

**PRINCEVILLE, NORTH CAROLINA
FLOOD RISK MANAGEMENT
INTEGRATED FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT**

FINAL REPORT

December 2015 (Rev April 2016)



**US Army Corps
of Engineers** ®
Wilmington District

Errata

Following is additional information that was not included, or changes to information stated in the Princeville, North Carolina Flood Risk Management Integrated Feasibility Report and Environmental Assessment (EA), dated December 2015. This EA was circulated for a 30-day State and Agency review in December 2015 and January 2016. Although these items were not addressed in the EA, or change information provided in the EA, their inclusion does not create a significant change in the proposed project, and does not warrant additional resource agency review.

1. Section 8 of the Main Report: “The impacts of the other viable array of alternatives are similar to those of the recommended plan unless otherwise noted in Table 5.5. All alternatives have been reviewed to have a less than significant impact to the resources analyzed.”

PRINCEVILLE, NORTH CAROLINA

FLOOD RISK MANAGEMENT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

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EXECUTIVE SUMMARY

Background

Princeville, North Carolina is the first municipality in America incorporated by former slaves (1885). At the end of the Civil War freed slaves occupied low-lying land in the Tar River floodplain, purchased plots from local landowners, and eventually incorporated the town as the “Town of Princeville”. While Princeville was built on low-lying ground in a bend in the Tar River, the Town of Tarboro is sited on the opposite side of the Tar River on mostly higher ground. Because of its low-lying location, Princeville has been repeatedly flooded during many years since its founding.

Princeville remains over 96% African-American. Approximately 2,100 residents are currently exposed to public/life safety issues and inundation damage associated with the existing threat from flooding. Per capita income for Princeville is approximately \$12,024, which is approximately 44% of the national average of \$27,334. The average structure value was \$77,300 in 2010, which was approximately 41% of the national average of \$188,400. The town is governed by a part-time mayor and council.

The town suffered multiple flood events and, in 1967, the Corps of Engineers built a levee along the Tar River under the continuing authority of Section 205 of the flood control Act of 1948 to address the frequent and severe flooding. Although the area continued to experience significant flood events, the levee reduced flood risk to the town until Hurricane Floyd in 1999 (a magnitude greater than 0.2% event), when the town suffered catastrophic flooding and the damage or destruction of 1,000 residential structures. Floyd revealed flaws and vulnerabilities in the levee design that were previously overlooked. Floodwaters initially entered the town through a number of un-gated culverts located under a section of U.S. Highway 64. This flood of record then overtopped the levee in one location and ultimately circumvented the levee at its north end, inundating the town with floodwaters. Up to twenty feet of water stood in Princeville for nearly 10 days until river levels subsided enough that the floodwaters drained or could be pumped from the town.

As a result of the catastrophic flooding and historical significance of the town, then-President Clinton issued *Executive Order 13146*, which established a “*President’s Council on the Future of Princeville, North Carolina*.” (Exhibit 1). The executive order directed the President’s Interagency Council to consider, among other things:

...the unique historic and cultural importance of Princeville in American history;...the views and recommendations of the relevant State and local governments, the private sector, citizens, community groups and non-profit organizations, on actions that they could take to enhance the future of Princeville and its citizens;...and, agency assessments and

recommendations to repair and rebuild Princeville, and to the extent practicable, protect Princeville from future floods.

The White House issued a Statement by the President that stressed the enormous importance of honoring the “long and proud history of this uniquely important town” and of the steps needed to preserve its “special and significant place in our nation’s history.” Exhibit 2. The President’s Council was chaired by the Office of Management and Budget (OMB), with twelve participating agencies. Participation was delegated to staff level, including members of the existing Federal Interagency Working Group on Environmental Justice, which was established in 1994 under Executive Order (E.O.) 12898. The Council’s report was submitted in August 2000, and recommended quickly bringing the citizens of Princeville home while rebuilding toward a more disaster-resistant community. See Section 1.2 for the full text of E.O. 13146.

In consideration of E.O. 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations”, Federal agencies are required to consider potential disproportional adverse effects or denial of potential benefits of Federal policies and programs to communities such as Princeville. This study gave consideration of Environmental Justice in its deliberations, and while considering this issue during the study process, did not base plan selection on those factors.

Numerous heavily-damaged structures of historical value were demolished because they were not restored within 12 months following the flood. The National Park Service (NPS), Federal Emergency Management Agency (FEMA), and the State Historic Preservation Officer (SHPO) worked out a strategy for evaluating the historic town. FEMA led standard recordation measure efforts for structures condemned by the town and subsequently demolished. Only four structures remain eligible for the National Register of Historic Places and one baptismal site is considered eligible as a Traditional Cultural Property. The town turned down an “all or nothing” buyout offer from FEMA due to the resulting likelihood for adverse social, economic, and cultural impacts.

Numerous Federal agencies including FEMA, Housing and Urban Development (HUD), Small Business Administration (SBA), United States Department of Agriculture (USDA), and the Department of Labor provided millions of dollars for recovery and reconstruction of the town. Several Federal agencies invested millions of dollars in not only clean-up immediately after Hurricane Floyd, but also in redevelopment. FEMA, HUD, SBA, USDA, Department of Labor, and the Environmental Protection Agency (EPA) provided funds for clean-up, temporary housing, technical assistance, and home repairs in immediate response. State agencies and numerous non-profits also provided funding and volunteer labor. After the clean-up mission was complete, Federal agencies including FEMA, HUD, SBA, Health and Human Services, Federal Highway Administration, and the NPS provided significant technical assistance, grants, and loans to:

- Design and construct a 64-unit mobile home park within the Town of Princeville;
- Construct public housing, a multi-family housing complex, reconstruct the Town Hall, and a senior community center;
- Repair a Head Start Center;
- Assist in developing community programs that would provide coordinated health care to uninsured, low income residents in Princeville and other affected areas.;
- Restore the old Town Hall into an African-American “Firsts” museum; and;
- Develop the Princeville Heritage Trail Concept Plan (the trail was selected by the *Save America’s Treasures* program in 2001 because of its importance of linking historical and cultural sites in the oldest incorporated African-American town in the Nation).

The Current Study

The Corps was authorized to prepare a feasibility study to address flood risk management issues and funds were provided in 2001. The Corps and the State of North Carolina signed a Feasibility Cost Sharing Agreement in July 2002.

Multiple structural and non-structural measures and alternatives were examined during the course of the feasibility study. The Feasibility Scoping Meeting, held in 2006, discussed the likelihood that many of the most responsive plans might lack economically-justified alternatives that would meet the current guidance requiring National Economic Development (NED) justification. At that time, the entire vertical team agreed to pursue alternatives that addressed all areas of flood risk, including extending the existing levee.

The Final Array of Alternatives consisted of a No-Action Plan and an array of structural and non-structural alternatives. Each alternative was formulated to provide an incremental solution to flood risk at the least cost for a given increment of flooding, as well as a suite of non-structural measures considered to be critical to the success of each alternative. These non-structural measures included a flood warning and evacuation plan, continued floodplain management and updating of local building and zoning codes, and a flood risk management education and communication plan (for both the community and local schools). All of these non-structural components were ultimately deemed essential for an adequate flood risk management strategy for the town, and would substantially reduce remaining levels of flood risk after construction or implementation of any structural plan elements.

Final alternatives were assessed by comparison of plan attributes, benefits, costs, and positive and negative impacts and outcomes; this summarization is presented in the "System of Accounts" format. All alternatives were composed of a combination of structural and non-structural measures. Plan selection took into consideration potential contributions to NED, Environmental Quality (EQ), Other Social Effects (OSE), and Regional Economic Development (RED). **Key amongst these, because of the benefit-cost analysis on each alternative, was the consideration of Life and Safety Risk, and OSE, including consideration of impacts to community cohesion, cultural and historical values, local per capita and household incomes in comparison to national averages and other factors not captured in an NED analysis alone.** The process used to select a plan gave consideration to both Congressional directive and to the Presidential Executive Order established exclusively for Princeville and its inhabitants.

Consideration of all factors evaluated resulted in a plan that is the most responsive to flood risk of all those evaluated, in terms of flood risk reduction, while not inducing unacceptable impacts to adjacent and downstream assets, and is discussed herein as Alternative 4. All alternatives were an assemblage of measures designed to solve each increment of flooding (e.g.: Alternative 1 solves Increment 1 of flooding). While only Increments 1 through 3 of that alternative are economically justified, an additional 4th increment was added, in consideration of the remaining (residual) risks to life and safety left unaddressed by Increments/Alternatives 1 through 3 alone, specifically due to the lack of any measure that would prevent (upstream) circumvention of the existing levee at its northern terminus. This increment of flooding, and the alternative designed to address it, is especially important in the addressing of flood risk to the maximum extent practicable, as it is this increment of flooding that causes the highest degree of threat to life, public safety, and threat to egress posed by cut-off from the road network. It is this increment of flooding that bypasses the northern terminus of the existing levee, flows south and east across the floodplain cutting off most portions of town and isolating individuals within the deepest potential flooding zones, and cuts off egress to evacuation routes. These risks would be substantially

reduced by implementation of Alternative 4, and will be referred to hereafter in the report, as the “Recommended Plan” (Alternative 4). This plan best balances Life and Safety risks, economics and cost-effectiveness, consideration of Social Effects, Environmental Quality and National and Regional Economic effects, while also being technically feasible and environmentally sound.

While the benefit-cost ratio of the plan, currently at 0.5, is not within current policy as to NED Plan justification, it was felt that the addition of the final, economically unjustified increment, should be considered in determining a successful plan, particularly in consideration of life and safety, but also in recognition of extremely low individual and household income, community cohesion, reduction of risk to Federal, State and Local investments, and Other Social Effects (OSE) considerations. Further details on factors considered in the analysis of OSE are contained in both the Main Report and Appendix F. It was also considered that no other plan, either structural or non-structural, or combination thereof, would provide a solution adequate to the mandate provided in Executive Order 13146, to provide a practicable reduction in risk associated with flooding. The identified plan provides, to the extent practicable, maximization of risk reduction, in light of cost-effectiveness, environmental acceptability, technical soundness and numerous social and cultural considerations.

The Recommended Plan would have minimal impacts to the environment and ultimately would be expected to result in a “Finding of No Significant Impact” (FONSI).

The Recommended Plan would have an important beneficial effect on cultural resources, since it would better reduce risks to the remaining historic buildings and cemeteries, and have a positive effect on the historic setting. The aesthetics of flood-prone neighborhoods would improve, since the threat of damages and cleanup that accompany the flooding of buildings and property would be considerably reduced. Implementing the Recommended Plan would decrease flood-related interruptions in commercial and social community activities, thus stabilizing the family unit by minimizing the migration of Princeville residents out of the community.

Further restoration of structures and infrastructure within the Town of Princeville in the absence of the Recommended Plan would fail to reduce risks to Federal and non-Federal investments to date. While the Recommended Plan benefits do not exceed monetary costs, the overwhelming benefit to this historic, low-income community, as reflected in the OSE account, justifies consideration of a more robust approach to Flood Risk Management than that provided by an NED Plan alone. Based on the evaluation of Federal policies and guidance, including Executive Orders, and while also taking into consideration all project objectives and constraints, the Recommended Plan is identified as the best alternative available to provide substantive flood risk management for the Town of Princeville.

The Recommended Plan provides a substantial reduction in flood risk; however, it does not eliminate all remaining risk, as the unique physical situation of the town would prevent any complete reduction of flood risk, short of relocation (and removal from the floodplain) of the entire community. The community strongly opposes relocation efforts, due to perceived impacts to social cohesion and an inability of many residents to afford living elsewhere. The report also discusses actions taken, to date, by those participating agencies whose investment in the town also remains at risk from the continued flood threat.

The Recommended Plan (Alternative Four, which includes Levee Alignment “1”) is illustrated in Figure XS-1 and consists of:

- Installation of flap gates on twelve ungated culverts, and construction of several new culverts to address floodflow penetration and interior drainage issues, respectively;

- Modification of the intersection of N.C. Highway 33 and U.S. Highway 64, increasing elevations of the interchange of N.C. Hwy 33 and U.S. Highway 64, by up to 4.5 feet;
- Installation of a “Shoulder Levee” adjacent to a low spot on U.S. Highway 64;
- Extension of the existing levee at the point of its current northern-most terminus along Highway 258, to the east, and then south, to its juncture with the approximate southern terminus of the project.
- Non-structural measures that consist of: Flood Warning and Evacuation Plan updates, Flood Risk Management Education and Communication Plans, and updating of Floodplain Management plans.
- Interior Drainage Features (Appendix 3, Real Estate Plan, Figures 1.4.1-5 and 1.4.1-6).

The current estimated first cost of the Recommended Plan is \$21,540,000. Cost-sharing for the Recommended Plan would be 65% Federal / 35% non-Federal, based on current guidance on Flood Risk Management projects (cost-shared first cost = \$14,001,000 Federal/\$7,539,000 Non-Federal). The benefit to cost ratio is currently 0.5 to 1.

The Recommended Plan is not the National Economic Development (NED) plan and has a benefit to cost ratio of less than one. The NED plan, however, would not provide significant flood risk reduction to the Town of Princeville and as a result, an exception to NED policy was granted by the Assistant Secretary of the Army (Civil Works), on July 19, 2012, allowing the Corps to move forward with the plan recommended in this report (Attachment E).

This Final Report has undergone District Quality Control (DQC), Agency Technical Review (ATR), Public Review, Independent External Peer Review (IEPR), and Division Quality Assurance (QA), which resulted in movement of the shoulder levee feature from the landward side of Highway 64, to the river side of Highway 64. A Public Notice was circulated to the public notifying them of this change. Comments received are contained in the FONSI. Comments from the ATR and IEPR also resulted in putting more detail on the non-structural flood risk management measures. Final cost certification has been performed, which resulted in an increase in project cost. Comments from Final ATR of the study products have been received, responses have been generated, and the ATR and IEPR processes have been documented as separate products provided in the Supplemental Materials binder.

The hydrologic and hydraulic analyses used to generate water surface elevations and extent, for various flood frequencies used in this study, utilized the Corps’ HEC-RAS modeling software, version 4.1. To date, these model runs found no significant induced flooding as a result of the proposed project. Additional detailed hydraulic analyses will be conducted based on finalized design specifications of the recommended plan during PED. If any impacts are identified during these analyses, appropriate action to address will be taken at that time.

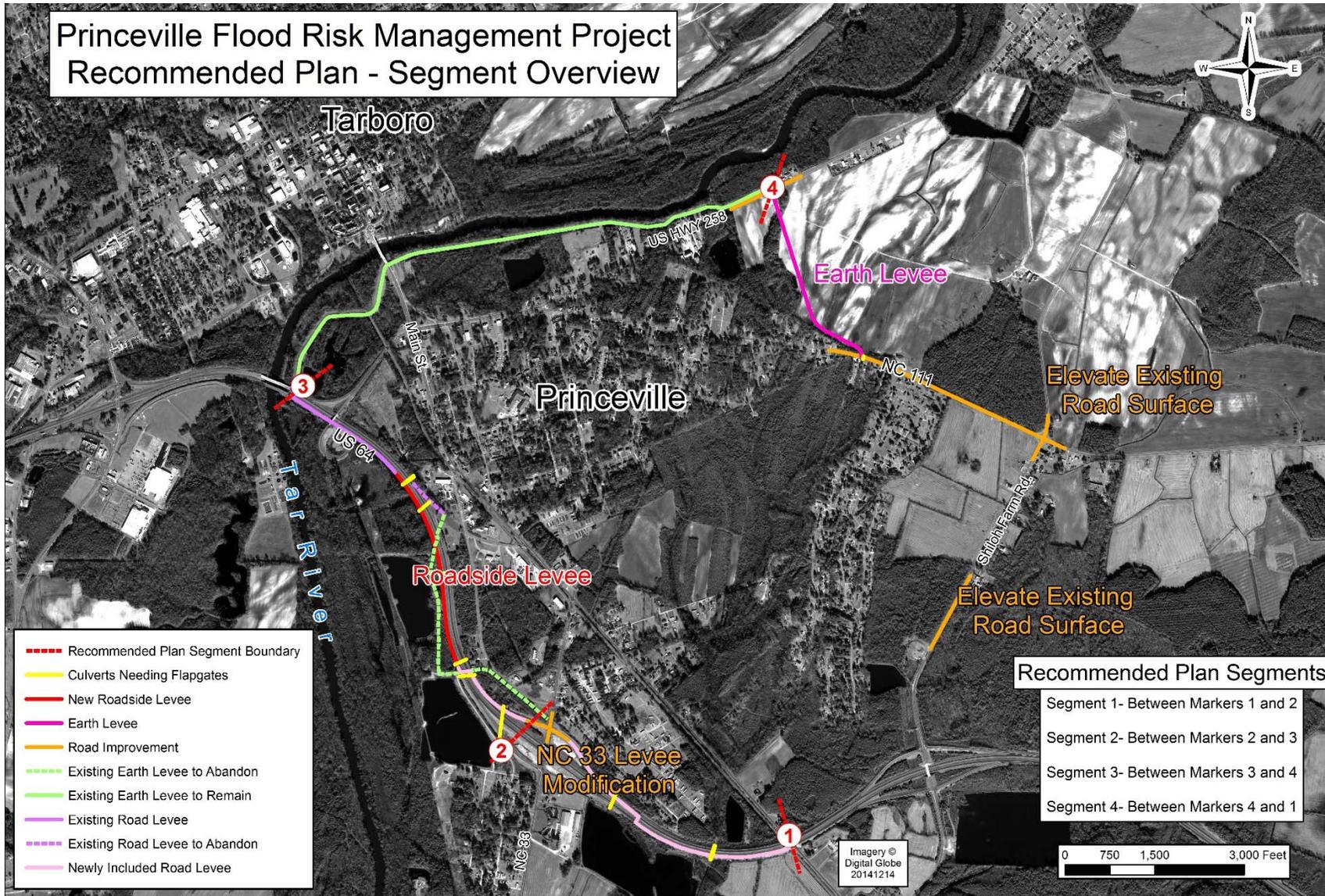


Figure XS-1: Recommended Plan – Segment Overview

PRINCEVILLE, NORTH CAROLINA

FLOOD RISK MANAGEMENT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

December 2015

Final Report

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* These sections have been included to address the National Environmental Policy Act (NEPA) (40 CFR Parts 1500-1508).

▲ These sections discuss the purpose and need of this flood risk management study.

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- Appendix E – Real Estate
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EXHIBITS

- Exhibit 1 – Executive Order 13146 – Follows page 6 of text
- Exhibit 2 – Statement by the President on Princeville – Follows page 6 of text

PRINCEVILLE, NORTH CAROLINA

FLOOD RISK MANAGEMENT STUDY – MAIN REPORT

SECTION 1 – STUDY BACKGROUND

1.1 AUTHORITY

The Princeville Flood Risk Management Study proposes modifications to a flood risk management project for the Town of Princeville, Edgecombe County, North Carolina, authorized under Section 205 of the Flood Control Act of 1948, as amended . The Main Report and accompanying documentation is provided under Section 216 of the Flood Control Act of 1970, 33 U.S.C. 549a, which authorizes the Secretary of the Army, acting through the Chief of Engineers, to review flood control projects previously constructed by the Corps of Engineers and to report to Congress on the advisability of any recommended modifications. Initial funding for the study was specifically provided in the Emergency Supplemental Act, 2000, (Public Law No. 106-246, Division B, Chapter 2), dated July 13, 2000, which appropriated \$3.5 million in additional General Investigations funds, of which \$1.5 million “shall be for a feasibility study and report of a project to provide flood damage reduction for the Town of Princeville, North Carolina.” Additional direction was provided in an Executive Order (E.O. 13146) issued on February 29, 2000, by President William Clinton, which required, in part, “agency assessments and recommendations to repair and rebuild Princeville, and, *to the extent practicable, protect Princeville from future floods*” (emphasis added). Preconstruction engineering and design (PED) activities, if funded, would be continued under the Section 216 study authority cited above.

1.2 HISTORICAL SIGNIFICANCE AND COMMUNITY BACKGROUND

The historical Town of Princeville, population approximately 2,100, is located in Edgecombe County, North Carolina (*Figure 1.1*).

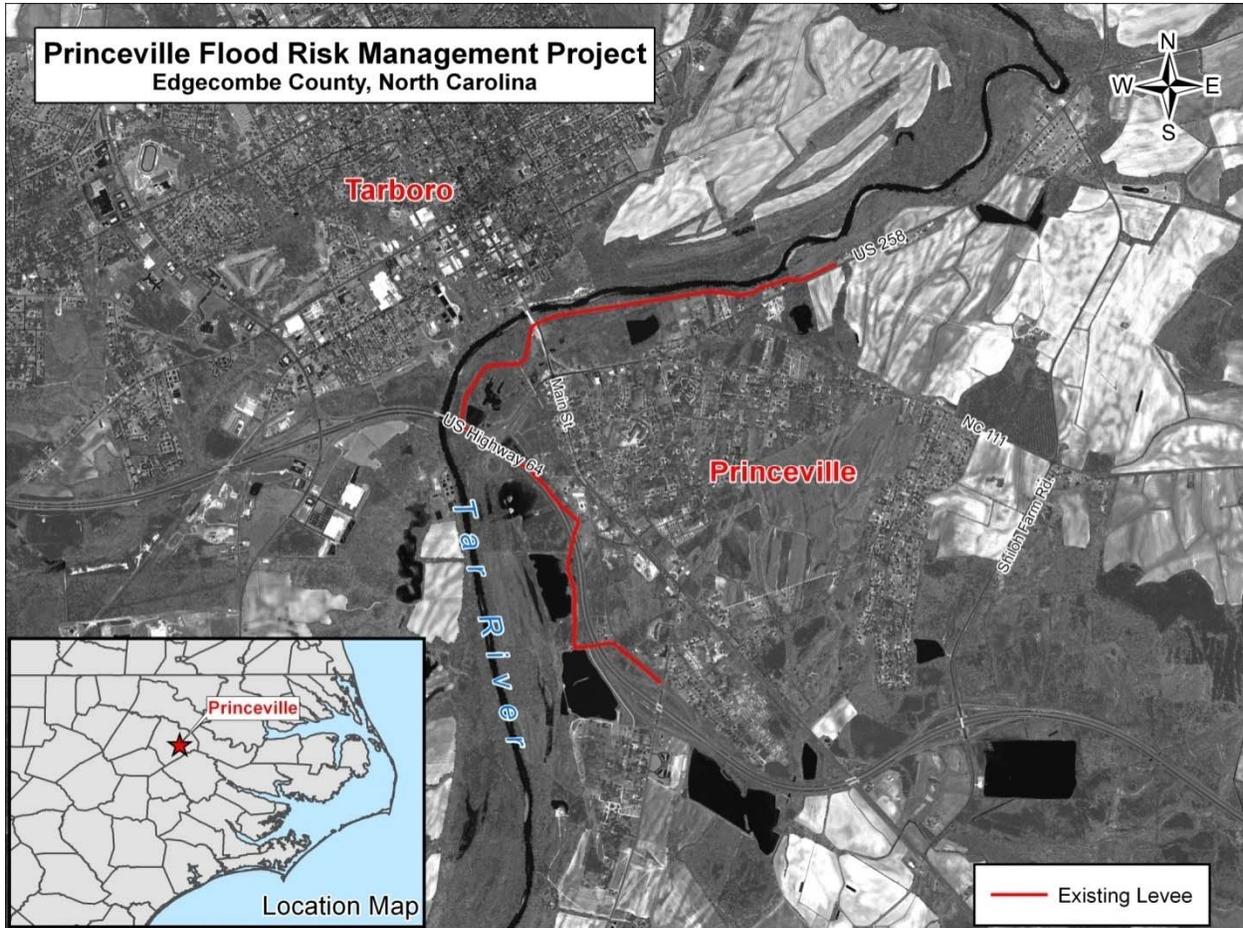


Figure 1.1: Location of Princeville, N.C, and Existing Flood Risk Reduction (Section 205) Project.

After the Civil War in 1865, freed slaves settled in a Union Army camp area in the floodplain across the Tar River from Tarboro. This settlement, later renamed “Princeville”, was originally named “Freedom Hill” or “Liberty Hill” after the decree from the Union troops atop the highest point in the town that the former slaves were now free (*Figure 1.2*). Before departing, the Union soldiers advised the former slaves to return to their former owners to work as plantation workers; however, many chose to stay in “Freedom Hill”, giving rise to the community of Princeville.

The people of Princeville elected to name their town after an early resident, Turner Prince, a carpenter born into slavery in North Carolina 20 years before the Civil War. In February 1885, the North Carolina General Assembly passed an act to incorporate the Town of Princeville, making it the nation’s first town incorporated by freed slaves.



Figure 1.2: Freedom Hill

The Town of Princeville is a community of national importance, not only as the first town in the nation incorporated by ex-slaves, but also for its great sense of community, its strong ties and bonds between residents, its ingrained sense of its history and ties to what many refer to as “sacred ground”, and their resulting unwillingness to leave. Readers are strongly encouraged to read Appendix H – “White Paper”, and also Appendix F – Other Social Effects, for the deeper story on Princeville and its unique attributes and vulnerability.

In response to the great flood of 1958, two town leaders worked to have a levee project approved for construction. The State of North Carolina General Assembly passed legislation in 1959 annexing additional land to the Town of Princeville. In 1967, under the general continuing authority of *Section 205, Flood Control Act of 1948*, as amended, the U.S. Army Corps of Engineers (USACE) constructed an earthen levee between the Tar River and Princeville, alleviating serious flooding events for the next 32 years.

In 1999 Hurricanes Dennis and Floyd made landfall along eastern North Carolina. Hurricane Floyd produced a flood event with a magnitude greater than 0.2% chance event (approximately one chance in 500 of occurrence in any given year (U.S. Geological Survey [USGS]), creating historic flooding in eastern North Carolina (*Figure 1.3, Figure 1.4*). The large rainfall associated with Hurricane Floyd caused the waters of the Tar River to bypass, and eventually overtop the levee system and flood Princeville. Fortunately, due to advance flood warnings, all residents were safely evacuated and there was no loss of human life. However, many of the town’s houses and businesses were lost as the flood levels rose to up to twenty feet and inundated Princeville to the roof tops of many buildings. The town remained flooded for eleven days before the flood waters receded, revealing significant damage and destruction.



Figure 1.3: Hurricane Floyd Flooding, September 1999 (view from Northeast)



Figure 1.4: Glennie's Store During & After Hurricane Floyd Flooding, 1999

After the flood it was evident that a recovery effort of historic magnitude would be needed to restore the town. Early-returnee Thad Knight (*Figure 1.5*) was the sole resident of the town for a time (his house had been water-filled to near ceiling-level) while many families were housed miles away in temporary facilities. For years following, a government trailer park built in the area served as home for numerous residents that had lost their houses in the flood. In 2000 the levee was restored to its original condition (*Figure 1.6*). Many questioned whether Princeville was safe from future catastrophic flood events given its location in the Tar River floodplain.

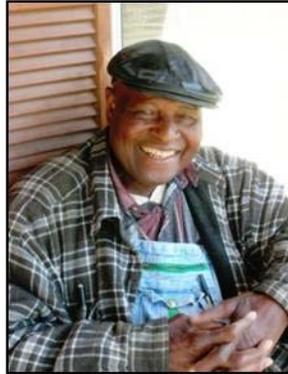


Figure 1.5: Thad Knight



Figure 1.6: Levee Repair after Hurricane Floyd, 2000

The Federal Emergency Management Agency (FEMA) offered a government buyout that would have purchased properties and required residents to move out of Princeville. This buyout would cause historic Princeville to be abandoned and remain uninhabited. Although the FEMA buyout underwent serious consideration and debate, the townspeople decided they were not willing to sacrifice the history and family ties defined in their town, risk community dissolution, and refused the buyout.

Meanwhile, attention to Princeville's story progressed from Edgecombe County, to the State House in Raleigh, North Carolina, to the U.S. Congress and the White House in Washington D.C. Subsequently, President William J. Clinton visited the area and soon issued presidential Executive Order No. 13146¹ (*Exhibits 1 and 2*), which mandated a formal investigation to determine how the town could be "better protected" from future disasters while maintaining its heritage. The USACE was authorized and funded in the Military Construction Appropriations Act of 2001 (Public Law 106-246) to address flood risk management for the Town of Princeville. USACE began working with the town, stakeholders, and resource agencies to evaluate current conditions and possible solutions. At the time of construction in 1967, the largest flood of record at this location was the flood of 1919. This was, at the time, believed to be an approximately 0.333% chance event, or one occurring approximately once every 300-years, based on analysis of records to that date. The existing levee system (Figure 1.7) was designed to accommodate that flood, with some added height to accommodate slightly larger flood events.

¹ Executive Order No. 13146 – President William J. Clinton, February 2000: Federal Assistance for the Future and Sustainability of Princeville, North Carolina (Exhibit 1).

EXHIBIT 1
Executive Order 13146
by President of the United States
President's Council on the Future of Princeville, North Carolina

*Signed by President **William J. Clinton** February 29, 2000*

Federal Register page and date: 65 FR 11201, March 2, 2000

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to develop recommendations for Federal agency actions to address the future of Princeville, North Carolina, it is hereby ordered as follows:

Section 1. Policy. Princeville, North Carolina (Princeville) has a unique place in American history. This small city in eastern North Carolina was the first city in the United States founded by ex-slaves. In its history, Princeville has been damaged by floods many times. Recently, it was devastated by floods caused by Hurricane Floyd. In response to the damage, appropriate Federal agencies have already begun repair and recovery efforts to assist Princeville. However, it is the policy of this Administration to do more to help this city that occupies such a significant place in our history. Therefore, this order will create an interagency council to develop recommendations for further actions to address the future of Princeville.

Sec. 2. Establishment. (a) There is established the "President's Council on the Future of Princeville, North Carolina" (Council). The Council shall comprise the Secretaries of Defense, Agriculture, Commerce, Labor, Health and Human Services, Housing and Urban Development, Transportation, the Director of the Office of Management and Budget (OMB), the Administrator of the Environmental Protection Agency, the Commander of the Army Corps of Engineers, the Administrator of the Small Business Administration, the Director of the Federal Emergency Management Agency, the Assistant to the President for Domestic Policy, the Assistant to the President for Economic Policy, and the Assistant to the President for Intergovernmental Affairs, or their designees, and such other executive department and agency (agencies) representatives as the President may deem appropriate. The Council shall consult with other agencies and State and local governments, as appropriate.

(b) The Director of the Office of Management and Budget, or his designee, shall serve as Chair of the Council.

Sec. 3. Functions. The Council shall develop recommendations for the President on further agency and legislative actions that can be undertaken to address the future of Princeville. In developing the recommendations, the Council shall consider, among other things: (a) the unique historic and cultural importance of Princeville in American history; (b) the views and recommendations of the relevant State and local governments, the private sector, citizens, community groups, and non-profit organizations, on actions that they all could take to enhance the future of Princeville and its citizens; and (c) agency assessments and recommendations to repair and rebuild Princeville, and, to the extent practicable, protect Princeville from future floods. The Council, through its Chair, shall submit its recommendations to the President. Where appropriate, the Council's recommendations shall include draft legislation requesting additional funding or other authorities to aid in the reconstruction and protection of Princeville.

Sec. 4. Coordination. At the request of the Chair, agencies shall cooperate with and provide information to the Council.

Sec. 5. Judicial Review. This order is not intended to, nor does it create, any right or benefit, substantive or procedural, enforceable at law by a party against the United States, its agencies, its officers or employees, or any other person.

*William J. Clinton
THE WHITE HOUSE
February 29, 2000*

EXHIBIT 2
THE WHITE HOUSE
Office of the Press Secretary
February 29, 2000

STATEMENT BY THE PRESIDENT

“As the first city in the United States founded by former slaves, Princeville, North Carolina holds a special and highly significant place in our nation’s history. In its early days, Princeville was called Freedom Hill by fleeing African Americans who settled along the banks of the River Tar under the protection of Union troops at the close of the Civil War. In more recent times, repeated flooding from the River Tar has caused damage in Princeville, which was devastated this fall by the particularly severe floods that accompanied Hurricane Floyd.

Today, I am announcing the creation, by Executive Order, of the President’s Council on the Future of Princeville, North Carolina. This Council will bring together representatives from twelve Federal agencies, several key members of my Cabinet and, chaired by Sally Katzen of the Office of Management and Budget, it will work with elected officials, the private sector, community and non-profit groups to recommend measures to preserve and protect Princeville for the future. I have asked the Council to move promptly to recommend action that my Administration can take to help repair and rebuild Princeville, and, to the extent possible, protect the Town from future floods.

We have taken many steps since this terrible flooding hit Princeville last fall, from immediately dispatching emergency workers to making resources available for the people of Princeville in their efforts to rebuild. It is my firm belief and the policy of my Administration that we must do more to help the people of Princeville who have bravely chosen to stay and rebuild their badly damaged hometown. We owe them our best efforts.

It is enormously important that, as we celebrate Black History Month and honor the long and proud history of this uniquely important town, we also take the steps to preserve it for the future. As we embark on this new chapter in Princeville’s history, I would like to thank Rep. Eva Clayton who has led the charge for this step I am announcing today and who has worked tirelessly on behalf of this important town. I also thank Rep. Charles Rangel for his support of this important effort.”

Unfortunately, in the approximately forty years since construction, and with the accumulation of additional hydrologic data, including larger events such as Hurricane Floyd, the magnitude of events like the 1919 flood has been determined to be more frequent than previously thought, and the existing project determined to be less capable of containing large flood events.

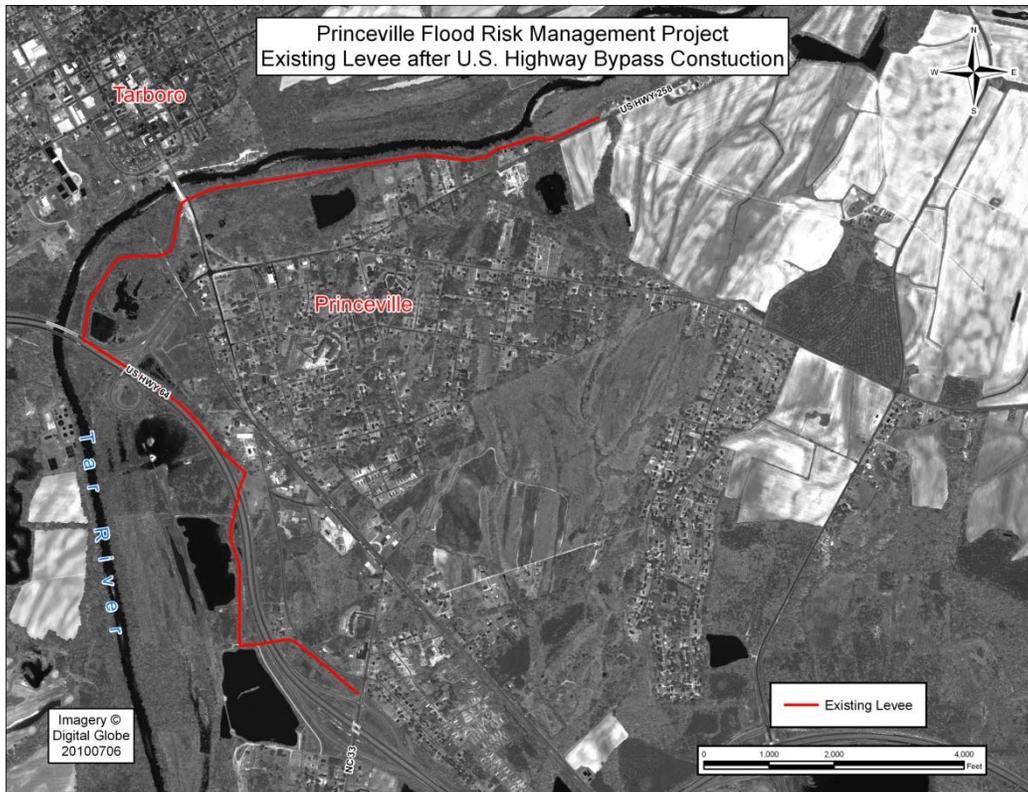


Figure 1.7: Authorized and Constructed 205 Levee Project - Princeville, N.C.

Despite the presence of the existing Section 205 levee project, the town continues to be exposed to the effects of large flood events. Floodwater reaches un-gated culverts along the perimeter of, and then enters town, at an approximate 5% chance event. Flood damages begin to occur shortly thereafter. At flood events having an approximately 1.3% chance of occurrence, flow overtopping Highway 111 in the north connects with flow from the south, effectively cutting off egress to all but limited access to U.S. Highway 64. Additionally, flow also begins to top Highway 64 at a low spot. At an approximate 1% chance event, flow has completely inundated the Highway 33 underpass and interchange with U.S. Highway 64. Also at the approximate 1% chance event, floodflows have completely flanked the existing levee system and floods most portions of town, cutting off egress and creating great depths of flooding in the western (historic) part of Town. Without modification to the existing project, flooding can be expected to continue into the foreseeable future. Complicating the situation are the low average annual incomes of the residents, who have reduced access to transportation, and the low values of the properties, making it difficult for the residents who may want to move from this high risk area but cannot afford the higher cost of living in other nearby locations.

For a more complete Historic Overview of the Town of Princeville, please see *Appendix H – Princeville, Edgecombe County, North Carolina, White Paper*.

1.3 THE PRESIDENT'S COUNCIL ON THE FUTURE OF PRINCEVILLE

President Clinton's Executive Order 13146 established the President's Council on the Future of Princeville, North Carolina, chaired by the Office of Management and Budget, comprised of the Secretaries of Defense, Agriculture, Commerce, Labor, Health and Human Services, Housing and Urban Development, and Transportation; the Directors of the Office of Management and Budget and FEMA; the Administrators of the EPA and Small Business Administration (SBA); the Commander of USACE; and the Assistants to the President for Domestic Policy, Economic Policy, and Intergovernmental Affairs, or their designees. Participation was delegated to working level staff including members of the existing Federal Interagency Working Group on Environmental Justice (IWG) that was established in 1994 under Executive Order 12898. In addition, the Department of the Interior (DOI), the White House Task Force on Livable Communities – Cabinet Affairs, the Community Empowerment Board, and the Director of Presidential Personnel also participated on the Council.

The Council was tasked with developing recommendations for the President on further agency and legislative actions that could be undertaken to help repair, rebuild, and to the extent possible protect Princeville from future floods. When developing its recommendations, the Council was to consider:

- The unique historic and cultural importance of Princeville in American history;
- The views and recommendations of the relevant State and local governments, citizens, community groups, non-profit organizations, and the private sector on actions they could take to enhance the future of Princeville and its citizens; and
- Agency assessments and recommendations to repair, rebuild, and protect Princeville from future floods, to the extent practicable.

The Council issued a report entitled "Recommendations for the Future of Princeville" dated August 11, 2000, that outlined assistance provided to Princeville immediately after the flood, assistance after the Council was established, and recommendations for further assistance. A summary of the report is included in Section 1.9. Shortly after the Council's report, changes in both local and Federal administrations occurred and formal council meetings stopped, however, agencies continue to progress on individual projects identified by the Council. To assist in achieving its vision of sustainable recovery, redevelopment, and revitalization while ensuring coordinated Federal support, Princeville was selected by the IWG as one of fifteen revitalization demonstration projects in 2003, but with changes in town management, the town did not pursue the project. Despite its limited financial capacity, the town continues to work closely with both Federal and state agencies on the individual projects recommended in the Council's report and the State of North Carolina continues to participate with non-Federal funding requirements.

1.4 STUDY SPONSORS AND STAKEHOLDERS

The State of North Carolina is the non-Federal sponsor, cost-sharing this feasibility study 50-50 with USACE. The Town of Princeville has been actively engaged in the study, providing USACE with critical information about flooding events. Also involved throughout the study are Edgecombe County, the Town of Tarboro, and the North Carolina Department of Transportation (NCDOT) and Division of Water Resources (NCDWR). Several meetings were held early in development of the study scope. Some of the key meetings held since that time are described below:

- November 19, 2004 - Meeting with NCDOT and NCDWR in Raleigh to discuss the proposed flood risk management study in Princeville.

- February 10, 2005 - Meeting in Princeville with the North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and NCDWR to inspect the existing levee and proposed levee extensions along U.S. Highways 64 and 258.
- May 17, 2007 - Meeting in Princeville with the following stakeholders: Town of Princeville, Town of Tarboro, Edgecombe County, Congressman G. K. Butterfield's (1st District – North Carolina) Office, and NCDWR. Later that day USACE held a Public Workshop at the Princeville Town Hall.
- May 22, 2008 - Meeting in Princeville with the following stakeholders: Town of Princeville, Town of Tarboro, Edgecombe County, and NCDWR. Purpose of the meeting was to discuss project alternatives.
- June 24, 2008 - Meeting in Princeville with representatives from USACE – Wilmington District Raleigh Regulatory Field Office and NCDWQ (now NCDWR) Aquifer Protection Section to walk and inspect levee extension alternatives.
- September 8, 2008 - Meeting in Tarboro with the following stakeholders: Town of Tarboro's Mayor, Attorney, Manager, Planning Director, and Building Inspector. Additionally, about 30 interested private citizens attended this meeting. Purpose of this meeting was to discuss the potential impacts of the Princeville Dike (Levee) extension project on flooding in Tarboro.
- September 25, 2008 - Meeting in Princeville with representatives from USACE – Wilmington District Raleigh Regulatory Field Office and NCDWR – Aquifer Protection Section. The purpose of this meeting was to inspect potential locations of interior drainage features and the preliminary 50-acre borrow area.
- July 20, 2010 – Meeting with NCDOT Division Office to discuss highway impacts and background on project.
- August 3, 2010 – Meeting in Princeville with representatives of the USACE Raleigh Regulatory Field Office and NCDWR Aquifer Protection Section to inspect the proposed Recommended Plan and new proposed 40-acre (revised) borrow area.
- August 5, 2010 – Meeting with FHWA at Raleigh Field Office.
- August 22, 2013 – Site Visit with Brigadier General Jackson.
- September 23, 2013 – Meeting with Town residents and Council, on study status, and selected levee alignment.
- February 28, 2014 – Meeting with NCDOT to ensure project implementation requirements are coordinated between agencies.
- July 30, 2014 – Site Visit with Mr. James Dalton and members of the Regional Integration Team.
- March 11, 2015 – Meeting with Fish and Wildlife, State, and Town officials, to discuss wetlands, mitigation, State, and Town concerns, and agreement on mitigation requirements.

1.5 STUDY PURPOSE AND SCOPE

The primary purposes, or goals, of this Flood Risk Management feasibility study are to:

- Assess the flooding problems in the community of Princeville and provide recommendations to repair and rebuild Princeville and to protect the town from future floods, *to the extent practicable* in accordance with E.O. 13146 (*Exhibit 1*).
- Reduce flood risk for the Town of Princeville to the minimum level intended by the authorized Section 205 project, thus reducing risks and preserving the social fabric of this nationally-

important cultural resource while reducing risks to the residents and resources of this community, keeping them from further harm.

1.6 RECONNAISSANCE PHASE – REPORT FINDINGS

Damage estimates to Princeville from inundation after Hurricane Floyd were approximately \$116 million. On December 9, 1999, the Town of Princeville requested USACE to conduct a feasibility study to evaluate the existing levee and reduce the level of flood risk, thereby facilitating the desire to reduced risks to a community of national historical value.

Wilmington District completed a reconnaissance report in May 2001, under section 905(b) of the Water Resources Development Act of 1986. The primary alternatives developed and addressed in the reconnaissance study included modifications to the existing levee, construction of upstream reservoirs, and construction of a high flow bypass channel. Although the costs for these alternatives were extremely high (estimated between \$40 - \$400 million), the support offered from private and public entities, including the White House, indicated continuing strong support for further reducing risks and providing for preservation of the town. The reconnaissance study recommended that USACE proceed to the flood risk management feasibility phase for the Town of Princeville. The analysis and recommendations from the reconnaissance study were approved on June 22, 2001 by the Directorate of Civil Works, Chief of Planning and Policy Division, USACE Headquarters.

1.6.1 REVISED SCOPE AND FINDINGS

The initial request from the town was for the study to solely address storm events of the magnitude of Hurricane Floyd or greater. Early in the feasibility study scoping process, Princeville residents requested USACE to consider alternatives that would provide a much higher level of risk reduction. This study identifies several potential alternatives that would meet the town's needs including the construction of a (high) ring levee around the entire community, plus non-structural features, flood proofing of homes, elevating structures, upstream reservoirs, an overall improved and higher levee system, and a high-flow bypass channel. During further development, USACE determined that these alternatives posed some difficulties including:

- Serious public health and safety issues with the construction of a high ring levee around Princeville,
- Induced damage and increased risk elsewhere, and,
- Estimated costs for these alternatives ranging from \$40 million to \$400 million. Contrary to residents' request, the costs of the vast majority of alternatives were beyond what the community and the State could financially support.

