

# On-site Mitigation Design

Project Development and  
Environmental Analysis Branch



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## **Purpose**

The purpose of this procedure is to guide the project engineer through the design phase for mitigation sites, including instructions on outsourcing.

## **Responsibility**

The NEU Engineering Group (NEU-EG), Hydraulics Unit, and the Indirect and Cumulative Impacts (ICI) Group, are responsible for the design of mitigation sites. These units establish the design requirements for all wetland, stream, buffer, and conservation mitigation sites throughout the Department.

## **Scheduling and Time Constraints**

The ICI Group submits a request for input from the NEU-EG once potential on-site mitigation areas are identified. This request will occur after Concurrence Point 4B for Merger projects. The design plans must be completed 12 months prior to the permit application date for R, U, I, and W projects and 6 months prior to the permit application date for bridge replacement projects to be included in the final on-site mitigation advertisement.

## **Procedures**

- Step 1.** The ICI Group will submit a request to the NEU-EG Supervisor for input on the potential on-site mitigation areas that have been identified along, or adjacent to, the proposed roadway corridor. For Merger projects it will occur after the Concurrence Pt. 4B meeting. The request should include a brief description of the project, along with the type of input that is requested for the project.
- Step 2.** The NEU-EG Supervisor will assign the project to the appropriate staff within the group. The NEU-EG project manager is responsible for providing input to the ICI Group involving site design constraints, construction issues, and post-construction monitoring activities.

- Step 3.** The ICI Group and the Hydraulics Unit will coordinate to determine which potential sites should move forward and the method in which they will be investigated. The methods are:
- Hydraulics Unit “in-house” – The Hydraulics Unit will complete the design of the mitigation site(s) and the NEU-EG will provide comments on the design.
  - Hydraulics Unit “on-call” consultant – The Hydraulics unit will utilize one of their on-call consultants to complete the design. The NEU-EG will provide assistance in the development of the scope, task list, and man-day estimate. The NEU-EG and the ICI Group will provide comments on the design.
  - NEU “in-house” – The NEU-EG will complete the design with assistance from the Hydraulics Unit and the ICI Group.
  - NEU “on-call” consultant – The NEU-EG will use one of its on call consultants to complete the design. The Hydraulics Unit will assist in the development of the scope, task list, and man-day estimate.
  - Transportation Program Management Unit Design-Build – The NEU-EG and the Hydraulics Unit will coordinate with the TPMU to develop a scope of work to be included in the Design-Build Package. The NEU-EG and the Hydraulics Unit will review the design completed by the Design-Build firm chosen by the TPMU.
  - Reference the examples of Scope of Work and Man-day Estimates found under the Resources and Tools Section.
- Step 4.** If a NEU “on-call” consultant will be performing the work, they will coordinate with NEU-EG and/or the Hydraulics Unit to develop a scope of work and task list for producing designs and construction plans. Once the scope of work and task list is finalized the Consultant will prepare and submit a cost estimate to the appropriate contact person within the Natural Environment Unit (not directly to the NEU-EG). The NEU-EG project manager will also prepare and submit a cost estimate to the appropriate contact person. The cost estimates must compare within 5% on man-days and 10% total costs. If the cost estimates do not meet these 2 criteria, the NEU-EG must negotiate with the Consultant to bring the both the man-days and total costs to within the required criteria.
- Step 5.** The NEU-EG and Hydraulics Unit then determine how to incorporate the design into the roadway project. Depending on the size of the mitigation sites, the design can be included as part of the final roadway design plan sheets or the design can be completed as a separate set of plan sheets that will be attached to the roadway design plan sheets. Coordinate with the Roadway Design Unit (RDU) to ensure that the plans are included regardless of the chosen method. The decision on how to incorporate the plans needs to be addressed before a consultant is chosen. Coordinate with the Roadside Environmental Unit (REU) to ensure that the special Provisions and quantities are included in the roadway plans.
- Step 6.** Prepare the draft design plans using the method chosen in Step 3. All plan sheets shall adhere to the NCDOT Highway Design Manual. The manual is located at the following website:  
<http://www.doh.dot.state.nc.us/construction/ps/contracts/default.htm>
- Step 7.** At a minimum, the following design requirements should be included in the design for the specified type of mitigation.
- Wetland, Buffer, and Conservation Mitigation Sites
- Plan
    - Base line survey data

- Existing ditches (if applicable)
- Existing streams (if applicable)
- Existing wetland boundaries (if applicable)
- Proposed swales or channel blocks (if applicable)
- Property boundary- Proposed slope stake lines
- Target elevation for wetland site
- Typical Sections
  - Typical section showing existing ground and proposed grade
  - Typical section of swales (if applicable)
- Cross Sections
  - Cross Sections at intervals specified by the NEEG
- Details & Special Provisions
  - Use applicable standard details and special provisions that have been developed by the Hydraulics Unit and NEU. Standard details are available in the Hydraulics Unit Microstation Workspace. Special Provisions are available at the following website:  
[NCDOT Natural Environmental Unit – Special Provisions](#)
- Miscellaneous
  - Reforestation Plans and Specifications
  - Erosion Control Plans and Specifications
  - [NCDOT Roadside Environmental Unit: Soil & Water Section](#)

