Maintaining Flexibility and Options in Alternatives Development: A Case Study of the Successful Use of Modeling, Agency Coordination and Public Involvement to Determine the Least Environmentally Damaging Practicable Alternative for a 17-Mile Transportation Project

By

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Introduction

This paper explores the alternatives development process for a North Carolina Department of Transportation new location roadway project. The case study will identify how potential project conflicts were avoided or resolved through a commitment to a comprehensive evaluation of a full range of alternatives, frequent agency and public coordination and maintaining flexibility. This approach reduced the length of time typically needed for a project of this size to reach the selection of the Least Environmentally Damaging Practicable Alternative by approximately 40 percent and will help to streamline the permitting process.

Project Background

North Carolina State Transportation Improvement Program (STIP) projects U-4751 and R-3300 involve the construction of Military Cutoff Road Extension in New Hanover County and the US 17 Hampstead Bypass in New Hanover and Pender Counties. A Draft Environmental Impact Statement (DEIS) was prepared for both projects in accordance with the National Environmental Policy Act of 1969, as amended (42 United States Code 4321-4327), as codified in Title 40 of the Code of Federal Regulations Parts 1500-1508 and the North Carolina Environmental Policy Act of 1971, as amended (North Carolina General Statutes Article I Chapter 113A), as codified in the North Carolina Administrative Code, Title 1, Chapter 25.

During project development it was recognized that projects U-4751 and R-3300 may share a common terminus. Because they may be adjoining new location projects and together they would have a cumulative impact on the human and natural environment, it was decided that the two projects should be addressed in a single document. The combined DEIS provides a way to communicate all direct and indirect impacts the projects would have on the environment, as well as the cumulative impact resulting from the incremental impacts of the two projects when added to other past, present, and reasonably foreseeable future actions. The combined projects are referred to as the "US 17 Corridor Study." The project vicinity and study area are shown below.

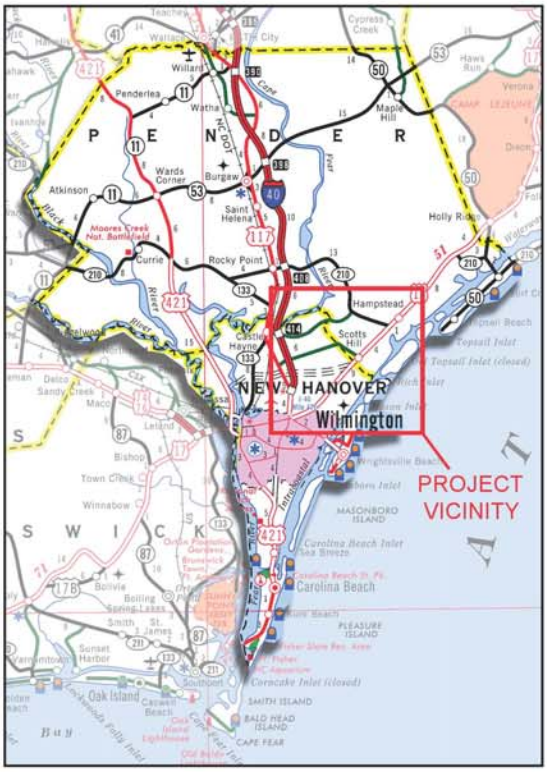
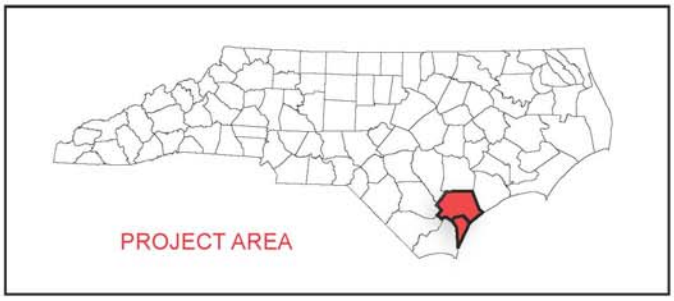


