

3. Existing Conditions and Environmental Consequences

3.8 Floodplains

3.8.1 WHAT ARE FLOODPLAINS?

Floodplains are low-lying areas adjacent to rivers, streams, and other waterbodies that are susceptible to inundation (flooding) during rain events. These areas provide important functions in the natural environment such as providing storage for flood waters, protecting the surrounding environment from erosion, and providing habitat for wildlife. As such, agencies are required to take actions that reduce the risk of impacts to floodplains and their associated floodway, or main channel of flow. Floodplain areas exist within the project study area of the Carolina Crossroads, and this chapter describes the potential impacts to those areas.

3.8.2 HOW ARE FLOODPLAINS REGULATED?

Floodplain and floodway protection is required under several federal, state, and local laws, including Executive Order 11988 entitled “Floodplain Management,” which requires federal agencies to avoid making modifications to and supporting development in floodplains wherever practical. Floodplains subject to inundation by the 1-percent-annual-chance flood event are regulated by the Federal Emergency Management Agency (FEMA).

FEMA publishes maps which depict areas of regulated floodplains and floodways. The Flood Insurance Rate Map (FIRM)¹ is the most common of these flood maps. The FIRM is an official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community. FIRMs depict the boundaries of flood hazard areas and differentiates them by zone.

Zone A floodplains are areas subject to inundation by the 1-percent-annual-chance flood event (100-year flood) and are generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, base flood elevations (BFE) or flood depths are not available for Zone A floodplains.

Zone AE floodplains are areas subject to inundation by the 1-percent-annual-chance flood event and are determined by detailed methods. BFEs are available for Zone AE floodplains and are provided on FIRMs.

The Saluda River is also under the jurisdiction of the Federal Energy Regulatory Commission (FERC) because of its function as a hydroelectric power facility. FERC is the United States federal agency that regulates the transmission and wholesale of electricity, natural gas and oil (by pipeline) in interstate commerce. FERC also reviews proposals to build interstate natural gas pipelines, natural gas storage projects, and liquefied natural gas (LNG) terminals, in addition to licensing non-federal hydropower projects. The project would require

What is a 100-year flood?

A 100-year flood (also referred to as a base flood) is a flood that has 1% chance of occurring in any given year. A 100-year floodplain is the area around a water body that would be inundated by a 100-year flood.

¹ <https://msc.fema.gov/portal/>. Last accessed February 25, 2018.

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coordination with FERC due to the bridge crossings over the Saluda River. The coordination would occur during final design once specific impacts are identified.

