



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
69-A Hagood Avenue
CHARLESTON, SOUTH CAROLINA 29403-5107

October 17, 2016

Regulatory Division

Ms. Siobhan O. Gordon
South Carolina Department of Transportation
P.O. Box 191
Columbia, South Carolina 29202-0191

Dear Ms. Gordon:

We received your permit application and plans dated September 30, 2016, on October 3, 2016, however, additional information is required before consideration can be given by the concerned agencies and other interested parties. The following information must be provided to this office in order to complete your application:

1. The submitted application makes reference to safety zone clearing within wetlands and streams, stating that trees and shrubs will be cut flush with the ground surface. To determine if there is an impact to jurisdictional waters of the U.S., including wetlands, please provide additional details regarding this activity, including showing the clearing locations on submitted site plans. Please provide a more detailed description of the activity, including but not limited to, how the activity will be conducted, the need for temporary construction access, the filling or grading of regulated areas, and justification for the proposed activity. Any permanent filling of waters of the U.S., including wetlands, and/or permanent conversion of forested and/or scrub-shrub wetlands will require compensatory mitigation; please submit a compensatory mitigation plan that is in compliance with the 2008 Compensatory Mitigation Rule and the Charleston District SOP to offset these impacts.
2. The application states that existing drainage ditches will be maintained by excavating sediment and reshaping side slopes. While this activity may be exempt per USACE Regulatory Guidance Letter No. 07-02, additional information is needed at this time to make that determination. Please provide center line cross-sections for each ditch proposed for maintenance with a cross-section detail showing proposed side slopes; these plan sheets should show existing and proposed grades. The Corps acknowledges that the applicant may not know the original shape or bottom invert of the ditches. To that end, the Corps may make the determination that the previously authorized ditch bottom coincides with the bottom invert of the adjacent culvert. All ditches proposed for maintenance shall not exceed a depth equal to the bottom invert of the adjacent culvert and should be shown as such on the plan sheets. Any excavation deeper than this elevation does not qualify for exemption per Regulatory Guidance Letter No. 07-02 and may need to be permitted.
3. Impacts to waters of the U.S., including wetlands, must be avoided to the maximum extent practicable and unavoidable impacts must be minimized. Please justify the need for large rip-rap pads on the upstream sides of streams 23 and 26, and within wetlands 19 and 22, respectively, as depicted on sheets 9 and 13 of the submitted plans.

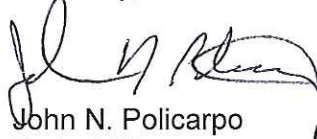
4. In reviewing the submitted drawings, it appears that some cross sections show proposed rip-rap pads above the bottom invert of culverts, specifically cross-section views B, F, J, and K. Please explain. Be advised that to maintain water flow during low flow conditions, all rip-rap stone must be placed so that the top of the stone is flush with existing ground surface. Please revise the detail sheets if necessary.
5. The submitted application makes reference to temporary construction access through jurisdictional waters of the U.S., including wetlands; however, these impacts are not quantified or shown. The use of structures for temporary access within waters of the U.S., including wetlands, may be considered fill and must be sufficiently detailed and quantified. So as not to confuse the submitted impact plans, please submit a separate temporary construction access plan set. In regards to temporary construction access, please answer the following:
 - a. Please detail what type of measures will be used at each temporary access point within waters of the U.S., including wetlands (i.e., construction mats, coffer dams, temporary causeways, etc.), and depict them on plan sheets;
 - b. Please indicate areas that will be utilized for stockpiling construction and/or excavated materials. Please note that the stockpiling of materials in waters of the U.S., including wetlands, is not authorized;
 - c. If temporary stream diversion devices, such as pump arounds and sand bags will be utilized to work under dry conditions, please depict these structures on plan sheets and quantify their impact;
 - d. In regards to the Lake Windsor portion of the project, please answer the following:
 - 1) It is noted in the application that Lake Windsor has been drained due to Hurricane Joaquin. Please indicate if the area is still a jurisdictional water of the U.S. or if there has been a conversion of the lake to a different habitat;
 - 2) Please depict the coffer dam at Lake Windsor on plan sheets and quantify the impacts; and,
 - 3) Please discuss why the excavated material at Lake Windsor is being taken off site instead of being used to restore the site after construction.
 - e. The permanent conversion of forested and/or scrub-shrub wetlands due to temporary construction access measures will require mitigation. Please quantify these impacts and provide an appropriate mitigation plan to compensate for these impacts; and,
 - f. Please submit a restoration plan for all temporary impact areas within jurisdictional waters of the U.S., including wetlands, due to construction access.
6. In regards to the submitted mitigation proposal, please answer the following:
 - a. Please provide the stream assessment forms for each tributary showing how the amount of mitigation was determined; and,

- b. Appropriate mitigation to waters of the U.S., including wetlands, will be determined after all project impacts, both permanent and temporary, have been accurately assessed.
7. It appears that the endangered species coordination was conducted in February 2015, but the updated list of Federally listed species in Richland County was updated in October 2015 and includes Michaux sumac (*Rhus michauxii*). The proposed project is located in proximity to two known occurrences of the species. Although the project area is not the preferred habitat, the listed species has been known to inhabit maintained roadway rights-of-way. Please provide information stating that the proposed project will not adversely impact Michaux sumac.

It is requested that you provide this office with the requested information by December 17, 2016. Should the information not be received by this date, this office will assume that you no longer wish to pursue this application and will remove it from our active files. If you desire to apply to this office at a later date for this work, the same project number, SAC-2015-00155, will be used.

If there are any questions regarding this matter, please do not hesitate to contact me at 843-329-8043 or at john.n.policarpo@usace.army.mil.