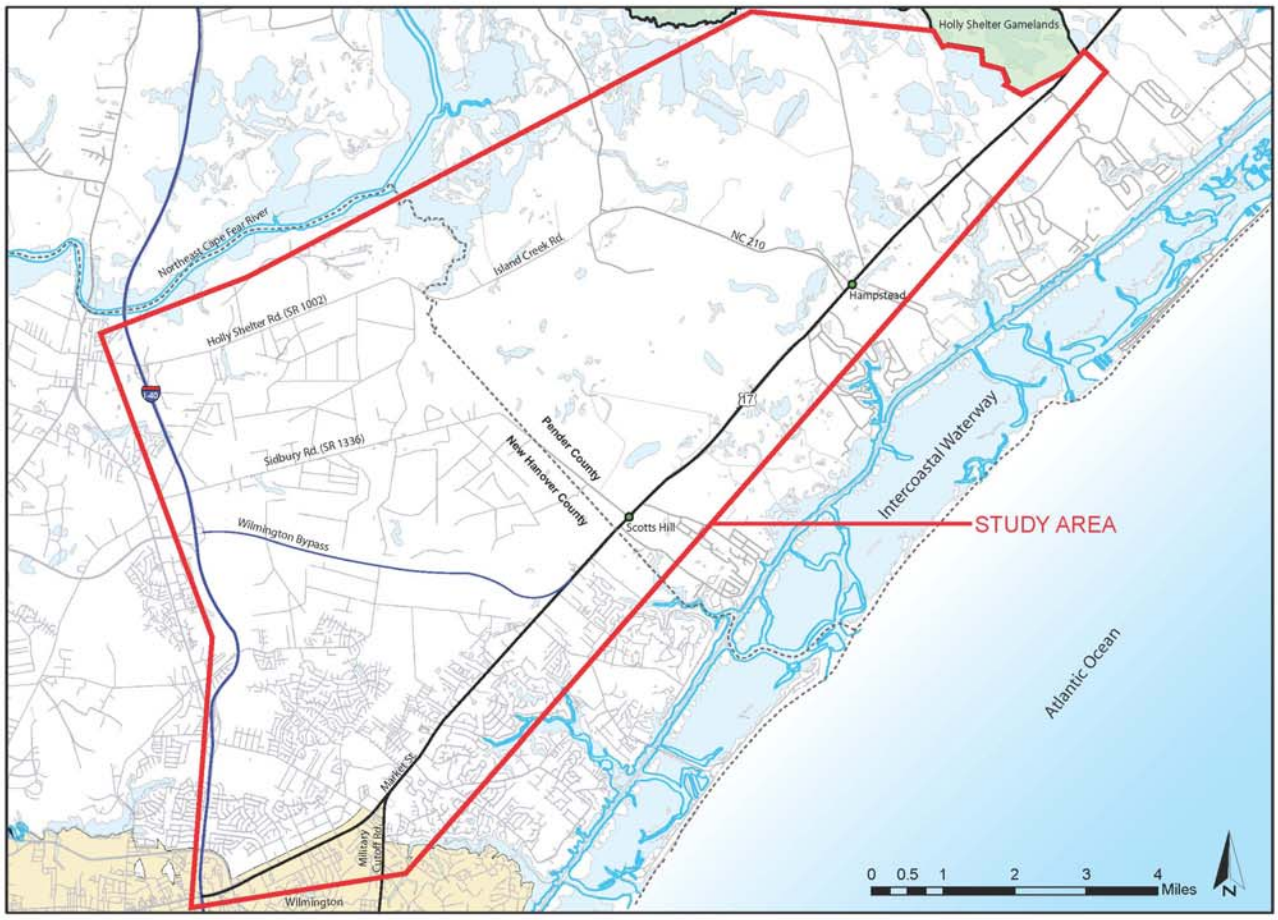
Figure 1

PROJECT VICINITY

US 17 Corridor Study
NCDOT TIP Nos. U-4751 and R-3300
New Hanover and Pender Counties

North Carolina
Department of Transportation





For project U-4751, the North Carolina Department of Transportation (NCDOT) proposes to extend Military Cutoff Road as a six-lane divided roadway on new location from its current terminus at US 17 (Market Street) in Wilmington north to an interchange with the US 17 Wilmington Bypass (John Jay Burney Jr. Freeway). Limited and full control of access is proposed. For project R-3300, NCDOT proposes to construct the US 17 Hampstead Bypass as a freeway mostly on new location. The US 17 Hampstead Bypass may connect to the proposed Military Cutoff Road Extension at the existing US 17 Wilmington Bypass and extend to existing US 17 north of Hampstead. Full control of access is proposed for the US 17 Hampstead Bypass.

The proposed projects are located in the outer Coastal Plain and cross portions of northern New Hanover County and southern Pender County. This part of the Cape Fear River basin is the only coastal area in North Carolina that is accessible by interstate highway, making it a popular destination because of its proximity to the Atlantic Ocean, beaches, and estuarine waters. In the project vicinity, the City of Wilmington is home to one of the state's largest historic districts and the USS North Carolina battleship and memorial. Wilmington and nearby communities of Hampstead, Topsail Island, Wrightsville Beach, Kure Beach, and Carolina Beach offer numerous options for dining, shopping, recreation, and entertainment. The Hampstead area is home to several golf courses and its proximity to numerous coastal communities makes this area a popular second-home and retirement destination.

The southern extent of the study area is characterized primarily by a mix of commercial and residential development. The northern extent includes preserved land, undeveloped forested and wetland areas, several schools, and areas of residential and commercial development.

The purpose of the project is to improve the traffic carrying capacity and safety of the US 17 and Market Street corridor in the study area.

Agency Coordination

North Carolina was experiencing substantial project delays in the project development and permitting processes in the mid-1990's and relationships between NCDOT and the federal and state resource agencies were strained. The Federal Highway Administration (FHWA) suggested that North Carolina consider implementing a merger process to address these problems. Neither

the problems nor the suggested process were unique to North Carolina and FHWA was promoting a merger process as one potential solution.

The concept of a merger process started at the federal level following the passage of the Intermodal Surface transportation Efficiency Act of 1991 (ISTEA). Working together, FHWA, NCDOT and the US Army Corps of Engineers (USACE)-Wilmington District developed North Carolina's first merger process and an Interagency Memorandum of Agreement (MOA) was signed in 1997. A modified agreement incorporating streamlining provisions of the Transportation Equity Act for the 21st Century (TEA-21) was signed in mid-2005 by FHWA, NCDOT, USACE, and the North Carolina Department of Environment and Natural Resources (NCDENR). In 2012 the agreement was again modified to allow Rural Planning Organization participation in the process.