3.8.3 WHAT FLOODPLAINS ARE LOCATED WITHIN THE PROJECT STUDY AREA?

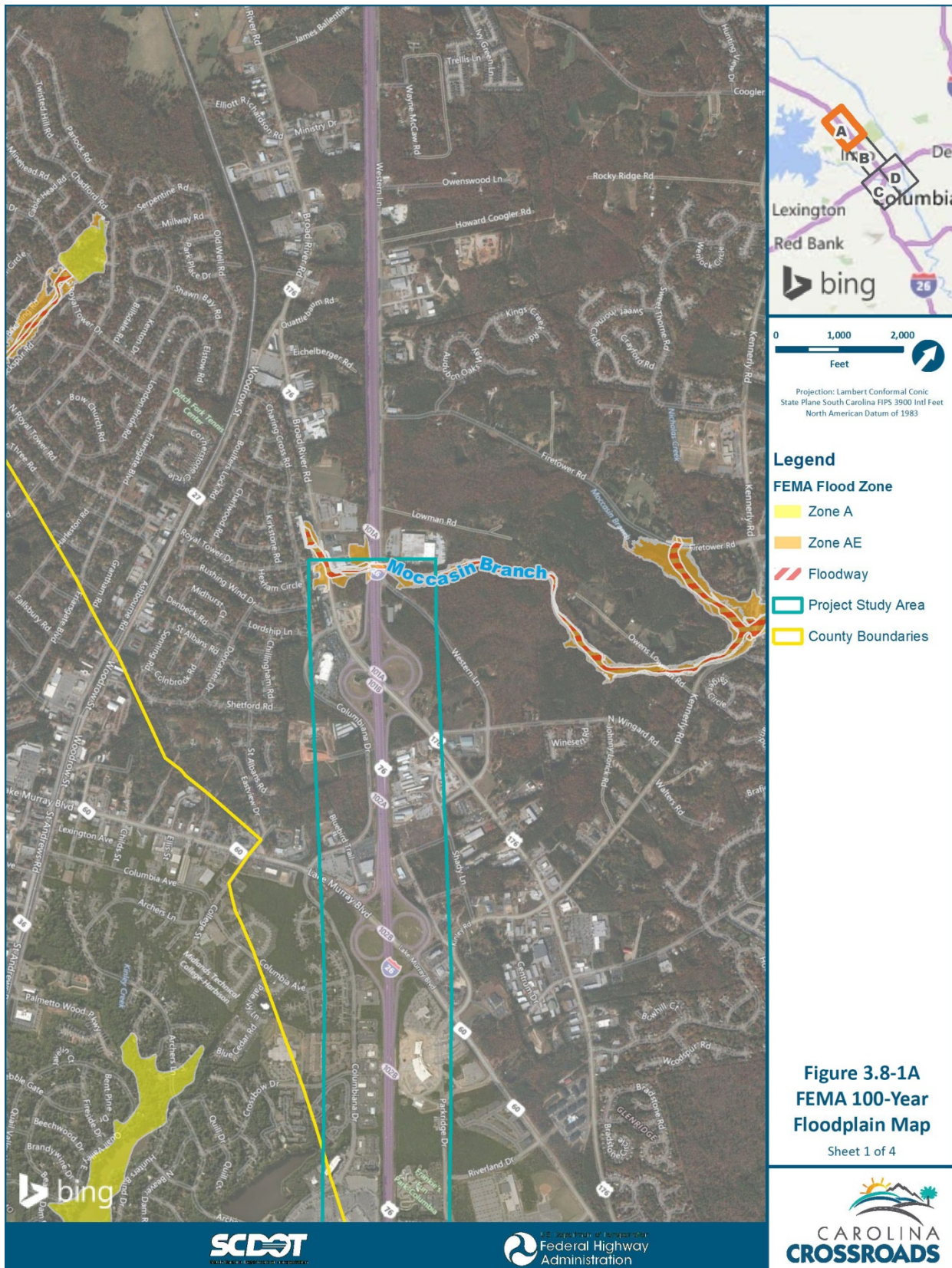
Based upon a review of the floodplain mapping and a GIS analysis of the project study area, the proposed project crosses or encroaches on six FEMA-regulated floodplains. Table 3.8-1 below lists these floodplains by their associated waterbody. The extent of each floodplain is shown on Figures 3.8-1A through 3.8-1D.