Sincerely,



John N. Policarpo
Project Manager

Copy Furnished:

Mr. John Collum (via email)
Ms. Siobhan O. Gordon (via email)



South Carolina
Department of Transportation

November 1, 2016

Mr. John N. Policarpo
Project Manager, Regulatory Division
Department of the Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, SC 29043-5107

Re: Interstate 77 Widening and Rehabilitation (from MM 15 – MM 27)
USACE SAC-2015-00155. SCDOT PIN P027002

Dear Mr. Policarpo:

The South Carolina Department of Transportation (SCDOT) is providing this information in response to your letter dated October 17, 2016, and our subsequent phone conversation on October 19, 2016. We appreciate your assistance in processing this permit application.

Your letter requested additional information to complete the application. We hope that this correspondence, in combination with previously provided information in the permit application, the NEPA Categorical Exclusion and subsequent Re-evaluation will facilitate finalization of your permitting process. Your information request is summarized and a response is provided for each as follows:

1. *You requested additional information on safety zone clearing within wetlands including locations, a description of how the activity will be conducted, access, justification, and mitigation.*

Wetlands not permitted for impact will be demarcated with temporary orange barrier fence along the Preliminary JD (July 28, 2015) line. Where necessary for the Safety Clearing and Clear Zone, if in streams and wetlands, trees and shrubs will be cut flush with the ground via non-regulated methods such as, but not limited to, hand-clearing, removal of cut trees with a rubber-tired skidder, use of a rubber-tired or low ground pressure hydro-ax or feller-buncher. If soils within the wetlands are not suitable, timber mats will be used to prevent rutting. Clearing without grubbing or activities which do not constitute fill, when conducted in a manner such as these is non-regulated, so details and mitigation are not provided or required.

2. *You requested additional information on drainage ditch maintenance.*

The described ditch maintenance is excavation of accumulated sediments from ditches to facilitate drainage from the roadway infrastructure. Access measures will be similar to the clearing (above) and also include prohibiting double-handling of excavated material in wetlands. If the activity is within a wetland, excavated material will be placed directly into a bucket or truck, hauled off and properly disposed. Ditch cleanout (when done in accordance with the guidelines stated herein and the application) is non-regulated, so details and mitigation are not provided or required.

3. *You requested justification for the rip-rap pads on the upstream sides of streams 23 & 26.*

As a scour protection measure (indicated in the SCDOT Permit Assessment / Notification Form For Nationwide Permit 14, Section II, Seasonal and Perennial Stream Impacts Table) the Design-Build contract (Final RFP, Exhibit 4e Hydraulic Design Criteria, Section 2.2.6) requires that the Contractor implement corrective actions to fix the existing scour holes at the inlet of Existing Culvert (EC)-1702 (Stream 23/Wetland 19) and the inlet of EC-2103 (Stream 26/Wetland 22). Due to the fact that the areas are existing scour holes, the area of rip-rap is slightly larger than typically seen. This is necessary in these two instances



to protect the culverts under I-77. The elevations of these rip-rap pads have also been adjusted (enclosed) pursuant to your Question 4, below; the dimensions and impacts have not changed.

4. *You noted rip-rap pads above the bottom invert of culverts, specifically sections B, F, J, and K.*

Sections B, F, J, and K have been adjusted and are enclosed as Revised Sheets 17, 21, 25, and 26 (of 31) with a Revision Date of 10/27/16. These adjustments did not result in any impact changes and are incorporated into the construction plans.

5. *You noted that temporary construction access activities may be considered fill and requested a separate temporary construction access plan set.*

Construction access in jurisdictional wetland areas will be obtained by clearing to the ground level with no discharge of dredged or fill material (no grubbing). The use of rubber-tired equipment, timber mats, barges or elevated work platforms (i.e. trestles) or other BMPs will be allowed in the wetland areas as necessary; no fill, grubbing, or double-handling of material will be associated with the construction access in wetlands. Construction access, when conducted in accordance with the guidelines stated herein and the application, is non-regulated, so details and mitigation are not provided or required.

- a. *You requested detail on the type of measures at each temporary access point in waters of the U.S.*

Construction access in jurisdictional areas will be obtained by clearing to the ground level. The use of rubber-tired equipment, timber mats, barges or elevated work platforms (i.e. trestles) or other BMPs will be allowed in the wetland areas as necessary; no fill, grubbing, or double-handling of material will be associated with the construction access in wetlands unless identified and quantified in the permitted plans. Construction access, when conducted in accordance with the guidelines stated herein and the application, is non-regulated, so details and mitigation are not provided or required.

- b. *You requested detail on stockpiling construction and/or excavated material.*

Minor amounts of excavation in Windsor Lake is required for access and will be conducted to establish a level enough ground surface to properly place the barges or mats. This will be conducted with an excavator from the upland banks of the lake, and barges or mats will be placed on top of a geotextile fabric. The bank of the lake will need to be 'notched' to allow equipment into the lower areas. It may be necessary to construct a sheetpile wall at these notches which transition from the uplands into the lake. The excavator will move out onto the mats and continue excavating material to establish a level surface. Barges or mats will continue to be placed in front of the excavator as it moves across the lake. There will be no stockpiling of materials in waters of the U.S., including wetlands. Excavated material will be placed directly into trucks and properly disposed. For both Windsor Lake and Little Jackson Creek, no fill, grubbing, or doublehandling of material will be associated with the construction access. Upon completion of the construction activities, disturbed areas will be stabilized with BMPs. These activities, when conducted in this manner, are non-regulated, so details and mitigation are not provided or required.