The environmental streamlining strategy "merged" decision-making for two federal regulations: the National Environmental Policy Act (NEPA) and Section 404 of the Clean Water Act (CWA) of 1977, as amended. These two laws have overlapping requirements and are involved with most transportation improvement projects. NEPA requires disclosure of environmental impacts when a major federal action is taken, such as federal funding or permitting by a federal agency. The CWA requires a permit to discharge dredged or fill material into Waters of the United States. The CWA also requires NEPA compliance prior to issuance of a Section 404 permit. Both Acts require identification of a purpose and need, identification of full range of alternatives, and the opportunity for public comment.

The NEPA/Section 404 Merger Process provides substantial benefits for both transportation project delivery and environmental quality in North Carolina. Prior to Merger, NEPA and the CWA were addressed sequentially and problems resulted. Consequences were major redo loops, delays and additional costs. The NEPA/Section 404 Merger Process allows for better predictability during permitting, provides an opportunity for early identification of "show-stopper" issues, and allows for more complete information to be provided to all participants, which results in better decisions.

There are two key elements that drive the success of the NEPA/Section 404 Merger Process. First is the use of Project Teams and second, the use of processes that include a series of

coordination/approval steps called “Concurrence Points”. The Project Team is made up of individuals from regulatory and resource agencies along with NCDOT, FHWA and others. These individuals have delegated decision-making authority through the formal signed Merger Process Agreements.

Agencies with regulatory authority and some of the laws they cover relevant to transportation projects include:

- USACE (Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act)
- NCDENR (Section 401 of the Clean Water Act, NC Buffer Rules, NC Coastal Area Management Act)
- EPA (Sections 404q and 401 of the Clean Water Act, Section 309 of the Clean Air Act)
- US Coast Guard (Section 9 of the Rivers and Harbors Act)
- FHWA (funding authority, Section 4(f) of the Transportation Efficiency Act of 1966, Section 106 of the National Historic Preservation Act, etc.)

Examples of other laws and legal authorities include:

- Fish and Wildlife Coordination Act: US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA)-Fisheries, NC Wildlife Resources Commission (NCWRC), NC Division of Marine Fisheries (NCDMF)
- Historic Preservation Act: NC State Historic Preservation Office (NCSHPO)
- Endangered Species Act (USFWS, NOAA-Fisheries)
- Special Use Permits (USFWS, National Park Service, US Forest Service, Tennessee Valley Authority)

As noted above, the second key element that drives the success of the NEPA/Section 404 Merger Process is the use of procedures that include a series of coordination/approval steps called “Concurrence Points”. The Project Team has scheduled meetings at critical decision points. Each team member and the agency that he/she represents agrees to the decisions made at these

points in the project development process and by doing so, pledges to abide by the decision made barring a profound changed condition.

Concurrence points in the NEPA/Section 404 Merger Process for new location projects are:

- Concurrence Point 1 – Purpose and Need and Study Area Defined
- Concurrence Point 2 –Detailed Study Alternatives Carried Forward
- Concurrence Point 2A – Bridging Decisions & Alignment Review
- Concurrence Point 3 – LEDPA/Preferred Alternative Selection
- Concurrence Point 4A – Avoidance and Minimization
- Concurrence Point 4B – 30 Percent Hydraulic Review
- Concurrence Point 4C – Permit Drawings Review

The US 17 Corridor Study has followed the NEPA/Section 404 Merger Process. The agencies represented on the project's Team are:

- US Army Corps of Engineers
- US Environmental Protection Agency
- US Fish and Wildlife Service
- National Marine Fisheries Service
- NC Division of Coastal Management
- NC State Historic Preservation Office
- NC Division of Marine Fisheries
- NC Division of Water Quality
- NC Wildlife Resources Commission
- NC Department of Transportation
- Wilmington Metropolitan Planning Organization

The NEPA/Section 404 Merger Team for the US 17 Corridor Study agreed on the purpose of and need for the project at their September 21, 2006 meeting.

Alternatives Development

Overview

More than 20 preliminary build alternatives were established through an evaluation of suitability mapping based on available socioeconomic, cultural, and environmental resource data. Preliminary build alternatives that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified as detailed study alternatives. The detailed study alternatives selection process incorporated recommendations made by federal and state environmental regulatory and resource agencies and comments received from the public. Project alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis. Six detailed study alternatives were evaluated in the Draft EIS.

Preliminary Corridors

Potential corridor alternatives were screened for suitability based on several criteria, including meeting the purpose of and need for the proposed project, minimizing impacts to resources, and consideration of community features. Geographic information system (GIS) data and modeling, aerial photography and observations from field visits were used in the analysis. Corridor centerlines were drawn to reflect alignments that minimized impacts. Impacts were calculated by section for each alignment and the sections with the least overall impacts were retained and combined into alignment alternative segments.

The segment centerlines were buffered and several 1,000-foot corridor alternatives were generated by merging the segments in different combinations. Roadway alignments were developed and placed within the 1,000-foot corridors to minimize impacts to resources, provide a roadway that is constructible, and cross roads, streams and utility easements at a reasonable angle.