Table 3.8-1 FEMA-Regulated Floodplains within the Project Study Area¹

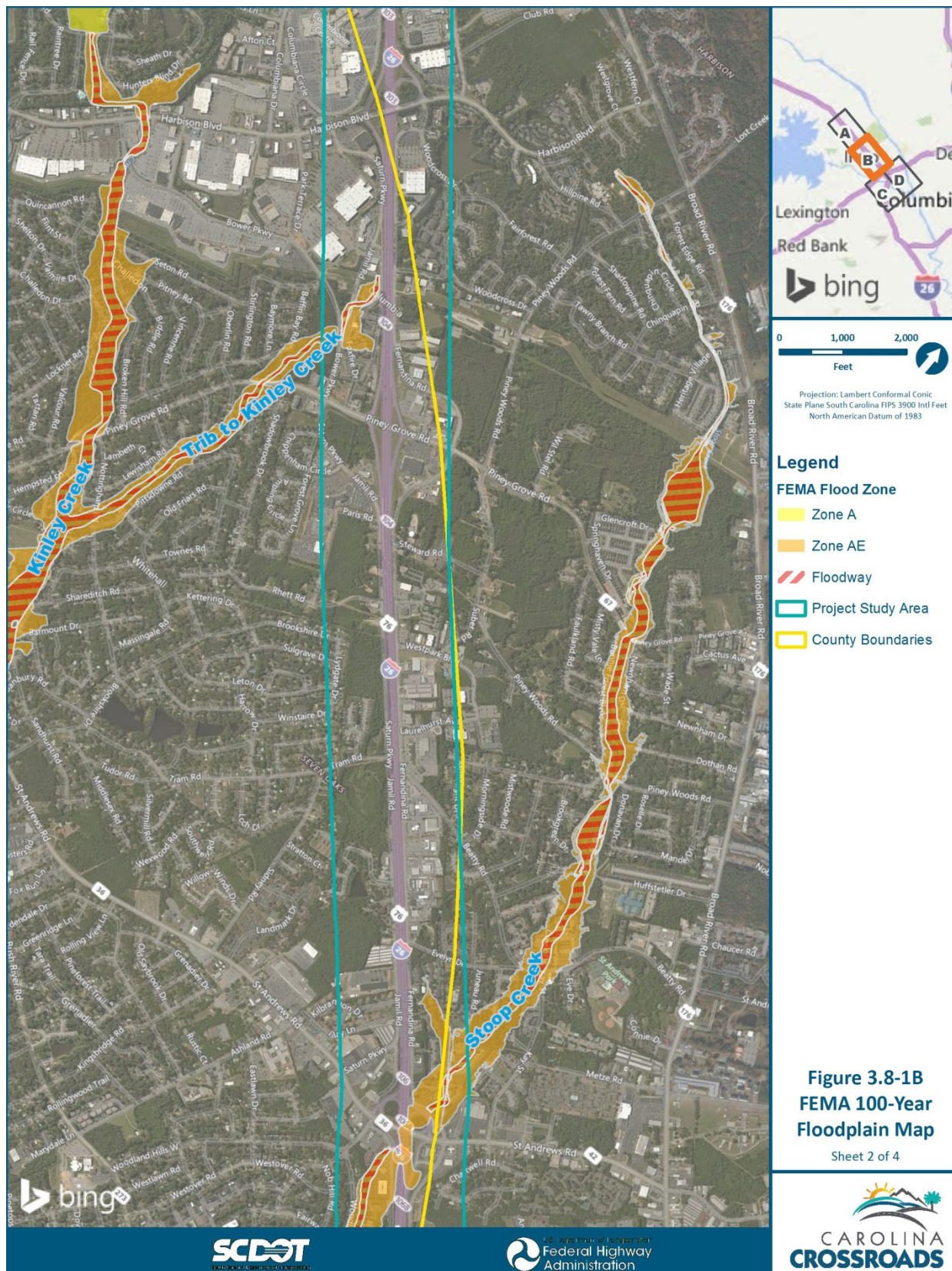
Floodplain	FIRM map ID	Existing crossing	Figure	FEMA zone
Moccasin Branch	45079C0206L	Culvert	3.8-1A	Zone AE
Tributary to Kinley Creek	45063C0134G	Culvert	3.8-1B	Zone AE floodway
Stoop Creek	45063C0161G	Culvert	3.8-1B	Zone AE floodway
Saluda River	45063C0144G & 45063C0163G	Bridge	3.8-1C	Zone AE floodway
Broad River	45079C0243L	Bridge	3.8-1D	Zone AE floodway
Senn Branch	45063C0163G	Culvert	3.8-1C	Zone AE floodway

¹The flood plain is the area inundated by the “base flood”, usually the 100-year flood. The floodway is the portion of the flood plain needed to convey the base flood without increasing water surfaces more than a designated height.