After consultation with major stakeholders and non-Federal partners, USACE determined that it must also consider alternative plans that focused on risk reduction at a lower cost, including that of upgrading the existing levee system to modern levels of risk reduction. This would bring the scope of the project to a scale that could be supported financially by the State of North Carolina (the non-Federal sponsor) and Town of Princeville and yet would still provide a critical level of flood risk reduction. Additional measures consisted of raising the levee system to bring it to a much higher level of flood risk reduction, along with a preliminary assessment of potential induced damages to other communities. The study team held a Feasibility Scoping Meeting in 2006, and discussed the lack of economically-justified alternatives meeting current guidance requiring National Economic Development (NED) justification. The entire vertical team agreed to pursue alternatives that addressed remaining areas of flood risk, including extending the existing levee.

Evaluations of existing and future hydrologic and hydraulic conditions indicated that Princeville is exposed to a much higher probability of flood inundation than identified in the original Section 205 project authorization. Minor flooding begins during a 5% chance event due to flood waters entering Princeville from culverts along U.S. Highway 64 on the south side of Town, and along highway NC-111 on the north side of Town, with serious damage beginning to accrue at an approximate 1.5% chance event. Damages expand exponentially from there. These findings put Princeville at a higher level of risk for more frequent flood events than originally believed.

1.7 PROJECT LOCATION/CONGRESSIONAL DISTRICT

The Town of Princeville is a small community of approximately 2,000 residents, located in the east central area of Edgecombe County, North Carolina. The city limits encompass a 1.6 square-mile area in the alluvial floodplain located on the west descending bank of the Tar River, immediately across the river from Tarboro, North Carolina (the County seat of Edgecombe County) (Figure 1.7). The study area is located in the eastern portion of North Carolina in the 1st Congressional District.

The Tar-Pamlico River Basin lies entirely within the State of North Carolina. It has a total drainage area of approximately 3,610 square miles, of which approximately 2,140 square miles are located upstream from the Towns of Tarboro and Princeville. The basin is approximately 160 miles long and has an average width of 30 miles. The land within the Tar-Pamlico basin is primarily agricultural (corn, tobacco, and cotton are the principal crops) with some manufacturing and lumbering. Rocky Mount, Tarboro, Princeville, Greenville, Henderson, and Washington are among the towns located within the basin.

1.8 PREVIOUS STUDIES AND REPORTS

Following is a list of previous studies, reports, and related documents related to Princeville and the Tar River. Refer to Section 2.5 for further information on the existing levee and its design.

- Princeville Dike, Tar River, Edgecombe County, North Carolina, Detailed Project Report, USACE, March 1963. Recommended a project for flood protection for Princeville, and design and construction of the original levee.
- Princeville Dike, Tar River, Edgecombe County, North Carolina, Operations & Maintenance Manual, USACE, 1966. Set forth operations and maintenance requirements for the completed original levee in Princeville.
- Tar River Basin Report, North Carolina, USACE, March 1979. A plan for development of the water and related land resources of the Tar River Basin for flood control, water supply, water-quality control, and recreation to meet current and future water resource conservation needs in the basin. Addressed potential construction of reservoirs on the Tar River.
- Project Information Report (Public Law 84-99), Tar River, Princeville, North Carolina, USACE, November 1999. Defines needed emergency restoration and repairs to the Princeville levee following Hurricane Floyd flooding, September 1999. Repairs were completed to bring the levee back to original design configuration in 2000.
- Executive Order 13146, President William J. Clinton, February 29, 2000. Established "President's Council on the Future of Princeville, North Carolina." Outlined Executive direction for Federal interest in the sustainability of the Town of Princeville, laying groundwork for a variety of forms of Federal assistance, including the current USACE study to assess and evaluate flood risk reduction in Princeville.

- Princeville Recovery Plan, May 2000. Prepared for FEMA in support of flood recovery efforts for the Town of Princeville, North Carolina. Report addressed a plan that would quickly bring all of the citizens of Princeville home while rebuilding toward a better and more disaster-resistant community.
- Draft, Town of Princeville, Section 205 Flood Control Study – Initial Project Planning Report, USACE, September 2000. Purpose was to evaluate the need for a flood improvement feasibility study for Princeville. A need was established and feasibility study is being pursued, as recommended.
- Memorandum to the President, Subject: Recommendations for the Future of Princeville from the President’s Council on the Future of Princeville, North Carolina, August 2000. Council report on activities thus far and recommendations for further assistance to achieve better physical security, infrastructure, and future economic sustainability. Flood risk management concepts were brought forward into this feasibility study
- USACE – Princeville Dike Repairs, Princeville, NC; Operations and Maintenance Manual, July 2001. This document is a supplement to the original Operations and Maintenance Manual due to repairs necessitated by hurricane Floyd.
- Tar River Basin Congressional Resolution, House of Representatives Committee on Transportation and Infrastructure, introduced by Congressman Walter B. Jones, May 21, 2003. Authorized study on flood control, water supply, and water quality concerns in the entire Tar River Basin. Basin study has not been funded to date.
- 905(b) Reconnaissance Study, USACE, May 31, 2001. Purpose was to evaluate whether there was a Federal interest in a further flood risk management study and a non-Federal sponsor willing to cost share a feasibility study. Analysis and recommendation to proceed with the current feasibility study was approved on June 22, 2001.

1.9 SUMMARY OF FEDERAL ASSISTANCE TO PRINCEVILLE AND THE STATE OF NORTH CAROLINA/SUMMARY FROM THE PRESIDENT’S COUNCIL ON THE FUTURE OF PRINCEVILLE, NORTH CAROLINA, REPORT DATED AUGUST 11, 2000

1.9.1 ASSISTANCE IMMEDIATELY AFTER HURRICANE FLOYD FLOODING

Assistance was provided by various Federal, State, and local agencies after the flooding associated with Hurricane Floyd:

- FEMA provided \$88 million in temporary housing assistance (not including mobile homes and travel trailers) to the State of North Carolina, over \$49 million for the State-managed manufactured housing program, over \$2 million in human assistance grants, and \$1.3 million to the Edgecombe County School District.
- Housing and Urban Development (HUD) deployed community redevelopment specialists to Princeville, began a systematic review of the housing crisis, and opened a disaster response office to provide technical assistance and increase capital improvement funding for public housing.
- SBA approved over \$8.3 million for 110 disaster assistance loans in Princeville, and approved a 7(a) general business loan for \$200,000.
- U.S. Department of Agricultural (USDA) Local Service Center provided immediate emergency technical assistance to help in the location of stranded residents, assess storm damage, and inspect the town’s drainage system. USDA also provided roughly \$250,000 for 25 grants and

loans to low-income elderly residents for home repairs, granted moratoriums on housing loans to over 40 borrowers, and prequalified many town residents for loan and grant funds to be used for single-family home purchases.

- Health and Human Services (HHS) performed public health assessments, assisted in the evaluation of the potential for vector borne disease, participated in the development of a mosquito spraying plan, and provided published technical guidance for flood prevention and recovery to the residents of Princeville.
- Department of Commerce/Economic Development Administration performed an Economic Impact Assessment for North Carolina, and funded a \$1.8 million Economic Adjustment grant to the Edgecombe County Water and Sewer Authority.
- Department of Defense/USACE dewatered remaining floodwaters from the town, some repairs were made to the existing levee to provide some flood risk reduction until full levee restoration could be completed. Full levee restoration was completed under P.L. 84-99 shortly afterward.
- North Carolina National Guard manned shelters in the Tarboro area, providing the residents of Princeville with clean drinking water, shower facilities, transportation, warehouses for food and supplies, and security for the area. They also worked together with the U.S. Coast Guard to recover disinterred caskets that had surfaced during the flooding.
- Environmental Protection Agency (EPA) helped coordinate emergency response activities, provided technical assistance on drinking and wastewater systems, and assisted in the removal and containment of hazardous substances.
- U.S. Department of Transportation (DOT) coordinated with FEMA and the NCDOT to clear debris.
- Department of Labor provided \$1.5 million for temporary employment of 46 Princeville residents to clean up, remove debris, and provide humanitarian assistance.
- National Park Service (NPS) provided technical assistance to Princeville for the completion of the conceptual design for a Heritage Trail.
- Numerous church groups, colleges, non-profits, housing organizations, and other private sector groups provided both funding and labor to help with clean-up and temporary housing.

1.9.2 ASSISTANCE AFTER THE COUNCIL WAS ESTABLISHED

The President's Council on the Future of Princeville, North Carolina, worked with the town administration, the State of North Carolina, non-profit groups, private sector firms, and other interested parties to determine the best ways to assist Princeville.

- FEMA provided eight personnel in support of the Princeville Recovery Plan, technical support in the selection and design for construction of a 64-unit mobile home park within the Town of Princeville, and infrastructure personnel, including extension of the Recovery Manager position to provide experienced management help for the town leadership.
- HUD provided nearly \$6 million in direct funding to housing redevelopment, a \$4 million grant from the Emergency Capital Fund to facilitate the reconstruction efforts of a public housing development, and funding for the East Tarboro-Princeville Community Development Corporation (CDC) in Tarboro.
- USDA Rural Housing Service assisted in funding for a multi-family housing complex, reconstruction of the Town Hall, and a senior community center.

- SBA provided technical assistance to homeowners and businesses seeking to obtain SBA guaranteed loans and microloans.
- HHS provided a \$445,700 carryover grant for the cost of repairs to a Head Start Center and for assistance with other program issues in Princeville. Funding was also provided to the N.C. Primary Health Association to assist in developing community programs that would provide coordinated health care to uninsured, low income residents in Princeville and other affected areas.
- Federal Highway Administration (FHWA) and NCDOT assisted in funding restoration of the old Town Hall into an African American “Firsts” museum.
- USACE completed repairs to the levee and is conducting a feasibility study to evaluate options for reducing flood risk. The State of North Carolina is cost sharing the feasibility study.
- North Carolina Parks and Recreation and Lowe’s Home Improvement funded development of a community park in an area that once housed mobile homes.
- NPS developed the Princeville Heritage Trail Concept Plan, technical drawings, and project estimates as part of a joint partnership effort to leverage \$1.8 million in DOT Enhancement funds to implement the project. The trail was selected by the Save America’s Treasures program in 2001 because of its importance of linking historical and cultural sites in the oldest incorporated African-American town in the Nation.

1.9.3 COUNCIL RECOMMENDATIONS FOR FURTHER ASSISTANCE

FEMA developed the Princeville Recovery Plan, May 2000, which describes the specific actions that the town would need to take to restore the loss and damage caused by Hurricane Floyd. The plan presented three options for recovery: (1) basic level of investment to restore the community to pre-flood conditions, (2) enhanced program to correct deficiencies in services and infrastructure, and (3) growth and development initiatives that would substantially upgrade facilities and infrastructure and pursue new economic development opportunities. The town chose to use funding to restore the community to pre-flood conditions.

1.10 PUBLIC COMMUNICATION

Public meetings have been, and will continue to be, an important part of the study process. Several meetings have been held in the Town of Princeville that included local, State, and Federal interests. At study inception, scoping letters were sent to agencies and special interest groups to solicit comments and any concerns that should be considered in determining a successful plan during the study process. Those comments and concerns were documented and used throughout the development of alternatives.

1.11 REPORT TERMINOLOGY

The Princeville Flood Risk Management project was authorized using the term “**dike**” to refer to the existing structure built in 1967 (*Figure 1.8*), but for the purposes of this feasibility study, the term “**levee**” will be considered synonymous with “dike” and will be used throughout the report.



Figure 1.8: Existing Dike (Levee), 1967

BACKFLOW DEVICE

The term **backflow device**, or “**flap gate**”, refers to a hinged steel flap device applied to prevent undesirable flow through a drainage feature that was designed to allow normal outward flow of water during runoff events (i.e. backwards flow through a culvert that passes through a levee). When the flood elevation outside (i.e., in this case the riverside) a feature rises above the elevation of the pipe, the backflow device is designed to automatically close and block the flow of water thereby preventing it from entering a given area. However, this may also cause water on the upstream side to accumulate (pond), and water inside the levee must rise to a level higher than waters outside the levee in order for the backflow device to open and allow movement of water through the pipe. An interior drainage plan is required for identification of waters that accumulate inside a levee and for development of a method to prevent damages from these waters. See *Figure 1.9* for an example of two backflow devices on an existing culvert in Princeville.



Figure 1.9: Flap Gate Backflow device on culverts

FLOOD INSURANCE RATE MAP (FIRM)

The Flood Insurance Rate Map (**FIRM**) depicts flood zones expected to be inundated by the “Base Flood,” or 1% chance event (originally referred to as the 100-year flood by FEMA), and the 0.2% chance flood (originally referred to as the 500-year by FEMA). The areas flooded by the 1% chance event are denoted either **ZONE AE** (defined by resolute flood elevations) or **ZONE A** (an approximate determination), and the additional area flooded by the 0.2% chance event is denoted **Zone X**. A FIRM also includes an area referred to as the **Floodway Zone** (floodway), or ZONE AEF, that defines the minimum area required to pass the 1% chance event without increasing the floodwater elevation more than 1.0 foot. The placement of fills or structures in an AEF zone is restricted and controlled by the FEMA **Floodplain Management regulations**. The area outside the AEF floodway and inside the AE zone is referred to as the **flood fringe**. Most communities and FEMA permit the construction of building structures and placement of fill within the flood fringe.

LEVEE

A **levee** is a manmade barrier (embankment, floodwall, or structure) along a water course or water body constructed for the primary purpose of excluding flood waters arising from hurricanes, storms, seasonal high water, storm or earthquake surges, precipitation, and other weather events from the leveed area.

Landside of the levee – The side of the levee landward of (further away from) the river that may cause flooding.

Riverside of the levee – The side of the levee on the same side of (directly adjacent to) the river causing the flooding.

NAVD’88

The term **NAVD ’88** refers to the current vertical datum (North American Vertical Datum of 1988) used to reference the elevations established during a survey.

REACH

A **reach** is a straight section of restricted waterway that is uniform with respect to discharge, slope, and cross-section.

RESIDUAL FLOOD RISK AND FLOOD RISK MANAGEMENT (FRM)

As no project provides 100 percent exclusion of flood waters, **residual flood risk** is used to identify any risk that remains after a flood risk management project is constructed. The residual risk is not only the probability of flooding taking place, but is also the extent of potential flooding. The term “**flood risk management**” (FRM) is used in the same manner as the term “flood risk reduction”, but goes beyond inundation risk reduction to include the potential to reduce risks to life, safety, and other risk-associated areas.

RISK

Risk is the probability of an event that results in undesirable consequences, such as the probability an area could be flooded during an event of a certain magnitude.

RISK ANALYSIS

Risk Analysis is an approach to the evaluation and decision making that explicitly, and to the extent practical, analytically incorporates considerations of uncertainty in a flood risk management study.

RIVER STAGE/STAGE

The use of the term **river stage**, or **stage**, refers to the relative height of water based on the reading taken from a gage board, and uses standard elevation data consistent with established vertical elevation measurement standards.

SEGMENT

A flood damage reduction **segment** is defined as a discrete geographically-defined portion of a flood damage reduction system that is operated and maintained by a single entity. A flood damage reduction segment can be made up of one or more features (levee, floodwall, pump stations, etc).

SYSTEM

A flood damage reduction **system** is made up of one or more flood damage reduction segments which collectively provide flood damage reduction to a defined area. Failure of one segment within a system constitutes failure of the entire system. Failure of one system does not affect another system.

THE 1% CHANCE EVENT

The **1% chance event**, commonly referred to as the “100-year flood,” is defined as a flood with a one percent probability of being equaled or exceeded in any given year, and is a statistically-derived regulatory standard used by Federal agencies and most states for administering floodplain management and FEMA programs. To help eliminate the misconception of how often flood events can occur, the current guidance is to state the percent probability, or the chance of the event happening in any given year, rather than the return period. For example, there is a 1% chance that a 100-year flood can happen in any given year, not just once every 100 years. In fact, a 1% chance event has a 26 percent chance of occurring during a 30-year period, the term of many home mortgages. In the FEMA Flood Insurance Studies (FIS), the 1% chance event is called the “**Base Flood**.”

UNCERTAINTY

Uncertainty is a measure of the imprecision of knowledge for parameters and functions used to describe the hydraulic, hydrologic, geotechnical, and economic aspects of a plan, as well as the improbability that events will occur as expected due to less predictable factors, such as human behavior.

SECTION 2 – EXISTING CONDITIONS*

2.1 ENVIRONMENT

2.1.1 VEGETATION AND WILDLIFE

Within the project study area, the nearly level, poorly drained soil in the broad floodplains of the Tar River are vegetated predominantly with an overstory of bald cypress (*Taxodium distichum*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), water hickory (*Carya aquatica*), sweetgum (*Liquidambar styraciflua*), swamp tupelo (*Nyssa sylvatica*), American elm (*Ulmus americana*), yellow poplar (*Liriodendron tulipifera*), river birch (*Betula nigra*), water oak (*Quercus nigra*), and willow oak (*Quercus phellos*). The understory species are mainly wax myrtle (*Myrica cerifera*), American holly (*Ilex opaca*), sweet bay (*Magnolia virginiana*), red bay (*Persea borbonia*), sourwood (*Oxydendrum arboreum*), greenbrier (*Smilax spp.*), and giant cane (*Arundinaria gigantea*). The upland portion of the project area is dominated with loblolly (*Pinus taeda*) and longleaf (*Pinus palustris*) pines, sweetgum, southern red oak (*Quercus falcata*), blackjack oak (*Quercus marilandica*), beech (*Fagus grandifolia*), sycamore (*Platanus occidentalis*), and some black walnut (*Juglans nigra*). The understory species are primarily dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), American holly, wax myrtle, honeysuckle (*Lonicera japonica*), Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*).

Since the town's inception in 1885, large portions of the project area (within the Princeville community) have been cleared as a result of the construction of roads (i.e., U.S. Highways 64 and 258, N.C. Highway 111), croplands (i.e., farm fields), forestry, and residential development within the town. This community development is a consequence of the project area becoming more urban in nature. Wildlife habitat has been lost in the project area, due to the removal of riparian vegetation to facilitate the expansion of the town.

Riparian forests such as those found along the Tar River have long been recognized as having outstanding value to both fish and wildlife resources due to their high productivity and their provision of food, cover, and water. However, because of the removal of riparian vegetation in the project area and the fragmented nature of the remaining wooded habitat, the wildlife value of the project area has been greatly diminished. Within Princeville, about 54 percent of the 1,024 acre study area or about 553 acres is considered wildlife habitat with suitable riparian vegetation.

Common species of mammals that have been documented to occur in the riparian woodlands along the river include the whitetail deer (*Odocoileus virginianus*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), and cottontail (*Sylvilagus floridanus*). Common bird species documented from the Tar River area include the red-eyed vireo (*Vireo olivaceus*), kingfisher (*Megaceryle alcyon*), barn swallow (*Hirundo rustica*), Carolina wren (*Thryothorus ludovicianus*), cardinal (*Cardinalis cardinalis*), mourning dove (*Zenaida macroura*), bobwhite quail (*Colinus virginianus*), and mockingbird (*Mimus polyglottos*).

Some of these riparian woodlands within the project area are classified as wetlands under the definition provided in Section 404 of the Clean Water Act of 1977, as amended or Executive Order 11990, Protection of Wetlands.

2.1.2 AQUATIC RESOURCES

The Tar-Pamlico River Basin, located entirely within North Carolina, is the fourth largest river basin in the state, and a major tributary to Pamlico Sound. Pamlico Sound, combined with the adjacent Albemarle Sound, forms one of the most productive estuarine systems in the country and is part of the U.S. Environmental Protection Agency's National Estuary Program (NCDENR N.C. Division of Soil and Water Conservation 2005).

The approximately 5,440-square mile Tar-Pamlico River Basin drainage area extends about 180 miles from its headwaters in the north central Piedmont region of the state to the Atlantic Ocean. The headwaters are located in Person and Granville Counties west of U.S. Interstate 85 and includes portions of 14 other counties -- Beaufort, Dare, Edgecombe, Franklin, Halifax, Hyde, Martin, Nash, Pamlico, Pitt, Vance, Warren, Washington and Wilson. Within the watershed as of 2000, there were approximately 415,000 people (NCDENR N.C. Division of Soil and Water Conservation 2005).

The Tar-Pamlico River Basin provides habitat for nine state or federally listed threatened or endangered freshwater mussel species. Two national wildlife refuges, Lake Mattamuskeet and Swan Quarter, are also located within the basin (NCDENR N.C. Division of Soil and Water Conservation 2005).

From its headwaters in Person and Granville Counties to U.S. Highway 17 in Washington, this portion of the stream is called the Tar River (predominantly fresh water and free flowing) and ranges in width from narrow ditches to 150 yards wide with a swift current. Downstream from the U.S. Highway 17-bridge in Washington to its confluence with Pamlico Sound, the stream is called the Pamlico River, which is primarily estuarine (salt water) and ranges from 500 yards wide in Washington to 5 miles wide at its mouth. The Pamlico River is largely influenced by wind rather than lunar tides. Major population centers within the basin are Greenville, Henderson, Oxford, Rocky Mount, Tarboro, and Washington (NCDENR N.C. Division of Soil and Water Conservation 2005).

According to the 1964 aquatic survey (Smith and Bayless 1964), the two largest tributaries of the Tar River are Fishing (about 760 square miles drainage area) and Swift Creeks (about 350 square miles drainage area), which enter the river upstream of Tarboro. The Tar River in the Piedmont is characterized by pool-riffle type of habitat, stream bottoms are primarily sand-silt or sand-gravel, and generally turbid. In the Upper Coastal Plain, the Tar River and its major tributaries are primarily turbid and stream bottoms are composed of sand-silt or sand-muck-detritus. In the Lower Coastal Plain portion of the Tar River, wind tides affect the main river channel. The tributaries upstream of the wind-tide driven waters are primarily black-water, swamp-drainage streams with muck-sand-detritus bottoms. Approximately 20 families and 75 species of fish populate the Tar River, with *Centrarchidae* (sunfishes) being the dominant family represented by 15 species. About eleven species of game fishes are commonly found within the river: redbfin pickerel (*Esox americanus*), chain pickerel (*Esox niger*), Roanoke bass (*Ambloplites cavifrons*), largemouth bass (*Micropterus salmoides*), flier (*Centrarchus macropterus*), striped bass (*Morone saxatilis*), warmouth (*Lepomis gulosus*), redbreast sunfish (*Lepomis auritus*), pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), and black crappie (*Pomoxis nigromaculatus*). During the spring, anadromous species, such as striped bass (*Marone saxatilis*), hickory shad (*Alosa mediocris*), and American shad (*Alosa sapidissima*) are also abundant within the river below the Rocky Mount Mills Dam.

2.1.3 THREATENED AND ENDANGERED SPECIES AND STATE PROTECTED SPECIES

USACE coordinated with USFWS and the National Marine Fisheries Service (NMFS) to identify endangered and threatened species (as well as Federal Species of Concern) that might be present in the vicinity of the project study area (Figure 1.7). Species that are currently Federally listed as endangered or threatened (as well as Federal Species of Concern), which may or do occur in the 1,024 acre Study Area, and which may be subject to impacts from the proposed project are listed in Table 2.1, below.

Table 2.1: Threatened and Endangered Species (Including Federal Species of Concern) Potentially Present In Edgecombe County, North Carolina

<i>Species Common Names</i>	<i>Scientific Name</i>	<i>Federal Status</i>
<i>Vertebrates</i>		
<i>Red-cockaded woodpecker</i>	<i>Picoides borealis</i>	<i>Endangered*</i>
<i>Shortnose sturgeon</i>	<i>Acipenser brevirostrum</i>	<i>Endangered*</i>
<i>Atlantic sturgeon</i>	<i>Acipenser oxyrinchus</i>	<i>Endangered</i>
<i>Northern Long Eared Bat</i>	<i>Myotis septentrionalis</i>	<i>Threatened</i>
<i>Invertebrates</i>		
<i>Atlantic pigtoe</i>	<i>Fusconaia masoni</i>	<i>FSC</i>
<i>Tar River Spinymussel</i>	<i>Elliptio steinstansana</i>	<i>Endangered</i>
<i>Yellow lampmussel</i>	<i>Lampsilis cariosa</i>	<i>FSC</i>
<i>Yellow lance</i>	<i>Elliptio lanceolata</i>	<i>FSC</i>
<i>Status Definition:</i>		
<i>Endangered - A taxon "in danger of extinction throughout all or a significant portion of its range."</i>		
<i>Threatened - A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."</i>		
<i>FSC - A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).</i>		
<i>*Historic record - the species was last observed in the county more than 50 years ago.</i>		

According to the USFWS Draft Coordination Act Report dated August 23, 2005 (Attachment B), the red-cockaded woodpecker (*Picoides borealis*) has only obscure or historic records in Edgecombe County.

The shortnose sturgeon (*Acipenser brevirostrum*) may historically have been found in the Tar/Pamlico River.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) may be found within the Tar/Pamlico River in or near the project area.

The Northern Long Eared Bat (NLEB) (*Myotis septentrionalis*) range encompasses Edgecombe County, although there are no documented records of NLEB within the county. However, there have been very few surveys conducted for NLEB in eastern North Carolina. It is possible that future surveys may document NLEB in this county.

A population of the endangered Tar River spiny mussel is found near the City of Tarboro's Wastewater Treatment Plant discharge, just downstream of the U.S. Highway 64 Bridge within the project study area (Personal Communication, Mr. John Alderman, Biologist, N.C. Wildlife Resources Commission, January 21, 2003). On 10 September 2010, Mr. Dale Suiter, USFWS stated that the endangered Tar River spiny mussel is still found in this location.

STATE PROTECTED SPECIES

On 3 December 2010, Mr. John Finnegan, Information Systems Manager with the North Carolina Natural Heritage Program, N.C. Department of Environment and Natural Resources, provided *Table 2.2*, below which lists those State Protected Species that might be present in the vicinity of the project study area.

Table 2.2: List of State Protected Species that may be found in Edgecombe County, North Carolina

Name Category	Scientific Name (click for map)	Common Name	State Status	County	County Status
Invertebrate Animal	<i>Alasmidonta undulata</i>	Triangle Floater	T	Edgecombe	Current
Invertebrate Animal	<i>Baetisca becki</i>	Mayfly	SR	Edgecombe	Current
Invertebrate Animal	<i>Baetisca obesa</i>	Mayfly	SR	Edgecombe	Current
Invertebrate Animal	<i>Elliptio lanceolata</i>	Yellow Lance	E	Edgecombe	Current
Invertebrate Animal	<i>Elliptio roanokensis</i>	Roanoke Slabshell	T	Edgecombe	Current
Invertebrate Animal	<i>Elliptio steinstansana</i>	Tar River Spiny mussel	E	Edgecombe	Current
Invertebrate Animal	<i>Fusconaia masoni</i>	Atlantic Pigtoe	E	Edgecombe	Current
Invertebrate Animal	<i>Lampsilis cariosa</i>	Yellow Lamp mussel	E	Edgecombe	Current

Name Category	Scientific Name (click for map)	Common Name	State Status	County	County Status
Invertebrate Animal	<i>Lampsilis radiata</i>	Eastern Lampmussel	T	Edgecombe	Current
Invertebrate Animal	<i>Lasmigona subviridis</i>	Green Floater	E	Edgecombe	Current
Invertebrate Animal	<i>Leptodea ochracea</i>	Tidewater Mucket	T	Edgecombe	Current
Invertebrate Animal	<i>Neurocordulia molesta</i>	Smoky Shadowdragon	SR	Edgecombe	Obscure
Invertebrate Animal	<i>Orconectes carolinensis</i>	North Carolina Spiny Crayfish	SC	Edgecombe	Current
Invertebrate Animal	<i>Strophitus undulatus</i>	Creeper	T	Edgecombe	Current
Vascular Plant	<i>Carex crus-corvi</i>	Crowfoot Sedge	SR-P	Edgecombe	Historical
Vascular Plant	<i>Desmodium fernaldii</i>	Fernald's Tick-trefoil	SR-P	Edgecombe	Historical
Vascular Plant	<i>Didiplis diandra</i>	Water Purslane	SR-P	Edgecombe	Historical
Vascular Plant	<i>Hottonia inflata</i>	Featherfoil	SR-O	Edgecombe	Historical
Vascular Plant	<i>Ranunculus flabellaris</i>	Yellow Water-crowfoot	SR-P	Edgecombe	Historical
Vertebrate Animal	<i>Ambloplites cavifrons</i>	Roanoke Bass	SR	Edgecombe	Historical
Vertebrate Animal	<i>Ammodramus henslowii susurrans</i>	Eastern Henslow's Sparrow	SC	Edgecombe	Current
Vertebrate Animal	<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	Edgecombe	Current
Vertebrate Animal	<i>Heterodon simus</i>	Southern Hognose Snake	SC	Edgecombe	Current
Vertebrate Animal	<i>Lampetra aepyptera</i>	Least Brook Lamprey	T	Edgecombe	Current
Vertebrate Animal	<i>Lanius ludovicianus</i>	Loggerhead Shrike	SC	Edgecombe	Current
Vertebrate Animal	<i>Necturus lewisi</i>	Neuse River Waterdog	SC	Edgecombe	Current
Vertebrate Animal	<i>Noturus furiosus</i>	Carolina Madtom	T	Edgecombe	Current
Vertebrate Animal	<i>Picoides borealis</i>	Red-cockaded Woodpecker	E	Edgecombe	Historical
Vertebrate Animal	<i>Sciurus niger</i>	Eastern Fox Squirrel	SR	Edgecombe	Current

N.C. Status – Endangered (E); Threatened (T); Special Concern (SC); Extirpated (EX), Significantly Rare (SR), Significantly Other (SR-O), Significantly Peripheral (SR-P)

Name Category	Scientific Name (click for map)	Common Name	State Status	County	County Status
E, T, and SC status species are given legal protection status by the N.C. Wildlife Resources Commission. Extirpated species are no longer believed to occur in the state.					

2.1.4 WETLANDS

Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions (33 C.F.R. § 328.3). Wetlands possess three essential characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Various types of wetlands are present in the study area. These wetlands are principally freshwater forested/shrub wetlands along the Tar River, but may include other types scattered in depressions or drainages.

2.1.5 WATER QUALITY

The North Carolina Department of Environment and Natural Resources (NCDENR) – Division of Water Resources assigns classifications to the surface waters and wetlands of the State (N.C. Administrative Code 15A NCAC 02B.0100 & .0200, Amended Effective April 1, 2003). The North Carolina Division of Water Resources (NCDWR 2004) has classified the waters of the Tar River within the project area as: Class C and NSW. Class C waters are protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, agriculture and other uses suitable for Class C. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. There are no restrictions on watershed development or types of discharges. Nutrient Sensitive Waters (NSW) is a supplemental classification intended for waters needing additional nutrient management due to their being subject to excessive growth of microscopic or macroscopic vegetation.

According to the Basinwide Assessment Report for the Tar River Basin (NCDENR 2003), the project area is located within subbasin 03 and there are three ambient monitoring sites in this subbasin: the Tar River at Tarboro, the Tar River near Falkland, and Conetoe Creek near Bethel. Low pH values in Conetoe Creek reflected swamp drainage, but these values were not low enough to affect the benthic fauna. Low dissolved oxygen concentrations were of greater concern in this subbasin, with occasional low concentrations recorded at both Tar River sites. Conetoe Creek also had elevated nitrogen concentrations. Mercury was found greater than the U.S. EPA criteria of 0.6 µg/g in two largemouth bass from the Tar River and greater than the state criteria of 0.4 to 0.6 µg/g in six largemouth bass and two notchlip suckers. Biological monitoring indicated relatively stable water quality in this subbasin. The Tar River’s water quality was rated “Good” (at Tarboro) and “Excellent” (at N.C. 42) based upon benthic macro-invertebrates (NCDENR 2003).

2.1.6 TAR-PAMLICO RIVER RIPARIAN BUFFER RULES

The Tar-Pamlico River Basin encompasses all or part of fifteen counties, is over 3.5 million acres in size, and has a drainage area of 5,400 square miles. The estuarine portion consists of 634,400 acres.

Effective August 1, 2000, the State of North Carolina adopted the Nutrient Sensitive Waters Management Strategy for maintaining and protecting existing riparian buffers in the Tar-Pamlico

River Basin (15A NCAC 02B .0259). The purpose of this rule is to protect and preserve existing riparian buffers to maintain their nutrient removal functions in the Tar-Pamlico River Basin (<http://portal.ncdenr.org/web/wq/ps/nps/tarpamlicobuffer>).

The main rule, called the buffer protection rule, requires that existing vegetated riparian buffers in the basin be protected and maintained on both sides of intermittent and perennial streams, lakes, ponds, and estuarine waters. This rule does not establish new buffers unless the existing use in the buffer area changes. The footprints of existing uses such as agriculture, buildings, commercial and other facilities, maintained lawns, utility lines, and on-site wastewater systems are exempt. A total of 50 feet of riparian area is required on each side of waterbodies. Within this 50 feet, the first 30 feet from the water, referred to as Zone 1, is to remain undisturbed with the exception of certain activities. The inner 20 feet, referred to as Zone 2, must be vegetated, but certain additional uses are allowed. Specific activities are identified in the rule as "exempt", "allowable", "allowable with mitigation" or "prohibited". Examples of "exempt" activities include driveway and utility crossings of certain sizes through Zone 1, and grading and revegetation in Zone 2. "Allowable" and "allowable with mitigation" activities require review by N.C. Division of Water Resources' staff and include activities such as new ponds in drainage ways and water crossings. The other two buffer rules are the buffer *mitigation* rule and the buffer program *delegation* rule. The mitigation rule defines the process applicants would follow to gain approval for activities that are identified in the buffer protection rule as "allowable with mitigation." It also outlines acceptable mitigation measures. The delegation rule lays out the criteria and process for local governments to obtain authority to implement the buffer rules within their jurisdictions (North Carolina Division of Forest Resources 2004).

2.1.7 CULTURAL RESOURCES

Historic Context

The Town of Princeville is located on the upper and lower "paleo-braidplain" terraces of the Tar River. Relict dune locations characterized by ridges and elevated landforms along the terraces appear to represent primary occupation sites in North Carolina during the Archaic and Woodland periods (Caynor, 2011). Research suggests "paleo-braidplain" sites contain more stratified deposits than upland terrace sites and greater potential in refining the cultural-historical sequence of North Carolina Coastal Plain prehistory (Daniel and Moore, 2011).

Prehistoric cultural resources within the Princeville project area generally consist of surface and subsurface material representing Early Archaic through Late Woodland occupations. The Early Archaic artifacts include corner-notched or side-notched projectile points such as the Big Sandy, Palmer, and Kirk types and the bifurcated stemmed Lecroy type. The Middle Archaic period is best typified by broad bladed projectile points of the Stanly and Morrow Mountain types. Savannah River stemmed points represent the dominant Late Archaic projectile point type.

Princeville has the unique historic significance of being the first town chartered by African Americans in the United States (Appendix H). The area that is now Princeville was originally settled in 1865 by newly-freed slaves shortly after the end of the Civil War (Mattson, Alexander and Associates, Inc. 1999). The town, which was originally known as Freedom Hill, attained representation in the State Congress in 1867 (URS Group, Inc. 2001). By the 1880s, Freedom Hill residents were turning their attention towards the incorporation of their town. In February 1885, the North Carolina General Assembly passed an act to incorporate the Town of Princeville, making it the nation's first town incorporated by freed slaves. The people elected to name their

town after an early resident, Turner Prince, a carpenter born into slavery in North Carolina 20 years before the Civil War (URS Group, Inc. 2001).

Area of Potential Effects

The area of potential effects (APE) for the newly Recommended Plan is the Town of Princeville and major project features within existing road rights-of-way in Segments 1, 2 and 4 (Figures 7.2, 7.3 and 7.5, respectively); the existing levee right-of-way in Segment 3 (Figure 7.4); the earthen levee alignment and associated construction areas connecting US Hwy 258 and state highway NC 111 (Figure 7.5); and a 40-acre site for a proposed borrow area located off SR 1524 near U.S. Highway 64 (Figure 7.6).

Historical Architectural Resources Survey of Princeville

After Hurricane Floyd, the National Park Service, Federal Emergency Management Agency (FEMA), and the North Carolina State Historic Preservation Officer (SHPO) worked out a strategy for evaluation of the historic town. Under a Memorandum of Agreement between the SHPO and FEMA, FEMA undertook standard recordation measures for those structures which the Town of Princeville had condemned and that were subsequently demolished. The FEMA study, *Historical Architectural Resource Survey of Princeville, North Carolina*, was prepared by the URS Group, Inc. and is dated April 2001. The study indicated that 13 structures were eligible for the National Register of Historic Places (NRHP) as contributing resources to a proposed historic district. Following the FEMA study, there was insufficient local interest shown in rehabilitation and registration, ten of those structures were subsequently abandoned or demolished, leaving three structures remaining on the NC State Study List:

- Abraham Wooten House, 259 Mutual Blvd. Princeville, ED 1113 DOE (Determined eligible by SHPO)
- Princeville School, U.S. 258, Princeville, ED 1039 SL DOE (Listed on the NRHP 9 Jan 2001)
- Mount Zion Primitive Baptist Church, Princeville, ED 1064 SL (Determined eligible by the SHPO)

In addition to these sites, the Baptismal Site on the south side of Tar River and east of the U.S. Hwy 64 Bridge is considered eligible as a Traditional Cultural Property. However, the State of North Carolina's Environmental Review Coordinator, has stated that based upon the FEMA study and past evaluations and findings, Princeville as a whole is not eligible for nomination to the NRHP but that individual structures will be considered for listing in the NRHP (email dated October 10, 2008).

2.1.8 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

According to the EPA Envirofacts Data Warehouse,² there are no superfund sites pursuant to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), one reported Small Quantity Generator (Delux Cleaners) in accordance with the Resource Conservation and Recovery Act (RCRA), and no large hazardous waste generators are located in the project area. Moreover, there are no hazardous waste sites on the National Priorities List that are located in the Princeville area.

A review of the N.C. Division of Waste Management, Registered Tanks GIS map (<http://portal.ncdenr.org/web/wm/gis/maps/tanks>) shows three Under Ground Storage Tanks

² http://oaspub.epa.gov/enviro/ef_home2.waste

(USTs) within the Town of Princeville. Two of the USTs are located off of NC 33 and one in the center of town by Princeville Elementary School. None of the existing USTs are within the levee alignment. No Above Ground Storage Tanks (ASTs) are present within the Town of Princeville.

According to the Hazardous Waste Section, N.C. Division of Waste Management Winchester Boats, at the intersection of Church Street and U.S. Highway 258 in Princeville, was considered an exempt small quantity hazardous waste generator. (email dated October 18, 2005) The project area along U.S. Highways 64 and 258 is several miles from this site and would not be impacted by this closed business. Moreover, very little activity has occurred since it opened in about 2000 and it has now been closed for many years.

2.1.9 AIR QUALITY

According to the N.C. Department of Environment and Natural Resources, Division of Air Quality, (<http://daq.state.nc.us/>) Edgecombe County is non-attainment for ozone and attainment for particulates (PM_{2.5}). Pursuant to 40 CFR 51.853 of the Clean Air Act, a conformity determination is required in a non-attainment or maintenance area if the action would discharge or emit an amount equal to or exceeding 50 tons/year of Volatile Organic Compounds (VOC's) and 100 tons/year of Nitrogen Oxides (NO_x). VOC's and NO_x are regulated by the USEPA and are considered precursors to ozone. If the Recommended Plan would discharge less than these amounts of VOC's and NO_x, then a conformity determination is not required.

2.1.10 FLOODPLAINS

The 100-year floodplain is established by the FEMA and is identified on Federal Flood Insurance Rate Maps. Base flood elevations for flood zones and velocity zones are also identified by FEMA, as are designated floodways. Projects in a designated floodway require a no-rise or no-impact evaluation. The 100-year (1%) floodplain information for the Town of Princeville, in Edgecombe County, North Carolina is found within community number 370318, in the revised map panels 3720473700, 3720473800, 3270474600, and 3720474800 dated May 3, 2004. New FEMA maps were provided to the community June 2, 2015.

The 100-year (1%) or base flood is defined as the flood having a 1 percent probability of being equaled or exceeded in any given year. A common misconception about the 100-year flood is that it represents the peak flow from historical records, or that it will occur once every 100 years. In fact, a 100-year flood has a 26 percent chance of occurring during a 30-year period, the length of many home mortgages. The 100-year flood is a statistically derived regulatory standard used by federal agencies, and most states, to administer floodplain management programs (FEMA 2005).

According to the current Flood Insurance Rate Map, with the exception of the proposed levee along U.S. Highway 64 and raised sections of Shiloh Farm Road and N.C. Highway 111, the majority of the project area within Princeville is located within a Zone AE and a Shaded X Zone.

2.1.11 PRIME FARMLAND

The Farmland Protection Policy Act (FPPA) requires federal agencies to minimize the conversion of prime and unique farmland to non-agricultural uses. Prime and unique farmlands are designations assigned by the U.S. Department of Agriculture (USDA). Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The land is also used as cropland, pastureland, rangeland, forest land, or other land, but cannot be used as urban built-up land or a water feature. Unique farmland

is land other than prime farmland that is used for the production of specific high value food and fiber crops. Such land has a special combination of soil quality, location, growing season, and moisture supply that is required to economically produce sustained high quality of a specific crop when treated and managed according to acceptable farming methods. According to the Edgecombe County Soil Survey (SCS 1979), the following prime farmland soils are found within the project area: Altavista fine sandy loam (AaA), State loamy sand (StB), and Wickham sandy loam (WkB). Currently the soil map unit that is being predominately farmed in Princeville is AaA. The remaining soil units located within the town limits of Princeville at the present time are not under cultivation. No unique farmlands are present in the project area.

2.2 SOCIO-ECONOMIC CHARACTERISTICS

2.2.1 BACKGROUND AND POPULATION

The study area is located in Edgecombe County, which was formed in 1741 from Bertie County. It was named for Richard Edgcumbe, a Member of Parliament from 1701 to 1742 and a lord of the treasury, who became 1st Baron Edgcumbe in 1742. In 1746 part of Edgecombe County became Granville County; in 1758 another part became Halifax County; in 1777 yet another part became Nash County. In 1855 the formation of Wilson County from parts of Edgecombe County, Johnston County, Nash County, and Wayne County reduced Edgecombe to its present dimensions (City Data.Com 2009). Tarboro is the county seat and is located about 2.1 miles from Princeville.

The 2010 census statistics estimated the population in Edgecombe County was 56,552 persons, with 21,680 households and 14,842 families, an increase from the 2000 census of 1.7%. The population density was 111.6 people per square mile (43/km²). Of the 100 NC counties in 2010, Edgecombe ranked 50th in size and 95th in per capita income (\$16,747). Princeville's socio-economic climate mirrors that of rural Edgecombe County, perpetuating a trend of disparity in the social and economic climate between the state and the region.

Edgecombe County is projected to gradually lose residents in the future. This condition may be attributed to a further decline in the farming economy and a shift to a service economy, mainly concentrated in more urbanized areas. Table 2.3 displays the population trends from 1990 to 2010, for Princeville, Edgecombe County, and North Carolina. While this table shows a sharp decline in Princeville's population in 2000, it is important to note that roughly half of the populous was displaced by the impacts of Hurricane Floyd. Table 2.3 indicates recovery beyond pre-storm population levels by 2010.

Table 2.3: Local and Regional Population Comparisons

Year	Princeville	Edgecombe County	North Carolina
2010	2,082	56,552	9,535,471
2000	940	55,606	8,049,313
1990	1,652	56,558	6,628,637

Data from the corresponding US Census survey was used for population estimates

According to the U.S. Census Bureau Fact Sheet (2006-2010 Estimate), the majority of the population in Princeville was African-American, at 96.3 percent. The white population was reported to be 2.6 percent of the total, and the remaining percentage was reported as “other”. The percentage of African-Americans in Princeville greatly exceeds those of the state, and nation, which were reported at 21.5 and 12.6 percent, respectively.

In 2010, there were 775 households in Princeville, out of which nearly 30% had children under the age of 19 living with them, 28% were married, living together, and 29.8% were non-families. Single individuals made up 26.5% of all households, and 11.5% of the population is someone who was 65 years of age or older. The average household size was 2.69 persons, and the average family size was 3.25 persons.