Modeling Process Overview

ArcGIS software and the Spatial Analyst extension, developed by Environmental Systems Research Institute (ESRI), were used in the development of the preliminary corridors based on a least-cost model utilizing two constraining layers: natural environment and human features.

The least-cost GIS models determine the alternative path that will have the least overall impact, combined with the shortest physical distance, from select start points to termini. A "least-cost best path" was calculated and secondary or multiple paths (corridors) were interpolated from the resultant output.

These paths served as the basis and guide for determining the least constrained area for a new location roadway and which potential alternatives should be presented to the Merger Team for evaluation at the Concurrence Point 2 meeting. The following methodology was used to generate the least-cost paths and corridors.

Base Files and Setup

In order to successfully build and operate the least cost model, natural environment and human base files were created and organized into an overall suitability dataset. Suitability, along with distance, was used to determine the best path for new alignments to cross through from a start point to select termini.

Project Start Points and Termini

Based on discussions with the project team, four termini were identified for inclusion in the model. Along with the project termini, two project start points were identified and used as input into the model. During the modeling process, user defined mid-points and break points could be identified and used as temporary start or termini points.

Suitability Base Files

All environmental, cultural, and community features in the US 17 Corridor Study Area were collected, mapped, and converted to GIS layers weighted and ranked based on their constraining effect on potential corridors by the project team. Each set of feature layers was weighed as an

overall group (i.e. wetlands) and as individual features within that group (i.e. pristine vs. non-pristine wetland). For modeling purposes, the higher weights were considered features with higher constraints on road construction. Special consideration was placed on identifying constraint features which potential alternatives should avoid, if possible (e.g., red-cockaded woodpecker foraging habitat). All features were mapped and depicted at the best scale and accuracy possible.

Natural Environment Features

Natural environment features were collected from the North Carolina Natural Heritage Dataset, North Carolina Floodplain Mapping Program, North Carolina Division of Coastal Management, and the North Carolina Center for Geographic Information and Analysis. The natural environment features have multiple geographic areas in which two separate layers will overlay on top of each other. For example, a pristine wetland may occur in the same geographic location as a significant natural heritage area. In these cases, the files are combined and a weight/score is totaled for the combination of both features.

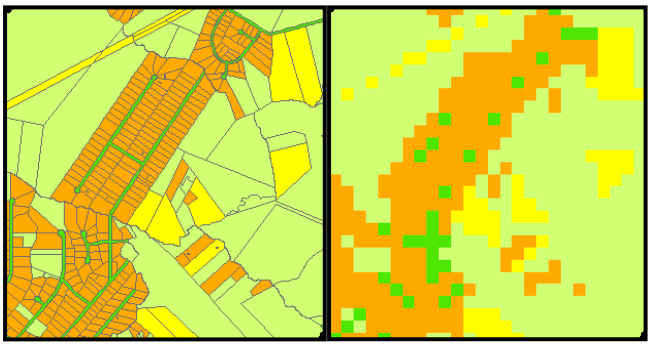
Human Features

Human features were mapped and defined at the parcel level using data files obtained from county data sets. The parcel data was augmented and verified for select features (i.e. churches, cemeteries) during field visits in August and October 2006.

Conversion to Grid

After the natural environment and human vector features were mapped and weighted, they were converted to a raster grid of cells utilizing ESRI's Spatial Analyst Extension. By converting the features to a raster data set, a generalized grid of square cells representing the data was created. This conversion to raster was applied for two reasons. The first is the modeling tools used in ESRI's Spatial Analyst extension require rasterized data. The second reason is the generalized raster files are smaller in file size than vector data, thus allowing for faster processing. A grid size that allowed for the cell data to be detailed enough to represent a real-world manner, but not large enough to obscure important features (e.g., a church on a small lot) was selected. Raster grids were created for both the natural environment and human weighted datasets (see graphic

below). These weighted datasets became the input suitability layers for use in the least-cost modeling.



Base Vector Data File *250-foot Grid Representation*

Suitability Scenarios

Several different scenarios were run using the natural environment and human base files to generate suitable alignments for the US 17 corridor alternatives. Through the weighting and modeling process, a Maximum Constraint scenario was determined as the best option for determining potential corridors, due to the combined weighting of both natural environment and human features. Using the maximum constraint scenario, if an area contained a feature with a weight of six in the natural environment suitability layer and a feature with a weight of two in the human layer, they would be combined to equal eight (and be considered the maximum constraint).

Modeling Runs and Output

Once the base file suitability layers were combined, ESRI's Spatial Analyst was used to generate the least-cost path (constraints and distance) corridors. Project start and end termini were chosen for each model run and the software calculated the weighted cost of each grid cell (250-foot by 250-foot) in terms of its constraint weighting and the distance from the start or termini point. Grid cells were then combined together to provide the least-cost in terms of constraint impact within the shortest physical distance from start to end point.

Two types of output files were created as a result of this preliminary corridor modeling analysis: least-cost paths and least-cost corridors.