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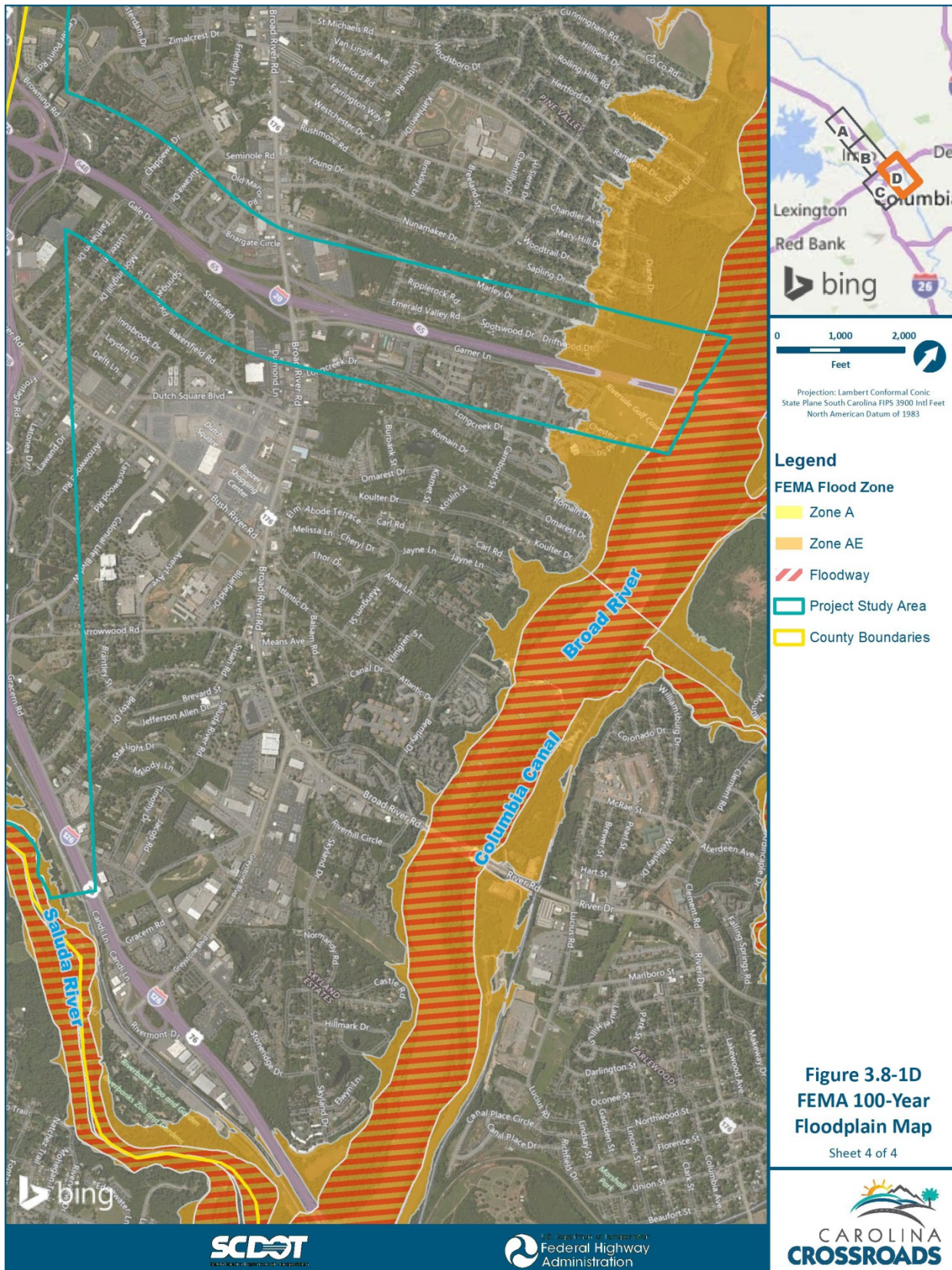
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3.8.4 HOW WOULD THE NO-BUILD ALTERNATIVE IMPACT FLOODPLAINS?

The No-build Alternative would not improve existing roads beyond what is currently planned. However, maintenance activities would continue to occur. The No-build Alternative would have no effect on floodplains since existing conditions would remain unchanged.

3.8.5 HOW WOULD THE REASONABLE ALTERNATIVES IMPACT FLOODPLAINS?

A potential floodplain impact evaluation has been performed by overlaying the reasonable alternatives on the project study area FEMA maps. Both alternatives would be located within FEMA-regulated floodplains. Bridge Replacement Risk Assessment Forms have been completed and are included in Appendix J.