#### Stream Mitigation and Stream Relocation Sites

- Plan
  - Proposed stream alignment
  - Existing stream alignment
  - Structure locations
  - Slope stake lines (stream and floodplain, if applicable)
  - Stationing on stream sections
  - Property boundary
- Profile
  - Thalweg profile
  - Grade control structure locations and elevations
  - Appropriate Riffle/pool sequence as referenced in morphological table
  - Scale
- Typical Sections
  - Typical riffle and pool sections, with depths and widths (bankfull channel depth, bankfull width, bottom of channel width, and side slopes, floodplain dimensions)
  - Typical structure placement relative to channel geometry

- Cross-sections
  - Cross-sections of new channel
- Details and Special Provisions
  - Use applicable standard details and special provisions that have been developed by the Hydraulics Unit and NEU. Standard details are available in the Hydraulics Unit Microstation Workspace. Special Provisions are available at the following website:  
[NCDOT Natural Environmental Unit – Special Provisions](#)
- Morphological Table
  - Include morph table in plans
- Curve data
  - Curve data to stake out channel section (coordinates on head and tail of riffle, radius length, angle, etc)
- Miscellaneous
  - Reforestation Plans and Specifications.
  - Erosion Control Plans and Specifications

**Step 8.** Upon completion of the draft design plans, the Hydraulics Unit, ICI Unit, and NEU-EG will review the proposed design and provide written comments to the established method of design. This review will take place prior to the 4c Merger Meeting.

**Step 9.** Revisions will be incorporated in the design plans for inclusion at the 4c Merger Meeting. The NEU-EG will work with the ICI Group to complete the draft Mitigation Plan for the proposed mitigation. A consultation will be held with REU to coordinate all vegetation issues included in the mitigation plan.

**Step 10.** The draft mitigation design and draft mitigation plan will be presented by the Hydraulics Unit at the 4c Merger Meeting. The ICI Group and NEU-EG will also attend the 4c Merger Meeting. After the 4c meeting, the regulatory agencies have the option of reviewing the proposed designs in the field as the final plans are prepared.

**Step 11.** Prepare a preliminary engineers estimate when the mitigation design plans are 60% complete so that a request for appropriate funding can be submitted and is available for construction of the mitigation site. Refer to the sample Preliminary Engineers Estimate under [Resources and Tools](#) for additional guidance. The estimate is used for internal funding and is not presented at the 4c merger meeting.

**Step 12.** The NEU-EG shall submit a request for funding to the Program Development Branch, based on the preliminary estimate. If it is determined that State Forces will perform the construction, the funding request must contain detailed information to justify the use of State Forces versus contract construction. Refer to the example Request Letters under [Resources and Tools](#) for the two different construction options.

**Step 13.** Prepare the final design plans. The NEU-EG will be responsible for submitting the final quantities to REU and coordinating with REU to ensure that the appropriate special provisions and individual bid items for the mitigation sites are included in the bid contract document. All erosion control design plans, special provisions, reforestation plans, and planting details will be developed and included in the final

roadway plan set by the Roadside Environmental Unit. Examples of the different types of mitigation plans are found under the [Resources and Tools](#) section.

**Step 14.** Upon Completion of the final plans, the NEU-EG will develop a Final Engineer's Estimate based on the final quantities. This estimate will be used to compare bids received from contractors.

## **Background**

The Natural Environment Engineering Group (NEEG) is a multi-discipline group of engineers that are involved in the planning, design, construction, monitoring, and remediation of on-site and/or adjacent wetland, buffer, stream, and conservation mitigation sites, statewide. These mitigation efforts are a result of unavoidable environmental impacts associated with roadway construction projects. The projects are used for compensatory mitigation to offset unavoidable environmental impacts pursuant with State and Federal Environmental Law and Guidelines. The mitigation projects are closely coordinated with several different internal Department Units, as well as State and Federal Environmental Regulatory Agencies, adjacent property owners, and the local citizens.

## **Policy, Regulatory, and Legal Requirements**

- [US Army Corps of Engineers-Wilmington District - Mitigation](#)

## **Warnings and Precautions**

- None

## **Resources and Tools**

- [Example Funding Request Letter for State Forces](#)
- [Example Funding Estimate for State Forces](#)
- [Example Funding Request Letter for Contract Construction](#)
- [Example Funding Estimate for Contract Construction](#)
- Example Wetland Mitigation Plans (future link)
- Example Stream Mitigation and Restoration Plans (future link)
- [Example of Preliminary Engineer's Estimate](#)
- [Example of Final Engineer's Estimate](#)
- [Example Scope of Work for Wetland Mitigation Plans](#)
- [Example Man-day Estimates for Wetland Mitigation Plans](#)
- [Example Scope of Work for Stream Mitigation Plans](#)
- [Example Man-day Estimates for Stream Mitigation Plans](#)

## **Contacts**

- For suggestions to change this procedure contact: Karen Capps (919) 431-2003
- For questions about performing this procedure contact: Randy Griffin (919) 431-6529

## ***User Access***

- Restricted NCDOT, FHWA, MPO, RPO, Consultants, etc.

## ***Flowchart***

- None