- c. *You requested detail on temporary stream diversion devices.*

Previous coordination with Charleston District USACE allows for temporary diversions, pump-arounds, and sand-bags to be utilized provided they are within permitted impact areas (such as at proposed rip-rap pads). Temporary measures such as these, if necessary, are permissible and no additional detail is required.

d. *Lake Windsor*

- i. *You requested information on if Windsor Lake is still jurisdictional or if it has been converted to a different habitat.*

In order to keep the project on schedule (timely permit approval is critical to the success of the project) the SCDOT is adhering to the determination of the current Preliminary JD (July 28, 2015). Any potential site conditions changes could only have kept the dimensions of the jurisdictional area the same or reduced it. Access means and methods which will be used, are non-regulated whether in a water of the U.S. or wetland, so details and mitigation are not provided or required.

- ii. *You requested information on a coffer dam at Lake Windsor.*

Depending on soil characteristics, it may be necessary to construct a sheetpile wall to retain the access notches at the transition from the uplands into the lake. If necessary, the sheetpile will be used to retain embankments at the cut access pathway perpendicular to the lake bank and prevent sloughing. Sheetpile is driven and removed without changing grades, mechanized land disturbance, or grubbing activities. No material would be backfilled behind the sheetpile in jurisdictional areas.

- iii. *You requested a discussion on why the excavated material is not being used to restore the lake.*

The USACE regulates the discharge of dredged or fill material into waters of the U.S. The Design-Build Contractor has designed or planned construction activities to meet the conditions of Nationwide Permit 14 and minimized construction related impacts by conducting them in a non-regulated manner. Backfilling excavated areas of Lake Windsor is a regulated activity and would trigger a permit action. This would require a plan and drawings and potentially a restoration, mitigation and/or planting plan, all of which has the potential to slow the permit approval process and increase project expenses. The lake bed is comprised of deposited sediments from upstream and removal of the deposited sediments is potentially a benefit to the lake and not a negative impact.

- e. *You stated that permanent conversion of wetlands due to temporary construction access measures will require mitigation and requested plans and details.*

Temporary construction access measures planned for this project will be conducted in a manner which does not require or constitute fill and is therefore not a regulated activity, so details and mitigation are not provided or required.

- f. *You requested a restoration plan for all temporary impact areas due to construction access.*

Temporary construction access measures planned for construction will be conducted in a manner which does not require or constitute fill and is therefore not a regulated activity, so details and a restoration plan are not provided or required.

6. *Mitigation*

- a. *You requested stream assessment forms for each tributary illustrating how the existing condition was determined.*

Stream assessment forms were provided in the NEPA CE-C document, in Appendix F. These forms are also enclosed. The forms were reviewed to determine the total score that correlated with the Charleston District Mitigation SOP existing condition factor.

- b. *You stated that appropriate mitigation will be determined after all project impacts have been accurately assessed.*

Pursuant to our phone conversation on October 19, this correspondence, and the permit application, construction activities are either not regulated by the USACE or are included in the permit application package as unavoidable impacts. The stream assessment forms and Charleston District Mitigation SOP has been utilized to determine the appropriate quantity and mitigation bank service areas were used to determine appropriate geographic vicinity. The mitigation proposed for this project is appropriate to offset unavoidable impacts.

7. *You noted that Michaux's sumac has been added to the USFWS Federally listed species.*

The survey window / time period for the Michaux's sumac is May-October (USFWS 10/20/15). The SCDOT conducted a site visit survey for the plant on October 25, 2016. The results of the threatened and endangered species study (enclosed) conclude that the proposed action will not affect Michaux's sumac. The Federal agency (FHWA) NEPA Re-evaluation (dated October 31, 2016) which incorporates these findings is enclosed. Nationwide Permit General Condition 18. Endangered Species (b) states, '*Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.*' The USFWS has an agreement (enclosed) with the SCDOT regarding 'no-effect' determinations whereby if the Federal agency (or its non-Federal representative – SCDOT) makes a no-effect determination, the Federal agency is not obligated to contact the USFWS for concurrence.

Please use this information to finalize your permit process and feel free to contact me if you have any additional questions. We appreciate your assistance on this important SCDOT project.