3.8.5.1 What impacts would RA1 (Recommended Preferred Alternative) have on floodplains?

RA1 would impact approximately 22.91 acres of floodplains associated with the Saluda River, Broad River, Senn Branch, Stoop Creek, Moccasin Branch, and unnamed tributaries to Kinley Creek. Floodplain crossings predominantly occur near the Saluda River and the I-20/I-26 interchange. Approximately 15.94 acres of potential floodplain impacts are classified as Zone AE, while the remaining 6.97 acres are classified as Zone AE regulated floodways. While all of the floodplain crossings would occur in areas of existing crossings, detailed flood studies of stream and river crossings would be required as part of the final roadway design. The bridges and culverts would be designed to FEMA standards and would provide clearances above the flood elevation; therefore, an increase in flooding is not anticipated. Coordination with South Carolina Electric & Gas (SCE&G) and FERC would be required for the two Saluda River floodway crossings due to its function as a hydroelectric facility.

Table 3.8-2 Summary of Potential Floodplain Impacts (in acres), RA1 (Preferred Alternative)

RA1 (Preferred Alternative)	
Zone AE Floodplains	15.94
Zone AE Regulatory Floodway	6.97
Total Floodplains	22.91

Table 3.8-3 Potential Floodplain and/or Floodway Crossings, RA1

RA1 (Preferred Alternative)	
Saluda River	2
Stoop Creek	2
Senn Branch	1
Tributaries to Kinley Creek	2
Moccasin Creek	1
Broad River	1
Total Crossings	9

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3.8.5.2 What impact would RA5 Modified have on floodplains?

RA5 Modified would impact approximately 23.69 acres of floodplains associated with the Saluda River, Broad River, Senn Branch, Stoop Creek, Moccasin Branch, and unnamed tributaries to Kinley Creek. Floodplain crossings predominantly occur near the Saluda River and the I-20/I-26 interchange. Approximately 16.64 acres of potential floodplain impacts are classified as Zone AE, while the remaining 7.05 acres are classified as Zone AE regulated floodways. While all of the floodplain crossings would occur in areas of existing crossings, detailed flood studies of stream and river crossings would be required as part of the final roadway design. The bridges would be designed to FEMA standards and would provide clearances above the flood elevation; therefore, an increase in flooding is not anticipated. Coordination with SCE&G and FERC would be required for the two Saluda River floodway crossings due to its use as a hydroelectric facility.

Table 3.8-4 Summary of Potential Floodplain Impacts (in acres), RA5 Modified

	RA5
Zone AE Floodplains	16.64
Zone AE Regulatory Floodway	7.05
Total Floodplains	23.69

Table 3.8-5 Potential Floodplain and/or Floodway Crossings, RA5 Modified

	RA5 Modified
Saluda River	2
Stoop Creek	2
Senn Branch	1
Tributaries to Kinley Creek	2
Moccasin Creek	1
Broad River	1
Total Crossings	9

3.8.6 WHAT ARE THE FLOODING RISKS AND POTENTIAL IMPACTS TO FLOODPLAIN VALUES?

The FHWA Technical Advisory 6640.8A requires that all potential encroachments into floodplains resulting from a proposed project discuss the level potential risk or environmental impact resulting from any floodplain encroachments. The following discussion provides a summary of the expected impacts that the reasonable alternatives would have on various floodplain functions.

3.8.6.1 What are the flooding risks associated with the project?

Floodplain encroachments of either reasonable alternative are not likely to increase the flooding in the area as bridge structures would be designed to FEMA standards as required by 23 CFR 650, Subpart A, *Location and*

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Hydraulic Design of Encroachment on Floodplains, and result in less than a one-foot rise in the base flood elevation. Additionally, structures would provide the minimum freeboard above the design flood elevation and would not be exceeded by the 100-year storm. A detailed hydrological study of the preferred alternative would be completed upon final design. This analysis would include establishing base flood elevations and adjusting bridge and culvert designs to minimize the risk of flooding upstream to less than one foot, as required by FEMA. A SCDOT *Bridge Scope and Risk Assessment Form* was completed for each crossing based on the preliminary analysis (Appendix J).

