Earth, 2016) along with limited field reconnaissance. The plant community types within the study area include hardwood, softwood, and mixed wood forests, shrubland, agricultural fields, wetlands, and developed areas. Wetland communities include forested and scrub-shrub wetlands (including vernal pools), emergent marsh, and wetland meadows communities. In addition to land cover data, the NH Wildlife Action Plan provides an assessment of habitat value, ranking all lands within NH as highest ranked in the state by ecological condition, highest ranked in the biological