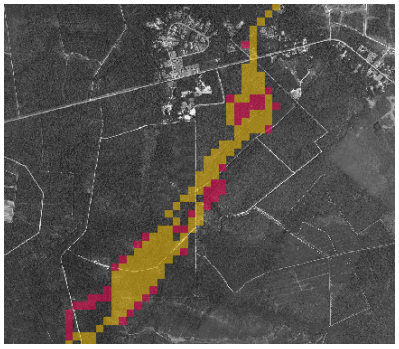
Least-Cost Paths

A least-cost path output is the best single line from start point to termini based on the suitability layer scenarios and physical distance (see graphic below). In a least-cost path model, multiple termini can be modeled in one setting, generating a unique path for each. Depending on the input grid cell of the suitability layers, in this case 250-feet by 250-feet, the output path lines can be jagged and not representative of engineering design criteria. In these cases, the least-cost paths provide a guide the engineer can use and adhere to when possible. The least-cost corridors, described below, provided a more generalized option to the roadway engineers.

Least-Cost Corridors

A least-cost path corridor is a set of cells that fall within a certain threshold percentage of the total score of the single least-cost path described above. In a least-cost corridor model, only one single start point to termini combination can be used. Once the model is run, the resultant output can be displayed as cells within a percentage of the optimum least-cost path score. For this project, cells within one-half percent and one percent of the least-cost path were displayed and saved. When combined, these cells generally provide a corridor wider than the least-cost path in which the engineer can have more options from a design standpoint. The output files were provided to roadway designers for more detailed refinement of the road alternatives.

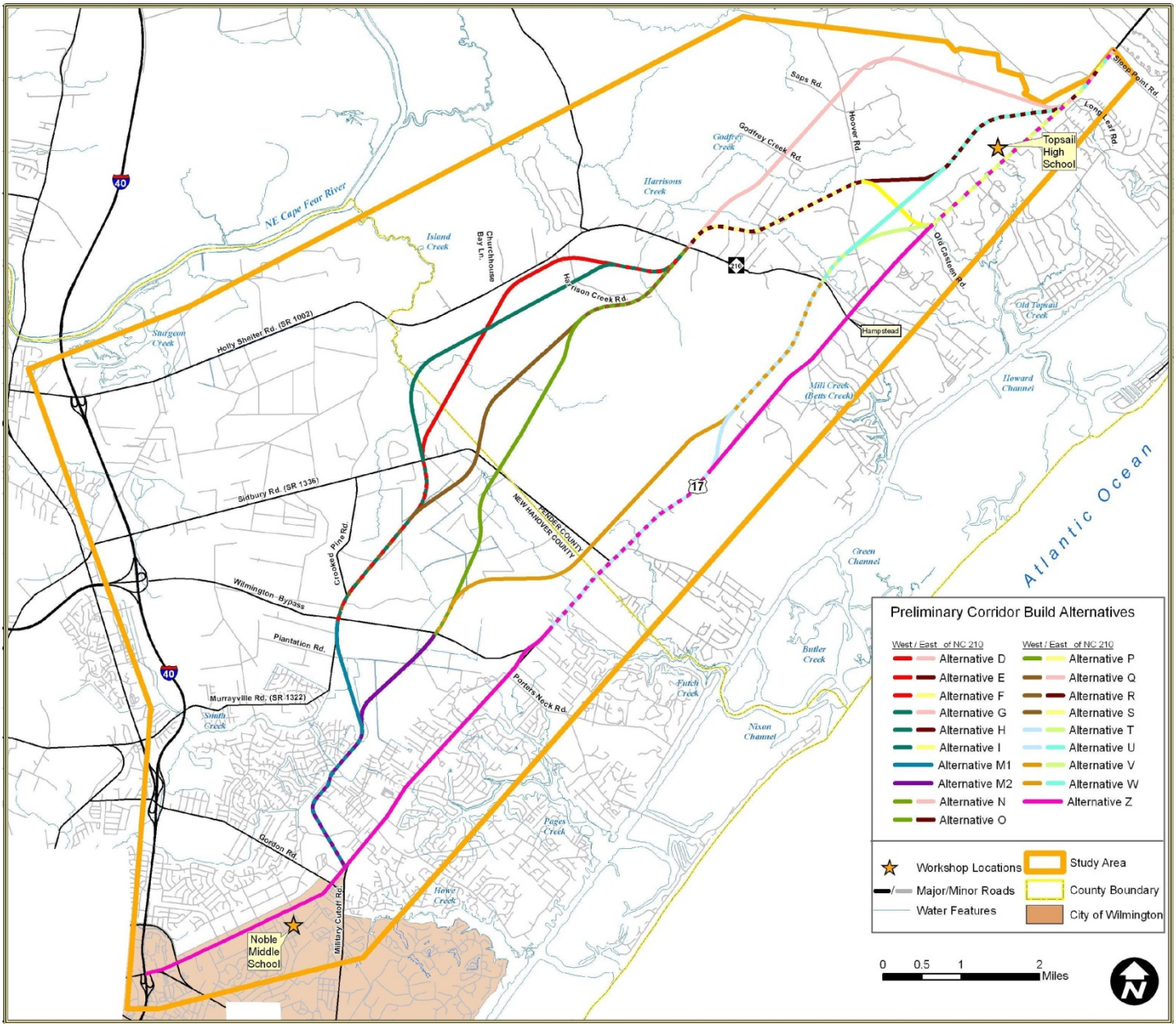
Least-Cost Best Path Alignments



Least-Cost Corridor

An Alternatives Screening Meeting was held with the NEPA/Section 404 Merger Team in February 2007 to review the preliminary alternatives for the US 17 Corridor Study before they were presented to the public. As a result of the meeting, the Merger Team agreed to drop six

alternatives because of potential constructability issues or their ability to meet the purpose and need of the project. The Merger Team requested three new alternatives be added to see if data would show they had fewer impacts than the current preliminary alternatives. The outcome of the meeting was a plan to show the public the range of alternatives NCDOT would consider, with the knowledge the public may add or refine the alternatives, which would then be brought back and filtered down at the NEPA/Section 404 Concurrence Point 2 Merger meeting. The preliminary alternatives shown at the citizens informational workshops are shown below.