The 2010 Census data states that the population of Princeville included 30.8% under the age of 19, 6.5% from 20 to 24, 21.4% from 25 to 44, 29.8% from 45 to 64, and 11.5% who were 65 years of age or older. The median age was 38 years. For every 100 females there were 81.5 males. For every 100 females age 18 and over, there were 76.9 males. The U.S. Census Bureau Fact Sheet (2006-2010 Estimate) indicates a median income for a household in the town of \$21,066, which is 40.4% of the national average of \$51,914. It also indicates a per capita income for the town of \$12,024, which is 43.9% of the national average which is \$27,334. About 38.9% of the population was below the poverty line; 2.8 times the national average.

Much of economic activity in Princeville revolves around production and service occupations, with some employed in sales and construction. Per the 2010 Census data, production, transportation and moving services accounted for 34.9% of employment followed by service occupations (28.9%), sales and office (18.0%), management and professional (12.8%), and construction, extraction and maintenance occupations (5.3%). In 2010, production, transportation and material moving were the largest of 20 major sectors in Edgecombe County. It had an average wage per job of \$31,527. Per capita income grew by 19.0% between 1995 and 2005 (adjusted for inflation). Table 2.4 displays this regional and state employment distribution by activity.

Although Princeville’s population has rebounded greatly since Hurricane Floyd’s flooding devastated the town, there are a number of original residents that did not return. In the intervening 16 years, population is now over 2,000 residents, primarily due to births and movement of people from outlying areas. It is not anticipated that the population will significantly increase within Princeville due to low economic opportunity

Table 2.4: 2010 Occupation Distribution, by Percent

<i>Occupation</i>	<i>Princeville</i>	<i>Edgecombe County</i>	<i>North Carolina</i>
<i>Management, professional, and related occupations</i>	12.8	20.4	33.9
<i>Service Occupations</i>	28.9	18.8	16.0
<i>Sales and office occupations</i>	18.0	23.4	24.4
<i>Farming, fishing, and forestry occupations</i>	0	1.51	0.7
<i>Construction, extraction, and maintenance occupations</i>	5.3	5.1	10.6
<i>Production, transportation, and material moving occupations</i>	34.9	26.1	14.4

Source: 2010 U.S. Census

2.2.2 LAND OWNERSHIP PATTERNS

According to the U.S. Census Bureau (U.S. Census Bureau 2009), Princeville’s land area is about 1.6 square miles or approximately 1,024 acres. On average, home values in Princeville were reported lower than those for the county and state. The decennial census reported that the average home in Princeville was valued at \$56,600 dollars in 2000, while Edgecombe County and North Carolina were valued at \$70,800 and \$108,300 respectively. Given the nature of the census data collection schedule, 2000 is the most current standardized data available for housing in the Princeville study area.

2.2.3 INFRASTRUCTURE

Transportation in the project area is facilitated by the presence of U.S. Highways 64 and 258, which are paved highways located north and west of town. The CSX Railroad also crosses the Tar River at Princeville. Several utility line crossings exist within the right-of-way of these aforementioned highways and within the residential portion of the project area.

2.2.4 LAND USE

Within Princeville and/or in Edgecombe County, there are no zoning or land use regulations that restrict development. Despite the fact that Princeville supports no current agricultural uses, Edgecombe County has designated Princeville as “agriculture” and has no restrictions on the construction of new buildings within the town. Princeville participates in the Flood Insurance Program (FIP) and they are required to enforce minimum ordinances in the 1% chance event floodplain.

2.2.5 PUBLIC WATER AND SEWER

Water and sewer is provided to Princeville by Edgecombe County and the Town of Tarboro. The Edgecombe County water system has two functioning districts east of the City of Rocky Mount and south of Tarboro. The Town of Tarboro has both water and sewer that also serves the Town of Princeville.

2.3 SOCIO-ECONOMIC/OTHER SOCIAL CONDITIONS

Aside from the economic impacts associated with the existing flood risk, the social environment of Princeville sees impacts attributed to the existing level of flood risk management. While a metric cannot be uniformly established to quantify the social impacts to the community, several themes exemplify the social environment as it presently exists.

2.3.1 SOCIAL BONDS, CONNECTEDNESS, AND IDENTITY

Each major flood has resulted in dislocation of residents from their homes. The majority of residents returned once floodwaters receded and repair or replacement of their homes could be accomplished. However, during periods of flooding and rebuilding ordinary social interaction is disrupted. Scattered families find it harder to maintain the connectedness of a cohesive community during separation, and social organizations, such as churches and clubs, are disrupted and must rebuild their ties and reaffirm their identities following major floods.

2.3.2 COMMUNITY

In view of the repeated stress of flooding, the ability of Princeville to survive as a community is a tribute to the residents' strong ties to both the town's historical identity and to the land. While community ties have endured the devastation of flood events, Princeville's re-development has undoubtedly been negatively impacted.

2.3.3 HEALTH AND SAFETY

A primary concern for the community of Princeville is the health and safety of residents. The personal health and safety of every resident is jeopardized by high water when floodwaters rise and engulf the town. Only effective evacuation and rescue, as accomplished during the Floyd event, can head off the loss of human life. Along with high water comes the threat of disease-bearing waterborne substances and vectors, as well as the destructive force of flowing water and the debris it carries. These present both immediate and lasting threats to residents, continuing throughout cleanup and rebuilding efforts. All residents are also affected by the abrupt interruption of governmental and utility services—potable water, sewage disposal and treatment, trash removal, electric power—critical for their health and safety.

2.3.4 ECONOMIC VITALITY

The damage and destruction of commercial facilities by flooding presents a serious setback to the economic vitality of the town. In an already economically depressed region the relatively low yearly per capita income leaves little to no leeway for reliable economic recovery after devastating flood events. Many residents carry two mortgages, one for their rebuilt home and another for the home they lost to Hurricane Floyd. Businesses lose precious operating time, along with equipment, goods, and often the structures that house them. Many businesses do not rebound after flooding wipes them out.

2.3.5 VULNERABILITY OF THE POPULATION

A substantial proportion of Princeville's population (over 40%) is over 45 years of age. Flood events can impose an extra-heavy burden on the more elderly residents. Resistance to disease, mobility during daily life and emergency evacuations, ebbing mental and physical strength, and limited economic resources can all be challenges to aging residents. Many Princeville residents are not highly mobile. They possess a lower than normal transportation ownership, and are vulnerable during flood events due to a lack of access to transportation during evacuation.

2.3.6 STRUCTURES

The severe damage and loss of structures through repeated flooding has resulted in a very small remnant of buildings with historical value. Flooding has destroyed many structures throughout Princeville’s history, and those that survived the floods have suffered deterioration. Repairs and renovations are set back each time flooding occurs, discouraging the serious investment needed to return the buildings to good condition. After Hurricane Floyd, 30 businesses within town were either destroyed, or so damaged as to required later demolition. All six churches in town were damaged, with five of six requiring later demolition. Other heavily-damaged structures of historical value, except the Town Hall (former Princeville School), were later demolished under cleanup requirements, because they were not restored within 12 months following the flood (SHPO, 1999; City of Princeville, 2010).

Table 2.5: Percent Distribution of Damage Categories

CATEGORY	PERCENT OF TOTAL STRUCTURES
Residential	92%
Commercial	3%
Agriculture	3%
Public	2%

2.4 FLOODING CONDITIONS

2.4.1 HISTORICAL FLOODING

Princeville’s location in the wide floodplain of the Tar River has left it vulnerable to flooding. Floods are known to have occurred in 1775, 1791, 1800, 1863, and 1887. A river stage gage has been in place since about 1896 and also recorded other floods in 1908, 1919, 1924, 1928, 1940, 1958, and 1999. The flood of 1919 remained the flood of record for the 80 years up to 1999. The flood of 1958 led to the construction of the existing levee by the USACE under the general continuing authority of Section 205 of the 1948 Flood Control Act, as amended. Between 1958 and 1998 the greatest flood was on April 22, 1987, with a stage of 28.37 feet, compared with the 1958 stage of 29.17 feet and 1919 stage of 34.00 (Gage datum is 9.32 feet NAVD 88). The last flood, resulting from Hurricanes Dennis and Floyd in September 1999, became the new flood of record (a stage of 41.51 feet at 70,600 cfs). A summary of Tarboro gage significant flood events is shown in Table 2..

Table 2.6: Tarboro Gage Historical Flood Events

Year	Date	Stage (ft)	Elevation, Ft NAVD '88**	Flow (cubic feet per second)
1910	23-Apr-1910	27.3	36.62	23,100
1919	27-Jul-1919	34	43.32	52,800
1922	9-Mar-1922	26.4	35.72	21,400
1924	4-Oct-1924	33.5	42.82	39,800
1928	24-Sep-1928	30.2	39.52	29,200
1929	7-Oct-1929	27.8	37.12	24,000
1934	6-Dec-1934	27.38	36.7	23,500
1936	12-Apr-1936	25.53	34.85	20,200
1937	2-Feb-1937	26.18	35.5	21,500
1939	3-Sep-1939	27	36.32	23,000
1940	20-Aug-1940	31.77	41.09	37,200
1945	23-Sep-1945	28.13	37.45	24,600
1954	27-Jan-1954	27.43	36.75	23,600
1958	12-May-1958	29.17	38.49	26,900
1964	9-Oct-1964	25.61	34.93	20,000
1975	21-Mar-1975	27.08	36.4	22,600
1978	3-May-1978	26.4	35.72	21,200
1979	3-Mar-1979	27.02	36.34	22,400
1984	4-Jun-1984	26.44	35.76	21,300
1987	22-Apr-1987	28.37	37.69	25,200
1988	Tarboro FIS 100-yr	---	42	45,000
1996	15-Sep-1996	26.57	35.89	21,600
1998	26-Mar-1998	27.64	36.96	23,700
1999	19-Sep-1999	41.51	50.83	70,600
2003	15-Apr-2003	26.27	35.59	21,000
2004	Edgecombe Co FIS* 100-yr	---	45.25	46,700
2006	19-Jun-2006	28.03	37.35	24,500

NAVD – North American Vertical Datum
 * FIS – Flood Insurance Study (FEMA). The FIS 100-yr flood elevations are provided as a reference.
 ** These elevations were converted from NGVD '29 to NAVD '88, except 2004 FIS 100-yr

Figure 2.1 illustrates flood extent by frequency, for the without-project condition.

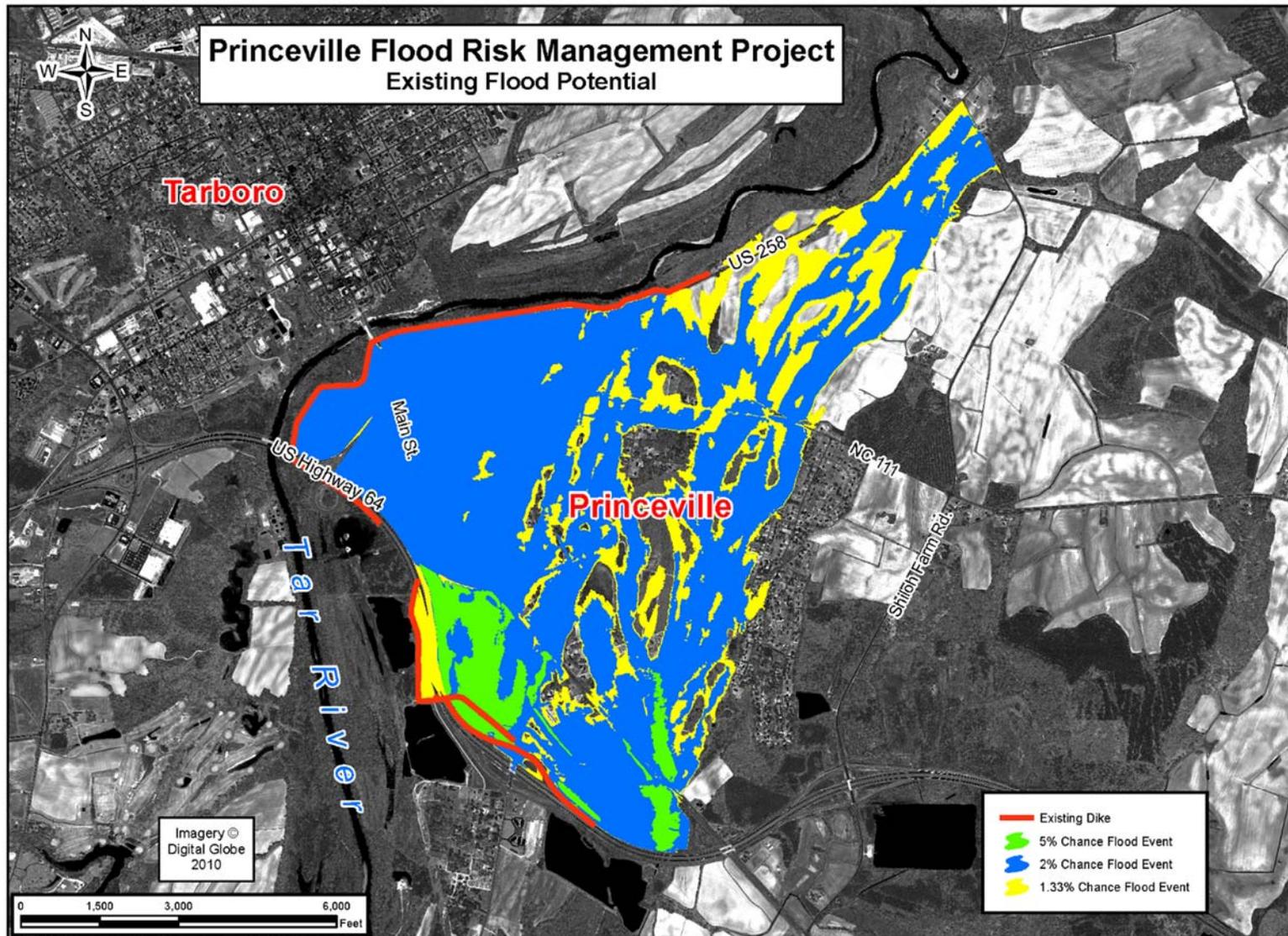


Figure 2.1: Existing Flood Potential, 5%, 2%, and 1.33% Chance Floods

Existing Project - Princeville Levee

2.4.2 ORIGINAL LAYOUT

The existing Federal project is documented in the *Princeville Dike, Tar River, Edgecombe County, North Carolina, Detailed Project Report, (DPR) March 1963* by the USACE Wilmington District. The Sponsor for the original Section 205 project was Edgecombe County, North Carolina. Edgecombe County cost-shared the original construction and has the responsibility for operations and maintenance of the completed project. The DPR states that the levee with a top elevation ranging from 43.9 feet at the downstream end to 47.3 feet at the upstream end (NAVD '88) "would provide 2 feet of freeboard for a flood 2 feet higher than the highest known flood, which occurred in 1919. This, the highest levee that is economically feasible to construct would provide a high degree of protection." Based on hydrologic and hydraulic (stage-frequency) information in the DPR, it was estimated that this level of flood risk management would prevent flood waters from entering the Town of Princeville from a design event, or that equivalent to what was considered at that time to be an approximate 0.333% chance flood event.

The existing levee does not tie into high ground. The reason for this is not known; however, it can be speculated that at the time of design of this structure, the flood of record, that of the 1919 flood, was thought to be the largest flood that should be planned for. Design of the time then called for some safety factor to prevent overtopping of the structure, for which was added two feet of additional structure height, then two feet of additional "freeboard". This may be the reason the structure appears to terminate so abruptly. The fact is, tying into high ground would have been an expensive proposition, given the flatness of the floodplain in this location, and the distance required to do so.

The original levee was built with a small notch to accommodate a railroad line that crossed the river just downstream of Main Street (old U.S. Highway 64) since the top of the levee was between three and four feet above the elevation of the tracks. The railroad line is currently owned by CSX. This required installation of a stop log closure structure at the railway opening during times of the highest level of flood flow. The stop log structure consists of an opening with headwalls, between which timber logs are placed and sealed using an impervious membrane and sand bags. The closure of this opening requires a fair amount of lead time, and a constant routine of checking to make sure the supplies required to close the opening are available. There was no need for a corresponding stop log structure on the Main Street Bridge due to its much higher deck elevation.

2.4.3 EXISTING PROJECT MODIFICATION

Between completion of the DPR and award of the construction contract, the USACE Wilmington District and the North Carolina Highway Commission agreed that a portion of the new U.S. Highway 64 would be used as a replacement for a portion of the original levee project. The original levee had a total length of 17,600 feet and was broken down into two segments, Levee Segments "A" and "B," which were connected by the U.S. Highway 64 (shown in red, yellow, and green, respectively, in *Figure 2.2*). Levee Segment "A," total length of 9,700 feet, begins approximately one mile northeast of the Princeville city limits on U.S. Highway 258, and extends south-west along the Tar River, where it intersects with the U.S. Highway 64. The embankment of this highway serves as a reach of the levee, connecting with Levee Segment "B" 3,176 feet southeast of Levee Segment "A." Levee Segment "B," total length of 7,900 feet, extends in a

south to south-east direction to the end of the project, near the intersection of County Roads 1001 and 1600, about one mile south of the Princeville city limits.

Alterations made to the alignment of U.S. Highway 64 in 1995 (*Figure 2.3*) resulted in portions of the highway fill being at a higher elevation than the levee, although with one exception, at an “S-curve” transition, the embankment is actually lower than the equivalent USACE levee height. Because of the elevation difference between the existing levee and the highway fill, floodwaters can overtop the existing U.S. Highway 64 (*Figure 2.3*) after the “existing, to be abandoned” original levee is overtopped, and enter town at that location. The road fill was not intended to provide flood risk reduction; thus, highway drainage culverts through the fill, adjacent to existing Levee Segment “B” were not equipped with back-flow prevention devices. *Figure 2.4* displays all the culverts within the Princeville project location.

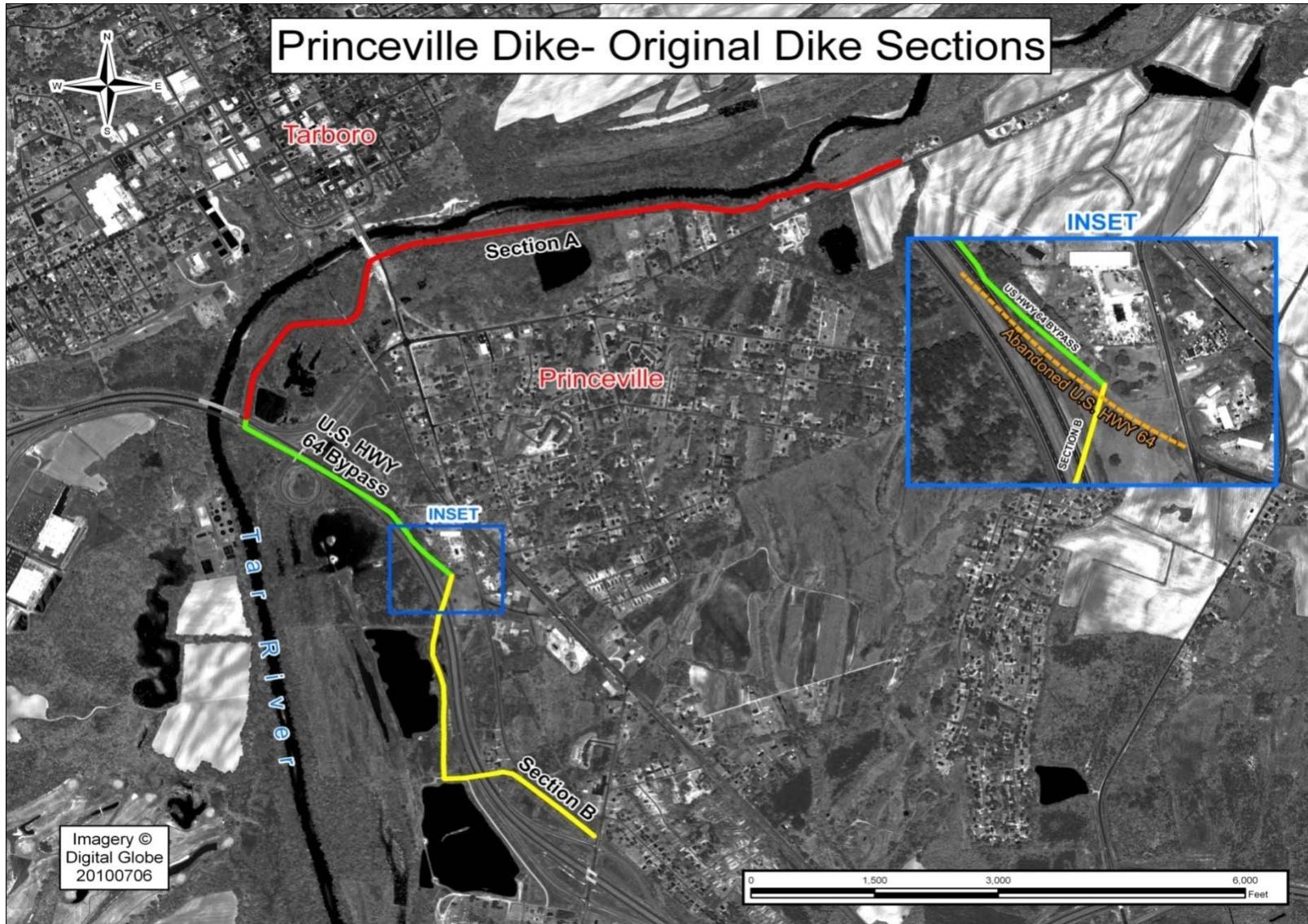


Figure 2.2: Original Dike (Levee) Segments “A” (Red), “B” (Green), and U.S. Highway 64 (Yellow)

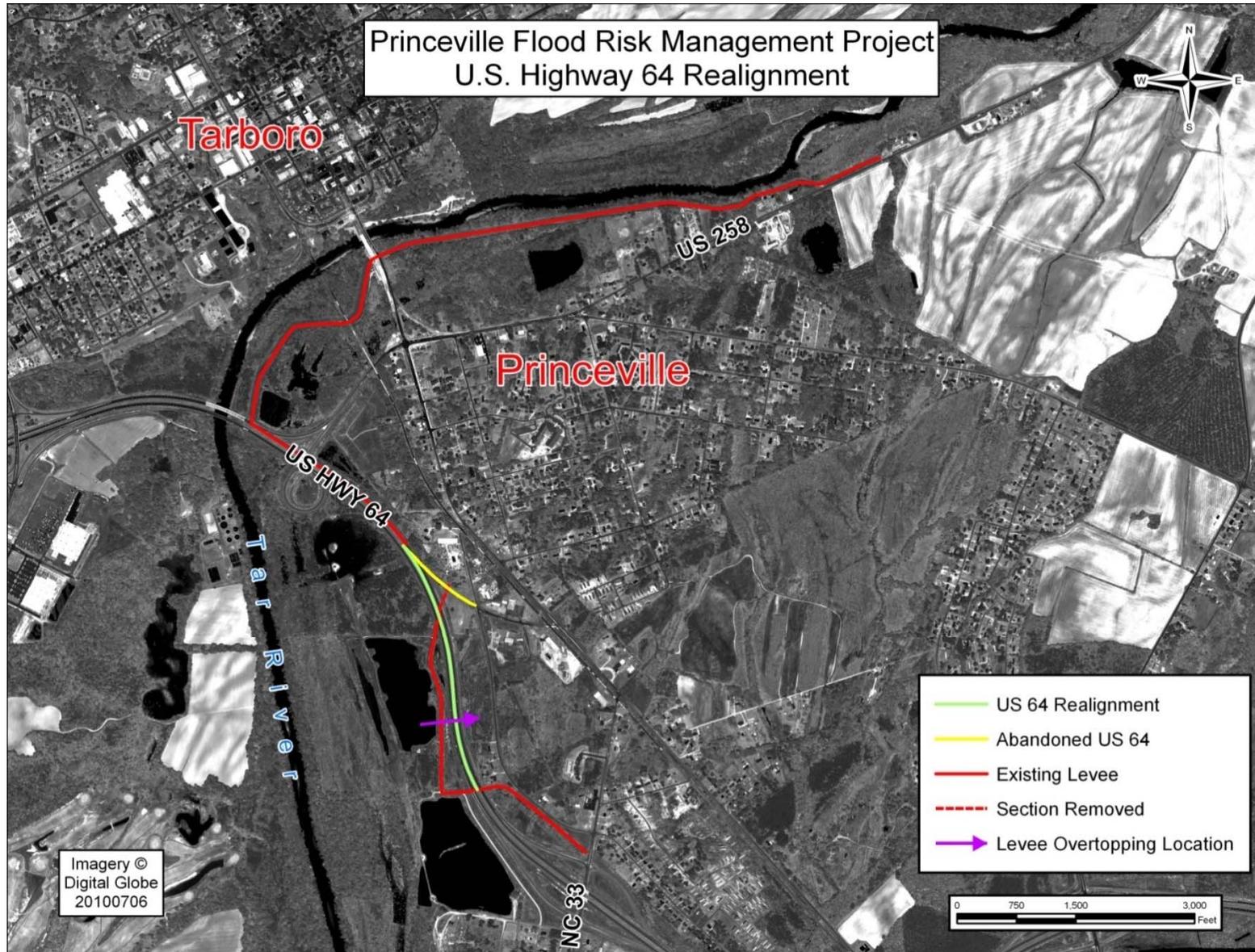


Figure 2.3: Original Dike (Levee) after U.S. Highway 64 Construction

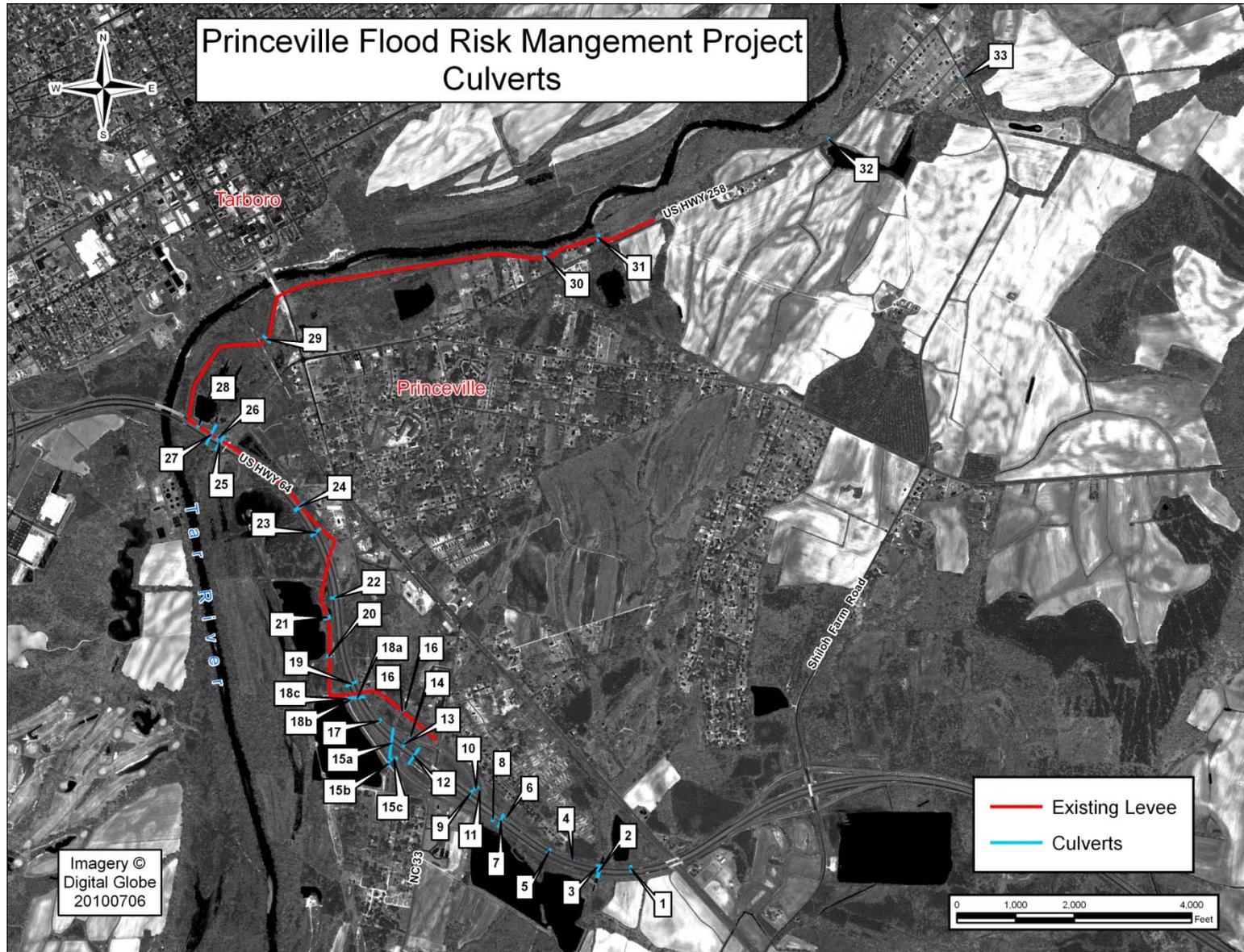


Figure 2.4: Princeville Culverts

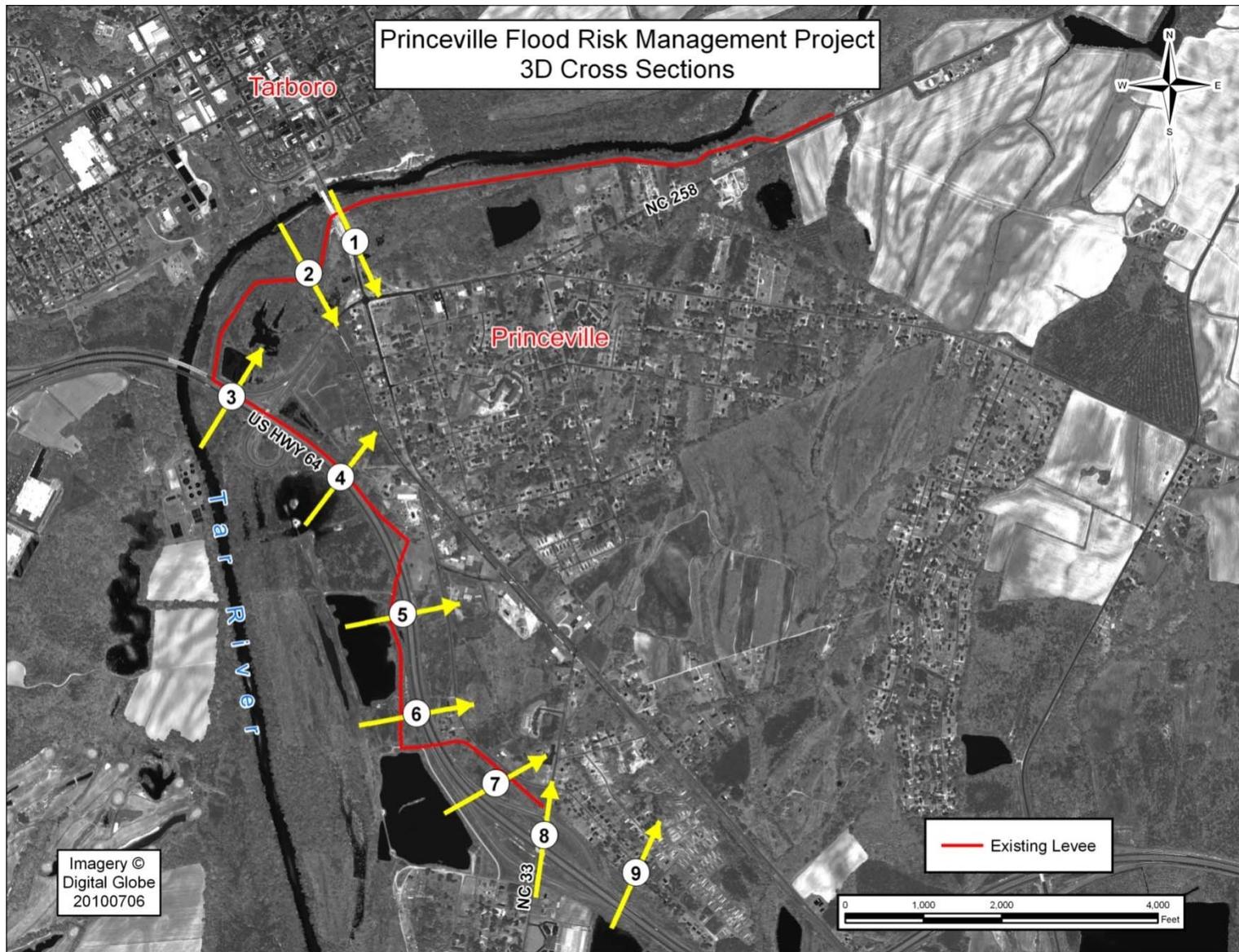


Figure 2.5: 3-D Cross sections showing relationship of the U.S. Highway 64 by-pass roadway fill and the existing levee

To better illustrate the relation of the U.S. Highway 64 roadway fill and its relation to the existing levee, cross sections were taken and are displayed in Figure 2.5 and 2.6

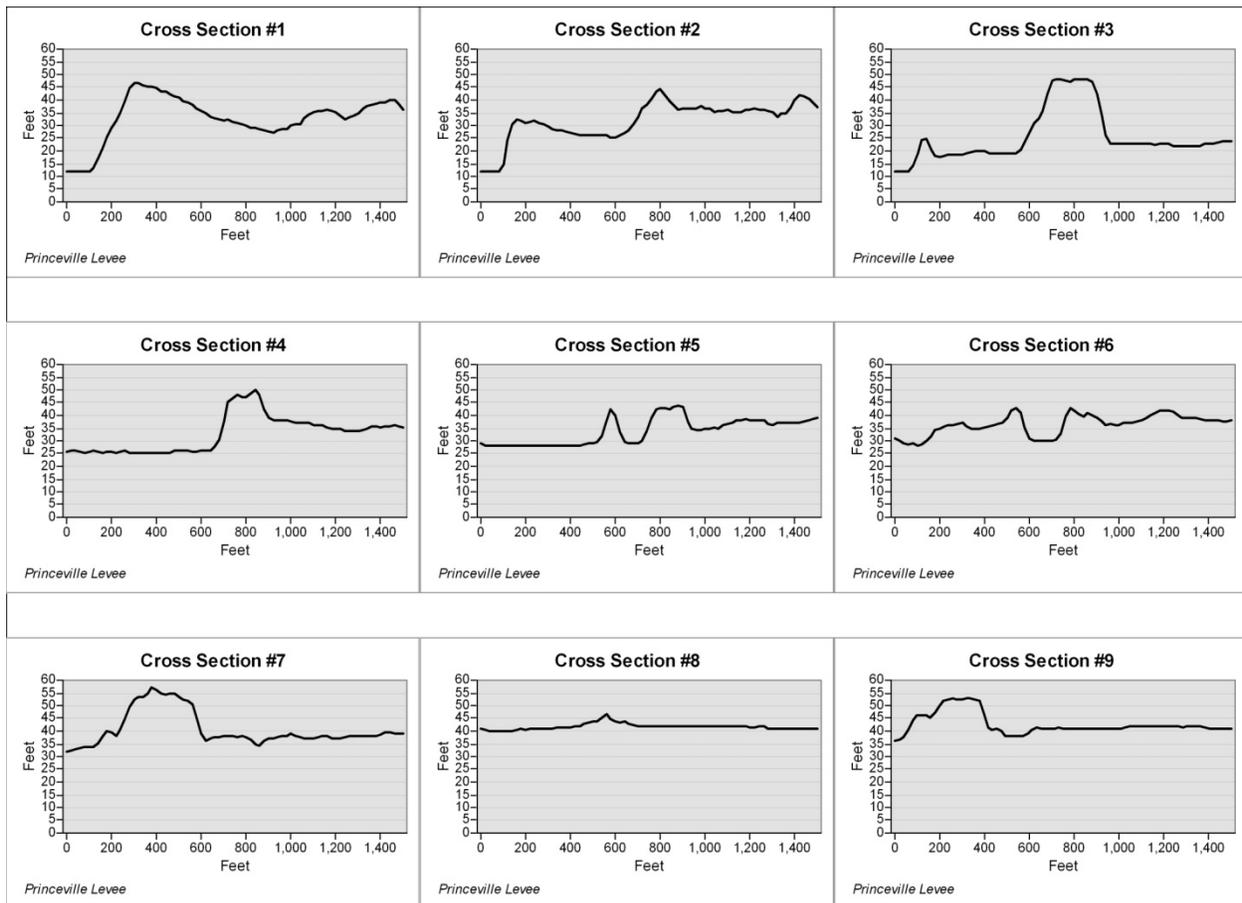


Figure 2.6: Cross Section U.S. Highway 64 and Original Dike (levee)

2.4.4 OTHER IMPORTANT PROJECT FEATURES

As shown in *Figure 2.7* and *Figure 2.8*, the ends of the original levee project were terminated on ground that is about 3 feet lower than the top of the levee. A photo of the north end of the levee (*Figure 2.7*) shows that the end of the levee was terminated abruptly sloping down approximately 3 feet and tying it in to the shoulder of U.S. Highway 258. *Figure 2.8* shows that the southern end of the levee terminated some 3 feet higher than the road and sloped down to tie into the shoulder of N.C. 33 on the south east side of Princeville. The Wilmington District has carefully reviewed the Section 205 project documents and the design of the original project, and can find no explanation or reason for not providing standard tie-out levee segments to natural high ground at the north and south ends of the project. These locations are identified on *Figure 2.9* as points 2 and 4.



Figure 2.7: Northern End of Levee

Photo is looking South at the North end of the Princeville Levee, which is located on the right side, at the sign. This is its termination point with U.S. Highway 258. The top of the levee slopes approximately 3 feet down to the road.



Figure 2.8: Southern End of Levee

This photo is looking southeast toward N.C. 33 with U.S. Highway 64 road fill in the background. The N.C. 33 and U.S. Highway 64 interchange is located on the right behind the trees. The levee is located on the right near the fence and in front of the red "No Entrance" sign. This is the termination point shown on Figure 2.5 at location number 4. The top of the levee slopes down about 3 feet to N.C. 33.

Natural drainage features on the north and southeast side of Princeville that are beyond the original levee project limits are shown as blue lines at points 3 and 5 on *Figure 2.9*. Additional information is provided in the Hydrology and Hydraulics Appendix.

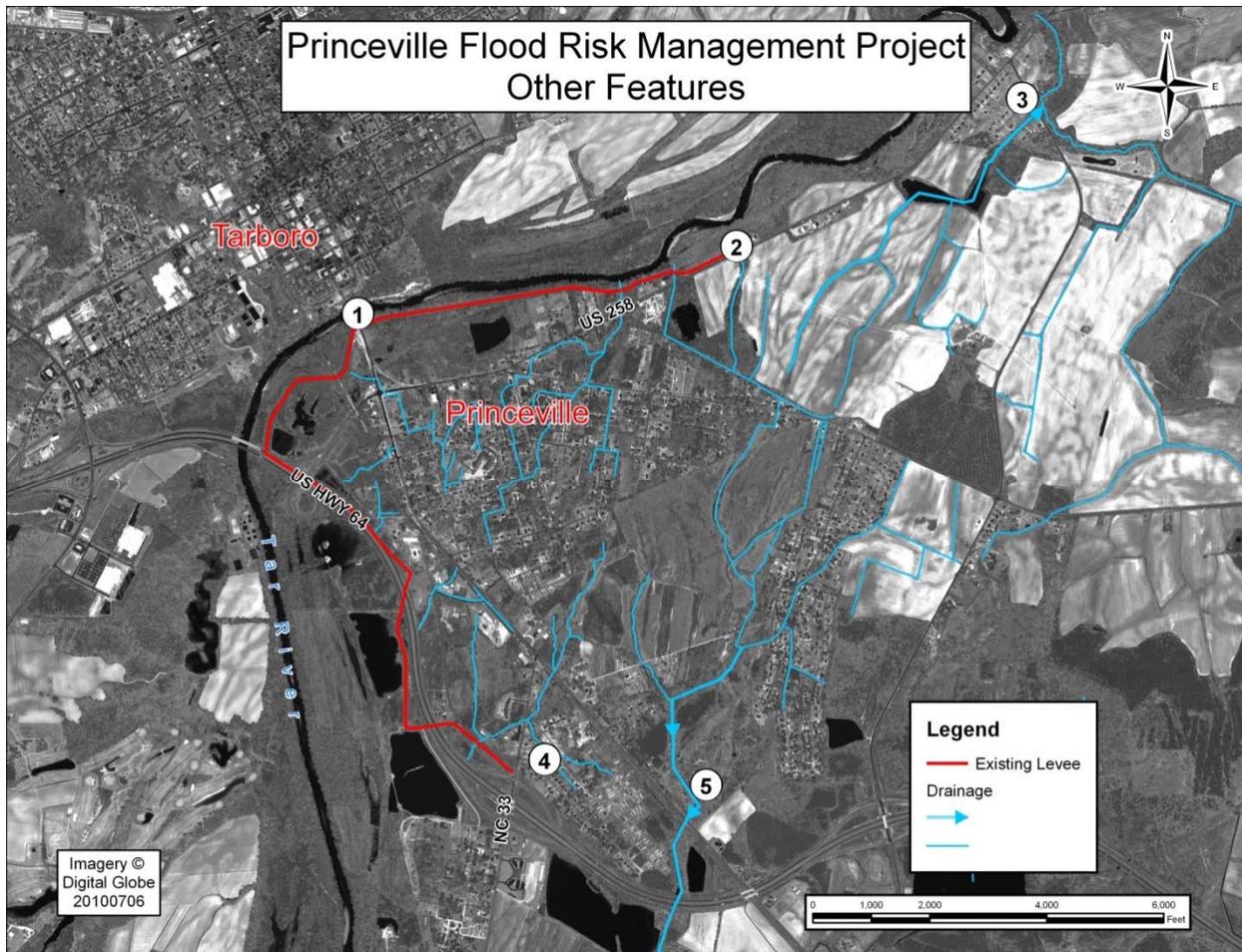


Figure 2.9: Original Dike (Levee) – Other Features

(Location 1 - Tarboro gage, Location 2 - Upstream end of the existing levee, Location 3 - Low area for drainage north *, Location 4 - Downstream end of the existing levee, Location 5 - low area for drainage south*)

* Note: These are outside original levee layout. They are shown for informational purposes only.

2.4.5 LEVEE CONDITIONS

Due to on-going maintenance, the existing physical condition of the levee is good (meaning there is little to no settlement, good grass cover, little to no erosion, and no signs of slope failure or seepage). Refer to the following paragraphs for more detailed description. Its alignment has been altered since original construction due to construction of the U.S. Highway 64. The road fill provides some level of flood risk reduction, as the northern-most portion that physically replaced a portion of the original levee was designed to function as a levee; the southern-most segment of US Highway 64 was not. Flood events, notably flooding from Hurricane Floyd, have damaged the levee. Floyd floodwaters surrounded and then inundated the levee, resulting in erosion along some portions of its alignment. USACE repaired portions of the levee in order to restore the original configuration and bring the crest back to original constructed height. Any eroded or settled areas along the crest that have developed since the post-Floyd breach repairs are minimal, but would require maintenance in the future to ensure that design elevations are maintained. Most of the existing interior drainage structures through the levee continue to receive the necessary

maintenance to ensure that the back-flow prevention devices operate properly during times of high water. Culverts in segment B were video inspected in 2014.

2.4.6 LEVEE MAINTENANCE

Levee maintenance is performed by Edgecombe County. The portion of the levee north of U.S. Highway 64 (segment A) is kept in good condition (*Figure 2.3*). The grass is normally cut twice a year and the drainage structures, including the flap gates, are well-maintained and vegetation has been cleared from within 15 feet of the levee in most areas. Annual training is conducted in order to keep emergency personnel familiar with the requirements and procedures for installing the stop logs in the railroad closure structure. The stop log components are inventoried and inspected as a part of the annual levee inspection. There are no pumping stations or large outlet control structures. There are ten culverts beneath the existing levee project; all ten culverts have back-flow prevention devices that are fully operational. Four of the ten culverts are located under the U.S. 64 portion of the levee. Vegetation along Segment B has not been recently removed; there are many trees larger than 4-inches in diameter growing on and around the levee.

