The minority population percentage of these block groups ranges from 1.18 percent to 4.73 percent, and the Hispanic population percentage of these block groups ranges from 0.0 to 8.78 percent. The block groups comprising the study area contain 4.1 percent minority and 3.1 percent Hispanic populations. None of the block groups that would experience relocations or displacements under the Build Alternatives has a median household income that would be classified as "low-income"; however, the percentage of the population living below poverty ranges from 1.1 to 7.5 percent, compared to an average of 3.4 percent living below poverty in the block groups comprising the study area. While some of the relocations and displacements could include minority or Hispanic persons or persons living below poverty, the relocations and displacement associated with the Build Alternatives would not be disproportionately borne by minority or low-income populations.

NHDOT conducted an additional environmental justice population analysis based on a larger study area, which included a 1-mile radius for the impacted area and a 3-mile radius for the surrounding area. Appendix A, *Agency Correspondence*, contains the results of this analysis. The NHDOT analysis considered additional populations that are not directly covered by federal environmental justice policies (which focus on low-income and minority populations), such as the elderly. The NHDOT analysis resulted in recommendations about Americans with Disabilities Act access that will be considered as the design is advanced and the identification of organizations related to low-income and elderly populations that should be contacted during Project outreach activities. These organizations were added to the Project mailing list to be notified of the availability of the SDEIS and the public hearing.

4.8.3 Mitigation

Because there are no disproportionately high adverse impacts to Environmental Justice, there are no mitigation measures.

4.9 Geology, Minerals, and Soils

4.9.1 Affected Environment

Geology

The 2007 DEIS provides an overview of bedrock and surficial geology in the study area (see Section 3.4.1 of the DEIS). Currently, erosion, sedimentation, and landscape alteration is an ongoing process, and soils continue to form in post-glacial material.

Minerals

Economic mineral resources in the study area include sand and gravel. The stratified drift deposits represent an important source of sand and gravel. The 2007 DEIS noted two gravel pits located on U.S. Geological Survey (USGS) topographic maps that are no longer active.

- The gravel pit to the north of Hoods Pond in Derry is now closed and zoned for residential use.
- A 16.5-acre sand and gravel pit was also once located in Londonderry, just south of Pillsbury Road and north of Wheeler Pond. This gravel pit is no longer in use, and a commercial building has since been constructed at this site.

Soils

Within 500 feet of the alternatives, there are two general soil associations (Kelsea and Gove, 1994), each named for the dominant soils that are found together within a particular landscape setting (Brady and Weil, 2001). The soil associations near the Build Alternatives are Hinckley-Windsor-Canton and Canton-Hollis-Chatfield.

The Hinckley-Windsor-Canton soil association is found within the southern and southwestern portions of the study area. Its soils are derived from glacial outwash and are excessively drained to well-drained, sandy and loamy soils formed in areas that are nearly level to steep. They are typically found on wide plains and broad, low, knobby hills. In most places, the plains are adjacent to streams and rivers. Many areas containing these soils are used for commercial, industrial, and residential development, or remain as woodland. This association contains approximately 18 percent Windsor, 16 percent Hinckley, 10 percent Canton, and 56 percent similar[11] and dissimilar[12] soils of minor extent (Brady and Weil, 2001). The soils of minor extent include the moderately well-drained Deerfield series, the somewhat poorly drained Pipestone, and the very poorly drained Greenwood and Chocorua soils.

The Canton-Hollis-Chatfield association is found throughout the study area and is typically well-drained to somewhat excessively well-drained. It is located on mountains, hills, and ridges that have many basins and narrow drainage ways. This association was formed in glacial till and consists of very deep to shallow, loamy soils that are gently sloping to steep. Approximately 20 percent of this association consists of the Canton soil series, 15 percent Chatfield, 10 percent Hollis, and 55 percent similar and dissimilar soils of minor extent. The minor extent soils include the Ossipee, Montauk, Scituate, and Newfields soils.