Sincerely,



Siobhan O. Gordon

Environmental Permits Manager, Midlands Region

SOG:bag

Enclosures

Revised Sections B, F, J, & K

Stream Assessment Forms

NEPA Re-evaluation

Michaux's sumac survey

USFWS/SCDOT Concurrence on "No-Effect" Biological Assessments

cc: Charles Hightower, SCDHEC

ec: Elizabeth Williams, USACE

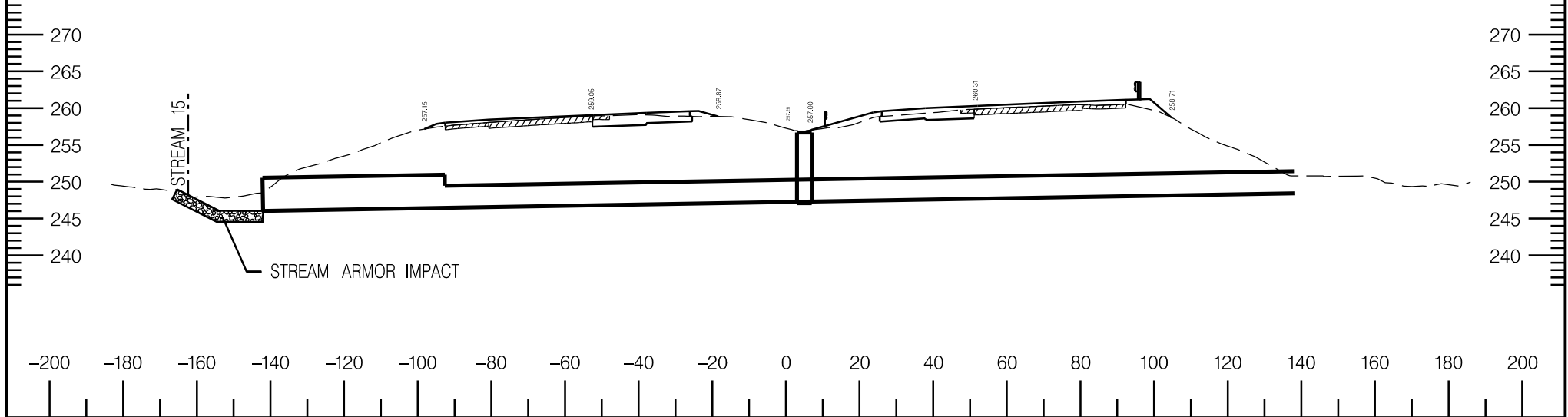
Christopher Mims, USACE

M. Sean Connolly, SCDOT

John Collum, JMT

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I-77
STA. 1278+80.13



STREAM ARMOR IMPACT

-200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200

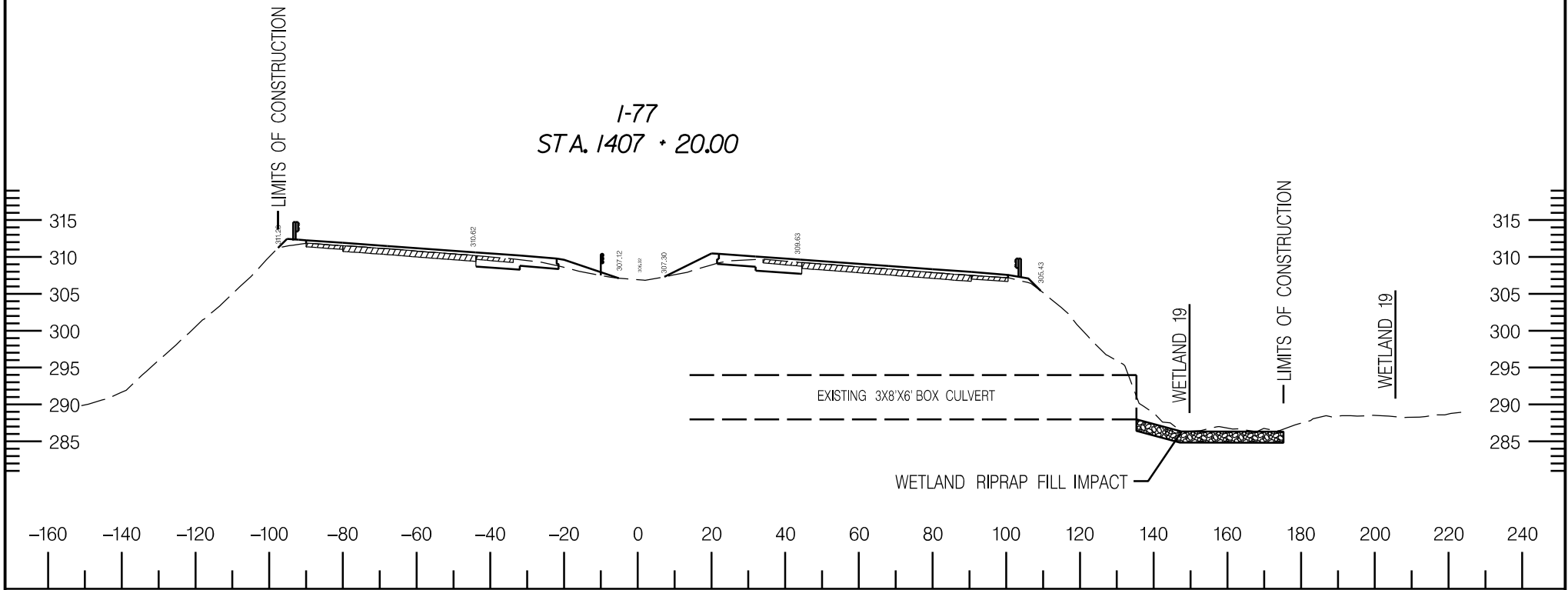
LEGEND
LIMITS OF CONSTRUCTION
STREAM LIMITS
RIPRAP



SECTION B-B'

APPLICATION BY SCDOT
PROJECT ID P027002: I-77 WIDENING
AND REHABILITATION (MM15-MM27)
RICHLAND COUNTY, SC
DATE: 8/2016
SHEET: 17 OF 31
REVISION DATE: 10/27/16