2.4.7 EXISTING LEVEE – PL 84-99 (Flood Control and Coastal Emergencies (FCCE)(33 U.S.C. 701n) (69 Stat. 186)) CONTINUING ELIGIBILITY AND PERIODIC INSPECTIONS

Information on system deficiencies is presented for the 2010 Periodic Inspection (PI) Report. This does not include the results of the Initial Eligibility Inspection (IEI) conducted in 2014. Both inspections follow the same checklist; however, the Periodic Inspection entails a more in depth review of design and construction documents, as well as previous inspection reports. Both inspections rate more than the physical condition of the levee. Items such as vegetation, encroachments, maintenance, and a video tape inspection of culverts are included as rated items. The PI performed in 2010 rated the project as “Unacceptable.” The official rating was in a letter sent to Edgecombe County dated February 22, 2012. An overall “Unacceptable” rating is defined as one or more items are rated as unacceptable and would prevent the system from performing as intended, or if a serious deficiency noted in past inspections (which had previously resulted in a minimally acceptable system rating) has not been corrected within the established timeframe, not to exceed two years.

2010 PERIODIC INSPECTION

Periodic Inspection (PI) was conducted on 12 and 13 April 2010 by the Government A-E contractor CH2Mhill, under the supervision and guidance of the USACE, with an overall rating of “Unacceptable.” The following deficiencies were rated Unacceptable (U):

- Along levee segment A, there were numerous trees along the alignment that overhang the levee and exist within the 15 feet of the riverside and protected side slopes. Levee segment B is significantly overgrown by trees and other woody vegetation.
- Video inspections of the nine (9) culverts were not performed by the deadline date of December 30, 2010.

The following deficiencies were rated Minimally Acceptable (M):

- Supplies such as sand bags are not maintained. A written Emergency Action Plan was not available.

- Encroachments to the earth levee include fences, power poles, highway signs, a garage, and guardrails.
- Some minor erosion of the crest and some minor erosion and rutting on the slopes caused by mowing equipment.
- Numerous ant hills on the earth levee. The County has a plan to deal with the ant hills and any animals.
- The outlet riprap of all culverts contains unwanted vegetation. Minor clearing is needed.
- Debris was keeping many of the flap gates from closing fully.
- Some trash racks needed cleaning while at least one was missing.

2014 INTERIM POLICY FOR DETERMINING ELIGIBILITY STATUS OF FLOOD RISK MANAGEMENT PROJECTS FOR THE REHABILITATION PROGRAM; PURSUANT TO PUBLIC LAW (PL) 84-99

In March of 2014, Headquarters USACE (HQ, USACE), published Interim Policy for Determining Eligibility Status of Flood Risk Management Projects for the Rehabilitation Program (RP), pursuant to Public Law (P.L.) 84-99, enclosed. The purpose of the Interim Policy, detailed in the following paragraphs, is to allow eligibility determination in the RP to be implemented while the new policy is being developed.

The new interim policy impacts how FDRPs (Flood Damage Reduction Projects) are rated and how eligibility in the RP is determined. Most significantly, the rating for a system is currently not directly tied to the system's eligibility in the RP. In most cases a system's rating will not change their RP eligibility: however, it is currently possible for a system to receive an Unacceptable rating and remain eligible in the RP. This type of scenario is possible in cases where vegetation or any issues in the condition of a drainage channel resulted in an Unacceptable rating. For the purposes of the new interim policy, vegetation and drainage channels will be considered only in making a determination of RP eligibility in the scenario where risk to life safety is increased.

2014 INITIAL ELIGIBILITY INSPECTION (IEI)

An Initial Eligibility Inspection (IEI) of the Princeville Flood Damage Reduction Project was completed in response to an email received from the sponsor requesting re-admittance to the Rehabilitation Program. The IEI was conducted in December 2014 to determine if progress in maintenance was sufficient to re-admit the project into the program. The following deficiencies were rated Unacceptable (U):

- Vegetative growth along segment B with trees larger than 2" in diameter.
- Significant vegetation around the culverts inlet and outlets.

The following deficiencies were rated as Minimally Acceptable (M):

- Small vegetation exists at the majority of culvert entrances and outlets in the riprap.
- Encroachments are present in both segments. In segment A, fences and power poles are placed in the levee crest or slope. In segment B trees and numerous other items, mostly highway signs and utility poles, were on or within 15 feet of the levee. In segment B there was a garage within 15 feet of the toe of the levee on the protected side.
- Flap gates 4, 5, 6, and 7 were open due to debris and sediment build up.

- Culvert inlets at pipes 4 to 9 did not have trash racks.

After the December 2014 inspection, the system rating for the Princeville FDRP is unacceptable (U). Although the rating is unacceptable, based upon the requirements set forth in the Interim Policy, specifically those provided in paragraph five of the policy, the Princeville FDRP has regained active status in the RP. Admittance back into the RP was also contingent upon the sponsor submitting video inspection records of all project culverts, which were completed in January 2012 and also November 2014, rated minimally acceptable.

There have been no signs of instability in the earthen levees observed, such as slope movement or settlement, but the levees have not been loaded on the riverside since Hurricane Floyd. Although modeling gives us an expectation of the system’s response, monitoring and inspection would need to be performed to verify the modeling results if the levee were to be loaded. There is a degree of uncertainty or risk inherent with this type of work.

Engineering Technical Letter (ETL) 1110-2-571 defines the vegetation free zone as a three dimensional corridor surrounding all levees, floodwalls, and all critical appurtenant structures. The corridor also includes a root free zone, three feet around the levee profile. The corridor must be free of obstructions to assure adequate access by personnel and equipment for surveillance, inspection, maintenance, monitoring, and flood-fighting. The only acceptable vegetation is perennial grass. Figure 2.10 illustrates the vegetation-free zone.

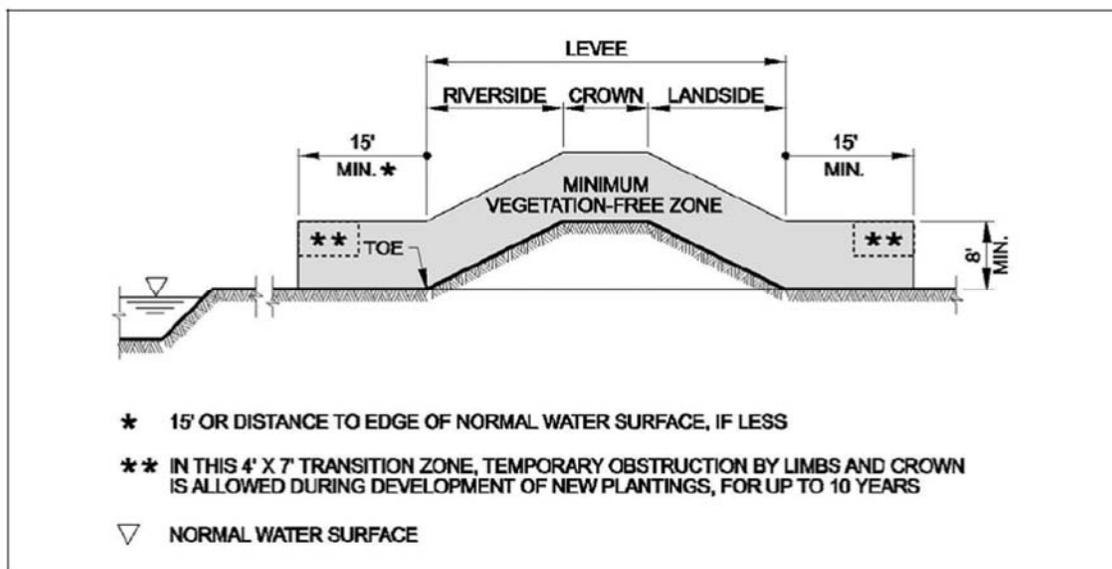


Figure 2.10: 15-Foot Vegetation Free Zone from ETL 1110-2-571

2.5 LAND USE AND POPULATION

Existing land use in Princeville is primarily residential with less than 10% commercial, a single school, and one governmental facility. Census data indicated a 15% increase in the population from 1980 to 1990, a 43% decrease between 1990 and 2000, and a 121% increase from 2000 to 2010.

2.6 ELECTION TO REMAIN

The Town of Princeville turned down a buyout offer from FEMA in the wake of the flooding caused by Hurricane Floyd due to perceived social and cultural impacts expected from a move of that nature. In addition, buyouts may not have been financially feasible for many Princeville residents. After major flood events landowners within flooded areas are often offered buyouts by FEMA; the purpose of such a buyout is to remove as many structures from the floodplain as possible. In most cases the property owners are offered fair market value for the property, but this price may or may not cover the remainder of the owner's mortgage. The property owner could use the FEMA funds to either help pay off the old mortgage and finance a new home, or to make a down payment on a new home and carry two mortgages. The property purchased by FEMA is then cleared of any structures and deeded to the local government. A restriction is placed on the vacated property to prohibit future construction of damageable structures. It can be very difficult for lower-wage mortgage holders to break even under a FEMA buyout, as is the case with many families in Princeville. And since such a buyout in Princeville would mean the dissolution of the town with residents scattering to other areas, the town elected to turn down the offer.

SECTION 3 – PURPOSE AND NEED* (PROBLEM STATEMENT)^

The USACE utilizes the multi-step planning process defined in the *Principles and Guidelines for Water and Related Land Resources (P&G)*, adopted by the U.S. Water Resources Council in 1983. This structured approach to problem solving provides a rational framework for sound decision-making. The initiation of this process involves determining the problems and opportunities in the study area, then using these to develop goals, objectives, and constraints (if any) that will set the direction for determining and evaluating solutions. Consequently, the first step in the planning process is identification of the problems and opportunities:

- **Problems** are undesirable conditions to be addressed through treatments and specific correction measures.
- **Opportunities** are conditions that are desirable, or that could be desirable (discussed in SECTION 5 – Formulation and Evaluation of Alternative Plans).

Relating to flood risk management projects, problems and opportunities affect the critical issues of life, health, and well-being of people living in flood-prone areas. Besides these public safety issues, there are other critical issues involving the very existence of residents' homes, personal property, businesses, and organizations. In order to capture all these concerns, the study has included collaboration with the State of North Carolina as the cost-sharing partner; and the Town of Princeville, the County of Edgecombe, the Town of Tarboro, and the State and Federal legislators as area stakeholders. Other stakeholder coordination has included Federal and State wildlife resource agencies, and the FEMA state coordinator. The problems and opportunities relating to flooding issues within the Town of Princeville, North Carolina, were identified through communication with the Princeville Town Council and residents, the Town of Tarboro, the County of Edgecombe, local interests, and the government of the State of North Carolina. Also, field investigations and reports from prior to the construction of the original levee, 1960's to the present, in the aftermath of Hurricane Floyd, provided valuable insight to conditions which define the problems and opportunities.

Identified problems stem from Princeville's location within a river floodplain and from the continued risk of exposure to catastrophic flooding even with the presence of an existing levee, as demonstrated by the Hurricane Floyd event. This study has revealed that current flood exposure is actually greater than the level intended by the design and construction of the original levee.

3.1 FLOODING CONDITIONS

Although minor levels of development are expected to continue in the upstream watershed, no substantial increase in flooding is expected in Princeville as a direct result. This is due to both the slow rate of growth and to the large size of the basin.

Based on review of several reports on global warming, the consensus appears to be that the trend in the 21st century for the southeastern United States, will be an increase in the average temperature and an increase in the amount of rainfall, (EC 1165-2-212). However, according to the Corps' Institute of Water Resources Screening-Level Climate Change Vulnerability Assessment Tool applied at the watershed level for the Tar-Pamlico Basin, the Tar River is not in the top 20% of rivers vulnerable to climate change for either wetter or drier projections. In addition, the ECB 2014-10 tool examining the "Tar River at Tarboro" stream gage shows that the annual maximum stream flow is constant, and that the maximum and minimum values are essentially consistent through time.

3.2 THE FLOOD PROBLEM

Following construction of the original levee, Hurricane Floyd in 1999 was the most significant and damaging flood event in the Princeville area. Under current conditions, floodwaters would initially enter Princeville at an approximately 5% chance event, as shown on *Figure 2.1*, with actual flood damages beginning to accrue thereafter. Potential flood damages by event frequency are estimated as shown below, and escalate rapidly above an approximate 1.5% chance event, as indicated by the damage estimates in *Table 3.1*.

1.5%	\$80,810
1%	\$8,624,000
0.5%	\$53,144,000
0.2%	\$69,580,000

Source: Damage-frequency relationship derived from flood damage analysis outputs.

3.2.1 FLOOD LOCATION

Flooding of the town would begin in southern Princeville through open culverts beneath U.S. Highway 64, and in northern Princeville at highway NC-111, at an approximately 5% chance event, and by an approximate 1.5% chance event, begins to cause flood damage to structures and their contents. Flooding through the culverts continues, eventually merging with floodflows issuing through the Highway 33 underpass, and also originating in culverts beneath, and eventually, over a low spot along U.S. Highway 64. All floodflow paths would merge, inundating most of town, to depths indicated in *Figure 3.1*.

3.2.2 FLOOD TIMING AND DURATION

The timing of the occurrence of flood events has been unpredictable throughout Princeville's history. Historically, events causing major flood damage occurred roughly 10 to 25 years prior to construction of the existing levee, and it generally takes a couple of days after a major event for the river to start rising. From the time the river started rising during Floyd, it took about 10 days to reach the 4% chance flood event level, approximately 3 additional days to reach the 1% chance flood event level, and then about 2 more days to peak. It was approximately 6 more days before the water receded back to the 1% chance flood event level, at which point the water stopped coming around the north end of the levee, and then another 4 days before it dropped below the culverts on the south side. Essentially, it took as much as 10 to 15 days for all of the water to drain out of Princeville. For the 0.5% chance flood event (*Figure 3.1*), the water level would be above the 4% chance event level for about 4 days, and then would take another 5 to 7 days to drain out of town. This highlights how, after a flood event, the slow drainage of floodwaters out of Princeville exacerbates the flood damages to structures and infrastructure.

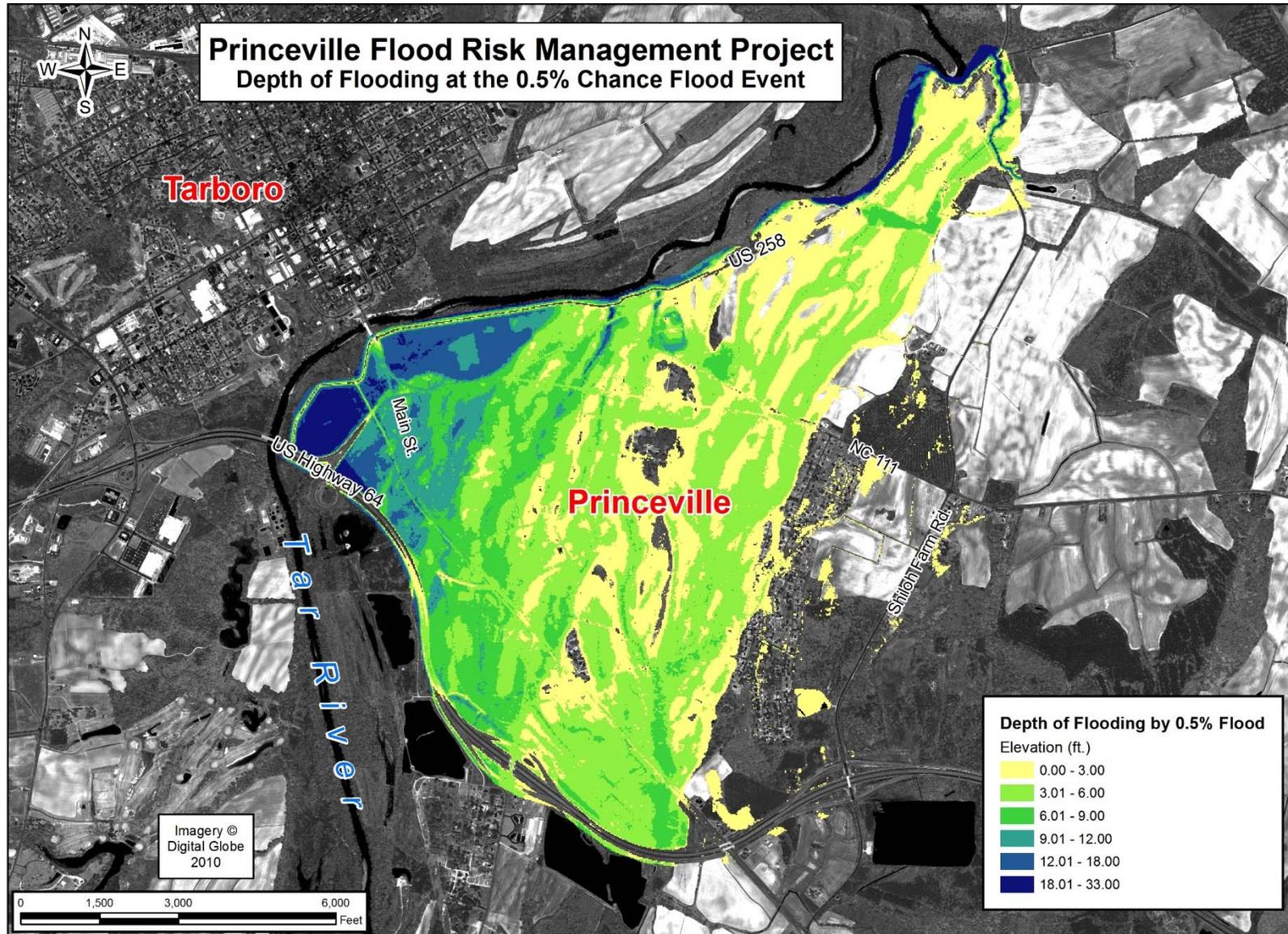


Figure 3.1: Depth of Flooding at the 0.5% Chance Flood Event

3.3 FLOOD RISK

The occurrence of Hurricane Floyd highlighted the residual risk that exists with the levee system in Princeville. The reanalysis of the Tar River hydrologic data conducted in 2001 by the U.S. Geological Survey (USGS), indicated that the study area is actually under a considerably higher risk of inundation by flooding from the Tar River than was thought prior to the Hurricane Floyd event. Currently, during an approximate 5% chance flood event, water begins to enter Princeville through twelve (12) ungated culverts under the U.S. Highway 64 embankment on the south side of Princeville (two locations, one being a triple box culvert) and at highway NC-111 along the north side of Princeville. Flood inundation through some of these culverts, within the inhabited areas within Princeville, could result in up to 6 feet of floodwater. By an approximate 1.5% chance event, damages from such an event would be approximately \$80,000, and escalate rapidly above that frequency. Following construction of U.S. Highway 64, which replaced portions of the project along its southern reach, drainage culverts through that structure were not provided with back-flow prevention devices, and although portions of the original project still exist on both sides of this feature in some places, floodflows may still enter town through those features.

Flood risk from initial increments of flooding includes severance of access to hurricane evacuation routes, as roadways suffering six inches of flooding may be closed by Edgecombe County officials, as a hazard to life and safety. The Southern Terrace community in the eastern part of Princeville has only one access point, which is directly onto highway NC-111, and is severed during this flooding. There is also insufficient signage to direct residents to accessible egress points along U.S. Highway 64, the hurricane evacuation route westward.

At events approaching an approximate 1% chance of occurrence during any year, water would overtop the existing levee (to be abandoned) and subsequently overtop and then cross a 2,700 foot low section of U.S. Highway 64 on the south side of Princeville; as well as at the Highway 33 underpass under U.S. Highway 64 (see Arrows labeled 2 in *Figure 3.2*). At the 1% chance event magnitude, some inhabited areas on the southwest side of Princeville could experience up to 10 feet of inundation, averaging \$8,100,000 in flood damages. By the approximate 1% chance event frequency, U.S. Highway 258, just north of the end of the existing levee would be outflanked, permitting flood water to flow into Princeville (see Arrows labeled No. 3 in *Figure 3.2*). (Note: As described in more detail later in this section, the northern end of the existing levee project terminates abruptly at U.S. Highway 258).

During a 0.5% chance event, much of Princeville would be inundated, with damages at approximately \$53 million. During a 0.2% chance flood event, almost all potential damages would accrue, with damages of approximately \$70 million.

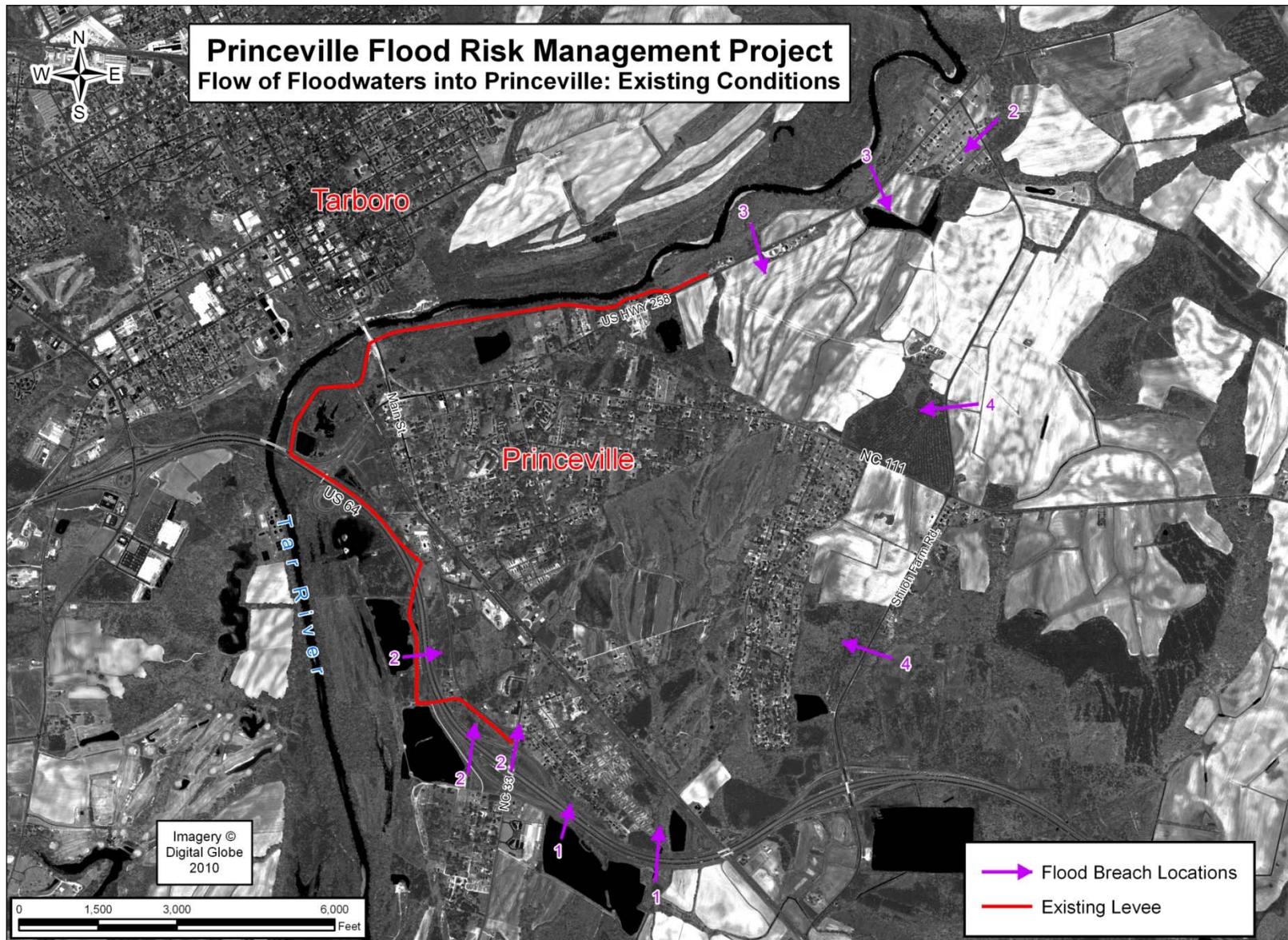


Figure 3.2: Flow of Floodwaters into Princeville: Existing Conditions

3.4 INTERIOR DRAINAGE CONDITIONS

Princeville experiences localized flooding from intense, short-duration thunderstorms due to flat terrain and random blockages of drainage structures from debris accumulation. When the existing levee was designed in the 1960's, the runoff from the western and southwestern part of town was intended to drain into low areas adjacent to the levee. The interior drainage flow was intended to be discharged to the river through ten project outlets that penetrate the existing levee. These ten outlets are equipped with back-flow prevention devices that, under normal flow conditions, do not hinder runoff discharge from draining into the river and simultaneously prevent river flood waters from flooding the interior areas. When river water levels rise above the culvert outlets, runoff builds up behind the levee and is stored in the low areas adjacent to the levee. The areas in which this ponding occurs are large enough to contain the runoff, therefore flooding is kept from reaching any interior structures in areas inland of the USACE levee.

3.5 EXISTING LEVEE

Maintenance is critical to the integrity of the existing flood risk management elements. The NCDOT and Edgecombe County will continue maintenance of the existing project, including grass-mowing, flap gate maintenance, and control of woody vegetation on the existing levee. As a part of continuing maintenance, the top elevation of the levee will be checked periodically by the non-Federal sponsor, to ensure that settlement of the levee hasn't occurred. Any low areas will be brought back to design height and stabilized. Back-flow prevention devices, i.e. flap gates, will be maintained to ensure they can stop the intrusion of rising floodwaters from outside the levee. Proper function of the railroad stop log structure will be checked periodically, the installation procedure kept up-to-date, and annual training provided to insure quick and effective implementation. Interior drainage features will be maintained to ensure efficient removal of excess water accumulated during storm events. Additionally, a video tape inspection of all culverts is required in the Continuing Eligibility and Periodic Inspection checklist. The video inspection is to be conducted once every five (5) years.

3.6 FUTURE WITHOUT-PROJECT CONDITIONS

"Future Without-Project Conditions" comprise forecasts for potential future conditions based on best available data concerning existing conditions, on-going trends, and probable future occurrences. The forecasts are given for a defined "period of analysis" of 50 years, during which time changing climatic, weather, land use, and hydrologic conditions may impact a project. Forecasting these conditions can be subjective and difficult, but it is essential in order to determine the necessity for, and effectiveness of, proposed flood risk management projects. The Princeville community under Future Without-Project Conditions assumes that there would be no new flood risk management measures developed and implemented.

3.6.1 ENVIRONMENTAL

The Tar River watershed is situated within a low-growth area of the State of North Carolina. Similarly, the Town of Princeville is not anticipated to undergo substantial growth over the period of analysis. As a result, the hydrology of the watershed is not anticipated to change enough to negatively impact downstream riparian resources, or to increase flood heights or timing over the period of analysis. The watershed and surrounding area do not have drivers that would encourage either growth of the human population or those factors that would substantially affect the environment over the period of analysis. Any minimal growth that may occur in the second

half of the period of analysis is not anticipated to affect peak discharges, timing, or floodflow velocities, and therefore affect resources associated with the project reach during the period of analysis. For further discussion on environmental resources under existing and future without-project conditions, refer to Section 2.1 Environmental Resources.

3.6.2 Socio-Economics

Census data for Edgecombe County, reported in 2010, shows a slight decline in population within the County, projecting to the year 2030. There may be a small increase in population over the second half of the projected period of analysis as the State witnesses further growth.

While future without project conditions for the socio-economic climate of Princeville cannot be accurately estimated using County population projections as a proxy, it is assumed that the town will follow regional trends and decline in population as migration to more urban areas continues, perhaps realizing some growth during the latter half of the period of analysis, as suggested by the current County population projections.

Perpetuation of the existing conditions and associated sporadic flooding will continue to impact housing and commercial property values, commercial enterprise, agriculture, commerce, and the existing infrastructure in the Town of Princeville, the latter of which currently represents a large Federal and non-Federal investment. Area residents and supporting agencies and businesses will continue to incur additional post-flood recovery costs associated with continuing periodic flood inundation. The absence of further risk reduction would most likely result in declines in economic and social attributes. Additionally, in the future without-project condition, long-term exposure to flood risks at the level they are, and will be, may cause further degradation of the community as a whole.

3.6.3 Other Social Effects (Ose)

COMMUNITY EFFECTS

Despite the presence of the existing levee, the town would continue to be exposed to the effects of flooding due to the potential of floodwaters flanking the levee or backing through the unprotected drainage structures on the south side. Each occurrence of flooding would bring another round of suffering and hardship to the community through loss of personal and community property, and damage to homes, businesses, other structures, and infrastructure. Despite the adversity posed by flood threats to the community of Princeville, the town has strong community bonds, and residents have shown a continued unwillingness to leave. During 2000, the community was offered a full buy-out by FEMA, in the wake of Hurricane Floyd, and chose not to accept it, due to perceived impacts to social cohesion and community. Additionally, residents have repeatedly stated that even were they to be moved to a different location, they could not afford to live in a higher cost of living location.

SOCIAL BONDS, CONNECTEDNESS, AND IDENTITY

Each major flood has resulted in dislocation of residents from their homes. The majority returned once floodwaters receded, and repair or replacement of their homes could be accomplished. However, during periods of flooding and rebuilding, ordinary social interaction is disrupted. Scattered families find it harder to maintain the connectedness of a cohesive community during separation. Social organizations such as churches and clubs are disrupted and must rebuild their ties and reaffirm their identities following major floods.

COMMUNITY

The ability of Princeville to survive as a community in view of the stress of repeated flooding is a tribute to the residents' strong ties to both the town's historical identity and the land. Without flood risk management improvements, and in view of the continuing threat of flooding, the future of the town remains continually at risk of economic loss and community disruption. Poor economic conditions will be unlikely to improve as the business community remains stagnant. As history has shown, the very existence of the community, the group of people unified by long-standing family and neighborhood ties in Princeville, is threatened by each major flood event. Residents are left homeless, living in scattered locations outside the town, their houses and possessions heavily damaged, lost, or destroyed. Some do not come back. Rebuilding can take months, or even years. Each flood disaster is a serious setback to the progress made by residents raising families, building businesses, and trying to create growth for the town. The more frequent the occurrences of flooding are, the more difficult the recovery is. Households, businesses, schools, church and club organizations, and town government, all occupy buildings which have been severely damaged or destroyed. The destruction of these structures removes physical evidence of the residents' past achievements, and even more importantly, the settings for those yet to come.

HEALTH AND SAFETY

A primary concern for the community of Princeville is the health and safety of residents. The personal health and safety of every resident is jeopardized by high water each time floodwaters rise and engulf the town. Only effective evacuation and rescue, as accomplished during the Floyd event, can head off the loss of human life. Along with high water comes the threat of disease-bearing waterborne substances and vectors, as well as the destructive force of flowing water and the debris it carries. These present both immediate and lasting threats to residents, continuing throughout cleanup and rebuilding efforts. All residents are affected as well by the abrupt interruption of governmental and utility services—potable water, sewage disposal and treatment, trash removal, electric power—critical for their health and safety. Although flood insurance has been available for residents at reasonable prices (due to FEMA mapping, which currently places Princeville outside the 1% chance event) this study has revealed that future mapping could likely include the town within the 1% chance event. This would make flood insurance even less accessible to these residents of very limited means.

ECONOMIC VITALITY

The damage and destruction of commercial facilities by flooding presents a serious setback to the economic vitality of the town. The relatively low yearly per capita income in an already economically depressed region leaves little to no leeway for reliable economic recovery after devastating flood events. Businesses lose precious operating time, along with equipment, goods, and often the structures that house them. Many businesses do not rebound after flooding wipes them out.

ENVIRONMENTAL JUSTICE

The Town of Princeville consists of a population that is both minority and low-income. The Without-Project Condition would continue to allow environmental conditions that will cause hardship, threats to community cohesion, and adverse economic impacts to continue unabated. Current exposure to flood risk will continue at a greater level than originally thought following construction of the original levee. This greater risk increases the potential for experiencing the

multiple adverse effects facing the community, and which continue to restrict the potential for community growth and improved economic conditions.

VULNERABILITY OF THE POPULATION

A substantial proportion of Princeville's population is older and less mobile; many residents do not own transportation. Resistance to disease, mobility during daily life as well as during emergency evacuations, ebbing mental and physical strength, limited economic resources, can all be challenges to aging residents. Flood events can impose an extra-heavy burden on the most elderly residents. Their problems are magnified and protracted during the stresses encountered following flood events. All the population carries a large measure of vulnerability given the generally low level of available resources, and lack of economic options. Extensive outside assistance from a great variety of sources was essential to their recovery after Hurricane Floyd.

HISTORIC STRUCTURES

The severe damage and loss of structures through repeated flooding has resulted in a very small remnant of buildings with historical ties. Flooding has destroyed many structures throughout Princeville's history, and even those surviving the floods have suffered deterioration. Repairs and renovations are set back each time flooding occurs, discouraging the serious investment needed to return them to good condition. After Hurricane Floyd, heavily-damaged structures of historical value were demolished under FEMA's cleanup requirements because they were not restored within 12 months following the flood.

3.7 SPECIFIC PROBLEMS

Future flood events may create a number of escalating negative impacts to the public, their health and property, and also commercial and governmental functions and properties. These escalating impacts begin at an approximately 2% chance flood event, and extend beyond the design level of the existing levee system. The following problem statements relate to sources and approximate frequencies at which these threats occur.

- ***Inundation:***

- a) As discussed in Section 3.3, Table 3.1, and shown on *Figure 3.2*, at events approaching an approximate 1.5% chance event, inundation of structures begins in earnest. By an approximate 1% chance event occurrence during any year, water would overtop and cross a 2,700 foot low section of U.S. Highway 64 on the south side of Princeville, as well as at the Highway 33 underpass under U.S. Highway 64. By the 1% chance event magnitude, some inhabited areas on the southwest side of Princeville could experience up to 10 feet of inundation, averaging \$8 million in damage. By the 0.5% chance flood event, damages approximating \$53 million will have accrued.

- ***Life and Safety:***

- a) Floodwaters entering town, particularly through the Highway 33 underpass or over the levee at Highway 64, pose a greater hazard for drowning, or trapping residents within lower-lying portions of town. Rising Tar River floodwaters did not become apparent in Princeville during Hurricane Floyd until after the storm had passed and residents began to re-enter town. During large events like this, residents may become surrounded by rising water and be unable to escape.

- **Investment:**
 - a) Current flood risk management measures do not provide sufficient risk reduction to protect Federal and local investment. Investment in commercial enterprises prior to Hurricane Floyd were largely lost as a result of the flood event, and this issue continues to contribute to a lack of local business growth, and hence, economic vitality. At current risk reduction levels, substantial commercial or governmental loans, grants, and other investments are unlikely.
- **Community Sustainability:**
 - a) The flood threat to Princeville confounds efforts to promote long-term community sustainability. Princeville does not have a strong economy with good jobs, stable businesses, or business development. In addition, the threat of flood damage discourages investment in local health care, public transportation, local educational facilities, recreation facilities, and other community amenities. While the community had few impacts between the time of original project construction and Hurricane Floyd in 1999, the latter event brought to the forefront that flood events are a continuing threat to the community. Under post-flood conditions, residents are displaced from their homes to scattered locations. As illustrated by events following Hurricane Floyd, it can be months or even years before residents return, and, when homes and livelihoods are destroyed, some do not, even though total population has largely rebounded due to births and some influx from adjoining rural areas. Family cohesion can be stressed due to displacement and the added financial hardship. Businesses, churches, schools, and other organizations lose their places of activity, and members scattered from their homes for an indefinite period find it difficult to maintain continuity.
- **Services:**
 - a) Large flood events inundate Princeville to flood depths such that its primary services such as town government, community services, police, and fire, become completely ineffective. Federal, State and local investment in these services post-Hurricane Floyd (Section 1.9), are now at risk from flood events at less than 1% chance occurrence. Although this type of event is statistically rare, when it does occur, water levels can be so high that most structures are damaged beyond repair.

3.8 OPPORTUNITIES

Application of different non-structural and structural flood risk reduction measures may provide the opportunity to substantially reduce flood threats to the Town of Princeville. The following opportunity statements relate to potential improvements that might be provided by various risk reduction measures.

- The opportunity exists to prevent floodflows entering town through existing un-gated culverts in the existing embankment along Highway 64, which currently cause damage in low-lying areas of town.
- The opportunity exists to prevent floodflows from entering town through the existing underpass of Highway 33 at Highway 64, by various structural measures.
- The opportunity exists to prevent overtopping of the existing low spot in Highway 64, by structural means.
- The opportunity exists by structural means to prevent floodflows from circumventing the levee system at its northern terminus, and thus, substantially reduce frequency of inundation to

residences at the north end of town, and also to reduce inundation depth and extent to lower-lying portions of town.

- The opportunity exists to reduce hazards for drowning or trapping residents within lower-lying portions of town, by both non-structural and structural means.
- The opportunity exists to reduce threats to existing and future Federal, State, and local investment through structural measures. This includes changes or enhancements to existing Federal investments made to the Town Hall, community center, HUD-funded housing developments, wastewater treatment plant, and others.
- The opportunity exists to enhance long-term community sustainability through reduction of flood threats. Reduction of flood threat could promote a stronger economy, a more stable business environment. It may also promote more investment in local health care, public transportation, local educational facilities, recreation facilities, and other community amenities, by both non-structural and structural means.
- The opportunity exists to reduce flood risk by structural means such that primary services such as town government, community services, police, and fire, remain effective during and after large flood events.

Following Hurricane Floyd, President Clinton's Executive Order 13146, of February 29, 2000, directed Federal agencies to form a committee to study and identify potential opportunities to reconstruct and protect Princeville to the maximum extent practicable. Additionally, private groups and individuals nationwide came together looking for opportunities to provide goods, services, and monetary assistance to the community. The combination of the efforts of all of these various entities have identified and addressed some of the immediate and short term opportunities to reconstruct or protect Princeville, and yet many opportunities remain. This study has focused on opportunities to address specific remaining problems that were identified through collaborative planning with the Town, County, and Sponsor, as follows:

- ***Provide an Increased Level of Flood Risk Management (FRM).*** The opportunity exists to provide substantially higher flood risk reduction through improvement of the existing levee system and subsequently a reduction of the frequency and magnitude of flood inundation in the Town of Princeville.
- ***Reduce Risk and Improve Health and Safety.*** A variety of threats to the health and safety of Princeville residents can be traced to the hazards posed by recurrent flooding in the town. The opportunity exists to mitigate these threats to health and safety by improving Princeville's level of flood risk management. Such improvements would reduce the statistical frequency of flooding in Princeville, that is, the likely number of flood incidents over a given period of time. Adverse impacts from flooding would become less frequent, and the residents' levels of health and safety would improve accordingly over time.
- ***Improve Sustainability of the Community.*** Executive Order 13146, "President's Council on the Future of Princeville, N.C." (Exhibit 1) requires that Federal agencies provide recommendations on actions to be taken to enhance the future of Princeville and its citizens, and to the extent practicable, "*protect them from future floods.*" This multi-agency approach to addressing the problems facing this community allows for a comprehensive strategy to assess the economic, environmental, and social issues that may be focused upon to improve the overall quality of life of current and future generations of Princeville citizens. The USACE has the ability to assess the potential mechanisms to reduce the threat of future floods, which would better position the community to successfully address other challenges that prevent them from becoming a sustainable community.

- **Better Uphold Community Social Fabric.** The social fabric of the nationally-important historic Town of Princeville could be better insulated from the destructive effects of sporadic flooding from the Tar River with improved FRM. Princeville has exhibited a strong community bond over 140 years. However, persistent flooding threats have made it difficult for residents to maintain homes and properties. Improving the level of FRM, and reducing the frequency of flooding would not eliminate the possibility of a catastrophic event but may reduce the number of flood events requiring evacuation. With less flooding threats the community of Princeville will be able to continue to strengthen family and community bonds improving the chance for recovery in the event of a disastrous flood.
- **Better Risk Reduction for Structures and Infrastructure.** Structures and infrastructure in Princeville, including National Register-eligible buildings could benefit from reduced frequency of repeated damage and destruction from flooding from the Tar River with improved FRM. With a notable reduction in the likelihood of flood damage to buildings and infrastructure in any given year, the likely frequency of the damage/repair cycle would be reduced. A more robust effort for preservation and improvement of the town's building inventory, including National Register-eligible structures, would be encouraged. Public services and utilities would likely enjoy longer uninterrupted periods of operability, and their improvement and expansion may also be encouraged.
- **Better Risk Reduction for Personal and Community Effects.** Items of irreplaceable value to individuals, organizations, and the community as a whole would benefit from improved FRM. Improved knowledge of flood risk and methods of mitigation could be imparted to the residents by expanded plans for flood warning and evacuation, and FRM education and communication. Residents would be able to better protect their own items of value, as well as those of organizations and of the entire community. With a notably reduced risk of catastrophic flooding in a given year, over time such valued items would be much less likely to be subject to loss or damage due to flooding.
- **Interior Drainage Improvements.** Structures in Princeville could benefit from flood risk reduction when ponding occurs from floodwaters entering from un-gated culverts along the Tar River. The entire system, areas included in the original design and areas affected by the construction of new levees, was evaluated using EM-1110-2-1413 *Analysis of Interior Areas*. Any new levee construction would incorporate the necessary features for adequate interior drainage inside the new levee.

3.9 CONSTRAINTS

Constraints, relative to FRM, represent a variety of limitations which must be observed in formulating alternative plans for improving FRM in the study area. The following were identified as potential constraints to the entire planning process, or to implementation of certain potential measures.

- Certain structural measures, particularly raising the height of the existing levee, may cause impacts to bridges, or hurricane evacuation routes, and/or may also induce impacts to adjacent and/or downstream communities. Mitigation may not be feasible for some induced impacts.
- Upstream reservoir options that could reduce flood stage at Princeville may not be implementable due to a lack of suitable locations.
- Certain structural measures that would require feature construction within the Tar River floodplain outside the existing project footprint may be environmentally unmitigable.

- Non-structural measures that would require relocation of low-income residents may be infeasible due to the added costs of living in an alternate community that does not provide equivalent cost for services and staples (i.e., beyond “safe and sanitary housing”).
- Many or all structural and non-structural measures may be economically infeasible, due to the low income and median dollar value of residential properties (i.e., No NED Plan may be possible). This may require a recommendation that is not compliant with current policy on plan selection, but may also meet the intent of the “Principles and Guidelines”.

SECTION 4 – PLANNING OBJECTIVES* ▲

Goals and objectives in FRM projects define what could be done about the critical problem issues regarding the life, health, and well-being of people living in flood-prone areas. Goals and objectives were identified through communication with town government and residents, Edgecombe County, local interests, and the State of North Carolina, and study objectives were further refined by the study team after detailed technical analysis.

4.1 GOALS

The primary planning study (and potential project) goals for the Princeville feasibility study, as established by the residents, County, State of North Carolina (Local Sponsor), and Presidential Executive Order are:

- Assess the flooding problems and to “protect the town from future floods “to the extent practicable.” (Executive Order No. 13146)³
- Improve flood risk management for the Town of Princeville, thus better upholding and preserving the social fabric of this nationally-important cultural resource, reducing flood risk to Federal and local investments, reduce risks to life and safety, and substantially reduce flood inundation damage to the community.

4.2 OBJECTIVES

In order to satisfy the primary goals, the following Objectives were identified:

- Evaluate the existing flood risk reduction system at Princeville, its current level of floodflow exclusion, and where needed, provide a cost-effective, technically-sound, and environmentally acceptable plan to better promote the exclusion of floodwaters from the town to a frequency substantially lower than that which currently exists, and so doing, reduce monetary flood inundation damage potential by at least 75%.
- Evaluate and ensure the adequacy of plans for flood warning and evacuation, and for Flood Risk Management Education and Communication for the residents. Key in the latter is the assurance of adequate access to flood egress routing before and during large flood events. This would provide local residents and community officials with adequate knowledge to make sound decisions regarding their flood risk, allow timely evacuation, and ensure a reduction in risk to life and safety to residents during flood periods.
- Address floodflows entering town through existing ungated culverts in the existing Highway 64 embankment, which currently cause damage in low-lying areas.
- Address floodflows from entering town through the existing underpass at Highway 33, by various structural measures, to substantially reduce flooding from that source, and better ensure egress by that route.
- Address overtopping of the existing levee and subsequent overtopping, at an existing low spot on Highway 64, by structural means, to substantially reduce flooding from that source, and to better ensure egress and continued use of Highway 64 during hurricane events.
- Address floodflows circumventing the levee system at its northern terminus, and substantially reduce frequency of inundation to residences.

³ Executive Order No. 13146 – President William J. Clinton, February 2000: Federal Assistance for the Future and Sustainability of Princeville, North Carolina.

