

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).

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).

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.

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. The rules provide that mitigation is not required for any crossing that is “self-mitigating.” The improvements proposed will provide improved hydraulic capacity and aquatic organism passage and as such will be self-mitigating. Stream impacts that are not self-mitigating will be mitigated through a payment to the Aquatic Resource Mitigation fund at NHDES and potentially preservation of conservation land. 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.

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)

Alternative	Waterbody Name	Nearest Road
	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 exists to the north of NH 28 and to the 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). Alternative A 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 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.

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 publically 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