3.8.6.2 What are the impacts to the natural and beneficial floodplain values?

No substantial impacts to floodplains are anticipated from construction of either reasonable alternative. The majority of the floodplain impacts would be adjacent to existing structures or within an existing transportation corridor, and all proposed crossings would be designed to provide existing or improved flow conditions. There may be temporary impacts to river access and/or use during construction and deconstruction over the Saluda and Broad Rivers. Sedimentation from construction may occur but appropriate best management practices would be incorporated to minimize these impacts.

3.8.6.3 Does the project support incompatible floodplain development?

No incompatible floodplain development would result from the proposed project. All structures would be designed to FEMA standards and would generally be constructed within an existing transportation corridor. The project would be designed to be consistent with local floodplain development plans and coordinated with local floodplain officials.

3.8.6.4 What measures were used to minimize floodplain impacts?

Various alternatives were analyzed from an engineering, environmental, and general public perspective. The design includes measures to avoid or minimize floodplain impacts through the use of piles instead of fill. Only minor fill would be needed to accommodate bridge, ramp, and culvert construction. Impacts would generally be adjacent to existing structures.

3.8.6.5 Were any measures used to restore and preserve the natural and beneficial floodplain values?

No substantial impacts to floodplain values are anticipated from the proposed project. Impacts to floodplains would be minimized through careful design and construction methods. If conditions change based on final design, additional measures would be evaluated to restore lost floodplain values.

3.8.7 HOW WOULD IMPACTS TO FLOODPLAINS BE MITIGATED?

In accordance with Executive Order 11988, a hydraulic analysis must be conducted for an encroachment of a FEMA-regulated floodplain. The hydraulic analysis is used to determine if the project is likely to increase the risk of flooding within the floodplain. In order to meet the requirements of a “No-Rise” condition, FEMA requires projects which would encroach on Regulated Floodways and Zone AE floodplains have to result in no more than a 0.1 foot change from the established 100-year flood elevations. Furthermore, SCDOT requires all Zone A

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crossings be analyzed for the 100-year flood to insure that the floodplain encroachment does not cause one foot or more of backwater when compared to unrestricted or natural conditions.

Hydrology studies have not been conducted at this stage of project development. At each cross drainage feature, a detailed hydraulic analysis will be performed to confirm that bridges and culverts identified during preliminary design would provide adequate conveyance of flood waters. The project will be designed in an effort to meet “No-Rise” requirements. In the event a “No-Rise” condition cannot be achieved, coordination with FEMA will require the preparation of a CLOMR (Conditional Letter of Map Revision)/ LOMR (Letter of Map Revision) package for the encroachment. This includes a detailed hydraulic analysis, determination of floodplain impacts, and preparation of the CLOMR. Following construction, impacts to the floodplain will be verified prior to the issuance of the LOMR. If the recommended preferred alternative includes a floodplain encroachment that would cause significant impacts, the Final EIS will include a finding that it is the only practicable alternative as required by 23 CFR 650, Subpart A. The finding should refer to Executive Order 11988 and 23 CFR 650, Subpart A. The finding must be supported by the following information:

- The reason(s) why the proposed action must be located in the floodplain,
- The alternatives considered and why they were not practicable, and,
- A statement indicating whether the action conforms to applicable state or local floodplain protection standards.

There is no practicable alternative to the preferred alternatives’ impacts on the floodplains. The floodplain crossings are perpendicular and cannot be avoided. Other alternatives would also impact the floodplains and result in greater impacts to other resources. The proposed project is not anticipated to result in any significant impacts to natural and beneficial floodplain values due to the minor nature of the impacts, their location adjacent to existing fills and/or within an existing transportation corridor. As previously mentioned, the project would be designed to be consistent with local floodplain development plans.

It is FHWA’s policy “to avoid longitudinal encroachments, where practicable” [23 CFR 650.103(b)]. Longitudinal encroachments are parallel or nearly parallel to a stream or the edge of a lake. Where regulatory floodplains are defined, hydraulic structures will be designed to accommodate a 100-year (1% annual chance) flood. Where no regulatory floodplain is defined, culverts and bridges will be designed to accommodate a 50-year magnitude flood event. Ongoing design efforts and coordination with resource and regulatory agencies would minimize floodplain impacts during the final design process.