- Reduce hazards for drowning or trapping residents within lower-lying portions of town, by both non-structural and structural means.
- Reduce threats to existing and future Federal and local investment. This includes Federal investments made to the Town Hall, community center, HUD-funded housing developments, and others, by structural means.
- Enhance long-term community sustainability through reduction of flood threats.
- Reduce flood risk to primary services such as town government, community services, police, and fire, so they remain effective during and after large flood events.
- Improve the interior drainage system to remove threats caused by interior floodwaters, during periods in which floodwaters within the Tar River are high enough to cause ponding behind the existing levee, when normal drainage outlets are closed.

SECTION 5 – FORMULATION AND EVALUATION OF ALTERNATIVE PLANS*

5.1 IDENTIFICATION OF MEASURES

Following determination of problems and opportunities, and development of goals and objectives, a set of measures were developed. A **Measure** is a feature or activity to be accomplished at a specific site for the purpose of addressing the project goals and objectives. Types of Measures are as follows:

Measures are considered either Structural or Non-structural:

- A **Structural Measure** is a built **feature** which would address project objectives.
- A **Non-structural Measure** is an **activity** which could be implemented to address project objectives.

5.2 Opportunities And Possible Measures For Reducing Flood Risk

For this study, five primary opportunities for reducing or eliminating flood risk for the Town of Princeville were initially identified.

Opportunity 1 – Eliminate flood risk through acquisition of structures/properties and relocation of residents

Opportunity 2 – Improve risk reduction by modification of the existing levee project (e.g., extension of the levee, and addressing other existing physical issues)

Opportunity 3 – Further improve flood risk reduction by raising features discussed in Opportunity 2, and additionally, extending the existing levee where needed

Opportunity 4 – Improve risk reduction by providing large scale structural measures (upstream dams/reservoirs; channel by-pass; bridge modifications)

Opportunity 5 – Reduce flood risk by application or modification of non-structural measures, including flood-proofing, flood warning and evacuations.

Numerous measures were identified which could accomplish project goals and objectives under these six options. The complete list of all applicable measures follows:

Structural Measures:

- Upstream dams/reservoirs
- River channel enlargement
- Modify existing bridges
- Bypass channel
- Drainage modification
- Flood proofing structures
- Ring levees
- Raise existing levee
- Existing levee extensions

- Culvert modifications

Non-Structural Measures:

- Elevate and raise structures
- Acquisition of structures/properties and relocation of residents
- Flood warning
- Evacuation
- Flood risk management education and communication
- Zoning changes
- Floodplain restrictions
- Building code modifications/restrictions

The primary options along with measures being considered are also shown in *Table 5.1* and are discussed in more detail in later paragraphs in this section. In addition to these options, this section also discusses the results of the recent inspection by the USACE of the existing levee, and its findings.

Table 5.1: Development of Options and Supporting Measures

Opportunity	Structural Measure	Non-Structural Measure
Opportunity 1 – Eliminate Flood Risk		Acquisition of Structures/Properties and relocation of residents
Opportunity 2 – Reduce Flood Risk: – Modify or Improve Existing Project	Northern Extension - Alignment A Northern Extension – Alignment B Northern Extension – Alignment C Northern Extension – Alignment D Northern Extension – Alignment E Northern Extension – Alignment F Northern Extension – Alignment G Northern Extension – Alignment H Northern Extension – Alignment I	Flood Warning and Evacuation Plan Flood Risk Information, communication, and education Zoning Changes Elevate and Raise Structures Floodplain Restrictions Building Code Modifications - Restrictions.

Opportunity	Structural Measure	Non-Structural Measure
	Drainage and Culvert Modifications U.S. Highway 64/N.C. 33 Roadway Improvements Southern Extensions	
Opportunity 3 - Reduce Flood Risk – Raise Existing Project	Additional Drainage and Culvert Modifications U.S. Highway 64/N.C. 33 Roadway Improvements Ring Levee Mitigate Induced Flooding	Flood Warning and Evacuation Plan Flood Risk Information, communication, and education Zoning Changes Elevate and Raise Structures Floodplain Restrictions Building Code Modifications - Restrictions.
Opportunity 4 - Reduce Flood Risk - Implementing Large Scale Improvements	Upstream Dams/Reservoirs Bridge Modification Channel By-pass River Channel Enlargement	Flood Warning and Evacuation Plan Flood Risk Information, communication, and education Zoning Changes Elevate and Raise Structures Floodplain Restrictions Building Code Modifications - Restrictions.
Opportunity 5 – Non-Structural	N/A	Flood Warning and Evacuation Plan Flood Risk Information, communication, and education Zoning Changes Elevate and Raise Structures Floodplain Restrictions Building Code Modifications - Restrictions.

5.2.1 STRUCTURAL MEASURES

While details discussed in this section are less comprehensive than the discussion contained in the Design Appendix, this discussion focuses on preliminary analysis of measures, for the purpose of “First Phase” evaluation, comparison, and screening, so later rounds of plan formulation could focus on a smaller list of viable alternatives.

Upstream reservoirs. This measure would involve construction of dams and reservoirs on the Tar River upstream of Princeville to retain floodwaters during major storm events, with the goal of reducing flood risk (both frequency of occurrence for a given level of discharge, and also stage) at Princeville.

River channel enlargement. This measure would involve deepening and/or widening the Tar River channel for the purpose of increasing capacity in the river thereby lowering flood risk at Princeville, by reducing stage and passing higher discharges.

Modify existing bridges. This measure would involve modifying the existing bridges along the Tar River at Princeville, to pass higher floodflows.

Bypass channel. This measure would involve the construction of a high-flow bypass channel (*Figure 5.1*) to convey floodwaters around Princeville and reduce river-source flooding within the town during storm events.

Ring levee. This measure would involve construction of a circular levee encircling the entire Town of Princeville.

Drainage and culvert modification. This measure would involve installation of features that would reduce ponding caused when runoff (generally sheetflow) backs up behind the existing levee (i.e., within the Town of Princeville). When flood stage on the Tar River rises above the level of the existing drainage structures (culverts that pass drainage through the levee or highway embankment), they trap interior runoff behind the levee. In some instances these waters can raise enough to inundate nearby structures. Drainage modifications, including installation of back flow devices (i.e. flap gates), would prevent Tar River floodwaters from entering Princeville through existing drainage structures. Installation of back flow devices can in some cases exacerbate ponding created by runoff issuing from within the area blocked by the existing levee and highway embankment. Under higher floodflow conditions, ponding would occur, potentially requiring acquisition and relocation, or flood proofing to mitigate for induced flooding.

Flood proofing structures. This non-structural measure would involve flood proofing (for the design event, currently more than 1,000 structures), including foundation waterproofing, raised utilities, sealing doors, raising the first floor by elevation, etc. (*Figure 5.2*)

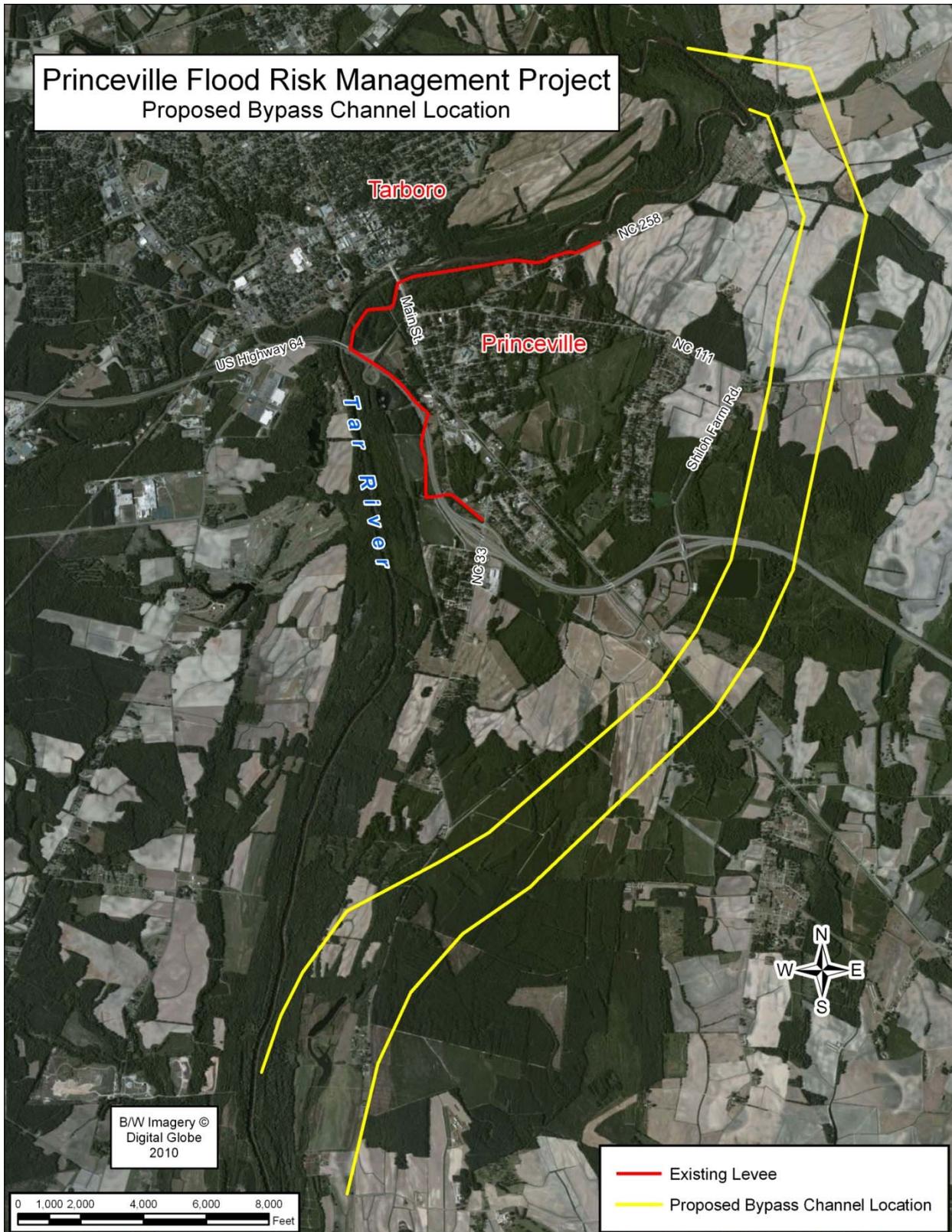


Figure 5.1: Bypass Channel



Figure 5.2: Example of Flood proofing - Raising First Floor of Structure

(NOTE: BFE = Base Flood Elevation, e.g. 1% chance event)

Raising the existing levee system. This structural measure would involve raising the crest of the existing levee, and additional features, for additional flood risk reduction.

The following alignments are shown on Figure 5.3 – page 84.

Extension of Existing Levee. These structural measures would involve extending the north end and/or the south end to prevent circumventing of the levee. As discussed earlier in this report, the original levee, when constructed, terminated abruptly at both the northern and southern ends without transitioning the levee to high ground. Extensions of the ends of the levee could effectively prevent circumvention of the existing levee at its upstream and downstream ends. There are numerous alignments a northern levee extension could take to prevent circumvention of the levee beyond its northern terminus. Refer to Figure 5.3 in reference to alignments, below.

Northern Extension of Existing Levee – Alignment A. This measure would consist of an extension of the northern end of the existing levee. This measure would also require addressing two locations at which natural drainage would have to be routed through new culverts under the levee extension. The levee extension would consist of about 8,650 feet of elevated roadway and a tie-in to the terminus of the existing levee. The reach of elevated roadway would consist of an earthen berm with an approximately 45-foot top width, to accommodate two 12-foot lanes, 5-foot paved shoulders, 5-foot unpaved shoulders on each side, and guardrails (as required), 3 to 1 side slopes and a bottom width from 60 to 70 feet. The height of the fill would range from 5 to 6 feet. This measure would also require the ramping of existing driveways (*Figure 5.4*) in an adjacent subdivision up to the new roadway elevation. Approximately 33 residential or farm driveways, 6 commercial, and 2 subdivision streets would be affected. Two existing culverts which lie beneath U.S. Highway 258 (a 4'x4' reinforced concrete pipe box culvert) and Shiloh Farm Road (a 48" RCP culvert) would be replaced with new culverts. Toe drains would also be required along the fill to address changes in the drainage patterns.

Northern Extension of Existing Levee – Alignment B. This measure is identical to Alignment A, described above, except that a service road would be constructed along U.S Highway 258 to provide access to the homes in an adjacent residential subdivision. This would eliminate the need to ramp individual driveways up to the new road surface.

Northern Extension of Existing Levee – Alignment C. This measure is identical to Alignment A described above, except that a new service road would be constructed behind houses facing U.S. Highway 258. This would eliminate the need to ramp about 17 residential driveways up to the new road surface. The new service road would contain two 8-foot-wide lanes, and would be about 1425 feet long. It would be located in the backyards of the houses facing U.S. Highway 258, and would connect to a subdivision street that exits onto Shiloh Farm Road.

Northern Extension of Existing Levee – Alignment D. This measure would consist of raising about 4,200 feet of U.S. Highway 258 using the same configuration as Alignment A described above. In addition, to provide flood risk reduction to other nearby residential and commercial structures located northwest of U.S. Highway 258 and northeast of Shiloh Farm Road, the next 5,067 feet of the alignment would combine 2,887 feet of floodwall and 2,180 feet of earth berm. This berm-floodwall alignment would include an earth ramp for access to the raised portion of U.S. Highway 258, just south of a creek near the U.S. 258 and Shiloh Farm Road Y-intersection, on the north end of the project area. About 1,500 feet of Shiloh Farm Road would also be raised. About 8 residential or farm drives, 6 commercial drives, and one subdivision street would need to be ramped up to the raised roadways. The earth berm would have a top width of about 10 feet, 3 to 1 side slopes, and a bottom width varying from 60 to 80 feet. Interior drains would need to be

constructed to remove water which would be trapped by the new berm and flood walls. Elevation of Shiloh Farm Road would require removal of the existing asphalt surface and sub base. New earth fill would then be placed on the road bed, overlaid by a new road surface. The top would be about 40 feet wide, and would contain two traffic lanes, paved and unpaved shoulders, and guard rails. Due to the sloping of the ground, drainage pipes should be added along the levee, along with toe drains and other surface drainage features

Northern Extension of Existing Levee – Alignment E. This would be substantially similar to Alignment D except this alignment would differ in the last 1,500 feet at Shiloh Farm Road. Shiloh Farm Road would not be elevated. Instead, a flood wall-and-berm feature would be constructed along the northeast side of the road. This would eliminate the need to ramp two drives and a street, and would eliminate the need to build a section of retaining wall at a residential structure.

Northern Extension of Existing Levee – Alignment F. This would be identical to Alignment E described above except that a floodwall would be constructed across U.S. Highway 258 from the 180-degree bend in the Tar River, to meet the Shiloh Farm Road end of the alignment as in Alignment E above. About 590 feet of floodwall would be required for that portion of the alignment, plus a ramp for U.S. Highway 258 to cross the floodwall. The remaining 2,655 feet would consist of 1,290 feet of floodwall and 1,365 feet of berm constructed on the north side of Shiloh Farm Road. Six residential and six commercial driveway ramps would be required. Berms would have a top width of around 10 feet, 3 to 1 side slopes, and a bottom width that varies from 60 to 70 feet. The roadway rebuild would have the same configuration as Alignment D.

Northern Extension of the Existing Levee – Alignment G. This would start at the north end of the existing levee and run north on U.S. Highway 258 for about 4,150 feet to a point just south of a subdivision. It would then turn east along Cummings Lane at the edge of a field, for about 1,100 feet to the woods line, then north and east following the edge of the woods for about 1,200 feet, to Shiloh Farm Road. Shiloh Farm Road would be raised for approximately 600 feet to complete the alignment. The U.S. Highway 258 portion would consist of a berm on the existing roadway with a top width of about 40 feet with two traffic lanes and paved and unpaved shoulders, and a bottom width around 70 feet. The segment from U.S. 258 to Shiloh Farm Road would be a flood wall. The Shiloh Farm Road raising would be similar to the U.S. Highway 258 construction, but with a bottom width of about 60 feet. Because of an existing drainage ditch, a culvert with a backflow device would be required through the flood wall.

Eastern Extension of Existing Levee - Alignment H. This measure would consist of a new levee which would tie in to the existing levee about 740 feet south of its north end. The alignment would cross U.S. Highway 258, requiring construction of a highway ramp. With the intent of minimizing impacts to farmland on the north side of the levee, a berm would then extend approximately 450 feet along a woods line to a point near an existing pond. The next 725 feet would be floodwall, due to proximity of the pond. Beyond the pond, the next 3,850 feet to N.C. Highway 111 would be a berm. The remainder of the levee, about 7,300 feet, would be constructed by elevating N.C. Highway 111. The berm would have a top width of about 10 feet, with 3 to 1 side slopes, and a bottom width that varies from 60 to 80 feet. Raising the road would require the removal of asphalt and sub base, then placing new fill on the road bed. The rebuilt road berm would have about a 40-foot top width and 3 to 1 side slopes, with a bottom width of about 60 feet. The roadway would have two lanes with paved and unpaved shoulders. The intersection of N.C. 111 and Shiloh Farm Road would require the construction of a ramp for Shiloh Farm Road. Fifteen driveways and one subdivision street would have to be ramped up to the new road surface.

Eastern Extension of Existing Levee – Alignment I. This measure consists of extension of the existing levee at the point of its current northern-most terminus along Highway 258, to the east, and then south, to its juncture with the approximate southern terminus of the project. The initial extension at the northern terminus would consist of a small extension at the height of the existing levee joining the levee to a new raised portion of Highway 258, which would bring all these features up to the same relative height (approx. elevation 49 feet NAVD). A new levee extension of the same height, of approximately 3,300 feet in length, would then extend from Highway 258 southeast and then east southeast, across existing farmland, to a juncture with Highway NC 111. At this point, a new levee section on which NC 111 would be re-constructed, would run along the existing roadway right-of-way, approximately 3,350 feet to the intersection of NC 111 and Shiloh Farm Road. At this point a new levee segment, with re-constructed roadway, would run south approximately 400 feet along the existing right-of-way of Shiloh Farm Road to a point at which Shiloh Farm Road rises high enough not to require additional height. One levee/road-raising further south at a low point on Shiloh Farm Road would also be added, at a length of approximately 1,400 feet.

Eastern Extension of Existing Levee – Alignment I (as modified). This measure consists of features of Alignment I above, but modified through re-alignment of the levee. This re-alignment was conducted to better reflect the realities of topography and structure and roadway locations. It is discussed in greater detail in later sections of the report, as The Recommended Plan.

Northern Extension of the Existing Levee – Alignment J. This measure provided an alternative alignment to the northern extension, excluding Shiloh Farms Estates. Alignment J provided no advantages over Alignments B or G, and was quickly dropped from further consideration.

Road Raises in Select Locations – Alignment K. These measures consist of road raises in select locations, to prevent over-topping. This measure was incorporated into various other alignments, as needed, and was no longer referred to as a separate alignment after this point in the formulation process.

Reconstruct and Improve Stability, Condition and Safety of Existing Levee/Levee. This measure would consist of specific improvements that might be performed to ensure that the existing levee was capable of being certified under current levee certification criteria, if found by geotechnical analysis to be required. This is discussed in more detail in Section 7.4 Design and Construction considerations, and the Geotechnical Appendix.

The Corps of Engineers has committed to working closely with NCDOT staff to ensure project implementation requirements are carefully coordinated between both agencies. NCDOT maintains responsibility for certain on-site transportation facilities and associated drainage features that will potentially require modification as a consequence of Federal project construction. Corps staff met with representatives of NCDOT on February 28, 2014 to walk through proposed project features and implementation requirements, and exchange information. NCDOT staff asked numerous clarifying questions about plan formulation and on-the-ground impacts to local and regional transportation routes. Ongoing coordination between NCDOT and the Corps, plus ATR and IEPR input, resulted in adoption of the option of moving the shoulder levee to the river side of the embankment, thus reducing residual flood effects to the existing hurricane evacuation route. Potential design refinements during preconstruction, engineering and design will also address on-site drainage efficiencies in the vicinity of culvert and flap gate features as well as roadway design requirements.

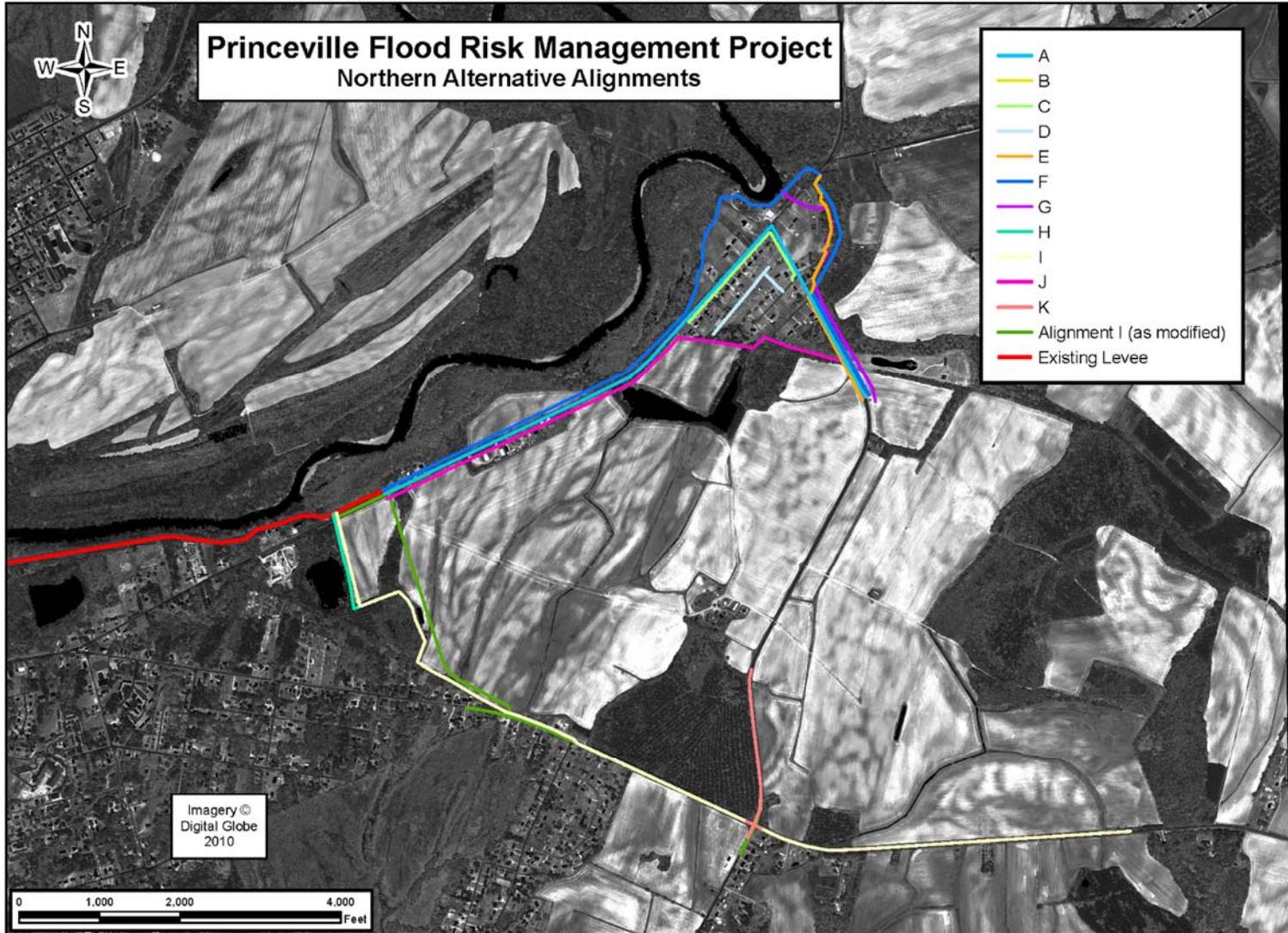
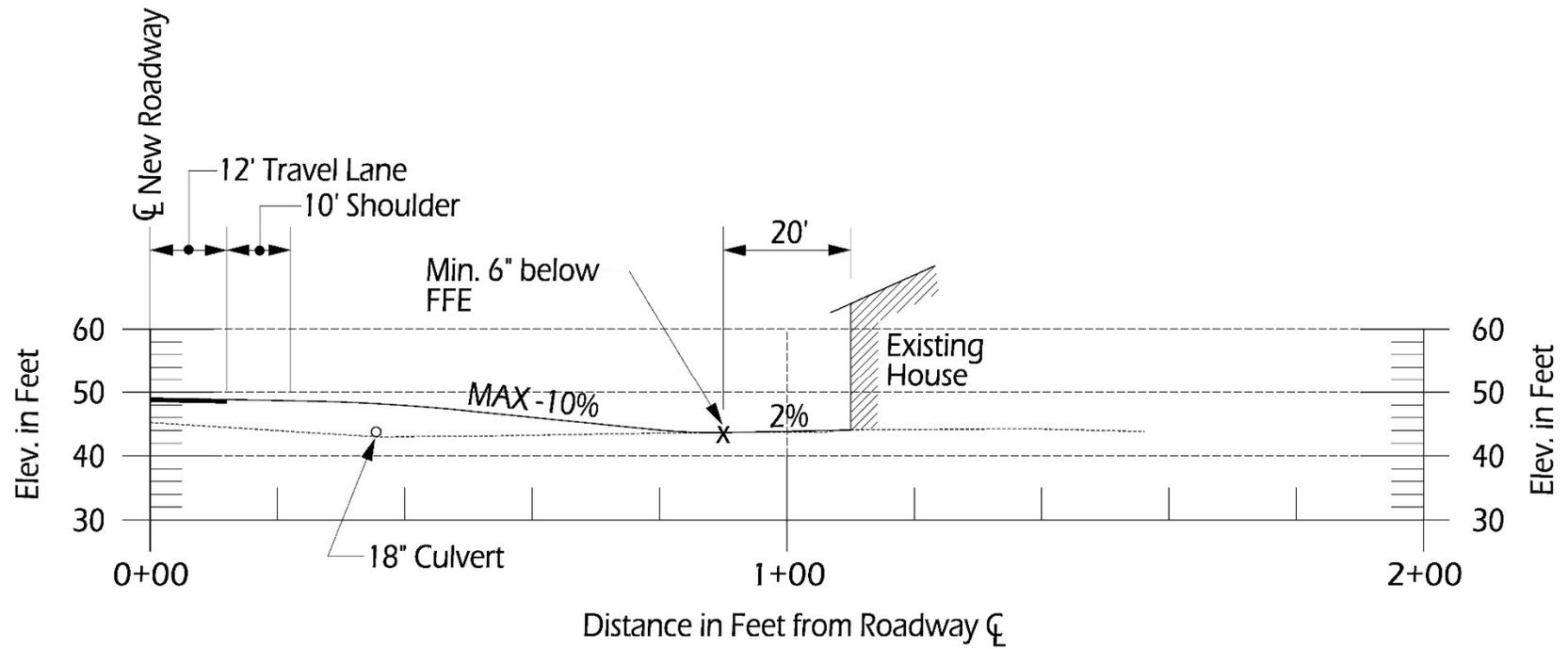


Figure 5.3: Alternative Alignments



TYPICAL DRIVEWAY MODIFICATION

Figure 5.4: Typical Driveway Modification

5.2.2 NON-STRUCTURAL MEASURES

Elevate and Raise Structures. This measure would consist of physically raising structures within the floodplain to an elevation above that floodflow elevation experienced during large flood events. This may be accomplished by raising foundations on piers or supports, raising structures on higher foundation walls, or installing ground floors beneath the first floor living space. This largely depends on the area within the floodplain and the depth of expected flooding.

Acquisition of Structures/Properties and Relocation of Residents. Reduction of flood risk might also be accomplished within the Town of Princeville by acquiring flood prone properties and relocating the residents to decent, safe, and sanitary housing outside of the floodplain. There is little to no opportunity for relocation outside the floodplain in Princeville within town limits, or immediate surroundings, as the vast majority of Princeville is subject to flooding.

Flood Warning and Evacuation. Risk reduction in Princeville can also be achieved by installation of a flood warning system, which notified residents of rising floodwaters and potentially dangerous flooding by warning sirens. This gives people advanced warning in order to evacuate town before serious flooding occurs, but does not reduce flood inundation damage to structures. The FEMA Warning and Evacuation Plan would be coordinated with the Town, County, State and Federal agencies for establishment of communications and responsibilities for accomplishment of preparatory actions. This plan would serve as an extension of the existing state-developed and maintained Tar River flood warning system. The plan will identify proper times and elevations for notification to residents in order to provide a safe and orderly evacuation. This measure would not provide any relief from structure and content damage.

Flood Risk Management and Communication. This measure consists of providing information and communication plans to advise local residents whether the area where they live is exposed to risks of flooding, including depth of flow. General historical flood information or photos would provide, as well as the range of risk to which they are exposed, the need to be “flood ready” (i.e., what they should do in planning for a future flood).

Zoning Changes. This measure consists of imposing zoning and land use controls on property and infrastructure development that reduce flood risk.

Floodplain Restrictions. There are a variety of floodplain restrictions that could reduce flood risk, and that could be imposed by the Town, County, or State. These include: constraints on construction or filling activities that would reduce the ‘storage capacity’ for floodwaters in a floodplain; expectations that road access be maintained above (higher than) the flood level of a 1% chance flood event; codes that require that the first floor of a new building must be at a level at least one foot above the 1% chance flood level; and that changes, improvements, and additions to existing structures must meet current requirements. FEMA is considering re-mapping the floodplain in this area based on new hydrology data.

Building Code Modifications/Restrictions. Higher levels of risk reduction can also be achieved by modifying local building codes, requiring any new construction of residential and commercial structures be either constructed with higher first floor elevations, or alternately, that building be restricted in the floodplain entirely.

5.3 INITIAL SCREENING

Planning-level cost estimates were developed at a preliminary level of cost detail for the purposes of screening the initial array of measures. Planning-level costs are contained in *Table 5.2*. Screening of initial measures was done on the basis of technical feasibility, environmental acceptability, and comparative cost-effectiveness for a given level of risk reduction. *Table 5.3* contains the rationale in the screening process for initial measures.

Table 5.2: Summary of Planning Level Total Cost Estimates for Opportunities & Measures

Options/ Measure(s)	Total Planning Level Cost (Approximate Present Value Dollars) ¹	
Opportunity 1 – Eliminate Risk Through Acquisition and Relocation	\$540,000,000	
Opportunity 2 – Reduce Risk / Modify Existing Levee		
Northern Ext – Alignment A	\$29,500,000	
Northern Ext – Alignment B	\$29,500,000	
Northern Ext – Alignment C	\$29,600,000	<i>Note: Costs shown here are preliminary, for the purposes of screening only, and should not be compared to more detailed costs prepared for the Final Array of Alternatives, nor for the Recommended Plan.</i>
Northern Ext – Alignment D	\$34,900,000	
Northern Ext – Alignment E	\$32,000,000	
Northern Ext – Alignment F	\$34,900,000	
Northern Ext – Alignment G	\$34,000,000	
Eastern Ext – Alignment H	\$28,800,000	
Eastern Ext – Alignment I	\$21,100,000	
Opportunity 3 – Reduce Risk / Raise Existing Levee		
Raise Levee and Mitigate Induced Flooding Damages	\$91 million, not including mitigation costs	
Opportunity 4 – Reduce Risk / Large Scale Measures		
Upstream Dams & Reservoirs.	>\$91,000,000, not including mitigation costs	
River Channel Enlargement	>\$50,000,000, not including mitigation costs	
Modify Existing Bridges	>\$15,000,000, not including mitigation costs	
Bypass Channel	\$150-\$400,000,000, not including mitigation costs	
Ring Levees	Discussed in more depth later as part of alternatives	
Opportunity 5 – Non Structural Measures		
Flood proof Structures	\$75,000,000 - \$100,000,000	
Elevate Structures by Raising (applies only to 25% of structures)	\$24,000,000	
Flood Warning and Evacuation	Will be updated as part of on-going State and local efforts (will use data from this report)	
Zoning	Minimal; would be implemented with other measures	

Floodplain Restrictions	Has been implemented by Town of Princeville
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Note 1: Costs used in this preliminary comparison are rough order of magnitude

Table 5.3: Comparison and Screening of Initial Measures

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Without Project	No-Action	Negative impacts to Public Health and Safety. Negative impacts to National Economic Development. Negative impacts to Regional Economic Development. Does not meet project objectives. Forms basis for comparison with all Alternatives as “Without-Project” Condition.	No
Opportunity 1 - Acquisition of Structures/ Properties and Relocate Residents	All existing structures would be acquired and displaced owners would be paid relocation assistance to move to high-ground locations outside Princeville’s flood prone lands. This measure could result in the establishment of a relocated town using existing structures. The existing community could remain relatively intact, although no longer located on its historical site. Existing lands of Princeville would be declared permanently uninhabitable.	Measure is not feasible for entire community due to economic constraints on residents in relocated community Measure is feasible for select structures within community, if re-located elsewhere within community within lower hazard zones (less flood-prone areas). Negative impacts to National Economic Development due to the cost associated with relocation of the town. Negative impacts to social environment. Does not meet project objectives.	Yes, if confined to entire community; Not screened if only applied to limited number of structures in high-hazard areas; Carried forward for consideration in limited applications

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 2 – Northern Alignment A	The north levee extension would involve raising U.S. Highway 258 and Shiloh Farm Road, and building ramps to connect approximately 39 driveways and one intersecting street to the raised roadways.	Measure would provide substantial risk reduction, if combined with other measures such as interior drainage and purchase and removal of flood-prone structures, but at a higher cost than other alignments. Measure would have similar environmental consequences to other alignments	Yes; not a cost-effective solution
Opportunity 2 – Northern Alignment B	This north levee extension would involve raising U.S. Highway 258 and Shiloh Farm Road, and building a frontage road for driveway access to the raised roadways. The NCDOT has advised that there is inadequate safety clearance between highway and buildings for a frontage road. If structures outside (west or north of Hwy 258 or Shiloh Farm Road) were excluded, but roadways and houses raised above design water surface elevation, this could constitute a viable alternative	Measure would provide substantial risk reduction, if combined with other measures such as interior drainage and purchase and removal of flood-prone structures Measure would have similar environmental consequences to other alignments Measure would not be as cost-effective as other alignments	Yes; not a cost-effective solution
Opportunity 2 – Northern Alignment C	The north levee extension would involve raising U.S. Highway 258 and Shiloh Farm Road, and building a service road behind the houses facing U.S. Highway 258 for car access.	Measure would provide substantial risk reduction, but the service road would adversely impact properties with Highway frontage. Measure would have similar environmental consequences to other alignments	Yes; Measure would not be implementable because it would result in the inability to provide driveway access to properties due to space limitations

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 2 – Northern Alignment D	The north levee extension would involve raising portions of U.S. Highway 258 and Shiloh Farm Road, and building an alignment of berms and floodwalls to the creek near N.C. State Road 1517.	Measure would provide substantial risk reduction, but at a high cost due to the extent of floodwalls needed. Measure would have similar environmental consequences to other alignments	Yes; Measure would cost more than other alignments producing similar level of risk reduction, and similar environmental consequences
Opportunity 2 – Northern Alignment E	The north levee extension would involve raising a portion of U.S. Highway 258 (but not Shiloh Farm Road), and building an alignment of berms and floodwalls to the creek near N.C. State Road 1517. In lieu of raising Shiloh Farm Road, the berm/floodwall alignment would extend alongside the road.	Measure would provide substantial risk reduction, but at a high cost due to the extent of floodwalls needed. Measure would have similar environmental consequences to other alignments	Yes; Measure would cost more than other alignments producing similar level of risk reduction, and similar environmental consequences
Opportunity 2 – Northern Alignment F	The north levee extension would involve raising a portion of U.S. Highway 258 (but not Shiloh Farm Road), and building an alignment of berms and floodwalls to the bend in the Tar River, and alongside Shiloh Farm Road.	Measure would provide substantial risk reduction, but at a high cost due to the extent of floodwalls needed. Measure would have similar environmental consequences to other alignments	Yes; Measure would cost more than other alignments producing similar level of risk reduction, and similar environmental consequences
Opportunity 2 – Northern Alignment G	Northern extension of levee along alignment of Cummings Lane would tie into the existing levee. A portion of Shiloh Farm Road would be raised.	Measure provides risk reduction, but leaves many properties still exposed to flood risk along U.S. Highway 258 and Shiloh Farm Road. Measure would have similar environmental consequences to other alignments	Yes; Measure would fail to provide risk reduction to large number of properties between Cummings Lane, U.S. Highway 258, and Shiloh Farms Road

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 2 – Northern Alignment H	New levee (approximately 4000 feet) to tie in to the existing levee near U.S. Highway 258, portion consisting of floodwall, and elevate 7,300 feet of N.C. Highway 111.	<p>Measure provides significant risk reduction, but at higher cost than Alignment I, which provides same degree of risk reduction.</p> <p>Measure would have similar environmental consequences to other alignments</p>	Yes; Measure provides significant risk reduction, but at higher cost than Alignment I, which provides same degree of risk reduction, and similar environmental consequences.

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
<p>Opportunity 2 – Northern Alignment I</p>	<p>Extension of the existing levee at the point of its current northern-most terminus along Highway 258, to the east, and then south, to its juncture with the approximate southern terminus of the project. The initial extension at the northern terminus would consist of a small extension at the height of the existing levee joining the levee to a new raised portion of Highway 258, which would bring all these features up to the same relative height (approx. elevation 49 feet NAVD). A new levee extension of the same height, of approximately 3,300 feet in length, would then extend from Highway 258 southeast and then east southeast, across existing farmland, to a juncture with Highway NC 111. At this point, a new levee section on which NC 111 would be re-constructed, would run along the existing roadway right-of-way, approximately 3,350 feet to the intersection of NC 111 and Shiloh Farm Road. At this point a new levee segment, with re-constructed roadway, would run south approximately 400 feet along the existing right-of-way of Shiloh Farm Road to a point at which Shiloh Farm Road rises high enough not to require additional height.</p>	<p>Measure provides significant flood risk reduction.</p> <p>Measure would have similar environmental consequences to other alignments</p>	<p>No; This measure would provide significant flood risk reduction for the Town of Princeville, and was carried forward for further consideration, technical and environmental analyses, and refinement of features.</p>

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
<p>Opportunity 3 - Raise existing levee</p>	<p>The existing levee could be raised to resist higher floodwater levels from greater flood events than those excluded by the existing levee. Raising the existing levee would require concurrent construction of extensions or a ring levee system to prevent floodwaters from flanking the levee, or entering from other sources.</p>	<p>Measure would cause induced flooding to adjacent and downstream communities, with significant technical and environmental mitigation required.</p> <p>Measure would be extremely expensive, due to costs of levee raise and additional real estate, and also potential to mitigate induced impacts, when compared to less extensive measures.</p> <p>Measure would require raising of several bridges.</p> <p>Negative impacts to Environmental Quality.</p> <p>Negative impacts to National Economic Development.</p> <p>Partially meets project objectives of significantly reducing flood risk.</p>	<p>No; this measure could be combined with other measures to provide higher level of risk reduction (see discussion in final array of alternatives [Alternatives 5 and 6]), without creating life and safety hazards associated with ring levees.</p>

<p>Opportunity 4 - Construct Ring Levee</p>	<p>An extension of the existing levee, or a higher levee system and extension of the existing system around the entire town would exclude floodflow from entering town during large flood events.</p>	<p>Limited extension of the existing levee may provide a reduction in flood damage potential without creating risks associated with high ring levees. This measure might also provide better access to flood egress (evacuation) routes, thus providing greater flood risk reduction. A higher ring levee concept (i.e., at a higher elevation than the existing levee), would result in very high construction costs. A higher ring levee measure would also cause an increase in flood water surface elevations, since it would block a large portion of the existing floodplain, requiring additional measures at the Town of Tarboro. The community could become isolated at certain levels of flooding, when floodwaters could surround the town and flood all evacuation routes. A higher ring levee measure could also present serious potential health and safety issues, notably inability to ensure that residents would not be trapped by flood event overtopping; would be given false sense of security. A higher ring levee would cause negative impacts to Environmental Quality due to intrusion within the Tar River riparian zone.</p>	<p>Yes, for a higher ring levee measure; No, for a smaller ring levee measure; a lower ring levee may be possible when applied as part of general upgrade of existing system (see Alignment I in combination with other measures, for example). An all-new higher ring levee would be cost-prohibitive, and potentially cause higher risks to life and safety, and was screened from further consideration. A partial or low ring levee concept was carried forward.</p>
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Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 4 - Channel Modification	The Tar River channel would be deepened and/or widened in order to increase its capacity and lower floodwater levels. Potential reductions in floodwater levels would be modest and unlikely to be notably beneficial to Princeville. The required impacts to the channel would be extremely difficult to coordinate environmentally, given the presence of the Tar River Spiny mussel, listed as endangered species.	Deepening is not technically or environmentally feasible. Widening would be extremely expensive due to cost of occupied real estate and cost of riparian mitigation. Negative impacts to Environmental Quality.	Yes; Measure was deemed highly environmentally damaging and costly, and was screened from further consideration.
Opportunity 4 - Upstream Dams/Reservoirs	Reservoir(s)/dams would be constructed upstream with the intent of reducing floodwater levels in Princeville during storm events. A dam would be constructed in order to impound waters for combined purposes including flood control, water supply, water-quality control, and recreation. The Tar River Basin, North Carolina study indicated in 1969 that floodwater elevations from a 1% chance event could be reduced by 1.2 feet. This reduction would improve the level of FRM, but would not prevent catastrophic flooding in Princeville. The level of cost, extent of coordination and planning needed, and time required to complete such a project would result in lengthy and indefinite delays and protracted exposure of the town to disastrous flooding. The eventual results would provide only a moderate improvement of FRM at Princeville.	Measure would be extremely costly in comparison to other measures that would produce same risk reduction for much less cost. Measure would cause substantial environmental impacts. Measure would require substantial real estate investment. Retention/Detention structures of such size to store sufficient floodwater to cause reduction in flood risk for Princeville would be extraordinarily costly. Negative impacts to Environmental Quality. Negative impacts to National Economic Development.	Yes; Upstream dams and reservoirs would be considerably more costly and environmentally impacting than other measures delivering the same level of risk reduction.

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 4 - Modify Existing Bridges	The existing bridges would be modified with the intent to reduce resistance to high water flood flow, resulting in lower floodwater levels. These types of modifications would be expected to be highly expensive. Expected benefit to Princeville would be very minor in that floodwater level effects would only be produced for a limited distance upstream; no downstream benefits would be expected. Potential impacts to the endangered Tar River Spiny mussel would lead to extremely difficult environmental coordination.	Measure would not provide substantial reduction in peak discharge or water surface elevation without commensurate raising of levee. Negative impacts to Environmental Quality. Does not meet project objectives.	Partly; Measure would not provide improvement of flood risk for any but the largest flood events (see discussion of final array of alternatives).
Opportunity 4 – Bypass Channel	A high-flow bypass channel would be constructed to the east and south of Princeville, with the intent of containing floodwater flow during storm events and lowering or eliminating flooding within the town. The channel would need to be 2,000 feet wide and 20 feet deep to adequately serve the purpose. Six highways, 2-4-lanes each, and a railroad would be crossed, and new bridges would be required. Mitigation would be required for adverse effects to wetlands. A high overall cost would be a major drawback of this measure. Since the channel could form a barrier between the town and high ground during flooding, safety is a serious concern.	Measure would be much more expensive than other measures providing the same risk reduction, for a lesser cost. Measure would create substantial environmental impacts. Negative impacts to Public Health and Safety. Negative impacts to Environmental Quality. Negative impacts to National Economic Development. Negative impacts to Regional Economic Development. Does not meet project objectives.	Yes; This measure would be considerably more costly than other measures providing same level of risk reduction, would isolate community, and would be highly environmentally impacting.

Opportunity/ Measure(s)	Description	Assessment	Screened From Consideration
Opportunity 5 – Flood Proof Structures	<p>Flood proofing either directly applied to the structures or taking the form of a freestanding wall outside the structure.</p> <p>Would require flood proofing heights of 4 to 10 feet, which would likely prove impractical for the number of structures exposed, and given problems such as access for older residents. Flood proofing is generally used for non-residential structures.</p>	<p>Not Technically Feasible for residential structures.</p> <p>Measure is much more costly than structural measures that achieve same benefit</p> <p>Does not meet project objectives.</p>	<p>Yes; Not deemed technically feasible based on actual structure construction within Town of Princeville.</p>
Opportunity 5 - Raising Structures	<p>Structures would be raised at least one foot above the anticipated flood elevation. For a 1% chance event, structures would be raised to elevation 47.2 feet above the NAVD '88 datum. In some cases structures would be raised up to 10 feet above the ground, creating difficulties in access for the aging population.</p>	<p>Not technically feasible for majority of structures, which are “slab on grade” structures. Raising structures would provide relief from structural inundation to the design flood elevation, but would result in structures sitting in a ponding area during large events. Public services such as fire and police would not have access to structures during large flood events.</p>	<p>Yes; Not deemed technically feasible for majority of existing structures within Town of Princeville, but remains a viable solution in limited applications, in conjunction with other measures.</p>

5.4 SECOND ROUND: MEASURE REFINEMENT, PRELIMINARY ALTERNATIVE DEVELOPMENT, EVALUATION AND SCREENING

The second round of plan formulation required that a higher level of detail be developed for the screened list of measures so that a reduced list of measures could be assembled into preliminary alternatives, evaluated, screened and carried forward for further refinement, evaluation and screening. This round of plan formulation sought to carry forward only a list of technically viable, environmentally acceptable, cost-effective solutions, that fully addressed the study objectives and Executive Order directives.