Table 4.9-1 and Figure 4.9-1 show the soils mapped within 500 feet of the Build Alternative alignments (study area). A discussion of hydric soils is provided in Section 4.12.

Table 4.9-1. Soils within 500 feet of the Alternatives

Map Unit	Soil Name	Alternatives
12B	Hinckley loamy sand, 3 to 8 percent slopes	ABCD
12C	Hinckley loamy sand, 8 to 15 percent slopes	F
12E	Hinckley loamy sand, 15 to 60 percent slopes	CD
26B	Windsor loamy sand, 3 to 8 percent slopes	CD
42B	Canton fine sandy loam, 3 to 8 percent slopes	ABCDF
42C	Canton fine sandy loam, 8 to 15 percent slopes	ABCD
43B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	BC

[11] Similar Soils—These are soils that differ so little from the named soil in the map unit that there are no important differences in interpretations. These soils are not named components in the map unit. Recognition is limited to a brief description of the feature or features by which the soil in question differs from the soils in the map unit named.

[12] Dissimilar Soils—Map units are permitted to have certain proportions of included soils that differ sufficiently from the named soil to affect major interpretations. Usually the dissimilarities are such that the soils behave differently. Dissimilar soils are named in the map unit description if they are part of the name of another map unit in the soil survey area.

Map Unit	Soil Name	Alternatives
43C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	BC
43D	Canton fine sandy loam, 15 to 25 percent slopes, very stony	ABCD
97	Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes	ABCDF
140B	Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	ABCDF
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	ABCDF
140D	Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, rocky	ABCD
295	Freetown mucky peat, 0 to 2 percent slopes	ACD
298	Pits, sand and gravel	ABCD
299	Udorthents, smoothed	ABCDF
305	Lim-Pootatuck complex	BCDF
313B	Deerfield fine sandy loam, 3 to 8 percent slopes	CD
395	Swansea mucky peat, 0 to 2 percent slopes	ABCDF
446B	Scituate-Newfields complex, 3 to 8 percent slopes	AD
447B	Scituate-Newfields complex, 3 to 8 percent slopes, very stony	ABCD
495	Natchaug mucky peat, 0 to 2 percent slopes	BCD
546A	Walpole very fine sandy loam, 0 to 5 percent slopes	ABCD
547A	Walpole very fine sandy loam, 0 to 3 percent slopes, very stony	ABCD
599	Urban land-Hoosic complex, 3 to 15 percent slopes	F
657A	Ridgebury very fine sandy loam, 0 to 3 percent slopes, very stony	AD
699	Urban land	ABCDF
799	Urban land-Canton complex, 3 to 15 percent slopes	ABCDF
W	Water	ABCD

Source: NRCS (1993)

4.9.2 Environmental Consequences

No Build Alternative

The No Build Alternative would not involve new construction; no impacts on geology, minerals, or soils would occur.

Build Alternatives

Geology

None of the Build Alternatives would result in substantive changes to bedrock or surficial geology. Impacts related to soil disturbance are discussed below.

Minerals

Sand and gravel are the only geologic and mineral resources that have been identified within the study area.

American Excavating Corporation is located at 5 Madden Road, adjacent to the preferred alternative. The driveway to access the property will be moved to square it with the North High Street intersection. While part of the property will be acquired for the connector road and to provide access for Madden Road, the property appears to be in use for stock piling, rather than mining operations. The driveway to American Excavating Corporation will be moved to create a signalized intersection with North High Street. Additionally, a partial acquisition of this property will be used to provide access to provide a connection to Madden Road. Operation of this stockpiling facility is not anticipated to be impacted by the preferred alternative.

No active sand or gravel operations are located along Build Alternatives B, C, D, and F. Therefore, substantive economic or resource impacts on existing sand or gravel extraction operations are not expected to result from any of these proposed Build Alternative alignments.