I-77
STA. 1407 + 20.00

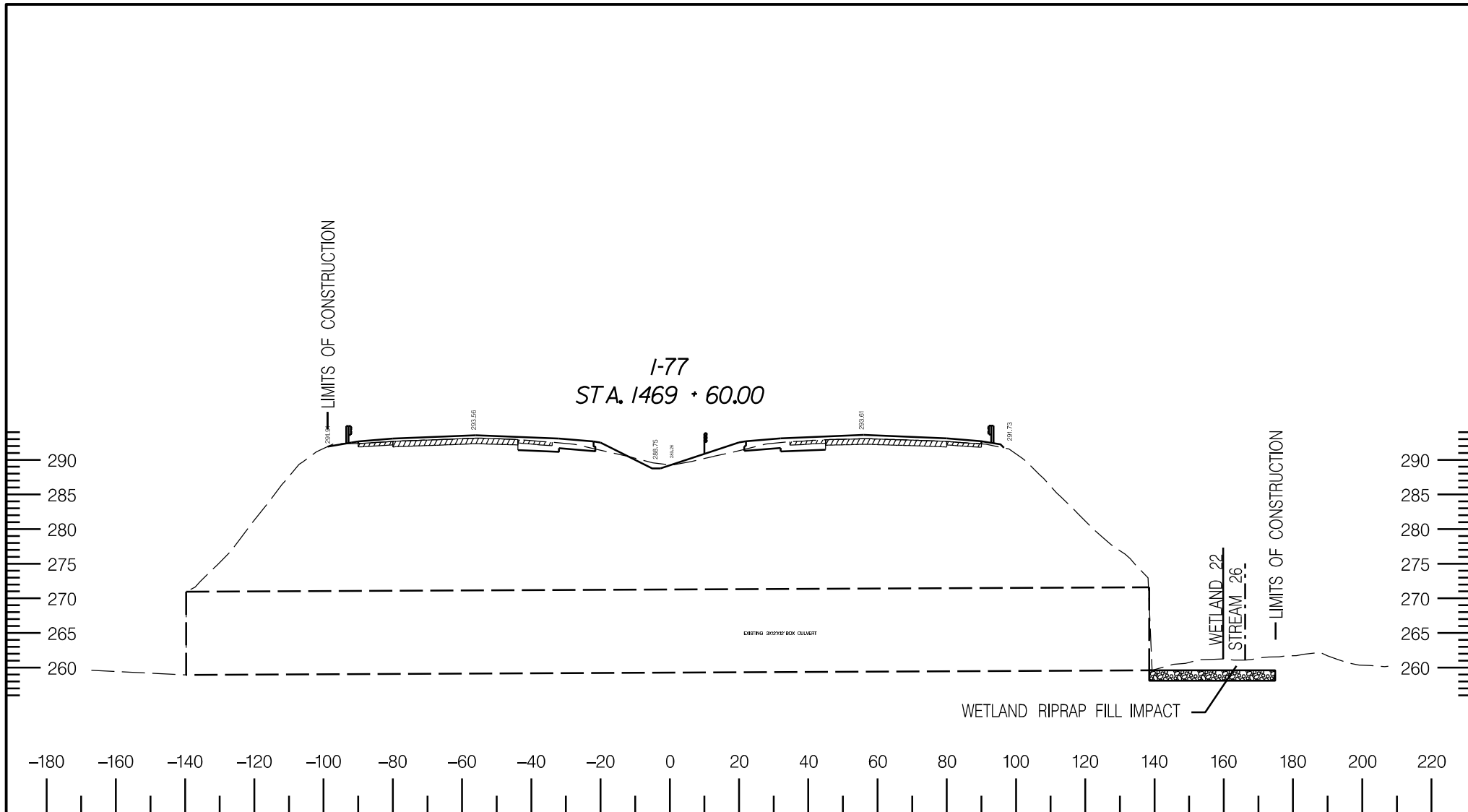


LEGEND
LIMITS OF CONSTRUCTION
STREAM LIMITS
RIPRAP



SECTION F-F'

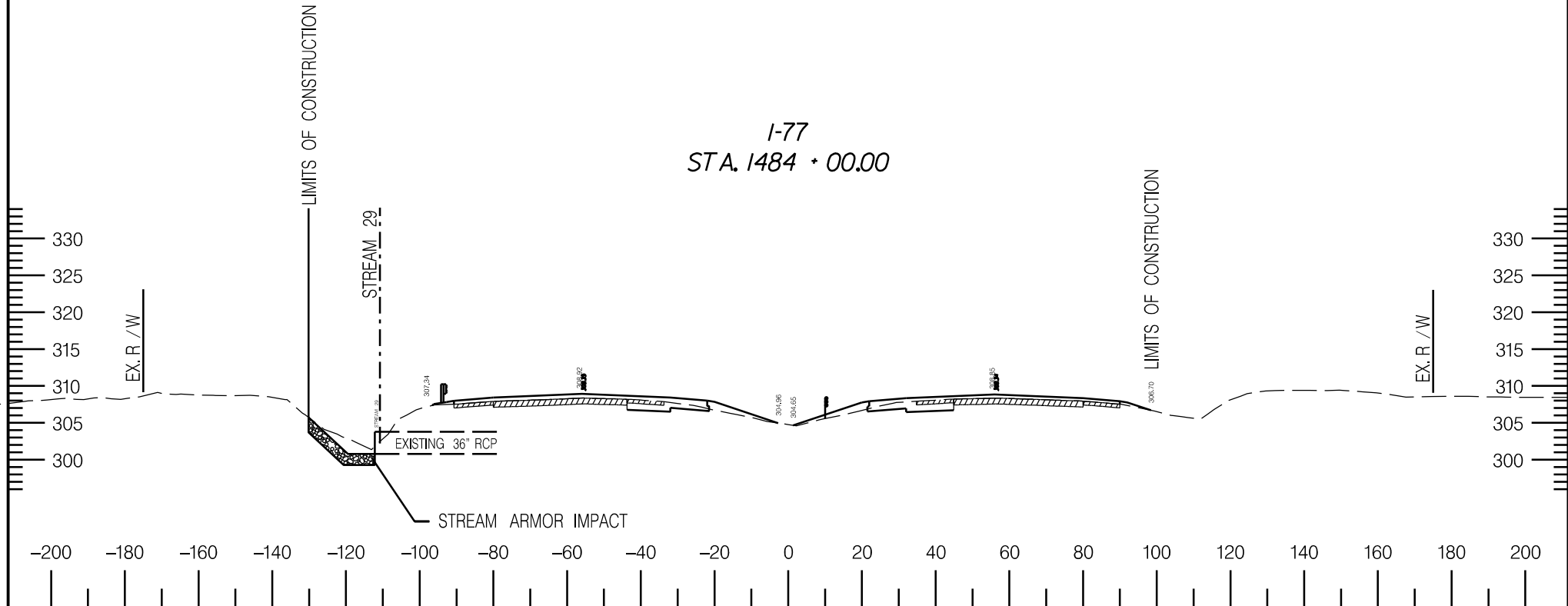
APPLICATION BY SCDOT
PROJECT ID P027002: I-77 WIDENING
AND REHABILITATION (MM15-MM27)
RICHLAND COUNTY, SC
DATE: 8/2016
SHEET: 21 OF 31
REVISION DATE: 10/27/16