Because flooding of the Town of Princeville can occur from multiple entry points or sources, the solution of flooding must be approached incrementally, and thus, can be solved by either one measure, or a group of measures, depending on the increment of flooding in question. This is discussed sequentially, below.

To analyze the performance of second round - refined measures, a more detailed plan was developed for each measure and then evaluated for its performance using a suite of engineering models, including the USACE HEC-HMS, and HEC-RAS (vers. 4.1) models, which routed a variety of flood events through the project reach, and ultimately HEC-FDA, which evaluated how each measure or preliminary alternative performed, with regard to risk reduction by elimination of flooding sources, or alternatively, or by removal of damageable property.

5.4.1 EVALUATION AND FINDINGS ON SECOND ROUND MEASURES AND PRELIMINARY ALTERNATIVES

Second round measures, such as flapgate installation, extension of levees, buy-out and removal of structures from a given area, and other discrete measures, as well as preliminary alternatives, such as flapgates in combination with levee extension and other measures, were systematically evaluated for their potential for incremental solution of the flood problem, with the following results:

- A. For the initial increment of flooding, flow begins to occur at an approximately 5% chance flood event, through the group of culverts along the U.S. Highway 64 embankment. This is discussed as flooding Increment 1. **Analysis:** There is approximately \$340,000 in average annual damages preventable within the zone covered by the first increment of flooding. The majority of these structures are slab-on-grade, or low foundation wall construction. Purchase and removal costs for this group of structures exceeds the cost of installing flap gates on existing culverts, therefore the non-structural floodproofing measure for this increment was screened from further consideration. By far, the simplest and most cost-effective measure, consisting of flapgate installation and culvert modifications (to only those culverts currently passing flow from the river back into the Town of Princeville through existing levees and embankments) was also deemed technically viable, and environmentally sound, and was carried forward as the only remaining solution to flood inundation arising from that source (Increment 1) of flooding. This preliminary alternative would also include non-structural measures such as updated floodplain management, updated evacuation plans, and others. **This group of measures is henceforth referred to as Alternative 1.**
- B. The next increment of flooding occurs either by floodflows entering town through the highway underpass at the junction of N.C.Highway 33 and U.S. Highway 64 at an approximate 2% chance event, or, by overflow of the existing levee (to be abandoned) and then subsequent overtopping of U.S. Highway 64 embankment upstream of that point,

over a low spot in the highway, at an approximate 1.3% chance event. Potential measures or alternatives to eliminate these sources of flooding could be built at a lower or higher level of flood exclusion; therefore, flooding issuing from these two points, but at a lower or higher elevation of flood depth, is henceforth referred to as flooding Increment 2 and Increment 3, respectively. There is approximately \$423,000 in average annual damages preventable within the zone covered by the second, and approximately \$442,000 within the third increment of flooding.

There are three possible measures or preliminary alternatives that can be applied to provide flood risk reduction for Increment 2 of flooding. These consist of: a) purchase and removal of structures and contents from the zone affected by Increment 2, b) a stop-log structure at the underpass of Highway 33 at Highway 64, combined with a shoulder levee on the low spot on Highway 64, or c) interchange raising at the interchange of Highways 33 and 64, combined with a shoulder levee on the low spot on Highway 64.

Analysis: For Increment 2, the majority of structures are primarily slab-on-grade, and also low foundation wall construction. Purchase and removal costs for this group of structures far exceeds the cost of installing either a stop-log structure at the underpass, or by modification of exit and entrance ramping and the roadway of N.C. Highway 33 which connects them, and by installation of a shoulder levee applied to the inside (landward) or outside (riverside) slope of the Highway 64 embankment. Additional analysis of the stop-log at Highway 33/64 interchange indicated that the height necessary, and risks associated with long-term reliability in its consistent application, would be far outweighed by the reliability of the interchange raising measure. Consequently, the stop-log measure was also dropped from further consideration. This preliminary alternative would also include non-structural measures such as updated floodplain management, updated evacuation plans, and others. Thus, **the screened pairing of measures/preliminary alternative consisting of an interchange raising at Highways 33 and 64, combined with a lower shoulder levee, and all measures discussed in Alternative 1, is henceforth discussed as Alternative 2 (reducing risks from Increments 1 and 2 of flooding).**

- C. Additional risk reduction, to solve flooding Increment 3, can also be achieved by the following measures or preliminary alternatives: a) adding additional structures to a buy-out and removal plan, or b): by raising both the interchange at Highways 33 and 64, and also adding additional height to the shoulder levee on Highway 64, to prevent overtopping of either measure at an approximate 1.3% chance event. **Analysis:** Purchase and removal costs for this group of structures also far exceeds the cost of installing a higher exit and entrance ramp and higher shoulder levee, thus, the purchase and removal opportunity was dropped from further consideration. Thus, only the shoulder levee on Highway 64, and the interchange raising at Highways 33 and 64, were carried forward for further consideration. This preliminary alternative would also include non-structural measures such as updated floodplain management, updated evacuation plans, and others. **The screened pairing of a preliminary alternative consisting of a higher interchange raising at Highways 33 and 64, combined with a higher shoulder levee, and measures discussed under Alternative 1, is henceforth discussed as Alternative 3 (reducing risks from Increments 1 through 3 of flooding).**
- D. For the next increment of flooding, inundation can occur by floodflow circumvention of the existing levee at its northern terminus, beginning at an approximate 5% chance event (but for which no damages begin to accrue until a higher event frequency), and by overtopping of roadways on the north (NC-111, at an approximate 2% chance event), and east

perimeter of town (at Shiloh Farm Road). Flooding from these sources is referred to as flooding Increment 4. There are many preliminary alternatives that can provide risk reduction for floodflows issuing from this source. These consist of: a) purchase and removal of all structures and contents within the footprint impacted by floodflows circumventing the levee at its northern terminus, and also from additional sources overtopping Highway 258 and Shiloh Farm Road, or b): structural measures discussed for Increments 1 and 3 above, combined with a number of new levee extensions running along various alignments, to connect the northern and southern termini of the levee, reducing flood risk to remaining portions of the Town of Princeville. **Analysis:** Purchase and removal costs for this group of structures consists of the vast majority of structures within the Town of Princeville (an estimated cost of between \$86 and \$90 million), which far exceeds the cost of various structural measures discussed as Increments 1 and 3, and those measures comprising Increment 4 discussed below. A number of alternative levee alignments were also analyzed, as shown in Figure 5.3 and discussed in Table 5.2. Alignments A through H reduce flood risk to a greater number of structures, some of which are not in the footprint of the Town of Princeville, but all at a much more significant cost per structure, and overall cost as shown in Table 5.2. Refinement of an alignment along preliminary Alignment "I" was demonstrated to be most cost-effective, and also maximized risk reduction to both life and property, of all those alignments analyzed, and was optimized along alignment "I" as modified, shown in Figure 5.3, in purple. **The group of structural measures consisting of flap gates along the Highway 64 embankment (Increment 1), shoulder levee on Highway 64 and interchange modifications at Highways 33 and 64 (Increment 3), plus the new levee extension running along Alignment "I" modified, to connect the northern and southern termini of the levee, and reducing flood risk to remaining portions of the Town of Princeville, and interior drainage management features (Increment 4), is henceforth discussed as Alternative 4.** This preliminary alternative would also include non-structural measures such as updated floodplain management, updated evacuation plans, and others.

- E. For the next increment of flooding, which occurs at flood depths averaging two feet higher than those addressed by Alternative 4, many additional measures would be required to prevent inundation of the Town of Princeville. This additional increment of flooding is henceforth referred to as flooding Increment 5. Measures formulated to provide risk reduction for this increment of flooding could be addressed by either a non-structural plan consisting of purchase and removal of almost all structures within the Town of Princeville, and many low-lying structures within the Town of Tarboro, at an estimated cost in excess of \$150 million, or the following structural measures, including: a) addition of closure structures (if indeed the interchange cannot be raised an additional approximate 2 feet) at the underpass at the interchange at Highways 33 and 64, at the CSX Railroad, and at the Main Street bridge; b) further raising and extending the shoulder levee applied to the riverside slope of the Highway 64 embankment; c) constructing an earthen levee that will be extended to the southeast across U.S. Highway 258 across the field approximately 3,300 linear feet where it enters the N.C. Highway 111 right-of-way; d) the fixing of additional low spots and areas of lower ground on the existing levee structure; and e) additional raising of Shiloh Farm Road south of NC-111, and along much of the existing levee alignment. This group of measures, while providing a consistent level of risk reduction for the entire town and project reach, would cause induced impacts to the Town of Tarboro, which would have to be mitigated by installation of additional measures including floodwalls and/or levee modifications adjacent to Tarboro, and also potential modification of Highway 64 and its bridge over the Tar River, to prevent entry of floodflows from that source, and to prevent backwater effects upstream. **Analysis:** Purchase and

removal costs for this group of structures consists of the vast majority of structures within the Town of Princeville (an estimated cost of over \$150 million), exceeds the cost of various structural measures discussed as Increments 1, 2, 3, and 4, and was thus, screened from further consideration. The measures contained in this alternative would create a deeper ring levee condition, which would create a higher hazard when overtopped. As ingress and egress from town would no longer be possible by virtue of overtopping elsewhere along Highway 64, the key evacuation route from points east, it is carried forward for further comparison. **This group of measures is henceforth discussed as Alternative 5.**

- F. For the next increment of flooding, henceforth referred to as flooding Increment 6 all measures discussed above in Increment 5 would be modified to provide an even higher level of flood risk reduction, equivalent to an approximately two foot higher project. This additional increment of flooding could be addressed by either a non-structural plan consisting of purchase and removal of almost all structures within the Town of Princeville, and a larger percentage of structures within the Town of Tarboro, at an estimated cost in excess of \$200 million, or the following structural measures, including: a) addition of an even higher group of closure structures at the underpass at the interchange at Highways 33 and 64, at the CSX Railroad, and at the Main Street bridge; b) further raising and extending the shoulder levee applied to the riverside slope of the Highway 64 embankment; c) constructing an earthen levee that will be extended to the southeast across U.S. Highway 258 across the field approximately 3,300 linear feet where it enters the N.C. Highway 111 right-of-way; d) the fixing of additional low spots and areas of lower ground on the existing levee structure; and, e) the raising of the entirety of Shiloh Farm Road, and much of the existing levee system, by as much as four feet. This group of measures, while providing a consistent level of risk reduction for the entire town and project reach, would cause additional induced impacts to the Town of Tarboro, which would have to be mitigated by installation of additional measures including even higher floodwalls and levee modifications adjacent to Tarboro, and also the raising of Highway 64 and its bridge over the Tar River, to prevent entry of floodflows from that source, and to prevent backwater effects upstream. **Analysis:** Purchase and removal costs for this group of structures consists of the vast majority of structures within the Town of Princeville and many within the Town of Tarboro (an estimated cost of over \$200 million), exceeds the cost of various structural measures discussed as Increments 1, 2, 3, 4, and 5, and was thus, screened from further consideration. As with Increment 5, the measures contained in this alternative would create a deeper ring levee condition, which would create a higher hazard when overtopped. As the key ingress and egress from town necessary for evacuation from points east, it is carried forward for further comparison. **This group of measures is henceforth discussed as Alternative 6.**

For additional information on each increment, see the Design Appendix (Appendix B).

5.4.2 EVALUATION AND FINDINGS ON THIRD ROUND MEASURES AND PRELIMINARY ALTERNATIVES

The focus of the third round of plan formulation prior to analysis of the Final Array of Alternatives was performed in order to identify a “final” alignment to solve Increment 4 of flooding. This could then become the basis for Alternative 4 in the final array.

As discussed in Section 5.3 “Initial Screening”, and illustrated in Tables 5.2 and 5.3, alternative alignments A through H are more expensive, and in some cases, considerably more expensive,

than alternative Alignment I, which provides most of the flood risk reduction benefit, and at a lesser cost. Additional detail on design, potential environmental impacts, and cost estimation during the third round of development, evaluation, comparison, and screening, showed that Alignment I was indeed less costly than other similar measures, provided very similar (and very minimal) environmental impact, and was carried forward as an element of Alternative 4 in the final plan formulation, evaluation, comparison and selection process.

In addition to the measures that solve increment one through three of flooding, Alignment I also consists of extension of the existing levee at the point of its current northern-most terminus along Highway 258, to the east, and then south, to its juncture with the approximate southern terminus of the project. The initial extension at the northern terminus would consist of a small extension at the height of the existing levee joining the levee to a new raised portion of Highway 258, which would bring all these features up to the same relative height (approx. elevation 49 feet NAVD). A new levee extension of the same height, of approximately 3,300 feet in length, would then extend from Highway 258 southeast and then east southeast, across existing farmland, to a juncture with Highway NC 111. At this point, a new levee section on which NC 111 would be re-constructed, would run along the existing roadway right-of-way, approximately 3,350 feet to the intersection of NC 111 and Shiloh Farm Road. At this point a new levee segment, with re-constructed roadway, would run south approximately 400 feet along the existing right-of-way of Shiloh Farm Road to a point at which Shiloh Farm Road rises high enough not to require additional height. One levee/road-raising further south at a low point on Shiloh Farm Road would also be added, at a length of approximately 1,400 feet. Ditching would be required along the base of the new portions of levee, to remove existing reinforced concrete pipes along NC 111 at two locations. New flap gates would also be added to twin elliptical pipes, also along NC 111.

Structural measures associated with Alternative 4, would provide a minimal “ring levee” effect, by raising portions of NC 258, NC 111, and Shiloh Farm Road; however, the risks associated with doing so would be minimal. This is due to the low height of the “ring”, at its northern and eastern boundaries, and maintenance of a high degree of access to flood evacuation (egress) routes before and during a flood event. In the event of overtopping, it would occur at a low spot in the southeastern (downstream-most) portion of the project, and proceed upstream, minimizing the occurrence of “trapping” behind the existing, and higher portions of the levee system.

None of the alignments evaluated were deemed to have anything more than a minimal environmental impact, as discussed in the section on Affected Environment (see Section 8).

5.5 PROJECT BENEFITS

The recommended alternative must yield flood risk management benefits to the Town of Princeville, so as to meet the intent of Executive Order 13146. Many alternative plans were formulated in a systematic manner to ensure that all reasonable alternatives and measures were evaluated. Comparisons among alternatives and their corresponding benefits were examined during the screening of alternatives part of this study, and in particular, were taken into account during the comparison of costs, benefits, life-safety, and Other Social Effects analyses. The damage reduction benefits of the flood risk management alternatives were determined through the use of a USACE Flood Damage Assessment model (FDA), which utilizes both hydrologic and economic data. The model was a tool to aid the investigators in calculating *existing* value of flood risk management features and the anticipated *future* value of potential flood risk management features under the various proposed Alternatives. Flood risk management benefits for the existing conditions at Princeville, future without-project conditions, and conditions under each of the Alternatives were calculated using the model.

5.5.1 TOTAL PROJECT BENEFITS

The project benefits are measured in terms of reduced damage at each structure (building), and its contents, for use in the economic analysis. For each combination of measures, the issue of primary concern was the difference between damage occurring with the measures in place, compared to the damage occurring without the measures. This comparison was obtained by determining the flood damage for all structures in a damage reach, and then aggregating over the damage reaches to get expected damages for the project on an annual basis. Finally, after all aggregation is complete, the project benefits can be defined by calculating the difference in damages with and without the measures in place. An alternative to this method is to consider the project benefits structure by structure, and then to aggregate those benefits over the project.

5.5.2 NET BENEFITS

Net benefits are measured as the difference between benefits and costs, where benefits are defined as the reduction in flood damage resulting from the project. Assessment of economic performance builds upon hydrologic, hydraulic, and geotechnical factors that enter into the assessment of engineering performance, plus the computation of flood damage to structures or other activity in the floodplain. While engineering performance is focused on risk at each damage reach, economic assessment is more complex, involving the integration of information at several spatial scales.

In the case of Princeville there are three spatial scales of analysis. These are:

- Project scale at which all the economic analysis is summarized,
- Damage reach scales used for most analysis in HEC-FDA (flood damage assessment model), and
- Structure scale where the assessment of damage to structures is made.

The study area was divided into four damage reaches for the purposes of economics and damage assessment, containing 1,018 structures, with most of the structures concentrated in the lower reach.

HEC-FDA conducts a distribution based Monte Carlo probability simulation, in which 100 iterations of damaging flows are re-created to best ascertain damages to those structures. Four variables will be randomized for each structure: first-floor elevation, value of the structure, value of the contents, and other values of the facility. The results of these simulations are aggregated by damage category (e.g., single-family residential, commercial, agricultural, and public). A "Without Project" run was also conducted through FDA to establish simulated project performance against existing conditions.

An incremental analysis was conducted for all plans; in addition, a standard analysis was also completed for plan selection, including consideration of many non-monetary factors, as displayed in the System of Accounts analysis.

For the purposes of this analysis, the damages will be represented as an aggregate number. This aggregated figure has then been compared to a "Without Project" condition to establish a benefit of project implementation. The costs used in this analysis are represented as an average annual cost, as are the benefits. These two figures, when compared, produce a benefit/cost ratio. For National Economic Development (NED) projects, maximization of net NED benefits is the critical factor in identifying the NED plan. Plans with greater net benefits indicate that a

greater return is received for the investment. *Table 5.4* displays the results of the economic assessment for each Alternative.

Table 5.4: Princeville N.C., FRM Project Performance (in thousands)

	Average Annual Damage	Average Annual Benefits	Incremental Benefit	Average Annual Cost	Incremental Cost	Benefit/Cost Ratio	Average Annual Net Benefits
Without project Damages	\$519						
W/Flap Gate Retro-fit- Alternative 1*		\$340	+\$340	\$34	+\$34	10.0	\$306
W/ Flap Gate, plus Shoulder Levee & US64/NC33 fix Alternative 2		\$424	+\$84	\$263	+\$229	1.6	\$161
Alternative 3: plus fixes to 1' higher increment		\$442	+\$20	\$275	+\$12	1.6	\$167
Alternative 4: plus northern & eastern ext. & NC-111 & 258 raises		\$460	+\$28	\$940	+\$798	0.5	-\$538
Alternative 5: , plus additional raise		\$476	+\$6	\$2,538	+\$1465	0.2	-\$2,062
Alternative 6: plus additional raise		\$491	+\$15	\$2,596	+\$58	0.2	-\$2,107

* NED Plan

5.6 ENVIRONMENTAL OPERATING PRINCIPLES

The USACE Environmental Operating Principles (EOPs) were developed to ensure that the Corps of Engineers missions include sustainable environmental practices. The plan formulation for the Princeville project meets the Federal planning requirements and Executive Order 13146. The feasibility study is being carried out in a manner consistent with the USACE EOPs. The principles are consistent with NEPA; the Army’s Environmental Strategy with its four pillars (prevention, compliance, restoration, and conservation); and other environmental statutes that govern USACE activities.

Specifically for the Princeville project, the EOPs were utilized during the planning process with regards to screening of the potential levee alignments and possible borrow areas to limit the impacts to natural resources such as cultural resources and wetlands. Additionally, USACE has worked closely with federal and state agencies as well as local officials to ensure the project alternatives selected are the most environmentally sustainable choices.

5.7 PRINCIPLES AND GUIDELINES CRITERIA

Once measures were screened and alternatives were formed, the alternatives were evaluated to make sure they meet the minimum subjective standards of these criteria in order to qualify for further consideration and comparison with other plans. The “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” (U.S. Water Resources Council, 1983) (often referred to as the “Principles and Guidelines”) states that all alternative plans should be formulated in consideration of four criteria: *acceptability, completeness, efficiency, and effectiveness*. The Principles and Guidelines defines these criteria:

- **Acceptability**, is the viability and appropriateness of an alternative from the perspective of the Nation’s general public and consistency with existing Federal laws, authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency.
- **Completeness**, is the extent to which an alternative provides and accounts for all features, investments, and/or other actions necessary to realize the planned effects, including any necessary actions by others. It does not necessarily mean that alternative actions need to be large in scope or scale.
- **Efficiency**, is the extent to which an alternative alleviates the specified problems and realizes the specified opportunities at the least cost consistent with protecting the Nation’s environment.
- **Effectiveness**, is the extent to which an alternative alleviates the specified problems and achieves the specified opportunities.

All reasonable alternatives were reviewed in light of these above mentioned criteria, as well as other project-specific criteria. The No-Action alternative was considered as a valid choice in the range of reasonable alternatives and was scrutinized under the National Environmental Policy Act regulations (40 CFR Part 1502.14) and by ER 1105-2-100. The No-Action alternative was also considered as the baseline of existing impacts continued into the future against which to compare impacts of all alternatives.

5.8 THE SYSTEM OF ACCOUNTS

All remaining alternatives (1 through 6), plus the No-Action Alternative, were carried forward for development of a full discussion of potential benefits, impacts and positive and negative outcomes, and are presented below in *Table 5.5*, in “System of Accounts” format for final evaluation, screening, and plan selection. This will be followed by a full disclosure of risks and uncertainties associated with the No-Action, and Increment 1 through 6 (*Table 5.6*). For a more thorough display of analysis of risk assessment, please refer to the Hydrology & Hydraulics Appendix (Appendix A).

The System of Accounts defined by the Principles and Guidelines (para. 1.6.2(c)) was used to compare plans. The four accounts used to compare proposed water resource development plans

are the National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE) accounts.

National Economic Development (NED) account. The NED Account represents increases in the net value of the national output of goods and services, expressed in monetary units, and are the direct net benefits that accrue in the planning area, and the rest of the Nation. The benefits, average annual cost and total cost were based on the monetary costs or damages prevented, and were ranked accordingly. Additional information can be found in the Economics Appendix (Appendix G).

Environmental Quality (EQ) account. The Environmental Quality (EQ) account is an assessment of favorable or unfavorable changes in the ecological, aesthetic and cultural or natural resources. This review is being conducted with the participation of agencies, local governments, and stakeholders through an on-going and engaging series of scoping meetings, public input meetings, agency and stakeholder meetings, and on-site meetings, and will continue through PED study phase and coordination of the project through State and Agency reviews.

Regional Economic Development (RED) account. The Regional Economic Development (RED) account is represented by employment created during construction, employment created after construction, agricultural production and local farm tax revenues. The benefits were generated using standardized RED computer software programs (see Economic and Social Considerations Appendix for more details) and local tax rolls. Employment during construction is based on software output, which is derived using construction costs. The Without Project alternative will typically provide the least RED benefits, as it has the lowest construction cost, thus the least regional multiplier effect. Employment after construction is based on OMRR&R costs. Greater OMRR&R efforts generally require more manpower. Additional information can be found in the Economic Appendix.

Other Social Effects (OSE) account. The Other Social Effects (OSE) account considers the effects of alternative plans in areas that are not already contained in the NED and RED accounts. The categories of effects contained within the OSE account include: urban and community impacts; displacement; long-term productivity, energy requirements and energy conservation; and public health and safety. Additional information can be found in the Other Social Effects Appendix (Appendix F).

A summary of the features of each Increment of flooding, and those measures carried forward for comparison in the System of Accounts analysis, is contained in *Table 5.5*.

5.8.1 RISK

The USACE Public Safety and risk portion of the systems of account analysis involved consideration of all factors involved in reducing risk, with the goal of reducing risk to as many impact areas as possible. This accounting goes hand in hand with the risk analysis requirement included in the assessment and evaluation of a project's alternative plans. A key element of the "Public Safety" account for flood risk management projects is the emphasis on development of a Flood Risk Education and Communication Plan. Projects formerly referred to as "Flood Damage Reduction" projects are now termed "Flood Risk Management Projects." This change in terminology points to the fact that even after project construction is completed, there remains an element of risk associated with the project—that is, no project can ensure 100 percent reduction in damages. The annual probability of an event exceeding the design level of a project may be very small, but the extent of damages from such an event could be catastrophic. These two factors, probability and extent of potential damages, together determine the amount of residual

risk associated with a project. Residual risk generally applies to the resident population within the area of flood risk management concern. The particular level of residual risk may vary from person to person or household to household and must be assessed for each individual or household considering the surrounding conditions. The potentially-affected residents must be made aware of the degree of residual risk they carry so they can evaluate the risk and make informed decisions to avoid and mitigate potential losses.

A summary of the risk associated with the four planning accounts is provided in *Table 5.6*.

Table 5.5: System of Accounts

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
PLAN DESCRIPTION	No Federal Action	Flap gate additions and culvert modifications on existing culverts	Flap gates, Hwy 33/64 interchange raising, and low shoulder levee on Hwy 64	Flap gates, Hwy 33/64 interchange raising, and higher shoulder levee on Hwy 64	Flap gates, Hwy 33/64 interchange raising, higher shoulder levee on Hwy 64, plus levee extension and Hwy 258 & 111 raises & ltd Shiloh Farm Road raises	Flap gates, Hwy 33/64 interchange raising, higher shoulder levee on Hwy 64, levee ext., Hwy 258 & 111 raises & ltd Shiloh Farm Road raises and other measures such as bridge raises	Flap gates, Hwy 33/64 interchange raising, higher shoulder levee on Hwy 64, levee ext., Hwy 258 raise and other & 111 raises & ltd Shiloh Farm Road raises and other measures such as bridge raises at higher elevation
IMPACT ASSESSMENT							
1. National Economic Development							
a. Beneficial Impacts							
Average Annual Damages Prevented	\$0	\$340,000	\$424,000	\$442,000	\$459,870	\$476,000	\$491,000
Emergency Costs Avoided	\$0	unknown	Unknown	unknown	unknown	unknown	unknown
Recreation	\$0	N/A	N/A	N/A	N/A	N/A	N/A
Total Beneficial Impacts	None.	\$340,000	\$424,000	\$442,000	\$459,870	\$476,000	\$491,000
b. Adverse Impacts							
Initial Project Cost, Including Real Estate	N/A	\$772,000	\$5,696,000	\$5,953,000	\$21,540,000	\$54,970,000	\$56,228,000
Interest During Construction	N/A	\$3,000	\$234,848	\$245,445	\$2,086,387	\$2,266,000	\$2,318,000
Economic Costs for BCR	N/A	\$775,000	\$5,930,848	\$6,198,445	\$23,626,387	\$57,236,000	\$58,546,000

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Average Annual First Cost	N/A	\$33,000	\$253,000	\$264,000	\$940,164	\$2,440,000	\$2,496,000
Annual O&M	N/A	\$1,000	\$10,000	\$11,000	\$57,760	\$98,000	\$100,000
Total Avg. Annual Costs	N/A	\$34,000	\$263,000	\$275,000	\$997,924	\$2,538,000	\$2,596,000
Benefit-Cost Ratio	N/A	10.0	1.6	1.6	0.5	0.2	0.2
Avg Ann Net Benefits	N/A	\$306,360	\$160,760	\$167,320	-\$538,054	-\$2,061,530	-\$2,104,660

2. Environmental Quality (EQ)

Physical Environment							
Sediment and Erosion	Status quo maintained	Sedimentation and erosion control plan needed for land disturbance area.	Sedimentation and erosion control plan needed for land disturbance area.	Sedimentation and erosion control plan needed for land disturbance area.	Sedimentation and erosion control plan needed for land disturbance area.	Sedimentation and erosion control plan needed for land disturbance area.	Sedimentation and erosion control plan needed for land disturbance area.
Flooding	Status quo maintained.	No increase in flood impacts. Approx. 45% probability of containing the 1% chance flood event.	No increase in flood impacts. Approx. 45% probability of containing the 1% chance flood event.	No increase in flood impacts. Approximately 65% probability of containing the 1% chance flood event.	No increase in flood impacts. Approximately 76% probability of containing the 1% chance flood event.	No increase in flood impacts. Approx. 98% probability of containing the 1% chance flood event.	No increase in flood impacts. Approx. 99% probability of containing the 1% chance flood event.
Water Quality	Status quo maintained	Temporary impacts to water quality due to construction.	Temporary impacts to water quality due to construction.	Temporary impacts to water quality due to construction.	Temporary impacts to water quality due to construction.	Temporary impacts to water quality due to construction.	Temporary impacts to water quality due to construction.
Air Quality	Status quo maintained. No anticipated effect on air quality	Temporary and minimal air pollutant increases during construction	Temporary and minimal air pollutant increases during construction	Temporary and minimal air pollutant increases during construction	Temporary and minimal air pollutant increases during construction	Temporary and minimal air pollutant increases during construction	Temporary and minimal air pollutant increases during construction
Noise Levels	Status quo maintained	Temporary increase in noise levels during construction	Temporary increase in noise levels during construction	Temporary increase in noise levels during construction	Temporary increase in noise levels during construction	Temporary increase in noise levels during construction	Temporary increase in noise levels during construction
Biological Environment							

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Aquatic Habitat (Tar River and tributaries)	No effect	No adverse impacts	No adverse impacts	No adverse impacts	No adverse impacts	No adverse impacts	No adverse impacts
Riparian Habitat	Status quo maintained. No impacts to riparian habitat.	No impacts to riparian habitat.	No impacts to riparian habitat.	No significant impacts to riparian habitat.	No significant impacts to riparian habitat.	No significant impacts to riparian habitat.	No significant impacts to riparian habitat.
Wetlands	No wetland impacts	No wetland impacts	Impacts to a small linear wetland along HW64 – mitigation planned.	Impacts to a small linear wetland along HW64 – mitigation planned.	Impacts to a small linear wetland along HW64 and three tributary crossings along levee alignment – plus approx. 5 acres of wetlands within floodplain at shoulder levee - mitigation planned.	Impacts to a small linear wetland along HW64 and three tributary crossings along levee alignment plus approx. 8 acres of wetlands within floodplain at shoulder levee - mitigation planned.– mitigation planned.	Impacts to a small linear wetland along HW64 and three tributary crossings along levee alignment plus approx. 12 acres of wetlands within floodplain at shoulder levee - mitigation planned.
Threatened and Endangered Species	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Prime and Unique Farmland	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Cultural Environment							
Aesthetic Values	Status quo maintained. Continued degradation of aesthetic values	Minimal aesthetic improvement	Minimal to Moderate aesthetic improvement	Minimal to Moderate aesthetic improvement	Moderate aesthetic improvement	Moderate to substantial aesthetic improvement	Moderate to substantial aesthetic improvement
Cultural Resources	Status quo maintained.	Minimal preservation of cultural or historical resources	Moderate preservation of cultural or historical resources	Moderate preservation of cultural or historical resources	Substantial preservation of cultural or historical resources	Substantial preservation of cultural or historical resources	Substantial v preservation of cultural or historical resources

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
3. Regional Economic Development (RED)							
Impact on Sales Volume	Sales volumes at local businesses will be lower due to displacement from flooding conditions	Minimally improved sales volumes; sales volumes at local businesses will remain lower due to displacement from flooding conditions	Moderately improved; sales volumes at local businesses will be moderately improved from displacement from flooding conditions	Moderately improved; sales volumes at local businesses will be moderately improved from displacement from flooding conditions	Moderately improved impact to local businesses will be lessened, causing an increase in sales volumes from the existing conditions	Moderately improved impact to local businesses will be lessened, causing an increase in sales volumes from the existing conditions	Moderately improved impact to local businesses will be lessened, causing an increase in sales volumes from the existing conditions
Impact on Income	-Business closures will stunt the local economy and impact local and regional incomes	Minimally improved; persisting impacts to local commerce and businesses, equating to employment and local & regional incomes, with some moderate improvements	Moderate reduction in impacts to regional business and employment	Moderate reduction in impacts to regional business and employment	Moderate reduction in localized low employment rates and income, because of increased risk reduction, incomes may increase somewhat, and the community may attract new businesses	Moderate reduction in localized low employment rates and income, because of increased risk reduction, incomes may increase somewhat, and the community may attract new businesses	Moderate reduction in localized low employment rates and income, because of reduced flood risk, incomes may increase somewhat, and the community may attract new businesses
Impact on Employment	Business closures will stunt the local economy and impact local and regional incomes	Minimally improved; persisting impacts to local commerce and businesses, and thereby employment and local & regional incomes, with some moderate improvements	Moderate reduction in impacts to regional business and employment	Moderate reduction in impacts to regional business and employment	Moderate reduction in impacts to regional business and employment	Moderate reduction in impacts to regional business and employment	Moderate reduction in impacts to regional business and employment

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Tax Changes	With continued flooding, tax values on homes and collected sales tax values will remain depressed	Minimal improvements to the tax base; with continued flooding, tax values on homes and collected sales tax values will remain depressed	Minimal improvements to the tax base, but remaining residual flooding will marginalize any potential tax revenues	Minimal improvement to the tax base, but remaining residual flooding will marginalize any potential tax revenues	Moderately improved tax base, although remaining residual flooding will potentially lessen any potential tax revenues	Moderately improved tax base, although remaining residual flooding will potentially lessen any potential tax revenues	Moderately improved tax base, although remaining residual flooding will potentially lessen any potential tax revenues
4. Other Social Effects (OSE)							
a. Beneficial Impacts							
Security of Life, Health, and Safety	Continued risks to life, health and safety	Minimal decrease in risks to life, health and safety.	Moderate decrease in risks to life, health and safety.	Moderate decrease in risks to life, health and safety.	Substantial decrease in risks to life, health and safety for residents of Princeville, including increased access to local and regional hurricane evacuation routes	Substantial decrease in risks to life, health and safety for residents of Princeville, but potential increased risk for residents outside Princeville, and impacts to evacuation route users.	Substantial decrease in risks to life, health and safety for residents of Princeville, but potential increased risk for residents outside Princeville, and impacts to evacuation route users
Preserves Historic Importance	Does not help preserve historic importance	Minimal help to promote historic importance	Moderate help to promote historic importance	Moderate help to promote historic importance	Substantial help to promote historic importance	Substantial help to promote historic importance	Substantial help to promote historic importance
Minimization of Impacts to Cultural Resources	Does not help to minimize impacts	Minimal reduction to impacts to cultural resources	Moderate reduction to impacts to cultural resources	Moderate reduction to impacts to cultural resources	Substantial reduction to impacts to cultural resources	Substantial reduction to impacts to cultural resources	Substantial reduction to impacts to cultural resources
Maintains Social Bonds/Connections	Does not aid in maintaining social bonds	Minimally aids in maintaining social bonds	Moderate aid in maintaining social bonds	Moderate aid in maintaining social bonds	Substantial aid in maintaining social bonds	Substantial aid in maintaining social bonds	Substantial aid in maintaining social bonds

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Community Cohesion	Continued severe risk of impacts to community cohesion	Minimal but positive impacts to community.	Minimal but positive impact to community	Minimal but positive impact to community	Substantial positive impacts to promote community cohesion	Potentially substantial positive impacts to community cohesion, but also potential negative impacts to adjacent communities	Potentially substantial positive impacts to community cohesion, but also potential negative impacts to adjacent communities
Minimizes Risks to Life and Safety	Does nothing to minimize risk	Minimal improvement in reducing risk	Moderate improvement in reducing risk	Moderate improvement in reducing risk	Substantial improvement in reducing risk	Substantial improvement in reducing risk	Substantial improvement in reducing risk
Reduces Vulnerability of Population	Does not reduce vulnerability	Minimally reduces vulnerability	Moderately reduces vulnerability	Moderately reduces vulnerability	Substantially reduces vulnerability	Substantially reduces vulnerability	Substantially reduces vulnerability
Preserves Access to Evacuation Routes	Does nothing to preserve access	Minimally helps to preserve access	Moderately assists in promoting access	Moderately assists in promoting access	Substantially assists in promoting access	Substantially assists in promoting access	Substantially assists in promoting access
Minimizes Excessive Flood Depths	Continued Excessive Depth	Minimally aids in reducing flood depth	Moderately reduces excessive flood depth for some events	Moderately reduces excessive flood depth for some events	Substantially reduces excessive flood depth for majority of events	Substantially reduces excessive flood depth for vast majority of events	Substantially reduces excessive flood depth for almost all potential events
Promotes resiliency	Does not promote resiliency	Minimally promotes resiliency	Moderately promotes resiliency	Moderately promotes resiliency	Substantially promotes resiliency	Substantially promotes resiliency	Substantially promotes resiliency
Reduces Flood Risks to Extent Practicable	Does not address existing flood risks	Minimal reduction in flood risk	Moderate reduction in flood risk	Moderate reduction in flood risk	Substantial; reduces flood risk to extent practicable	Substantial; reduces flood risks but at greater cost for mitigation of induced damage	Substantial; reduces flood risks but at great cost for mitigation of induced damage
Meets Intent of Executive Order 13146	Does not meet intent of E.O. 13146	Minimally addresses intent of E.O. 13146	Moderately addresses intent of E.O. 13146	Moderately addresses intent of E.O. 13146	Substantial; fully meets the intent of E.O. 13146	Substantial; addresses the intent of E.O. 13146, but is not practicable	Substantial; addresses the intent of E.O. 13146, but is not practicable

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Tax Values	With continued flooding, tax values on homes and collected sales tax values will remain decreased	Minimal improvements to the tax base, but persistent flooding will marginalize any potential tax revenues	Minimal improvements to the tax base, but persistent flooding will marginalize any potential tax revenues	Minimal improvements to the tax base, but persistent flooding will marginalize any potential tax revenues	Potential moderate improvement to tax base; remaining residual flooding will potentially limit any potential increase in tax revenues	Potential moderate improvement to tax base; remaining residual flooding will potentially limit any potential increase in tax revenues	Potential moderate improvement to tax base; remaining residual flooding will potentially limit any potential increase in tax revenues
Community Growth/Economic Vitality	Could have continued negative impact on growth as residents leave community with each additional flood event	Minimal positive impact to community growth and economic vitality	Minimal positive impact to community growth and economic vitality	Minimal positive impact to community growth and economic vitality	Moderate; may promote community growth and economic vitality	Moderate; may promote community growth and economic vitality	Moderate; may promote community growth and economic vitality
Property Values	Persistent flooding will continue to decrease property values	Minimal; residual flooding will continue to depress property values	Minimal; residual flooding will continue to depress property values	Minimal; residual flooding will continue to depress property values	Moderate; decreased flooding frequency may aid in gradual rise in property value	Moderate; decreased flooding frequency may aid in gradual rise in property value	Moderate; decreased flooding frequency may aid in gradual rise in property value
Public Facilities	No-Action would provide little to no risk reduction to public facilities, including new Town Hall, and new school	Minimal; would provide very small improvement in risk reduction to public facilities, but not including new Town Hall, and new school	Moderate; would provide moderate improvement in risk reduction to public facilities, including small reduction in depth at new Town Hall, and new school	Moderate; would provide slightly larger improvement in risk reduction to public facilities, including reduction of deeper flood depths at new Town Hall, and new school	Would provide substantial improvement in risk reduction to public facilities, including new Town Hall, and new school	Substantial risk reduction to public facilities in Princeville, but may create additional impacts to public facilities in Tarboro and downstream	Substantial risk reduction to public facilities in Princeville, but may create additional impacts to public facilities in Tarboro and downstream
Public Services	Town will have to continue to expend substantial resources on frequent and costly event response.	Minimal improvement, but town will continue to expend substantial resources on event response.	Moderate improvement, but town will continue to expend substantial resources on event response	Moderate improvement, but town will continue to expend substantial resources on event response	Substantial; Town would expend substantially fewer resources on event response	Substantial; Town would expend substantially fewer resources on event response	Substantial; Town would expend substantially fewer resources on event response

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
PLAN EVALUATION							
1. Contributions to Planning Objectives							

<p>Flood, Hurricane and/or Storm Damage/Risk Reduction</p>	<p>No contribution to planning objectives</p>	<p>Minimal contribution to flood risk reduction for life and safety considerations due to great extent of flooding and great depth resulting from failure to address other sources of flooding, notably circumvention of the northern terminus of the existing project and flow through the Highway 33/64 interchange and overtopping of U.S. Highway 64; however, produces substantial benefit (totals approx. \$340,000) from reduction of damages to structures and contents by providing flap gates to un-gated culverts, especially to triple box culvert under U.S. Highway 64. Would result in a decrease of approximately \$306,000 in average annual net benefits</p>	<p>Moderate contribution to flood risk reduction for life and safety considerations due to great extent of flooding and great depth resulting from failure to address other sources of flooding, notably circumvention of the northern terminus of the existing project; however, produces moderate increase in benefit (totals approx. \$424,000, or increase of \$84,000) from reduction of damages to structures and contents by providing flap gates to un-gated culverts, especially to triple box culvert under U.S. Highway 64, and also prevention of approximately two feet of additional flooding minimized by flow through the Highway 33/64 interchange and overtopping of U.S. Highway 64. Would result in a decrease of approximately</p>	<p>Moderate contribution to flood risk reduction for life and safety considerations due to great extent of flooding and great depth resulting from failure to address other sources of flooding, notably circumvention of the northern terminus of the existing project; however, produces only a minimal increase in benefits (totals approx. \$442,000, or increase of only \$20,000) from reduction of damages to structures and contents by providing flap gates to un-gated culverts, especially to triple box culvert under U.S. Highway 64 and also prevention of approximately four feet of additional flooding minimized by flow through the Highway 33/64 interchange and overtopping of U.S. Highway 64. Would result in a decrease of approximately \$167,000 in</p>	<p>Substantial contribution to flood risk reduction for life and safety considerations due to minimizing threat of great extent of flooding and great depth resulting from caused by sources of flooding, between 5% chance and approximate 0.5% chance resulting from circumvention of the northern terminus of the existing project, through un-gated culverts, and prevention of approximately four feet of additional flooding minimized through the Highway 33/64 interchange and overtopping of U.S. Highway 64; however, produces only a minimal increase in benefits (totals approx. \$460,000, or increase of only \$28,000) from reduction of damages to structures and contents. Would result in a decrease of approximately \$-540,000 in average annual net benefits</p>	<p>Substantial contribution to flood risk reduction for life and safety considerations due to minimizing threat of great extent of flooding and great depth resulting from caused by sources of flooding, between 5% chance and beyond 0.5% chance resulting from circumvention of the northern terminus of the existing project, through un-gated culverts, and prevention of approximately four feet of additional flooding minimized through the Highway 33/64 interchange and overtopping of U.S. Highway 64; however, produces only a minimal increase in benefits (totals approx. \$476,000, or increase of only \$6,000) from reduction of damages to structures and contents. Would result in a decrease of approximately \$-2,062,000 in average annual net benefits</p>	<p>Substantial contribution to flood risk reduction for life and safety considerations due to minimizing threat of great extent of flooding and great depth resulting from caused by sources of flooding, between 5% chance and approximate 0.2% chance resulting from circumvention of the northern terminus of the existing project, through un-gated culverts, and prevention of approximately four feet of additional flooding minimized through the Highway 33/64 interchange and overtopping of U.S. Highway 64; however, produces only a minimal increase in benefits (totals approx. \$491,000, or increase of only \$15,000) from reduction of damages to structures and contents. Would result in a decrease of approximately \$-2,107,000 in average annual net benefits</p>
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Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
			\$161,000 in average annual net benefits	average annual net benefits			
2. Response to Evaluation Criteria							
a. Acceptability	Plan is unacceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies
b. Completeness	No-Action Plan is not a complete solution to identified problem set	Alternative 1 is a complete solution to only Increment 1 of flooding, but does not address Increments 2 through 6 of flood depth and extent	Alternative 2 is a complete solution to only Increments 1 and 2 of flooding, but does not address Increments 3 through 6 of flood depth and extent	Alternative 3 is a complete solution to only Increments 1 to 3 of flooding, but does not address Increments 4 through 6 of flood depth and extent	Alternative 4 is a complete solution to Increments 1 to 4 of flooding, but does not address Increments 5 and 6 of flood depth and extent	Alternative 5 is a complete solution to Increments 1 to 5 of flooding, but does not address Increment 6 of flood depth and extent	Alternative 6 is a complete solution to Increments 1 to 6 of flooding
c. Effectiveness	No-Action Plan is ineffective solution to identified problem set	Alternative 1 is an effective solution to only Increment 1 of flooding, but does not address Increments 2 through 6 of flood depth and extent	Alternative 2 is an effective solution to only Increments 1 and 2 of flooding, but does not address Increments 3 through 6 of flood depth and extent	Alternative 3 is an effective solution to only Increments 1 to 3 of flooding, but does not address Increments 4 through 6 of flood depth and extent	Alternative 4 is an effective solution to Increments 1 to 4 of flooding, but does not address Increments 5 and 6 of flood depth and extent	Alternative 5 is an effective solution to Increments 1 to 5 of flooding, but does not address Increment 6 of flood depth and extent	Alternative 6 is an effective solution to Increments 1 to 6 of flooding