Soils

As described in the 2007 DEIS, several soil series in the study area may pose substantial engineering challenges and/or have high potential for soil erosion. For example, within the Hinckley-Windsor-Canton soil association, the very poorly drained Greenwood and Chocorua soils have a high water table, or ponded water table, and the potential for severe frost action. In the Canton-Hollis-Chatfield association, the moderately well-drained Ossipee, Scituate, and Newfields soils possess a high water table and the potential for moderate frost action. In the Canton-Montauk-Paxton soil association, the Ridgebury and Walpole soils are known for having a high water table, and the Lim-Pootatuck complex can have a high water table along with a potential for severe frost action and frequent flooding.

Several other soil series that could be crossed by some of the Build Alternatives include areas that are shallow to bedrock with water seepage issues (e.g., the Hollis soil series), or that have difficulty establishing vegetation (e.g., the Hinckley soil series). Table 4.9-2 presents potential impacts on soils, including several of the more problematic types, by alternative.

Table 4.9-2. Soils Disturbed by the Build Alternatives

Alternative	Soils Disturbed (acres)	Potentially Problematic Soils
A	75.16	A large area of potential shallow to bedrock soils between I-93 and Shields Brook and an area of Walpole, Greenwood, and Ridgebury soils located along Tsienneto Road between Jeff Lane and NH 102.
B	78.69	A large area of potential shallow to bedrock soils between I-93 and Shields Brook; an area of Scituate-Newfields complex soils located just north and east of NH 28; an area of Ossipee mucky peat just east of where Alternative B would cross Scenic Drive; and areas mapped as Greenwood and Walpole soils to the north of Tsienneto Road between Jeff Lane and NH 102.

Alternative	Soils Disturbed (acres)	Potentially Problematic Soils
C	89.91	Areas of shallow to bedrock soils between I-93 and Ashleigh Drive. Because Alternative C would follow the same alignment as Alternative B from NH 28 east to Tsienneto Road, the soil-related impacts along this portion of the proposed roadway would be the same as those for Alternative B.
D	93.18	Similar to Alternative C, Alternative D would cross areas of shallow to bedrock soils between I-93 and Ashleigh Drive. Further to the south along NH 28, the alignment would cross an area of Lim-Pootatuck complex before following the same alignment as Alternative A along Tsienneto Road.
F	21.51	An area of Lim-Pootatuck complex, located along Shields Brook in downtown Derry.

4.9.3 Mitigation

Impacts associated with the problematic soils described are expected to be relatively minor, regardless of the alternative selected. Design and construction of new roadways frequently require addressing engineering challenges resulting from encountering soils with high water tables, surface seepage, severe frost activity, and ledge outcrops or soils that are shallow-to-bedrock. Typically, these issues can be resolved through the removal of unstable soils, placement of appropriate clean fill and granular base, installation of appropriate drainage structures, and installation of landscape plantings.

During construction, potential impacts associated with soil erosion can also be minimized through implementation of BMPs for erosion control (Rockingham County Conservation District, 1992). These practices could involve such measures as the installation of silt fencing, straw or hay bale barriers, or temporary sediment traps; mulching of disturbed areas, followed by seeding for long-term cover; and use of vegetated swales. Additionally, in areas with poor soil fertility, topsoil or an appropriate soil amendment would be used, as needed, prior to seeding or planting. A combination of these measures would mitigate any potential impacts associated with any of the Build Alternatives.

4.10 Contaminated Properties and Hazardous Materials

An environmental review was conducted in an attempt to identify the presence of potential and/or known contaminated properties and hazardous material sites near the alternatives. The liability that may be encountered through acquisition of properties impacted by hazardous materials, as well as worker health and safety issues related to exposure to a potentially hazardous environment, can substantially increase construction costs.

The presence or absence of potential petroleum and hazardous material sites within 500 feet and known petroleum and hazardous material sites within 1,000 feet of the alternatives was assessed based on present or former property use and best professional judgment. This study area is shown on Figure 4.10-1. Hazardous waste sites are regulated by both the Resource Conservation and Recovery Act (RCRA) of 1980 (40 CFR part 261, Subtitle C) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Pub. Law 96-