SECTION J-J'

APPLICATION BY SCDOT
 PROJECT ID P027002: I-77 WIDENING
 AND REHABILITATION (MM15-MM27)
 RICHLAND COUNTY, SC
 DATE: 8/2016
 SHEET: 25 OF 31
 REVISION DATE: 10/27/16

I-77
STA. 1484 + 00.00



LEGEND
LIMITS OF CONSTRUCTION
STREAM LIMITS
RIPRAP



SECTION K-K'

APPLICATION BY SCDOT
PROJECT ID P027002: I-77 WIDENING
AND REHABILITATION (MM15-MM27)
RICHLAND COUNTY, SC
DATE: 8/2016
SHEET: 26 OF 31
REVISION DATE: 10/27/16

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name <u>S2</u>		Basin/Watershed: <u>Congaree (03050110)</u>		USGS Quad: <u>Fort Jackson North</u>
Latitude: <u>34°3'19.37"N</u>		Longitude: <u>80°55'23.725"W</u>		County: <u>Richland</u>
Date: <u>8/4/14</u>		Time: <u>3:00 pm</u>		Investigator: <u>McMaster/Mulholland</u>
Stream width: <u>8.0'</u>		Stream Depth: <u>1.5'</u>		Length of Stream Reach: <u>~900'</u>
Has it rained within the past 48 hours? <u>Yes</u>		Adjacent land use? (Industrial, agriculture, etc): <u>Roadway</u>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3.Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 10.5

NOTES/COMMENTS: Stream is fed by one linear conveyance and terminates at a culvert.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: S15		Basin/Watershed: Congaree (03050110)		USGS Quad: Fort Jackson North
Latitude: 34°4'43.307"N		Longitude: 80°56'11.631"W		County: Richland
Date: 8/6/14		Time: 4:20 pm		Investigator: McMaster/Mulholland
Stream width: 6.0'		Stream Depth: 0.5'		Length of Stream Reach: ~111'
Has it rained within the past 48 hours? No		Adjacent land use? (Industrial, agriculture, etc): Roadway		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1. Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2. Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3. Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9. Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10. Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 10.5

NOTES/COMMENTS:

Stream branches and consists of a 78.0 LF main channel and a 33.0 LF branch.

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: <i>Jackson Creek (s18)</i>		Basin/Watershed: <i>Congaree (03050110)</i>		USGS Quad: <i>Fort Jackson North</i>
Latitude: <i>34°5' 17.208" N</i>		Longitude: <i>80°56' 57.215" W</i>		County: <i>Richland</i>
Date: <i>8-5-14</i>		Time: <i>1600</i>		Investigator: <i>Jamison</i>
Stream width: <i>20-40'</i>		Stream Depth: <i>5-8'</i>		Length of Stream Reach: <i>~500'</i>
Has it rained within the past 48 hours? <i>no</i>		Adjacent land use? (Industrial, agriculture, etc): <i>roadway, forested</i>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1. Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2. Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3. Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7. Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9. Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10. Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 10.5

NOTES/COMMENTS: *originally s210; passes below I-77 bridge; channel appears to be dredged and straightened; little to no riffle/pool complex; flows west perpendicular to I-77*

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: <i>s19 upstream</i>		Basin/Watershed: <i>Congaree (03050110)</i>		USGS Quad: <i>Fort Jackson North</i>
Latitude: <i>34°5' 45 835" N</i>		Longitude: <i>80°57' 19 122" W</i>		County: <i>Richland</i>
Date: <i>8-7-14</i>		Time: <i>0900</i>		Investigator: <i>Jamison</i>
Stream width: <i>6'</i>		Stream Depth: <i><1'</i>		Length of Stream Reach: <i>~200'</i>
Has it rained within the past 48 hours? <i>no</i>		Adjacent land use? (Industrial, agriculture, etc): <i>roadway, forested</i>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3.Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 5

NOTES/COMMENTS: originally s211; inside the interchange; channel is concrete-lined with no riffle/pool complex; flows southeast

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: <i>Cumbess Creek s23/s24</i>		Basin/Watershed: <i>Lower Broad (03050106)</i>		USGS Quad: <i>Fort Jackson North</i>
Latitude: <i>34°6' 24.215" N</i>		Longitude: <i>80°57' 44.581" W</i>		County: <i>Richland</i>
Date: <i>8-6-14</i>		Time: <i>1730</i>		Investigator: <i>Jamison</i>
Stream width: <i>10-12'</i>		Stream Depth: <i>1-3'</i>		Length of Stream Reach: <i>~200'</i>
Has it rained within the past 48 hours? <i>no</i>		Adjacent land use? (Industrial, agriculture, etc): <i>roadway, forested</i>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3.Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 13.5 NOTES/COMMENTS: *originally s219/s214; some riffle/pool complex; flows west; adjacent golf course and some apparent past riparian disturbance*