NCDOT held two citizens informational workshops in April 2007 to present the Purpose and Need for the project and to review preliminary study corridors. A total of 174 participants signed in at the workshops. In addition to comments made at the meeting, 47 comment forms were submitted. The majority of comments and questions related to project alternatives and what the effects of the proposed project would be on individual properties. Feedback from the public on the specific corridor alternatives was shared with the Merger Team at their next meeting. Also, at the request of citizens, a project-specific website was developed. Additional public involvement conducted as the project progressed included open-house style meetings, formal hearings, several newsletters, a toll-free project information line, a project website, and small group meetings.

Alternatives Refinement

Following the citizens informational workshops, the Merger Team met again in June 2007 to review the preliminary corridor alternatives. At the meeting, team members agreed to drop three alternatives based on residential and business relocations and impacts to cultural resources. However, the USACE wanted to conduct a field visit to evaluate the accuracy of the GIS stream and wetland data prior to eliminating any alternatives based on the level of impacts to those resources. The USACE and NCDOT performed the field review in early August and the full Merger Team met again in late August. At this meeting, the Merger Team combined some corridors because of their proximity to one another. This was done with the understanding the roadway alignment would be placed in best location (constructability and impact minimization) within the combined corridors. The corridor was also expanded at the northern end of the project to allow for flexibility when evaluating avoidance and minimization measures for protected species. The Merger Team agreed to revisit some alternatives at their next meeting after additional data was available.

Project alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis. Preliminary design plans were developed and potential impacts to the human and natural environments were calculated for the remaining corridor alternatives. The NEPA/Section 404 Merger Team next met in the spring of 2010 at a multi-part Concurrence Point 2A meeting (Bridging and Alignment Review). The first

meeting was held in April. The purpose of the meeting was to review detailed study alternatives and discuss hydraulic structure recommendations prior to the field visit segment of the Concurrence Point 2A meeting, which occurred over two days in May 2010.

Federal law (under the provisions of Section 7 of the Endangered Species Act [ESA] of 1973, as amended) requires that any action likely to adversely affect a species classified as federally-protected be subject to review by the USFWS. Prohibited actions which may affect any species protected under the ESA are outlined in Section 9 of the Act. Species which are listed, or are proposed for listing, as endangered (E) or threatened (T) are recorded in Section 4 of the ESA. As defined by the ESA, an endangered species is any plant or animal which is in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

Holly Shelter Game Land is located at the northern end of the study area. The site is managed by the state of North Carolina and is part of a Significant Natural Heritage Area. At over 50,000 acres, Holly Shelter Game Land is one of the highest quality areas of pocosin habitat and savanna flatwoods remaining on the east coast. The project's study area boundary was redrawn at the initial Concurrence Point 1 Merger Meeting (Purpose and Need and Study Area Defined) to eliminate any possibility of the project's encroachment onto the game land.

Red-cockaded woodpecker clusters on Holly Shelter Game Land are part of the Coastal North Carolina Primary Core Recovery Population within the Mid-Atlantic Coastal Plain Recovery Unit Population. The management of the red-cockaded woodpecker, a federally-protected endangered species, is a major function of Holly Shelter Game Land. The red-cockaded woodpecker foraging partitions extend off of Holly Shelter Game Land. There is not enough acreage within Holly Shelter Game Land to support red-cockaded woodpecker per the recovery plan; therefore, habitat outside game land is needed.

Design options for several Hampstead Bypass Alternatives were developed in response to concerns presented by the USFWS during the project development process and Merger Team meetings. The design options minimized impacts to red-cockaded woodpecker by moving the northern interchange near the project's terminus to south and west of its original location. At their April meeting, the Merger Team agreed to drop alternatives where it was not possible to develop an option to minimize impacts to red-cockaded woodpecker and other environmental

features. At this meeting, several other alternatives were also dropped from further study because they had higher impacts than other alternatives to a number of resources including streams, ponds, residential and business displacements, protected species habitat, and High Quality Waters. The NEPA/Section 404 Merger Team reached concurrence on Bridging and Alignment Review on May 27, 2010.

Detailed Study Alternatives

Two alternatives for Military Cutoff Road Extension (U-4751) and four alternatives for Hampstead Bypass (R-3300) were carried forward and studied in detail in the DEIS. Following approval of the DEIS, two Corridor Public Hearings were held for the project. The alternatives still under consideration were presented to the public for their comments at the hearing. Over 380 citizens registered their attendance at the meetings. Of the written comments submitted, approximately 25 percent related to Military Cutoff Road Extension. The remaining 75 percent of the comments pertained to Hampstead Bypass. Of those, most were related to the location of the northernmost interchange for the Hampstead Bypass. Most citizens found that the lack of direct access to the existing roadway from the Bypass at the northern end of the project, which was a direct result of relocating the interchange to avoid potential protected species impacts, was unacceptable.