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
<p>d. Efficiency (Cost-Effectiveness; i.e., most efficient use of Federal and non-Federal Funds)</p>	<p>No-Action Plan is inefficient solution to identified problem set (i.e., existing Federal investments made after Floyd remain at risk)</p>	<p>Alternative 1 is a highly-efficient solution to only Increment 1 of flooding, but does not address Increments 2 through 6 of flood depth and extent (i.e., existing Federal investments made after Floyd remain at risk)</p>	<p>Alternative 2 is an efficient solution to only Increments 1 and 2 of flooding, but does not address Increments 3 through 6 of flood depth and extent (i.e., existing Federal investments made after Floyd remain at risk)</p>	<p>Alternative 3 is an efficient solution to only Increments 1 to 3 of flooding, but does not address Increments 4 through 6 of flood depth and extent (i.e., existing Federal investments made after Floyd remain at risk)</p>	<p>Alternative 4 is not an efficient solution to the identified problem set (B/C < 1.0), but does address the entire problem set (i.e., existing Federal investments made after Floyd have significantly reduced risk of damage). Does significantly address life-safety concerns</p>	<p>Alternative 5 is not an efficient solution to the identified problem set (B/C < 1.0), but does address the entire problem set (i.e., existing Federal investments made after Floyd remain at risk), albeit with high costs for mitigation of induced damage Does significantly address life-safety concerns</p>	<p>Alternative 6 is not an efficient solution to the identified problem set (B/C < 1.0), but does address the entire problem set (i.e., existing Federal investments made after Floyd remain at risk), albeit with high costs for mitigation of induced damage Does significantly address life-safety concerns</p>
Risk Evaluation							
1. Risk and Vulnerabilities							
<p>Risk of Failure</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>	<p>There is a minimal risk of failure of the existing system due to levee overtopping</p>

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Residual Risk	Residual risk would remain very high due to failure to address existing flooding issues throughout the project	Residual risk in Princeville would remain high, because this Alternative only addresses flooding impacts in the southern interior drainage areas	While Alternative 2 would address impacts over a broader area than alternative 1, it would still fail to address over-topping and flow into northern areas of Town, and additional flooding depths over much of the study area created by circumvention of the northern terminus of the levee. Substantial remaining damages would be left unaddressed	While Alternative 3 would address impacts over a broader area than alternatives 1 or 2, it would still fail to address northern areas of the study area, and additional flooding depths over much of the study area created by circumvention of the northern terminus of the levee. Substantial remaining damages would be left unaddressed	Alternative 4 would provide the lowest residual risk level of all plans analyzed, in consideration that Alternatives 5 and 6 would induce impacts to areas at and downstream of Princeville.	Higher levels of risk reduction could be provided for Princeville, but induced flooding in Tarboro and downstream would occur as a result of these improvements, as well as induced impacts to bridges and evacuation routes	Higher levels of risk reduction could be provided for Princeville, but induced flooding in Tarboro and downstream would occur as a result of these improvements, as well as induced impacts to bridges and evacuation routes
Relative Sea Level Rise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Risk of Ecosystem Damage	None	None	Minimal Risk	Minimal Risk	Minimal Risk No significant impacts. Minor Wetland impacts offset through appropriate mitigation.	Moderate Risk. Risk of induced flooding in Tarboro and downstream expands the scope and scale of ecosystem risks including potential impacts the Tar River spiny mussel and public infrastructure	Moderate Risk. Risk of induced flooding in Tarboro and downstream expands the scope and scale of ecosystem risks including potential impacts the Tar River spiny mussel and public infrastructure

Item	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Risk to Life and Safety.	Substantial threats to Life and Safety from flood waters will continue in absence of actions taken to reduce flood risk	Moderate; threats to Life and Safety would persist, although lessened in the southern, interior drainage, segment of the project. Threats to Life and Safety would persist from all flood events beyond that level of risk reduction, including those from circumvention of the northern levee terminus	Moderate; threats to Life and Safety persist, although lessened in the southern, interior drainage and throughout the floodplain. Threats to Life and Safety would persist from all flood events beyond that level of risk reduction, including those from circumvention of the northern levee terminus.	Moderate; threats to Life and Safety persist, although lessened in the southern, interior drainage and throughout the floodplain. Threats to Life and Safety would persist from all flood events beyond that level of risk reduction, including those from circumvention of the northern levee terminus	Threats to Life and Safety would be substantially reduced, although flood risks would remain for events beyond that provided by Alternative 4 measures. These would include overtopping and/or circumvention of the levee for events of 0.5% chance or greater. Risks to life and safety would be lower due to the low height of the levee at the overtopping point, and the greater access to routes of egress before and during flooding	Threats to Life and Safety would be substantially reduced; however, risks would increase for communities adjacent to, and downstream of Princeville, due to induced added flood depth, and threats to bridges and evacuation routes. Overtopping and/or circumvention of the levee could still occur during extremely rare Risks to life and safety in Princeville would be lower due to the low height of the levee at the overtopping point, and the greater access to routes of egress before and during flooding	Threats to Life and Safety would be substantially reduced; however, risks would increase for communities adjacent to, and downstream of Princeville, due to induced added flood depth, and threats to bridges and evacuation routes. Overtopping and/or circumvention of the levee could still occur during extremely rare events. Risks to life and safety in Princeville would be lower due to the low height of the levee at the overtopping point, and the greater access to routes of egress before and during flooding
Risk to Mental and Physical Health	Substantial threats to Mental and Physical Health from flood waters will continue in absence of levee improvements	Substantial threats to Mental and Physical Health from flood waters will continue, though lessened with inclusion of the interior drainage features	Substantial threats to Mental and Physical Health from flood waters will continue, though lessened with inclusion of the interior drainage features and reach 1 and 2 of the project	Moderate; improvements to the existing levee reduce the risk to mental and physical health, but residual flooding risks still persist.	While threats from flood waters persist, measures that produce Alternative 4 would substantially reduce risks to mental and physical health, but risks would remain for extreme flood events	While threats from flood waters persist, measures that produce Alternative 5 would substantially reduce risks to mental and physical health, but risks would remain for extreme flood events	While threats from flood waters persist, measures that produce Alternative 6 would substantially reduce risks to mental and physical health, but risks would remain for extreme flood events

Table 5.6: Risk associated with the Four Planning Accounts

	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
NED	<p>Flooding remains in absence of risk reduction actions, allowing damage to both structures and contents</p> <p>Continued emergency and cleanup costs.</p> <p>No-Actions taken to reduce risk to Federal, State and local investments.</p>	<p>Flooding would be reduced for events of up to approximately 1.5% chance magnitude, but only from floods issuing from ungated culverts at the southern side of Town. Events of greater than this would continue to cause damage to both structures and contents. Alternative 1 would not address flooding from overtopping or from circumvention of northern terminus.</p> <p>Would produce approx. \$340,000 in damage reduction, and is also the NED Plan. Provides a minimal reduction in life and safety flood risk reduction to the community.</p> <p>B/C = 10.0</p>	<p>Flooding would be reduced for events of up to approximately 1% chance magnitude, but would fail to address flooding from overtopping or circumvention, which begins at an approximate 5% chance event. Events of greater magnitude would continue to cause flood inundation damage to structures and contents.</p> <p>Would produce approx. \$424,000 in damage reduction, although it provides a moderate reduction in life and safety flood risk reduction to the community.</p> <p>B/C = 1.6</p>	<p>Flooding would be reduced for events of up to approximately 0.5% chance magnitude, but would fail to address flooding from circumvention, which begins at an approximate 5% chance event. Events of greater magnitude would continue to cause flood inundation damage to structures and contents.</p> <p>Would produce approx. \$442,000 in damage reduction, although it provides a moderate reduction in life and safety flood risk reduction to the community.</p> <p>B/C = 1.6</p>	<p>Although the project does not meet the NED criteria of benefit-cost ratio unity (1:1), with a B/C ratio of 0.5; flooding would be reduced for events up to 0.5% chance magnitude. Events of greater magnitude would continue to cause flood inundation damage to structures and contents.</p> <p>Would produce approx. \$460,000 in damage reduction, and provides a substantial reduction in life and safety flood risk reduction to the community</p> <p>Benefit-Cost Ratio = 0.5 to 1</p>	<p>Flood inundation would be reduced for events over approximately 0.5% chance magnitude, but could create induced damage to adjacent and downstream communities. Events of greater magnitude would continue to cause flood inundation damage to structures and contents.</p> <p>Would produce approx. \$476,000 in damage reduction, and provides a substantial reduction in life and safety flood risk reduction to the community</p> <p>B/C = 0.2</p>	<p>Flood inundation would be reduced for events over approximately 0.5% chance magnitude, but could create induced damage to adjacent and downstream communities. Events of greater magnitude would continue to cause flood inundation damage to structures and contents.</p> <p>Would produce approx. \$491,000 in damage reduction, and provides a substantial reduction in life and safety flood risk reduction to the community</p> <p>B/C = 0.2</p>

	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
RED	<p>Local tax base will be impacted by flooding, both sales and property tax rolls</p> <p>Business closures will stunt the local economy and impact local and regional incomes</p>	<p>Continued impacts to local tax rolls, sales and property, with moderate improvements.</p> <p>Persisting impacts to local commerce and businesses, equating to employment and local & regional incomes, with some moderate improvements.</p>	<p>As spatial extent of damage decreases, impacts on the sales and property tax rolls lessen moderately.</p> <p>Moderate reduction in impacts to regional business and employment</p>	<p>As spatial extent of damage decreases, impacts on the sales and property tax rolls lessen moderately.</p> <p>Moderate reduction in impacts to regional business and employment</p>	<p>As spatial extent of damage decreases, impacts on the sales and property tax rolls lessen</p> <p>Of the plans analyzed Alternative 4 results in optimal reduction of impacts to regional business and employment, at lowest cost.</p>	<p>Providing risk reduction to Princeville at Alternative 5 & 6 levels will induce damages in Tarboro, causing impacts to sales and property tax rolls</p> <p>Induced flooding in Tarboro will potentially close businesses and impede regional commerce, impacting regional employment and incomes.</p>	<p>Providing risk reduction to Princeville at Alternative 5 & 6 levels will induce damages in Tarboro, causing impacts to sales and property tax rolls</p> <p>Induced flooding in Tarboro will potentially close businesses and impede regional commerce, impacting regional employment and incomes.</p>
EQ	<p>Continued flooding will not adversely impact quality of biota or vegetation, but would impact quality of human environment</p>	<p>Continued flooding will not adversely impact quality of biota or vegetation, but would impact quality of human environment</p>	<p>Continued flooding will not adversely impact quality of biota or vegetation, but would moderately reduce impacts to quality of human environment</p>	<p>Continued flooding will not adversely impact quality of biota or vegetation, but would moderately reduce impacts to quality of human environment</p>	<p>Of the plans analyzed, Alternative 4 would result in minimization of impacts to biota and vegetation, but would also substantially reduce impacts to human environment</p>	<p>Alternative 5, could increase the impacts to biota and vegetation within the channel due to levee enlargement activities, plus impacts to human environment in adjacent and downstream communities</p>	<p>Alternative 6, could increase the impacts to biota and vegetation within the channel due to levee enlargement activities, plus impacts to human environment in adjacent and downstream communities</p>

	No-Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
OSE	<p>Continued risks to life, health and safety</p> <p>Negative impacts to community cohesion, as families and individuals are displaced by floods</p> <p>Community growth impacts as flood frequency continues unabated</p> <p>Cultural and historic sites will continue to be damaged</p> <p>Aging populations will continue to be negatively impacted, as younger residents choose to migrate away after a flood</p>	<p>Minimal reduction in risks to life and safety.</p> <p>Minimal improvements to community cohesion, as improvements are limited to only southern ponding area</p> <p>Little to no increase in community growth</p> <p>Aging populations will continue to be negatively impacted, as younger residents choose to migrate away after a flood</p>	<p>Moderate improvement to risks to life and safety</p> <p>Moderate improvement to community cohesion, as flooding is reduced in a broader area</p> <p>Moderate decrease in community growth impacts</p> <p>Aging populations will continue to be negatively impacted, as younger residents choose to migrate away after a flood</p>	<p>Moderate improvement to risks to life and safety</p> <p>Moderate improvements to community cohesion, as improvements are limited to the southern interior drainage area</p> <p>Moderate decrease community growth impacts</p> <p>Aging populations will continue to be negatively impacted, as younger residents choose to migrate away after a flood</p>	<p>Substantial reduction in risks to life and safety, although risks still remain for extremely large flood events. Risks persist above the 1% annual chance event</p> <p>Community cohesion in Princeville, while more stable with Alternative 4 in place, is still threatened by flooding above the 1% annual chance</p>	<p>Substantial; risks to life and safety would be substantially reduced by Alternative 5, within the Town of Princeville, although risks from extreme events remain. Risks to adjacent and downstream communities would be increased.</p> <p>Risk to community cohesion in Princeville would be substantially reduced by Alternative 5, although some residual risk remains.</p> <p>Impacts to community cohesion increase in adjacent and downstream communities</p>	<p>Substantial; risks to life and safety would be substantially reduced by Alternative 6, within the Town of Princeville, although risks from extreme events remain. Risks to adjacent and downstream communities would be increased.</p> <p>Risk to community cohesion in Princeville would be substantially reduced by Alternative 6, although some residual risk remains.</p> <p>Impacts to community cohesion increase in adjacent and downstream communities</p>

Note: Comparative terms are defined as follows: Minimal – zero to five percent improvement in outcome; Moderate – between five and fifty percent improvement in outcome; Substantial – over fifty percent improvement in outcome.

SECTION 6 – PLAN SELECTION*

The Final Array of Alternatives consisted of a No-Action Plan, and an array of structural alternatives, each formulated to provide an incremental solution to flood risk, at the least cost for that increment of flooding, as well as a suite of non-structural measures considered to be critical to the success of each alternative, including a flood warning and evacuation plan, continued floodplain management and updating of local building and zoning codes, a flood risk management education and communication plan for both the community and local schools, and flood warning measures, all of which were ultimately deemed essential to an adequate flood risk management strategy for the Town of Princeville. All of these components would substantially reduce remaining levels of flood risk after construction or implementation of any plan elements.

All of the final alternatives were assessed by comparison of plan attributes, benefits, costs, and positive and negative impacts and outcomes, the summarization of which were presented in SECTION 5 in the “System of Accounts” tables. Additionally, all final alternatives were carried forward for analysis pursuant to the National Environmental Policy Act regulations (40CFR Parts 1500-1508). All final alternatives were composed of a combination of structural and non-structural measures. Plan selection took into consideration potential contributions to all four accounts: NED, EQ, OSE, and RED. Key amongst these, because of the benefit-cost analysis on each alternative, was the consideration of Life and Safety Risk, and Other Social Effects, including consideration of impacts to community cohesion, cultural and historical values, local per capita and household incomes in comparison to national averages, and other factors not captured in an NED analysis, alone. The process used to select a plan was also informed by the objectives provided by both the Congressional directive and the Presidential Executive Order.

Because Alternatives 1 through 3 did not meet the basic objectives established for a project for flood risk reduction, and left considerable life and safety threat unresolved, they were screened from further consideration as stand-alone projects, but were incorporated as necessary elements of Alternatives 4 through 6, in order to provide a complete and substantial flood risk management system.

Table 6.1 below, contains a summarization of the Trade-Off Analysis of remaining plans (The No-Action Plan, and Alternatives 4 through 6), for all factors and metrics considered in plan selection.

6.1 SELECTION OF A FLOOD RISK REDUCTION PLAN

To the maximum extent practicable, within broader constraints created by the physical environment, the Recommended Plan was selected based on a balance of trade-offs between cost-effectiveness (NED), RED, EQ, and OSE factors, and the following considerations:

- Minimization of risks to life and safety (OSE criteria);
- Historic importance of the Town of Princeville;
- Minimization of impacts to the physical environment and biota (EQ criteria);
- Minimization of impacts to environmental, cultural, and historical values; social bonds, connections and identity; cultural resources and community cohesion (EQ and OSE criteria);
- Potential to improve economic vitality (potentially both NED and RED criteria);
- Degree to which vulnerability of population could be reduced (OSE criteria);

- Consideration of income levels in relation to project justification (per capita income for Princeville is approximately \$12,024, or approximately 44% of the national average of \$27,334; and average structure value of \$77,300 in 2010, or approximately 41% of the national average of \$188,400). (both NED and OSE criteria);
- Minimization of impacts to transportation and evacuation routes (OSE criteria related to Risk);
- Degree to which the plan addressed “to the extent practicable”, the mandate provided by Executive Order 13146; and;
- Maximization of flood risk reduction, both for monetary and non-monetary outcomes.

Table 6.1: Summary of Trade-Off Analysis

Factors	No-Action Plan	Alternative 4	Alternative 5	Alternative 6
Minimizes Risks to Life & Safety?	No	Yes	Yes*	Yes*
Preserves Historic Importance?	No	Yes	Yes*	Yes*
Minimizes Impacts to Environment?	Yes	Yes	Yes*	Yes*
Minimizes Impacts to Cultural Resources?	No	Yes	Yes*	Yes*
Maintains Social Bonds/Connections?	No	Yes	Yes*	Yes*
Promotes Community Cohesion?	No	Yes	Yes*	Yes*
Improves Economic Vitality?	No	Yes	Yes*	Yes*
Reduces Vulnerability of Population?	No	Yes	Yes*	Yes*
Preserves Access to Evacuation Routes?	No	Yes	Yes*	Yes*
Prevents Excessive Flood Depths?	No	Yes	Yes*	Yes*

Promotes Resiliency?	No	Yes	Yes*	Yes*
Reduces Flood Risk to Extent Practicable?	No	Yes	Yes*	Yes*
Reduces Damage to Structures & Contents?	No	Yes	Yes*	Yes*
Meets the Intent of E.O. 13146	No	Yes	Yes*	Yes*

****With Need to Mitigate Induced Impacts Upstream, Adjacent, and Downstream of Project***

In consideration of all factors evaluated and presented in the System of Accounts analysis and accompanying text, the Recommended Plan was determined to be Alternative 4. Although only Alternatives 1 through 3 were demonstrated to be economically justified (with cost/benefit ratios > 1.0 to 1), the addition of structural measures including the levee along Alignment “I” including roadway raises on NC-111 and Shiloh Farms Road, must be added to arrive at a plan that addresses the large remaining risks (particularly life-safety) left unaddressed by the absence of prevention of circumvention of the levee at its northern terminus, the risks of which would be considerably reduced by implementation of Alternative 4. So, while only Alternatives 1 through 3 may be economically justified, the additional 4th increment of measures was added, in consideration of the large remaining (residual) risks to life and safety left unaddressed by Increments/Alternatives 1 through 3 alone. This increment of flooding, and the alternative designed to address it, is especially important in the addressing of flood risk to the maximum extent practicable, as it is this increment of flooding that causes the highest degree of threat to life, public safety, and threat to egress posed by cut-off from the road network. It is this increment of flooding that bypasses the northern terminus of the existing levee, flows south and east across the floodplain cutting off most portions of town and isolating individuals within the deepest potential flooding zones, and cuts off egress to evacuation routes. These risks would be substantially reduced by implementation of Alternative 4. This plan best balances Life and Safety risks, economics and cost-effectiveness, consideration of Social Effects, Environmental Quality and National and Regional Economic effects, while also being technically feasible and environmentally sound. Illustration of incremental effectiveness of plans is shown in Figure 6.1.

Although flood risk might be further reduced by a larger plan, such as raising the height of the existing and proposed project features, this was felt to be impractical due to potential for significant induced flooding impacts to upstream, and downstream assets, and due to the existing flood vulnerability in the Town of Tarboro. It would also potentially require the raising of the railroad bridge, the Main Street bridge, and might require complete reconstruction of the existing levee and Highway 64.

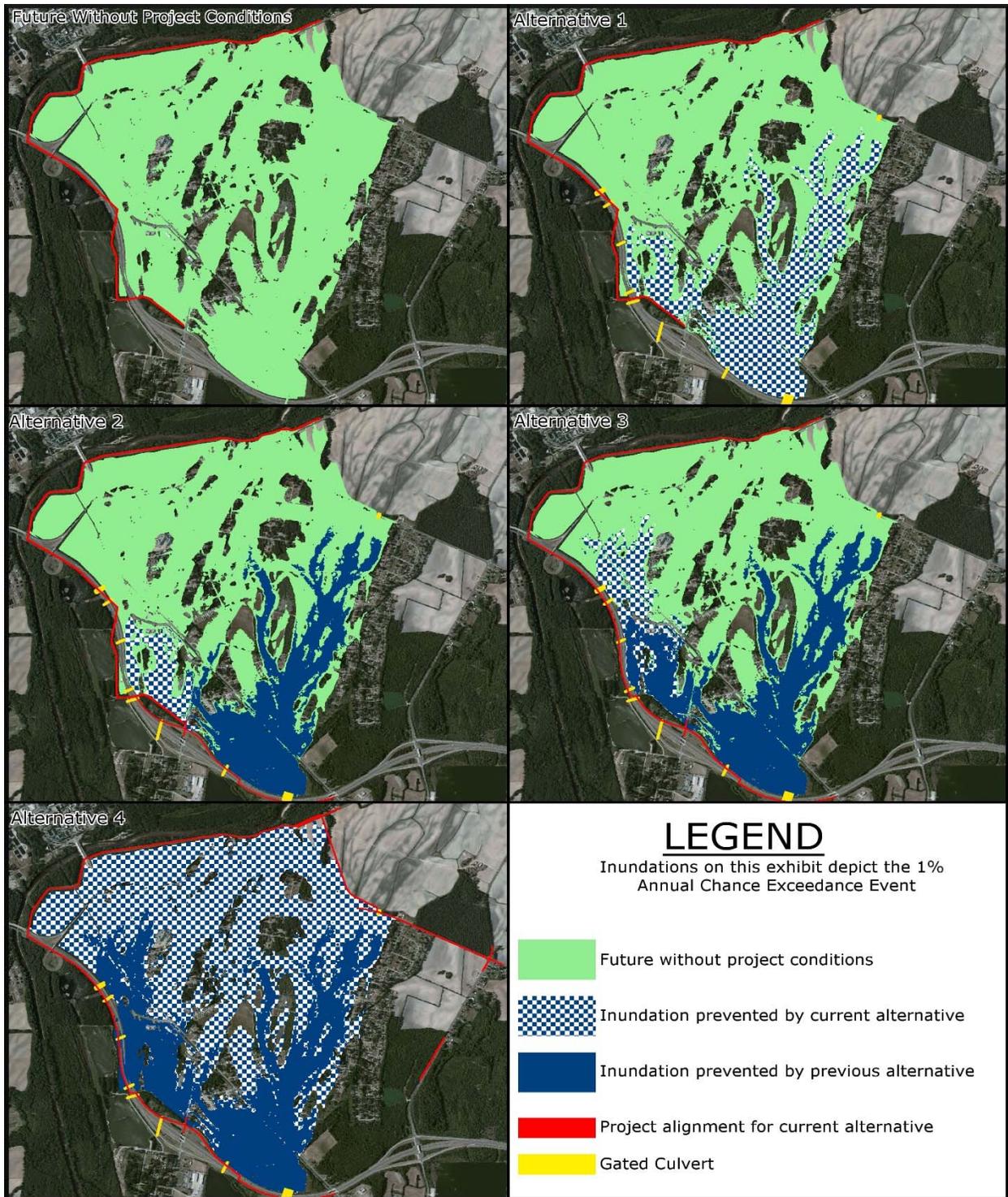


Figure 6.1: Alternative Plan Inundation by Increment

While the benefit-cost ratio of the Recommended Plan, at 0.5 is not within current policy as to NED Plan justification, it was decided that the addition of unjustified increments should be considered in determining a successful plan, particularly in consideration of Life and Safety, but also in recognition of extremely low individual and household income, community cohesion, risk reduction of Federal, State, and Local investments, and other OSE considerations summarized in Table 6.1. The waiver from ASA(CW) (see Attachment E) to allow a plan with a benefit-cost ratio less than unity to be considered, recognized the importance of those factors. Further details on factors considered in the analysis of Other Social Effects are contained in Appendix F.

It was also considered that no other plan, either structural or non-structural, or combination thereof, would provide a solution adequate to the mandate provided in Executive Order 13146.

The Recommended Plan would require the addition of flap gates at un-gated culverts at twelve (12) locations, addressing a low spot in the existing embankment height of Highway 64, addressing the existing Highway 33 underpass through which flood flows can enter the town, and construction of levee segments along specific locations along Highway 258, NC-111, and Shiloh Farm Road, to prevent overtopping. The Recommended Plan also include interior drainage features, and non-structural measures to maximize flood risk reduction to the extent practicable. Structural features are described below. Structural features are described in Section 7.2 of the main report, and non-structural features are discussed in Section 7.3.

The Recommended Plan also includes non-structural measures consisting of an updated flood warning and evacuation plan, continued floodplain management and updating of local building and zoning codes, a flood risk management education and residual risk communication plan for both the community and local schools, and flood warning measures, all of which were ultimately deemed essential to an adequate flood risk management strategy for the Town of Princeville. All non-structural measures that are part of this plan are a non-Federal responsibility, and are not part of the construction cost indicated below.

Project First Cost: \$21,540,000

Average Annual Cost \$940,164 (Includes IDC & O&M)

Average Annual Benefits \$ 459,870

Average Annual Net Benefits: (-)\$538,054

Benefit/Cost Ratio: 0.5

Further details on the Recommended Plan are provided in SECTION 7.

SECTION 7 – THE RECOMMENDED PLAN*

7.1 PLAN DESCRIPTION

The Recommended Plan would require the addition of flap gates at un-gated culverts at twelve (12) locations, addressing a low spot in the existing embankment height of Highway 64, addressing the existing Highway 33 underpass through which flood flows can enter the town, and construction of levee segments along specific locations along Highway 258, NC-111, and Shiloh Farm Road, to prevent overtopping. It would also include interior drainage features, and non-structural measures to maximize flood risk reduction to the extent practicable. Structural features are described below. Non-structural features are discussed in Section 7.3 of the Main Report. An overall view of the plan is shown in *Figure 7.1*. Structural and non-structural features are described below.

7.2 STRUCTURAL FEATURES

7.2.1 SEGMENT 1

Segment 1 (Figure 7.2) of the Recommended Plan consists of extension of the existing line of risk reduction by means of installation of flap gates at one un-gated triple box culvert and one pipe culvert, and the raising of the Highway 64/Highway 33 interchange in order to prevent flood flows from entering town via the underpass. This southern extension of the project would utilize a portion of Highway 64, and replaces a portion of the original 205 project, in order to connect to high ground.

This segment would require construction of new levee along the interchange ramp alignment resulting in raising of the road surface of the westbound off ramp and on ramp and the intersection of these features with Highway 33. The design of the vertical curves along Highway 33 was done in accordance with the North Carolina Department of Transportation's Highway Design Manual. The high point would be at the intersection of the Highway 33 on and off ramp interchange in order to provide adequate safe sight distances. It is recommended that the speed limit be reduced from 45 mph to 35 mph along Highway 33 from Main Street past the underpass in order to minimize dangers related to drivers approaching the high point with sufficient stopping distance before the intersection. Additional hurricane evacuation route signage will be installed on Highway 33, both north and south of the interchange, to direct evacuees to the proper egress route.

7.2.2 SEGMENT 2

Segment 2 (Figure 7.3) includes formal abandonment of the existing southern levee that is bisected by U.S. Highway 64 (previously called "Dike B"), formal adoption of a portion of the U.S. Highway 64 embankment as a project feature, and installation of a "shoulder levee" along a low spot in the existing Highway 64 embankment, to prevent overtopping up to the design event water surface elevation. The shoulder levee begins at the end of Segment 1, and runs north to the existing northern levee reach short of the westbound bridge abutment of Highway 64 over the Tar River. Eight (8) culverts within this realigned levee segment would require installation of flap gates.

The shoulder levee would be 3,450 linear feet long, with a fill volume of 61,500 cubic yards, a portion of which would occupy approximately five (5) acres of wetlands on the river side of the

existing levee, which would be fully mitigated by purchase of credits through the State's Division of Mitigation Service (DMS).

7.2.3 SEGMENT 3

Segment 3 (Figure 7.4) consists only of the existing Corps levee, and would require no modifications to the existing project.

7.2.4 SEGMENT 4

Segment 4 (Figure 7.5) consists of:

- the raising of Highway 258 to connect the northern terminus of the existing levee (old Segment A) to a new earthen levee segment;
- the installation of 3,400 linear feet of new levee across existing farmland/pasture;
- the raising of portions of NC Highway 111;
- the raising of the intersection of Highway 111 and Shiloh Farm Road;
- the raising of 1,375 feet of Shiloh Farm Road; and
- the extension of Harris Hill Lane by 800 feet to connect the eastern neighborhood of Southern Terrace, to hurricane evacuation routing and to provide construction access.

Modifications in this segment would also require the raising of 27 driveways and Strickland Drive, to meet the new road elevation along NC 111. All such work would be in compliance with current NCDOT specifications for road grade. Raising of roadway surfaces would require upgrades to meet current design standards. This would include widening of paved lanes from ten feet to twelve feet, widening of the shoulder to include four feet of paved shoulder, and four feet of grassed shoulder, and installation of a guard rail in accordance with NCDOT design standards. Additional hurricane evacuation route signage will be installed on local streets, and also within the Southern Terrace neighborhood, and on Harris Hill Lane and Strickland Drive, to direct evacuees to the proper egress route. Three interior storage areas would be connected to one drainage pipe through the levee which would include a flap gate. Interior drainage would prevent structure flooding up to the design event water surface elevation. Interior drainage features are shown in Appendix 3, Real Estate Plan, Figures 1.4.1-5 and 1.4.1-6.

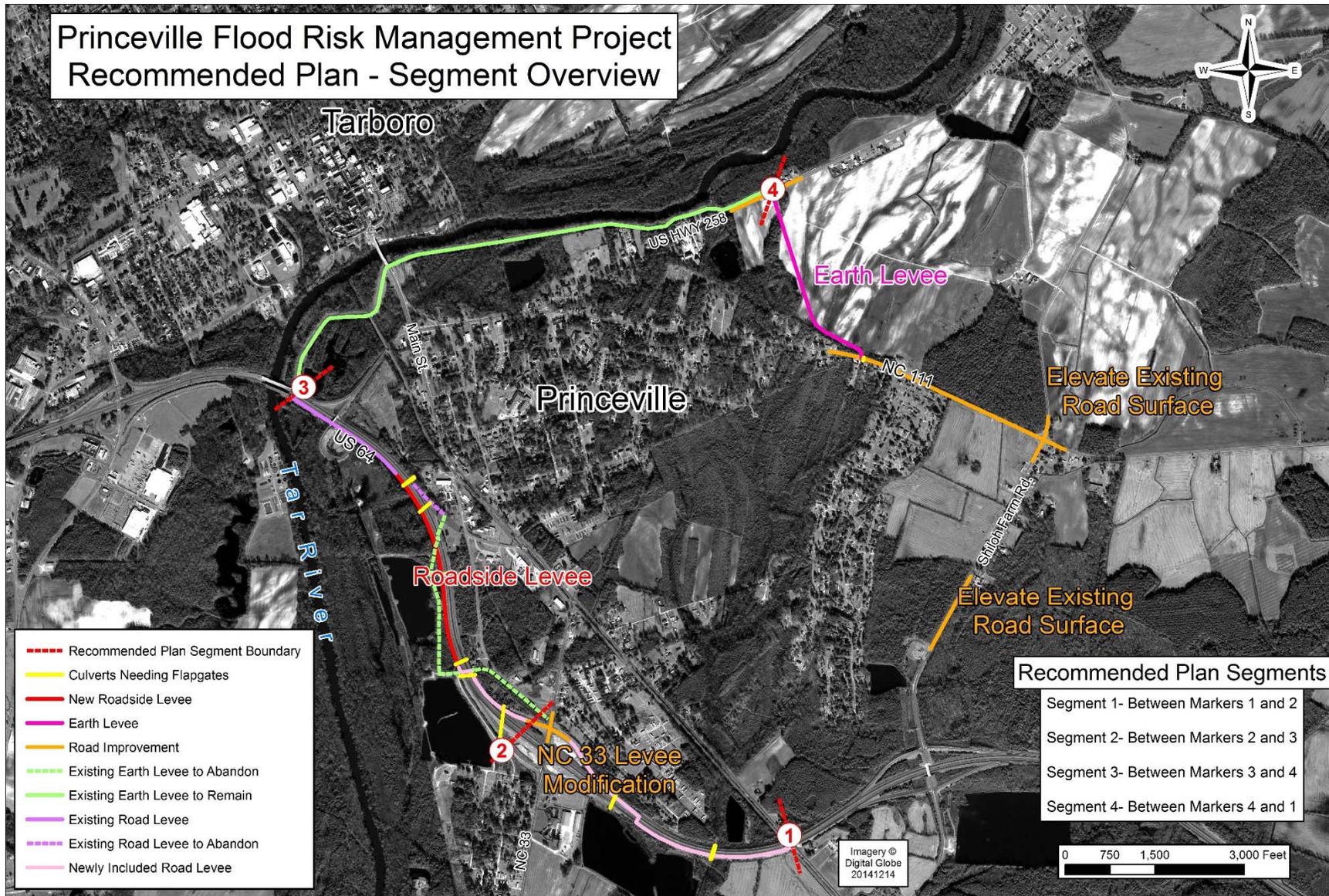


Figure 7.1: Recommended Plan Segments

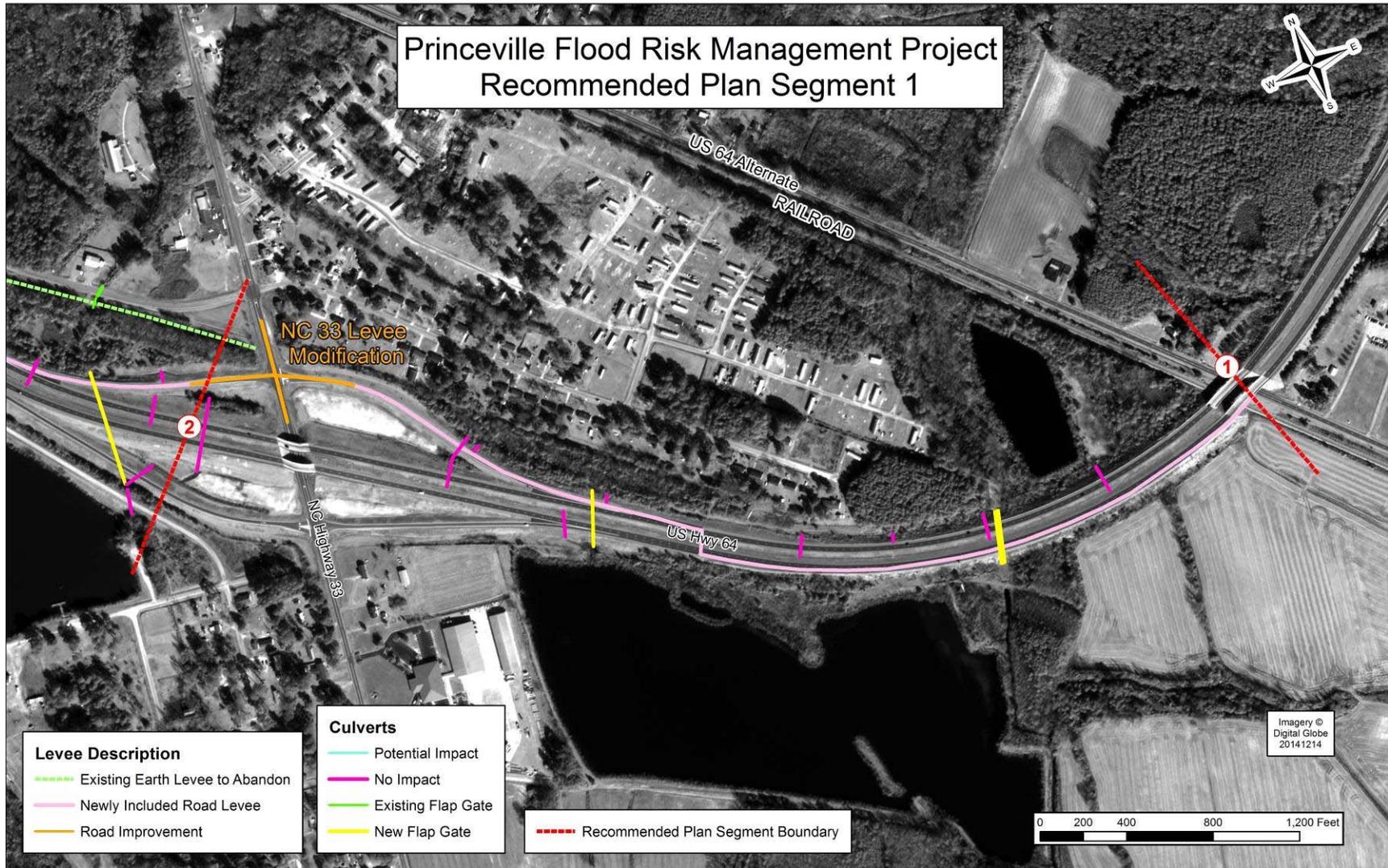


Figure 7.2: Recommended Plan Segment 1

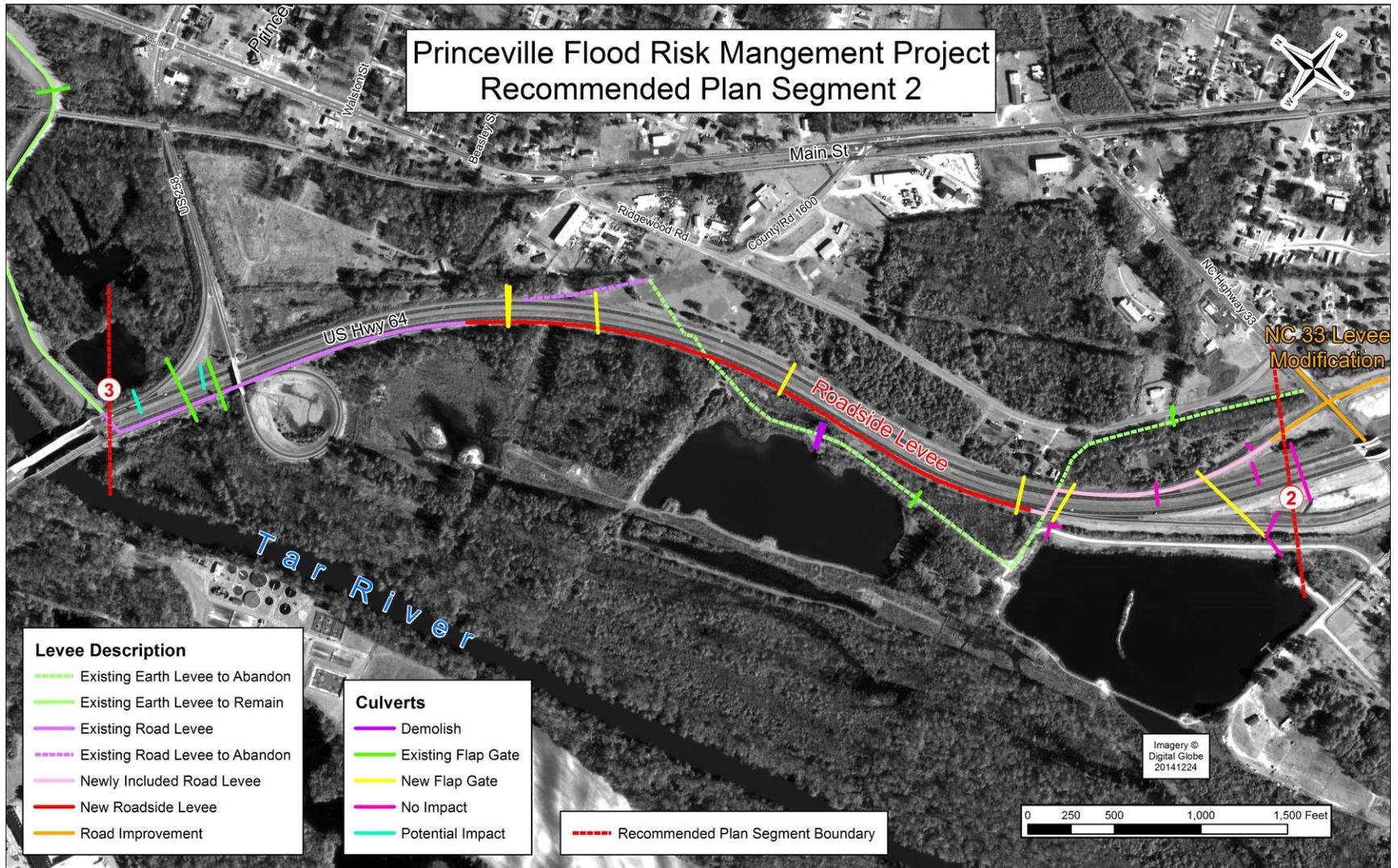


Figure 7.3: Recommended Plan Segment 2

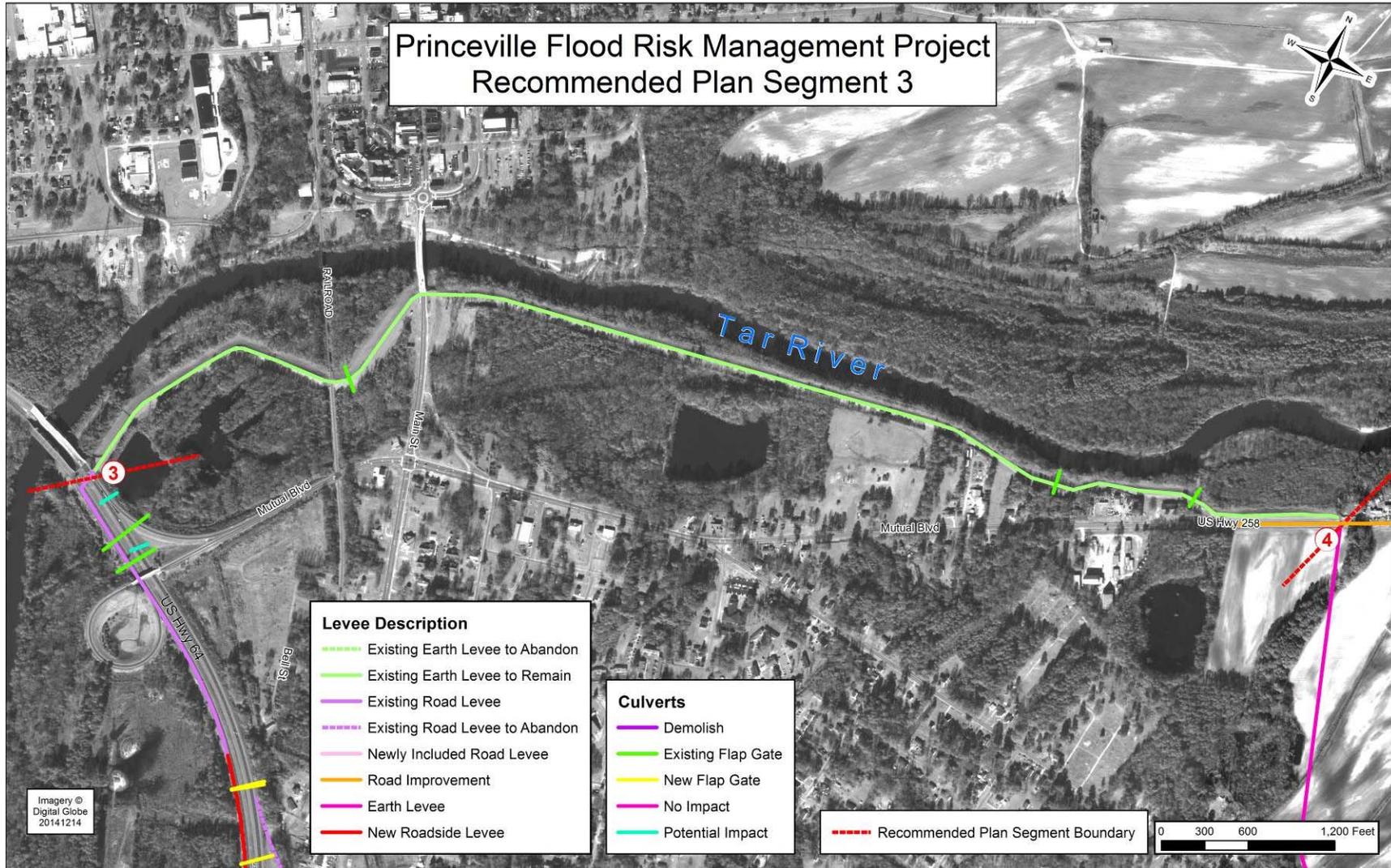


Figure 7.4: Recommended Plan Segment 3

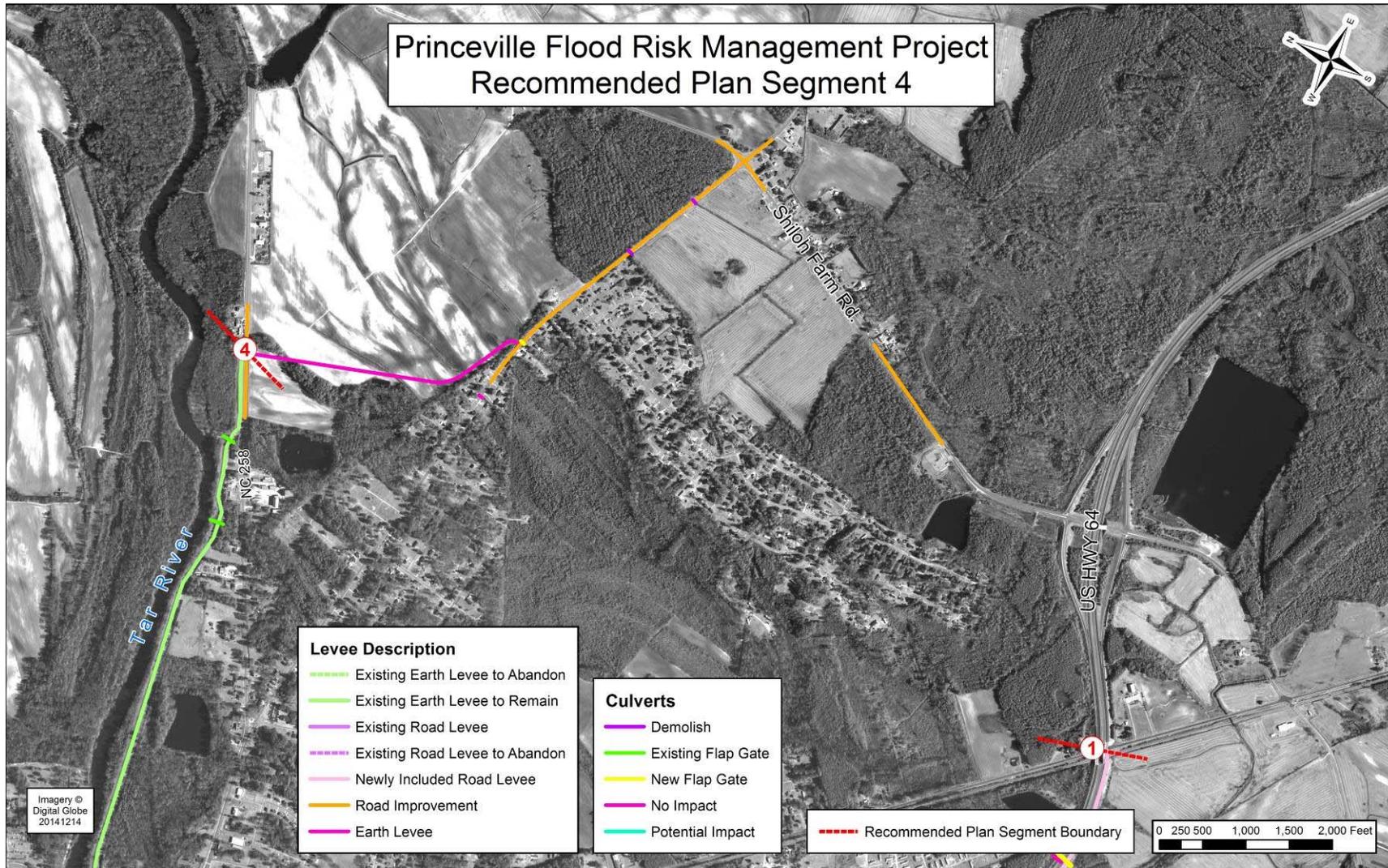


Figure 7.5: Recommended Plan Segment 4

7.3 NONSTRUCTURAL FEATURES

7.3.1 FLOOD WARNING AND EVACUATION PLAN

The existing Edgecombe County Emergency Plan will be modified so that it will work seamlessly with the State's emergency plan and provide an updated warning system and evacuation plan. The existing Tar River Flood warning system, developed by a joint effort of the State of North Carolina and the U.S. Geological Survey includes data and warning systems. It will be used to its maximum extent to provide the earliest and most accurate warning for the people of Princeville in order to reduce the risk of loss of life and damage to personal property. In light of changing education regarding flood risks and effects on roadways and evacuation routes, it is vital that current evacuation signage be inventoried, additional signage be provided, and routing clearly marked, particularly in regards to egress from the eastern portion of town for which there is currently only one egress route, to NC-111. All portions of town should be evaluated to ensure that all egress routes clearly mark routes to the U.S. Highway 64 evacuation route interchanges.