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name: <i>Crane Creek s26/s28</i>		Basin/Watershed: <i>Lower Broad (03050106)</i>		USGS Quad: <i>Fort Jackson North</i>
Latitude: <i>34°7' 25 129" N</i>		Longitude: <i>80°57' 47 324" W</i>		County: <i>Richland</i>
Date: <i>8-6-14</i>		Time: <i>1100</i>		Investigator: <i>Jamison</i>
Stream width: <i>12-20'</i>		Stream Depth: <i>1-4'</i>		Length of Stream Reach: <i>~400'</i>
Has it rained within the past 48 hours? <i>no</i>		Adjacent land use? (Industrial, agriculture, etc): <i>roadway, forested</i>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3.Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 14.25

NOTES/COMMENTS: *originally s215; large perennial stream with well-formed riffles and pools*

LOW GRADIENT STREAM ASSESSMENT DATA SHEET				
Stream Name <i>s29</i>		Basin/Watershed: <i>Lower Broad (03050106)</i>		USGS Quad: <i>Blythewood</i>
Latitude: <i>34°7' 38 252" N</i>		Longitude: <i>80°57' 44.692" W</i>		County: <i>Richland</i>
Date: <i>8-6-14</i>		Time: <i>1400</i>		Investigator: <i>Jamison</i>
Stream width: <i>4'</i>		Stream Depth: <i>0.5'</i>		Length of Stream Reach: <i>~200'</i>
Has it rained within the past 48 hours? <i>no</i>		Adjacent land use? (Industrial, agriculture, etc): <i>roadway, forested</i>		
Habitat	Condition Category			
Parameter	Fully Functional	Partially Impaired	Impaired	Very Impaired
1.Epifaunal Substrate or Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat lack of habitat is obvious; substrate unstable or lacking.
SCORE	2.0	1.5	1.0	0.5
2.Pool Substrate Characterization	Mix of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mix of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan, clay, or bedrock; no root mat or vegetation.
SCORE	2.0	1.5	1.0	0.5
3.Pool variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	2.0	1.5	1.0	0.5
4.Sediment Deposition	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	2.0	1.5	1.0	0.5
5.Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	2.0	1.5	1.0	0.5
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization (greater than past 20 yr.) may be present, but recent channelization not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	2.0	1.5	1.0	0.5
7.Channel Sinuosity	The bends in the stream increase the stream length 3-4X longer than if it was in a straight line (If braided channel, this parameter is difficult to rate.)	The bends in the stream increase the stream length 2-3X longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	2.0	1.5	1.0	0.5
8.Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosion scars.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
9.Vegetative Protection	>90% of SB surfaces and adjacent riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes. minimal or no evidence of grazing or mowing; almost all plants allowed to grow naturally	70-90% of the SB surfaces covered by native vegetation but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential more than 1/2 of potential plant stubble height remaining	50-70% of SB covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than 1/2 potential plant stubble height remaining.	<50% of SB surfaces covered by vegetation; disruption of SB vegetation is very high; vegetation has been removed to 5 cm. or less in average stubble height.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25
10.Riparian Veg Zone Width	Width of riparian zone >18 meters; human activities (roads, clear-cuts, lawns, crops, parking lots) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	Left Bank 1.0	0.75	0.50	0.25
SCORE	Right Bank 1.0	0.75	0.50	0.25

Total Score: 8.5

NOTES/COMMENTS: *originally s216; stream is ditched at pipe outlet, with recent maintenance activities having affected bedload and vegetative cover; runs and pools have lots of sand deposition; perennial flow*



ENVIRONMENTAL RE-EVALUATION FORM

FHWA South Carolina

State File # P027002

Fed Project # N/A

Project ID P027002

Route I-77

County Richland

Project Name/Description

The proposed project will widen I-77 from Percival Road (SC 12) to Killian Road in Richland County in both directions. In addition, the pavement would be rehabilitated from Two Notch Road (US 1) to Killian Road. The roadway would also be rehabilitated on the southbound lanes from Killian Road to Blythewood Road (S-59).

1. DOCUMENT TYPE: ☐ EIS ☐ EA ☒ CE (non Programmatic) ☐ PCE (No FHWA Approval Required)

A. Other Actions Associated with the Project:

- ☐ Section 4(f) Evaluation
☐ Section 106 Compliance
☐ Wetland Finding/Section 404 Compliance
☒ T & E Species Biological Assessment
☐ None

2. DOCUMENT APPROVAL DATE:

June 2, 2015

3. DATE(S) OF PRIOR RE-EVALUATIONS:

4. PROJECT DEVELOPMENT STAGE:

- ☐ Final Design
☐ ROW
☒ Construction
☐ Other, Specify

5. HAS DESIGN OR ROW CHANGED SINCE THE LAST APPROVAL?:

(if "NO" then Go To Item 7)

☐ YES

☒ NO

6. DESCRIPTION OF CURRENT PROJECT/DESIGN CHANGES:

The endangered plant species, Michaux's Sumac, was not listed for Richland County at the time the biological survey was conducted in August 2014. Later in 2015 it was added to the USFWS endangered species list for Richland County. Therefore, a survey was conducted with a finding of "no effect". See attached report.

7. HAVE THERE BEEN SIGNIFICANT CHANGES IN THE AFFECTED ENVIRONMENT OR HAVE THE ENVIRONMENTAL STUDIES BEEN UPDATED SINCE THE LAST PROJECT APPROVAL?: (If "NO" to both Items 5 and 7, Go To Item 10)

☒ YES☐ NO

8. APPROVED DOCUMENT(S) RE-EVALUATION:

A. REVIEW OF EFFECTS: (Complete this section if "YES" to either Item 5 or Item 7)

SOCIAL ENVIRONMENT

CHANGE

REMARKS

- | | | |
|--------------------------|------------------------------|--|
| 1. Land Use | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Community | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Relocations | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Churches/Institutions | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. Title VI/E.O. 12898 | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Economic | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Controversy | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 8. Other; Specify | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

NATURAL ENVIRONMENT

CHANGE

REMARKS

- | | | |
|-----------------------|---|--|
| 1. Wetlands | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Water Quality | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Wild/Scenic Rivers | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Farmland | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. T & E Species | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
| 6. Floodplains | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Other; Specify | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Survey for Michaux's Sumac, see attached.