In response to concerns presented by the public several modifications were incorporated into the project design or are under further review including: an assessment of the northern Hampstead Bypass interchange for a solution that would accommodate the public's needs as well as continue to minimize impacts to protected species; a shift in the Military Cutoff Road Extension design to minimize impacts to a neighborhood; and, the inclusion of a separation between the edge of pavement and bridge rails for local roads elevated over the bypass to accommodate pedestrian traffic, among others.

Least Environmentally Damaging Practicable Alternative

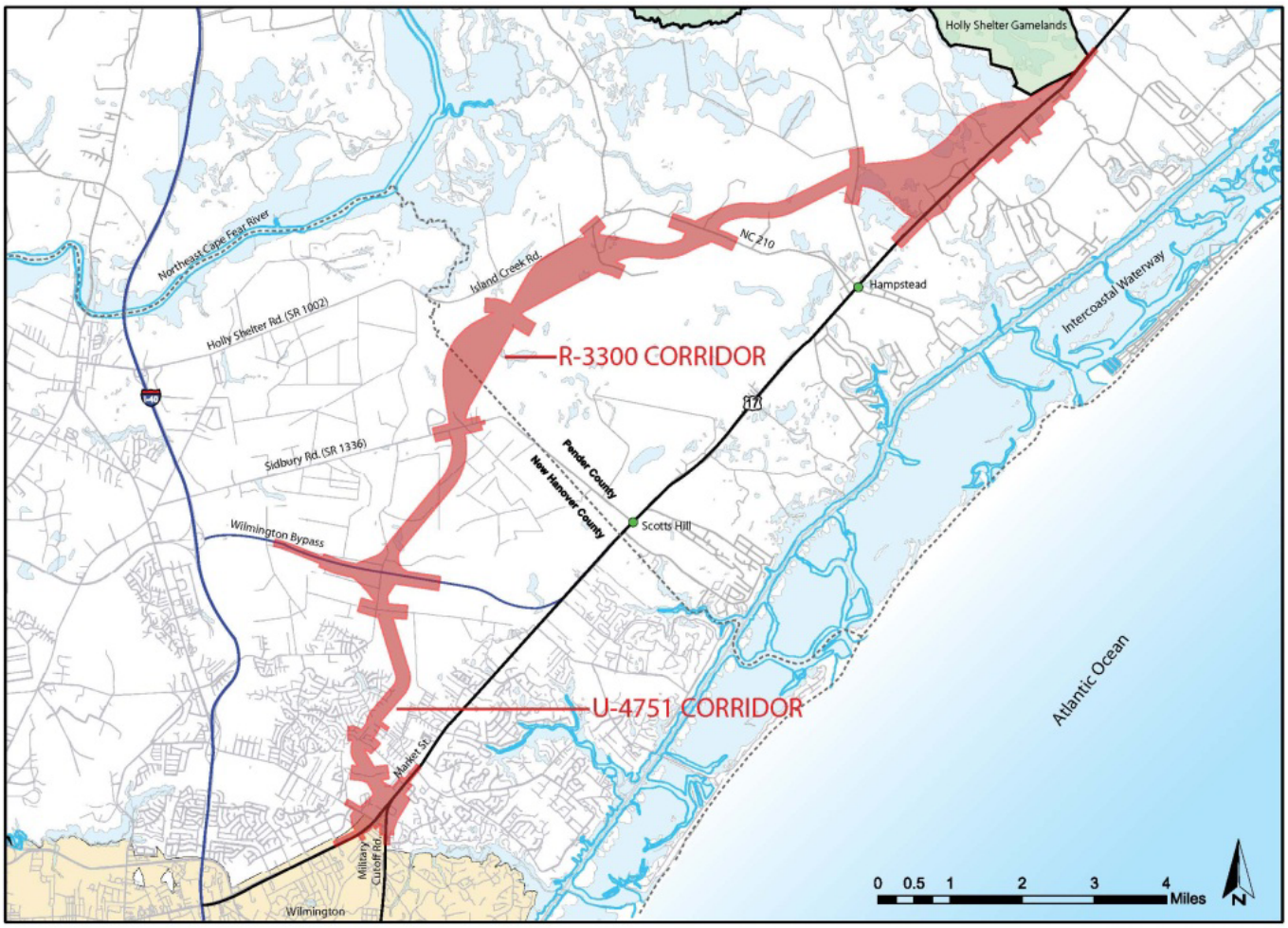
Agency comments on the DEIS covered a range of topics from purpose and need, to wetland and stream impacts, to proposed right-of-way width. The Environmental Protection Agency (EPA)

provided comments expressing concerns regarding the potential impacts of the proposed Military Cutoff Road Extension project on a groundwater water supply system in the project area.

The NEPA/Section 404 Merger Team met in December 2011 to review NCDOT's responses to agency comments on the DEIS, review citizen comments from the public hearings and to identify any additional information needed prior to conducting the Concurrence Point 3 meeting, Selection of the Least Environmentally Damaging Practical Alternative (LEDPA). At the meeting, the Merger Team requested additional information related stormwater pond permits and detailed stream quality information prior to LEDPA selection.

EPA also requested additional information on potential public water supply impacts prior to LEDPA concurrence as Military Cutoff Road Extension alternatives crossed two existing well sites. NCDOT committed to avoid direct impacts to the wells and the 100-foot buffer that must be maintained around the wells. In response to EPA's request, supplemental information was provided on February 9, 2012 in a report titled "Evaluation of Impacts to Public Water Supply Groundwater Wells, US 17 Corridor Study, NCDOT Projects U-4751 & R-3300 (Evaluation)." EPA provided comments on the Evaluation on February 28, 2012. NCDOT conducted further analysis and prepared a memorandum addressing the comments. The memorandum was provided to all Merger Team members prior to the Concurrence Point 3 Merger meeting.

At their next meeting in May 2012, the NEPA/Section 404 Merger Team selected the LEDPA based on a review and comparison of the detailed study alternatives' impacts (see figure below). The choice was clear for some Merger Team members when evaluating the corridor alternatives and their potential impacts with respect to the laws upheld by their agencies. One member declined to concur until additional information was provided on the topic of mitigation. Had this been identified as an unresolved issue in advance of the meeting, there would have been the opportunity to address it to that agency's satisfaction prior to requesting concurrence. Because the agency presenting the concern is a partnering agency and not a primary signatory, the project was able to move forward to the next stage, Concurrence Point 4A – Avoidance and Minimization. However, efforts to satisfy the agency's concerns are ongoing.



Selected LEDPA/Preferred Alternative M1+E-H

Additional Avoidance and Minimization

Efforts to avoid and minimize impacts were incorporated into the project development process from the onset of the project. The steps leading up to the Concurrence Point 4A meeting included a review the LEDPA alternative for any additional opportunities to avoid or minimize impacts to the natural, human or physical environments through slight shifts in the horizontal or vertical alignment, adjusting slopes or the use of retaining walls. Also considered were any seasonal moratoriums that may be required during the construction of the project and potential on-site mitigation.

Currently, only Military Cutoff Road Extension is fully funded for right-of-way acquisition and construction and it is ahead of the Hampstead Bypass in terms of schedule. A review of

additional avoidance and minimization measures for Hampstead Bypass, in particular at the northern interchange area, is still underway. The Merger Team agreed to hold the Concurrence Point 4A meeting for the Military Cutoff Road Extension portion of the project only in order to maintain the project schedule. Hampstead Bypass will be reviewed at a future Concurrence Point 4A meeting.

The selected alternative for Military Cutoff Road Extension minimizes impacts to resources. However, it is not feasible for the proposed project to completely avoid impacts to the Waters of the US and still meet the purpose and need of the project. The following avoidance and minimization efforts were incorporated into or committed to for the proposed project:

- 3:1 slopes are proposed in wetland areas and adjacent to streams.
- The design was shifted or slightly realigned and/or retaining walls were included at several locations to avoid or minimize impacts to wetlands, streams, ponds, preservation areas, residences, and businesses.
- The design was realigned to avoid wells and minimize impacts to groundwater water supply infrastructure. Commitments to coordinate with the local public utility authority on the implementation of additional protection measures were noted.
- Design Standards in Sensitive Watersheds for streams tributary to Outstanding Resource Waters will be implemented during project construction.
- Avoidance and minimization measures were incorporated into the design at historic resource locations.
- NCDOT agreed to investigate on-site mitigation opportunities at specific sites requested by members of the Merger Team.
- NCDOT agreed to evaluate several other specific design modifications at the request of the Merger Team during final design to further minimize impacts.

The NEPA/Section 404 Merger Team reached concurrence on Avoidance and Minimization for Military Cutoff Road Extension in June 2012. A public meeting to review the proposed design within the recommended corridor for Military Cutoff Road Extension was held in August 2012. The public comment period following the meeting is still open. Comments received about the

design of the Military Cutoff Road Extension from the public meeting will be reviewed at a NCDOT post-hearing meeting and incorporated, where feasible, into the development of final design plans for the project. Further studies and surveys will be conducted on the preliminary findings collected from the initial corridor studies for both the Military Cutoff Road Extension and Hampstead Bypass projects, such as hazardous materials, historic and archaeological sites, and access to residences and businesses. The Final Environmental Impact Statement (FEIS) will then be prepared and circulated for public and agency review. A design public hearing will be held for the Hampstead Bypass project at a later date, following the completion of the FEIS.

Conclusion

Issues that could have resulted in substantial project delays during final design or permitting were identified early and addressed as a result of the coordination that took place with regulatory agencies throughout the project development process. When needed, additional studies were conducted, and measures to avoid and minimize impacts to resources were evaluated and discussed with the Merger Team within a framework that fully considered NEPA, the agencies' laws and regulations, public input, and meeting the purpose and need for the project. A comprehensive approach to the development of preliminary alternatives using the best available data and tools resulted in a solid foundation to build on. Public input was solicited throughout the project and comments were incorporated into the design where possible. While it is not likely that everyone's concerns can be satisfied or impacts can be completely avoided on any given project, maintaining a flexible attitude and using a collaborative decision-making approach is much more likely to result in a project that avoids and minimizes impacts to the environment, meets the needs of the public, and that can be implemented.

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- September 10, 2010. Merger Team Concurrence Point 2A Meeting
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