PHYSICAL ENVIRONMENT

CHANGE

REMARKS

- | | | |
|-----------------------------|------------------------------|--|
| 1. Noise | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 2. Air Quality | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 3. Energy/Mineral Resources | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 4. Construction/Utilities | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 5. UST's | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 6. Hazardous Waste Sites | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| 7. Other; Specify | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Environmental Re-evaluation Form:

CULTURAL ENVIRONMENT	CHANGE	REMARKS
1. Historic Sites	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
2. Archaeological Resources	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
7. Other; Specify	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	

PERMITS	CHANGE	REMARKS
1. U.S. Coast Guard	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
2. Forest Service/USACE/USFWS Land	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
3. Section 404	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
4. Other; Specify	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	

Have the required permits been obtained? ☐ YES ☒ NO

If "YES" what is the expiration date?

***If permits have expired, permits will need updated and attached to re-evaluation.**

9. NEED FOR PUBLIC INVOLVMENT:

☐ A public hearing/public information meeting was held for the project on:

☒ There have been no changes in project design or environmental effects which would require a public hearing [or additional public hearing if one has already been held] or public information meeting.

☐ The change(s) in project design and/or effects require(s) an additional public hearing/public information meeting. The meeting is scheduled for:

10. FINDINGS/CONCLUSIONS:

☐ Based on the analysis contained in this re-evaluation, it has been determined that the change in project design and/or environmental effects would not significantly alter the conclusions reached in the approved environmental document and/or previous re-evaluation(s).

☒ There have been no changes in the design/ROW of this project nor have there been changes in project effects or the affected environment. Therefore, the conclusions reached in the approved environmental document and/or previous re-evaluation(s) remain valid.

Prepared By: Date:

For Non Programmatic CEs:

Concurred (FHWA): Date:

Biological Survey of Michaux's Sumac for the I-77
Widening from Percival Road (MM 15) to Killian Road (MM 22) and
Rehabilitation of I-77 Southbound Lanes from MM 22-27 in
Richland County, S.C.
P027002
October 25, 2016

Pursuant to Section 7 of the Endangered Species Act a field survey was conducted for Michaux's sumac (*Rhus michauxii*) on the proposed project.

Methods

The project area was examined by GIS and reconnaissance methods on October 24, 2016. Habitats analyzed were determined by Michaux's sumac's ecological requirements.

Results

The project consists of widening I-77 from Percival Road (MM 15) to Killian Road (MM 22) and rehabilitating the I-77 southbound lanes from MM 22-27 in Richland County, S.C. The project corridor consists of urban commercial and residential development with scattered forest. The project right of way consists predominately of mowed grass, along with species such as loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), groundsel-tree (*Baccharis halimifolia*), smooth sumac (*Rhus glabra*), winged sumac (*R. copallinum*), grape (*Vitis* sp.), and goldenrod (*Solidago* sp.).

According to the Heritage Trust database of endangered, threatened and rare species, Michaux's sumac has not been found in the vicinity of the project. Michaux's sumac lives in sandy or rocky open woods, possibly associated with basic soils. The project corridor is poor habitat for Michaux's sumac. Although smooth sumac (*Rhus glabra*) and winged sumac (*R. copallinum*) were found, no specimens of Michaux's sumac were observed.

Based on lack of suitable habitat, no historical occurrences in the area, and no observations of Michaux's sumac during the field survey, results of the threatened and endangered species study indicate that the proposed action will not affect Michaux's sumac.

Jeffrey West

October 25, 2016



United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

March 15, 2001

Ms. Blanche Sproul
SCDOT
P.O. Box 191
Columbia, South Carolina 29202-0191

Re: Concurrence on "No-Effect" Biological Assessments
FWS Log No. 4-6-01-I-176

Dear Ms. Sproul:

We have reviewed the information received February 12, 2001 concerning the above-referenced topic for "no-effect" biological assessments in South Carolina. The following comments are provided in accordance with section 7 of the Endangered Species Act, as amended (16 U.S.C. 1531-1543) (Act).

To comply with section 7 of the Act, the Federal agency (e.g., Federal Highways Administration) must conduct an analysis of the proposed project for potential impacts to Federally protected species. Using this analysis, the Federal agency (or its designated non-Federal representative - SCDOT) makes a determination of effect for Federally protected species. The Federal agency must make one of the following determinations: (1) no effect; (2) is not likely to adversely affect, or (3) is likely to adversely affect. "No effect" is the appropriate conclusion if the proposed action will not affect listed species. "Is not likely to adversely affect" is the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. "Is likely to adversely affect" is the appropriate conclusion if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions. (50 CFR 402). If a "no effect" determination is made, the Federal agency is not obligated to contact the Service for concurrence. If a "not likely to adversely affect" determination is made, the Federal agency must contact the Service for written concurrence. If a determination of "likely to adversely affect" is made, the Federal agency must initiate formal consultation with the Service (See 50 CFR 402 for additional information).

This is your future. Don't leave it blank. - Support the 2000 Census.

Your interest in ensuring the protection of endangered and threatened species is appreciated. If you have any questions please contact Ms. Lori Duncan of my staff at (843) 727-4707 ext. 21. In future correspondence concerning the project, please reference FWS Log No. 4-6-01-176.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Roger Banks", written in a cursive style.

Roger L. Banks
Field Supervisor

RLB/LWD

cc: Mr. Ken Myers, Federal Highway Administration