7.3.2 FLOOD RISK MANAGEMENT EDUCATION AND COMMUNICATION PLAN

A flood risk management education and residual risk communication plan will be drafted and used to communicate the risk of living behind a levee and the potential for the levee to fail, to the residents of Princeville, as well as persons who work in the vicinity. The plan will also include an annual program to keep the residents alert to the continued risk, and can be presented in conjunction with the town's "Town Hall Meetings". The Education and Communication Plan will be used in Princeville's Elementary School, and neighboring Middle and High schools, to educate young people to the town's risk profile. It is expected by doing so, that the town's young people will also educate their parents and families, to the nature of flood risk to the town. Continuing education of post-school-age citizens is also vital.

7.3.3 FLOODPLAIN MANAGEMENT AND UPDATING OF LOCAL BUILDING AND ZONING CODES

A flood risk management evaluation, based on data provided in this study, will be conducted. Mapping of depths, zones of inundation, and information on the nature of flooding and flood progression, should be evaluated by town officials, and management recommendations modified where needed. It is recommended that the Town and County evaluate current building and zoning codes, and make adjustments, as warranted, in light of data presented in this report and its appendices.

All of these non-structural measures were ultimately deemed essential to an adequate flood risk management strategy for the Town of Princeville. All non-structural measures that are part of this plan are a non-Federal responsibility, and are not part of the construction cost indicated below.

7.3.4 PREPARATION OF LEVEE FOR FLOOD EVENTS

Further planning is needed to ensure the effectiveness of the levee by better organizing preparations for impending flood events. The stoplog closure at the existing railway opening in the levee would require manpower to activate during preparation for a flood event. Back-flow prevention devices require inspection to assure proper operation as waters rise. Additionally, it is necessary for the emergency team to be familiar with these activities and to have annual refresher exercises on the placement of the stoplog structure. During the early part of the summer and after large rain events, the flap gates will be inspected for debris.

7.4 DESIGN AND CONSTRUCTION CONSIDERATIONS

7.4.1 ADDITIONAL INVESTIGATIONS

Initial geotechnical investigations have been performed on the existing levee, and results are contained in the Geotechnical Appendix (Appendix C). Geotechnical investigations of the Alignment I feature have not yet been performed, but will be done in the Project Engineering and Design (PED) Phase. Prior to construction, further geotechnical investigations are recommended to include additional drilling, laboratory testing and analysis along the alignment of the Recommended Plan to define the subsurface conditions and strength parameters of the foundations. A determination will be made of required and available quantities of suitable borrow material and investigate new or expanded borrow areas if required. Recommended placement and compaction requirements for design will be established based on new analysis and laboratory data. Laboratory testing on representative samples from the levee alignment will be performed to determine strength parameters and permeability of shallow sandy soils. Consolidation tests will be performed on any fine-grained soils considered problematic.

The slope stability of the levee will be computed using SLOPE/W stability software and additional subsurface information. Settlement calculations for the design of the new levee will be performed. A probabilistic levee analysis analysis will be performed on the preferred alignment of the proposed levee.

Much of the existing levee embankment was constructed with relatively clean sand, and has performed well under flooding conditions. For the new embankment levee, similar performance should be expected with similar soil types. However, it is recommended that for final design, a minimum percentage of fines be specified for embankment construction to reduce seepage problems developing during a flood event. Underseepage of the new embankment should not be a concern unless the surficial soils encountered are clean sands or gravels. If these materials are encountered under the new embankment, they will be removed to a depth determined in the final design and replaced with soils containing fine-grained material. This will be evaluated prior to construction. Undercut and backfill quantities have been estimated for the new embankment levee. See Appendix B for further details.

The U.S. Highway 64 road fill will be investigated in more detail and analyzed to determine if it meets the USACE design standards required for levees.

7.4.2 RECREATION

There is no recreational component to this project. The use of the levee except for controlled recreational purposes such as the Heritage Trail is discouraged in order to prevent damage and preserve its integrity.

7.5 BORROW AREA

The proposed 40-acre borrow area is located off Chinquapin Road (SR 1524) near U.S. Highway 64 (Figure 7.6). This area is a cultivated upland farm field which is about 4 miles east of the project area. Borings are included in the Geotechnical Appendix (Appendix C).

7.6 REAL ESTATE CONSIDERATIONS

The requirements for lands, easements, rights-of-way and relocations, and disposal/borrow areas (LERRDs) should include the rights to construct, maintain, repair, operate, patrol and replace a

levee or floodwall including all appurtenances thereto, raise highways and private driveways, construct drainage ditches with pipeline and a temporary access road within the project area. All components of the project can be constructed under standard easements. It is estimated that a total of 52 private landowners will be impacted and 77.33 acres. Approximately 14.1 acres within road right of way will be impacted. The estimated Real Estate cost developed in the Real Estate Plan and shown below are expressed in October 2014 price levels and total \$5,648,000. These costs were updated to October 2015 price levels as reflected in Appendix D (cost) and the certified project cost estimate at \$5,729,000). Further details are provided in the Real Estate Appendix E. The estimated real estate costs include the land cost for acquisition of land, relocation costs and federal and non-federal administrative costs and are shown below.

Lands, Improvements/Permits, Temp. Works Areas Borrow Area, Drainage	\$255,235
P.L. 91-646 Relocations	\$79,781
Administrative Costs	\$632,000
Utility Relocation Costs	\$3,316,759
Sub-Total	\$3,376,759
Contingencies (35%)	\$1,364,000
Total (Rounded)	\$5,647,775

Real Estate costs provided contain a 35% contingency for potential unexpected real estate cost beyond estimated, potential prolonged negotiations, and the potential need to go to condemnation, if warranted. All Real Estate costs are provided at October 2015 price levels.

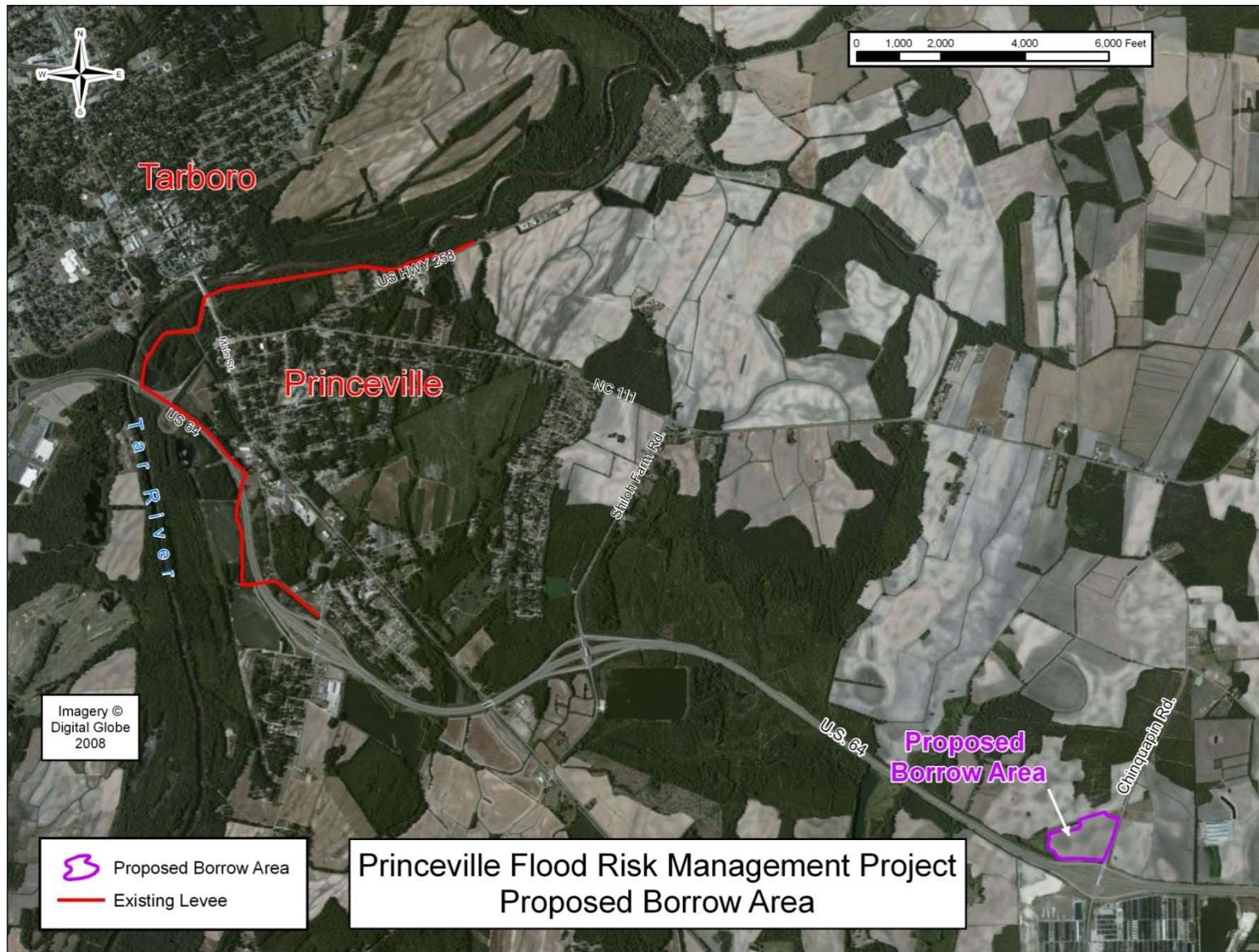


Figure 7.6: Proposed Borrow Area

7.7 OPERATION AND MAINTENANCE CONSIDERATIONS

Operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) requirements of the sponsor would consist of project inspections and maintenance. Edgecombe County is currently responsible for maintaining the existing levee. Periodic inspections and clean out of the existing and new flapgates would be required to ensure they are in proper working order. Estimated annual OMRR&R costs are \$57,760 (a 50-year project total of \$2,888,000, which includes a 25% contingency).

7.8 EVALUATION OF RISK AND UNCERTAINTY

Table 7.1 below provides additional information and a summary of findings on Risk and Uncertainty, comparing the No-Action to the Recommended Plan.

Table 7.1: Recommended Plan - Risk and Uncertainty

	NO-ACTION	RECOMMENDED PLAN
NED	<p>Flooding persists in absence of levee improvements, causing damage to both urban and rural concerns</p> <p>Compounding of emergency and cleanup cost</p>	<p>Existing flooding conditions lessened due to risk reduction increased to 1% annual chance risk reduction, above 1% annual chance events will result in damage to residential and commercial properties, roads, and infrastructure</p> <p>Emergency and cleanup costs are reduced for all events up to an approximate 1% chance event, during which police and fire costs are incurred. Clean up costs would be minimized for events up to 1% chance, at which point clean up of flood debris</p>
RED	<p>Local tax base will be impacted by flooding, both sales and property tax rolls</p> <p>Business closures will stunt the local economy and impact local and regional incomes</p>	<p>As spatial extent of damage decreases, impacts on the sales and property tax rolls lessen</p> <p>Of the plans analyzed, results in optimal reduction of impacts to regional business and employment</p>
EQ	<p>Continued flooding will not adversely impact wetlands, other habitats, or biota</p>	<p>Of the plans analyzed, Alternative 4 results in fewer impacts to EQ than any larger plans, but similar outcomes as to No-Action, Alternative 2, or Alternative 3.</p>

	NO-ACTION	RECOMMENDED PLAN
OSE	<p>Continued risks to life, health and safety</p> <p>Negative impacts to community cohesion, as families and individuals are displaced by floods</p> <p>Community growth impacts as flooding forces a resident exodus</p> <p>Cultural and historic sites will continue to be damaged</p> <p>Aging populations will continue to be negatively impacted, as younger residents choose to migrate away after a flood</p>	<p>Presents the lowest level of risk to life and safety in Princeville of all practicable (implementable) alternatives, preventing flows from circumventing of the levee, and thus avoidance of trapping residents in lower-lying portions of town. This plan also avoids inducing impacts to neighboring and downstream communities due to not increasing flood stage</p> <p>Community cohesion in Princeville would be better addressed by the Recommended Plan, the community is still under threat from flooding caused by an above-design magnitude event</p>
Residual Risk	<p>Residual risk would remain extremely high due to failure to address existing flooding issues throughout the project</p>	<p>Provides the lowest residual risk level of all plans analyzed, due to minimization of damages within Princeville while also not inducing impacts to neighboring and downstream communities</p> <p>The Recommended Plan would reduce monetary damage by approximately 76%</p>
Risk Of Ecosystem Damage	<p>No adverse impacts to ecosystem</p>	<p>No adverse impacts to ecosystem</p>
Risk To Life and Safety	<p>Threats to Life and Safety from flood waters will continue in absence of substantial risk reduction actions, due to flow through existing culverts, over-topping, flow through the Highway 33 underpass at Highway 64, and by circumvention of the levee at its northern terminus</p>	<p>Threats to Life and Safety are minimized through implementation of flood risk management measures proposed</p>
Risk To Mental and Physical Health	<p>Threats to Mental and Physical Health from flood waters will continue in absence of substantial risk reduction actions, due to flow through existing culverts, over-topping, flow through the Highway 33 underpass at Highway 64, and by circumvention of the levee at its northern terminus</p>	<p>While threats from flood waters persist, measures lessen the residual risk, lessening the risks to mental and physical health</p>

7.9 COMPARISON OF NO-ACTION AND RECOMMENDED PLAN

Table 7.2 contains a full comparison of No-Action and Recommended Plan.

Table 7.2: Full Comparison of No-Action and Recommended Plan

Plan Description	No Federal Action	Recommended Plan
IMPACT ASSESSMENT		
1. National Economic Development		
a. Beneficial Impacts (Numbers are Rounded)		
Average Annual Damages Prevented	\$0	\$459,870
Emergency Costs Avoided	\$0	Unknown
Recreation	\$0	N/A
Total Beneficial Impacts	None.	\$459,870
Project Cost	NA	\$ 21,540,000
Interest During Construction	NA	\$2,086,387
Average Annual First Cost	NA	\$940,164
Annual OMRR&R		\$57,760
Total Avg. Annual Costs	NA	\$997,924
Discount Rate		3.125%
Price Level		Oct 2015
2. Environmental Quality (EQ)		
Physical Environment		
Sediment and Erosion	Status quo maintained	Sedimentation and erosion control plan for land disturbance area minimizes impacts.
Prime and Unique Farmlands	Status quo maintained	Minor to no impacts. Coordination ongoing with NRCS.
Flooding	Status quo maintained.	No increase in flood impacts. Flood risks reduced.
Water Quality	Status quo maintained	Minor and temporary impacts to water quality due to construction.
Air Quality	Status quo maintained. No anticipated effect on air quality	No anticipated effect on air quality. Temporary increase in dust levels during construction.

Plan Description	No Federal Action	Recommended Plan
Noise Levels	No effect	Temporary increase in noise levels during construction
Biological Environment	No effect	No significant impacts
Aquatic Habitat (Tar River and tributaries)	No effect	No significant impacts
Riparian Habitat	Status quo maintained. No impacts to riparian habitat.	No significant impacts to riparian habitat. Impacts offset by mitigation.
Wetlands	No wetland impacts	No significant wetland impacts. Impacts offset by mitigation.
Threatened and Endangered Species	No effect	Not likely to adversely affect
Cultural Environment	No effect	Long Term positive impacts
Aesthetic Values	Status quo maintained.	Minimal aesthetic improvement
Cultural Resources	Status quo maintained.	Assessment and coordination ongoing for portions of levee alignment. Minimal preservation of cultural or historical resources.
3. Regional Economic Development (RED)		
Impact on Sales Volume	Sales volumes at local businesses will be lower due to displacement from persistent and repetitive flooding conditions	Impact to local businesses will be lessened, causing a maintenance or increase in sales volumes from the existing conditions
Impact on Income	Business closures will stunt the local economy and impact local and regional incomes	Reduction in localized negative employment because of increased risk reduction
Impact on Employment	Business closures will stunt the local economy and impact local and regional incomes	Reduction in localized negative employment because of increased risk reduction
Tax Changes	With continued flooding, tax values on homes and collected sales tax values will remain decreased	Improved tax base, but remaining residual flooding will potentially lessen any potential tax revenues
4. Other Social Effects (OSE)		
a. Beneficial Impacts		

Plan Description	No Federal Action	Recommended Plan
Security of Life, Health, and Safety	Continued risks to life, health and safety	Substantial decrease in risks to health and safety
Community Cohesion	Continued severe risk of impacts to community cohesion	Substantial positive impacts to promote community cohesion due to reduced effects from flooding
Tax Values	With continued flooding, tax values on homes and collected sales tax values will remain decreased	Improved tax base, but some remaining residual flooding will potentially lessen any potential tax revenues
Community Growth	Could have continued negative impact on growth as residents leave community with each additional flood event	Some positive impact on community growth
Property Values	Persistent flooding will decrease property values, particularly those that are disqualified from purchasing flood insurance because of their location in a floodplain	A reduction of the flooding frequency will potentially qualify some homes for the flood insurance program, thus increasing their value, and resale value.
PLAN EVALUATION		
1. Contributions to Planning Objectives		
Flood, Hurricane and/or Storm Damage/Risk Reduction	No contribution to planning objectives	Substantial contribution to flood risk reduction
2. Response to Evaluation Criteria		
a. Acceptability	No-Action Plan is unacceptable by virtue of guidance provided in Executive Order 13146	Plan could be deemed acceptable by virtue of providing substantial solution to problem identified in Executive Order 13146
b. Completeness	No-Action is an incomplete solution to the identified problem set	Provides the largest level of flood risk reduction without inducing damage to other entities and resources
c. Effectiveness	No-Action Plan is ineffective solution to identified problem set	An effective solution to identified problem set
d. Efficiency (Cost-Effectiveness; i.e., most efficient use of Federal and non-Federal Funds)	No-Action Plan is inefficient solution to identified problem set	An efficient solution to the identified problem set
RISK EVALUATION		

Plan Description	No Federal Action	Recommended Plan
1. Risk and Vulnerabilities		
Risk of Failure	There is a very small risk of failure of the original levee system during very large flood events, due to overtopping, although flooding of the town would begin at low-elevation portions of the levee at its southern end	There is a very small risk of failure of the original levee system during very large flood events, due to overtopping, although flooding of the town would begin at low-elevation portions of the levee at its southern end
Residual Risk	Residual risk would remain extremely high due to failure to address existing flooding issues throughout the project	Provides the lowest residual risk level of all plans analyzed except for Alt 5 & 6, which have very low B/C ratios and unacceptable induced effects
Relative Sea Level Rise	N/A	N/A
Risk of Ecosystem Damaged.	No adverse impacts to ecosystem	No adverse impacts to ecosystem
Risk to Life and Safety.	Substantial threats to Life and Safety from flood waters will continue in absence of levee improvements	Threats to Life and Safety are minimized through implementation of flood risk management measures proposed
Risk to Mental and Physical Health	Substantial threats to Mental and Physical Health from flood waters will continue in absence of levee improvements	While threats from flood waters persist, measures that produce Alternative 4 lessens the residual risk, lessening the risks to mental and physical health

A residual risk communication plan, with educational components focused on several levels of general education, including elementary, junior high, and high school, were identified as critical components of the risk reduction plan for Princeville. Continuing education of post-school-age citizens is also vital. In addition, upgrading of evacuation signage to reflect accurate routing to major evacuation routes such as U.S. Highway 64, is also considered a fundamental element of the plan.

7.10 PLAN ACCOMPLISHMENTS

The Recommended Plan would address a substantial number of the problems identified by the study team, Sponsor, and town residents. The Recommended Plan would also, to the maximum extent practicable, address the mandate given the USACE by Executive Order 13146, and is discussed in detail below.

7.10.1 INUNDATION

Floodwaters rising through existing ungated culverts in the existing embankment, beginning at an approximate 5% chance occurrence, would be prevented from inundating low-lying areas of town, and causing fairly frequent inundation damage in those areas. While the area inundated from this source is limited, this source of flooding would be eliminated.

Floodwaters entering town through the Highway 33 underpass, and those floodflows overtopping the existing levee on Highway 64, would be substantially reduced, effectively reducing the occurrence of flood inundation from those sources.

Floodwaters circumventing the levee system at its northern terminus, beginning at an approximate 5% chance event occurrence, would also be reduced substantially, reducing inundation of residences at the north end of town, and reducing both depth and extent of inundation caused by the two sources noted above. Likewise, interior drainage provisions at this, and other areas behind the levee, would further reduce inundation extent and depth. While the percent chance increase in inundation reduction may not seem substantial, all inundation reduction measures discussed to this point would provide major reductions in damage, and provide an approximate 76% chance of containment for that 1% chance event.

7.10.2 LIFE AND SAFETY

Floodwaters entering town, particularly from waters circumventing the levee, would pose a considerably lesser hazard for drowning, or trapping residents within lower-lying portions of town, due to reductions in flow coming from that source. Since rising Tar River floodwaters did not become apparent in Princeville during Hurricane Floyd until the threat of inundation appeared past, the Recommended Plan would both re-route and reduce the volume of floodflow from entering town from that source, and allow additional time to evacuate or assess conditions and react appropriately.

7.10.3 INVESTMENT

While current flood risk management measures do not provide sufficient risk reduction to Federal and local investment, the Recommended Plan would substantially reduce the frequency and severity of flooding, providing a substantial reduction in risk to investment in commercial enterprises, State and Federal governmentally-supported housing and city government facilities, and other investments.

7.10.4 COMMUNITY SUSTAINABILITY

The Recommended Plan, by substantially reducing current flood risk, would go a long way toward promoting long-term community sustainability. Princeville does not have a strong economy with good jobs, stable businesses, or business development. In addition, the current flood threat creates an environment that does not promote investment in local health care, public transportation, local educational facilities, recreation facilities, and other community amenities. The Recommended Plan would reduce displacement of residents from their homes, promote family cohesion through reducing displacement and financial hardship, and further reduce risks to businesses, churches, schools, and other organizations which sustain the community.

7.10.5 SERVICES

The Recommended Plan would reduce floods risk to primary services such as town government, community services, police, and fire. Federal investment in these services would also benefit from flood risk reduction.

7.10.6 ADDITIONAL ACCOMPLISHMENTS OF THE RECOMMENDED PLAN

The Recommended Plan would substantially address the intent of Executive Order 13146, which directed Federal agencies to “form a committee to study and identify potential opportunities to reconstruct and protect Princeville, to the maximum extent practicable.” In addressing the intent of EO 13146, the Recommended Plan would:

- **Provide an Increased Level of Flood Risk Management (FRM):** The Recommended Plan would provide substantially higher flood risk reduction through improvement of the existing levee system and subsequent reduction of the frequency and magnitude of flood inundation in the Town of Princeville.
- **Reduce risk and Improve Health and Safety:** A variety of threats to the health and safety of Princeville residents can be traced to the hazards posed by recurrent flooding in the town. The opportunity exists to mitigate these threats to health and safety, by improving Princeville’s level of flood risk management. Such improvements would reduce the statistical frequency of flooding in Princeville, that is, the likely number of flood incidents over a given period of time. Adverse impacts from flooding would become less frequent, and the residents’ levels of health and safety would improve accordingly over time.
- **Improve Sustainability of the Community:** The Recommended Plan would be an important part of any comprehensive strategy to address the economic, environmental, and social issues created by the threat of future floods, and would better position the community to successfully address other issues that prevent them from becoming a sustainable community.
- **Better Uphold the Community Social Fabric:** The Recommended Plan would better reduce risks to the social fabric of the nationally-important historic resource of Princeville, by substantially reducing the destructive effects of flooding from the Tar River.
- **Better Risk reduction for Structures and Infrastructure:** Structures and infrastructure in Princeville, including National Register-eligible buildings, would benefit from reduced frequency of repeated damage and destruction from flooding from the Tar River. Public services and utilities would likely enjoy longer uninterrupted periods of operability, and their improvement and expansion may also be encouraged. Existing Federal, State, and local investment in the community would also be subject to less risk of loss due to flood inundation.
- **Better Risk reduction of Personal and Community Effects:** Items of irreplaceable value to individuals, organizations, and the community as a whole would benefit from reduced frequency of the effects of flooding. Improved knowledge of flood risk and methods of mitigation could be imparted to the residents by expanded plans for flood warning and evacuation, and education and communication. Residents would be able to better protect their own items of great value, as well as those of organizations and of the entire community. With a notably reduced risk of catastrophic flooding in a given year, over time, such valued items would be much less likely to be subject to loss or damage due to flooding.

Structural elements of the plan are discussed in Section 7.2, and non-structural elements are discussed in Section 7.3. The Recommended Plan would provide an approximate 76% assurance that the 1% event would not inundate the Town of Princeville. The plan would have minimal impacts to the environment and no adverse impacts to the historic significance of the town.

7.10.7 ACHIEVEMENT OF CAMPAIGN PLAN GOALS

A COMPREHENSIVE SYSTEMS APPROACH

Employed an integrated, comprehensive and system-based approach:

- Discussion of the effects of increased impervious cover in the drainage basin as to increased discharges and reduced levels of FRM at Princeville is included in the Hydrology and Hydraulics appendix.

Employed risk-based concepts in planning, design, construction, operations, and major maintenance:

- The selection of levee top elevation was confirmed by the use of FDA, where it was confirmed that the level of risk reduction meets or exceeds the USACE minimum requirements for risk and uncertainty.
- A risk-based Geotechnical analysis was used to determine the required configuration of levee and sheet pile wall cross sections.
- A risk analysis was performed on the H&H to determine the mean and standard deviation required in HEC-FDA.

Continuously reassessed and update policy for program development, planning guidance, design and construction standards:

- The existing levee was analyzed to ensure that its structural characteristics comply with current standards.
- Levee design standards were applied to any road fills that are designed to perform the same functions as a levee.

Employed dynamic independent review:

- HEC performed an early independent review of the HEC-RAS (4.1) model. Model runs for Alignment I (the Recommended Plan) were reviewed during ATR with the new alignment. This version of the model found less than 0.1 foot of potential added water surface elevation at any locations.
- Agency Technical Reviews (ATR) of the AFB package were completed in 2009 and 2011. The proposed plan with the new alignment underwent final ATR in August 2015.

Employed adaptive planning and engineering systems:

- The alignments and components presented in the package are resilient; some change is expected during final design (PED), and the plan is flexible in application.
- Review and evaluation of the Recommended Plan ensured that project objectives are best met by the final design.

Focus on sustainability:

- The Recommended Plan would minimize and facilitate maintenance and operation of the final project.

- The focus on sustainability was illustrated by screening of a difficult-to-operate stop log structure at Highway 33 with a new minimum maintenance feature.

Review and inspect completed works:

- The latest inspection, a Periodic Inspection (PI) conducted in 2010, resulted in an “unacceptable” rating due to vegetative growth at the culvert openings, some culvert blockage, improper rip rap at the outlet ends of the drainage pipes, and lack of videotaping of some of the culverts. The project was subsequently removed from the Public Law (PL) 84-99 program. The PL 84-99 program provides rehabilitation assistance in flood fighting and rescue operations, or in the repair or restoration of any flood control work threatened or destroyed by flood. The sponsor has been re-admitted to the PL 84-99 program due to new interim guidance, and the culverts having been video inspected.

Assess and modify organizational behavior:

- The team responded to the task given it with a new package of recommendations that substantially reduce flood risk, and give credence to project justification based on more than NED benefits alone.

COMMUNICATION

Effectively communicate risk:

- The Hydrology and Hydraulics Appendix includes a section on Risk Management that covers the subjects of project risk and residual risk.
- The Recommended Plan includes Flood Warning and Evacuation upgrades, upgrades to evacuation signage, Flood Risk Management (FRM) education and communication, in both adult and young person forums, upgrading of floodplain management principles, and an update in floodplain zoning and building codes. See page 117 for more detail.
- The Recommended Plan emphasizes that the project’s primary goal is property risk reduction, although life and personal safety risk reduction is a vitally important benefit for those that cannot evacuate in a timely manner. It is further recommended that an evacuation for flood events above a certain level be mandatory.

Establish public involvement risk reduction strategies:

- Risk reduction strategies are included in the proposed Flood Warning and Evacuation, and FRM Education and Communication plans.
- Stress that each household prepare an individual evacuation and mitigation plan.

RELIABLE PUBLIC SERVICE PROFESSIONALISM

Manage and enhance technical expertise and professionalism:

- A member of the USACE-Wilmington PDT attended the National Levee Safety Conference in FY 2008.
- USACE-Wilmington has obtained a new Levee Inspection Tool and several persons were involved in its use on this study.

- A professional level of quality was attained through multiple ATR's and Independent External Peer reviews of the study products during development of the Draft and Final reports.

SECTION 8 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS OF THE NO-ACTION ALTERNATIVE AND THE RECOMMENDED PLAN*

The project area consists of approximately 1.6 square miles or 1,024 acres within the Princeville community adjacent to the Tar River in Edgecombe County, North Carolina. Princeville is directly across the river from the City of Tarboro and is located about 70-miles east of Raleigh, the capital of North Carolina.

The No-Action was considered as a valid choice in the range of reasonable alternatives and was evaluated as required by 40 CFR Part 1502.14 (d) and by ER 1105-2-100. The No-Action alternative was also considered as the baseline of existing impacts continued into the future against which to compare impacts of action alternatives. The No-Action Alternative means that this historic community would continue to flood. The community is actually subject to minor penetration of floodflows as common as an approximate 2% chance event. Princeville's infrastructure (roads, bridges, utility lines, etc.), commercial facilities, residents and their property would continue to be adversely impacted by being flooded. The No-Action Alternative is the status quo. The No-Action Alternative would also be considered the "Future Without" alternative. The Future Without alternative would mean that Princeville's residents and their property would continue to be damaged by future flooding which could result in adverse impacts to the residents and their property.

A plan has been identified that provides an approximate 76% assurance that the 1% chance flood event would not inundate Princeville. This Recommended Plan consists of:

- Constructing flap gates on twelve (12) ungated culverts, including construction of several new culverts to address floodflow penetration and interior drainage issues;
- Constructing a levee extending approximately 3,300 feet southeast from Highway US 258 to NC 111;
- Making road improvements to levee standards along 3,350 feet of NC 111 to Shiloh Farm Road then turning approximately 400 feet south along Shiloh Farm Road;
- Elevating a low point in Shiloh Farm Road approximately 2,500 feet south of its intersection with NC 111;
- Removing drainage pipes along NC 111 at two locations and installing flap gates at twin elliptical pipes located along NC 111;
- Modifying the intersection of N.C. Highway 33 and U.S. Highway 64, increasing elevations of the interchange of N.C. Hwy 33 and U.S. Hwy 64, by up to 4.5 feet;
- Installation of a "Shoulder Levee" parallel and adjacent to a low spot on Highway 64;

The plan also includes borrow and staging areas, interior drainage features, updating of existing Flood Warning and Evacuation Plans, and a Flood Risk Management Education and Communication Plan.

⁴The impacts of the other viable array of alternatives are similar to those of the recommended plan unless otherwise noted in Table 5.5. All alternatives have been reviewed to have a less than significant impact to the resources analyzed. Both the affected environment and the

⁴ (Rev April 2016)

environmental impacts of the No-Action Alternative and the Recommended Plan are discussed below.

8.1 VEGETATION AND WILDLIFE

Impacts of the No-Action Alternative

The No-Action alternative would not involve construction of a levee project so there would be no change to existing vegetation and wildlife or associated habitat within the project area. The vegetation and wildlife of this area are adapted for existence within flood prone areas.

Impacts of the Recommended Plan

The Recommended Plan would impact approximately:

- 6.0 acres of U.S. Highway 64 right-of-way (mostly grassed side of road shoulder with some wetlands at the toe of slope)
- 13.9 acres of paved U.S. Highway 258 and Shiloh Farm Road
- 12.45 acres of an existing cleared and cultivated farm field for construction of the earthen levee between US HWY 258 and NC 111
- 40 acres of an existing cleared and cultivated farm field at the proposed borrow area

Additionally there will be temporary impacts to grass and low shrub vegetation with four approximately 1-acre designated construction laydown areas which are all previously disturbed and a 1.07 acre temporary access easement which will require clearing of some immature pine trees and underbrush. There will also be some immature pines that would be removed along the proposed levee extension within the U.S. Highway 64 highway right-of-way. These pine trees consist of young (less than 5-year old and less than 3-inch DBH) loblolly pines. No old growth timber or specimen trees are located along the proposed levee alignments or the temporary construction laydown areas or accesses. Once construction has been completed, the levee extensions will be stabilized and grassed.

During construction of the levee some wildlife could be temporarily displaced from the project area due to construction noise and associated heavy equipment and workers. These impacts would likely be temporary and after completion of construction no permanent adverse impacts to wildlife or habitat area in the project area is expected.

8.2 AQUATIC RESOURCES

Impacts of the No-Action Alternative

The No Action alternative would not construct a levee project so there are no adverse impacts to the aquatic resources of the Tar River or any of its tributaries in the project area.

Impacts of the Recommended Plan

There are no adverse effects to mussels or fish species expected during construction of the levee. Best Management Practices (BMPs) for sediment and erosion control, as well as stormwater control will be used to avoid any short term impacts to water quality.

8.3 FLOODPLAINS

Impacts of the No-Action Alternative

The No Action alternative would not involve any construction activity; therefore, the No Action alternative will have no effect on the 1% chance event floodplain.

Impacts of the Recommended Plan

The Recommended Plan is not located within a designated floodway as identified on the current Flood Insurance Rate Map. There are no measures available for providing the town with a flood risk management project at the level of a 1% chance event which would not require construction in the 1% chance event floodplain.

The impact of the Recommended Plan on the floodplain was evaluated. The Hydrologic Engineering Center – River Analysis System (HEC-RAS vers. 4.1) model was run to ensure that the proposed action **would not** increase the flood impacts upstream, within adjacent neighboring communities (such as Tarboro), or downstream (i.e., Greenville or Washington, N.C.) of the project area. For the proposed action, the results of the modeling show that the difference in water surface elevation (with and with-out the proposed Princeville Levee Extension Alignments) was about 1/10 foot.

Additional hydrologic flood modeling will be performed during the Preconstruction Engineering and Design PED. phase of the project. It is not anticipated that implementation of the Recommended Plan would cause any flood impacts upstream of, adjacent to, or downstream of the project.

Therefore, no long term impacts to the 1% floodplain are anticipated as a result of the Recommended Plan.

8.4 THREATENED AND ENDANGERED SPECIES AND STATE PROTECTED SPECIES

Impacts of the No-Action Alternative

The No Action alternative would not effect federally endangered or threathened species or any State Protected species that may currently use or inhabit the project area. Additionally, since there will not be a construction project, there is no effect to existing habitat.

Impacts of the Recommended Plan

A few small immature pine trees would be removed along the proposed levee. Most of the levee is parallel to existing highway right-of-way corridors. These pine trees consist of young (less than 5-year old and less than 3-inch DBH) loblolly pines growing within the highway right-of-way. No vegetation (i.e., trees, shrubs, etc.) would be removed when U.S. Highway 258 and Shiloh Farm Road surfaces are raised up to 4.5-feet. No vegetation would be removed from the proposed 40 acre borrow area, which is currently a cultivated farm field. The proposed action would not remove

any mature (i.e., 60 year or older) pines. No known nesting or cavity trees are located within the project area. Therefore, the proposed action will have no effect on endangered red-cockaded woodpeckers or their habitat.

No known recent shortnose sturgeon populations have been found from the Delaware River, New Jersey, to the Cape Fear River, North Carolina, which includes the Tar River (Kynard 1997). Moreover, the proposed project will not place any fill material or any structures in any waters of the Tar River. Therefore, the proposed project will have no effect on shortnose sturgeon or their habitat.

Atlantic sturgeons may be found in the project area. However, the proposed project will not place any fill material or any structures in any waters of the Tar River. Any sedimentation and/or runoff from the construction site would be confined to the project area by State approved erosion/sedimentation control devices (see last paragraph in Section 8.5 Water Quality, below). Therefore, the proposed project will have no effect on Atlantic sturgeons or their habitat.

The Tar River spiny mussel is found in the project area. However, the proposed action would not place fill material and/or excavate any material from waters and/or adjacent wetlands within the Tar River. Any sedimentation and/or runoff from the construction site would be confined to the project area by State approved erosion/sedimentation control devices. Therefore the proposed action will have no effect the Tar River spiny mussel or its habitat.

There are currently no documented records of Northern Long Eared Bat (NLEB) within Edgecombe County. However, there have been very few surveys conducted for NLEB in eastern North Carolina. It is possible that future surveys may document NLEB in this county.

Accordingly, the proposed action will have no reasonably certain direct or indirect effect on any federally threatened or endangered species (or their habitats) and is in compliance with Section 7 of the Endangered Species Act of 1973, as amended. The Recommended Plan would not adversely impact any state designated protected species.

8.5 WATER QUALITY

Impacts of the No-Action Alternative

The No Action alternative would not involve any construction activity; therefore, the No Action alternative will have no effect on water quality.

Impacts of the Recommended Plan

The USACE will obtain the required erosion and sedimentation control permit from the North Carolina Department of Environment and Natural Resources, Division of Land Quality. The USACE construction contractor will abide by all conditions of the erosion and sedimentation control permit. Storm water and erosion control devices, both temporary and permanent, will be constructed as necessary. During construction, measures such as temporary seeding, mulching, matting, slope drains, and silt ditches and fences may be used to minimize erosion. Areas that have been cleared will be seeded and mulched. Matting may be used on sloped areas to stabilize the fill and hold seed in place. Silt fences will be constructed and installed according to NCDOT criteria. Upon completion of the project, all areas disturbed by construction shall be permanently seeded with native grasses and mulched.

The Recommended Plan will not result in any long-term impacts to water quality. During construction of the levee BMPs for sediment and erosion control, as well as stormwater control will be used to avoid any short term impacts to water quality.

A Section 401 Water Quality Certification under the Clean Water Act of 1977 (P.L. 95-217), as amended, is required for the proposed project and will be obtained from the NCDWR before construction begins. Construction would not begin until the certificate is received.

8.6 TAR-PAMLICO RIVER RIPARIAN BUFFER RULES

Impacts of the No-Action Alternative

The No Action alternative would not involve any construction therefore it will not have an effect on the Tar River or the associated buffer areas.

Impacts of the Recommended Plan

As per the Tar-Pamlico Buffer Rules, the Recommended Plan is considered levee maintenance (due to existing federal levee) and would be exempt from the Tar-Pamlico Buffer Rules.

8.7 CULTURAL RESOURCES

Impacts of the No-Action Alternative

Future and continued flooding within the Princeville community could adversely impact the three remaining structures listed in or determined eligible for nomination to the National Register of Historic Places (NRHP). Consequently, the No Action alternative would cause long-term adverse impacts to the project area.

Impacts of the Recommended Plan

In consultation with the SHPO, it was determined major project features were located within existing road or rights-of-way previously investigated by the NC DOT with no known historic properties (prehistoric or historic) eligible for or listed in the NRHP recorded. By letter dated July 19, 2005, the SHPO stated that the proposed project was unlikely to affect historic properties, including the Abraham Wooten House, Princeville School, Mount Zion Primitive Baptist Church, and Baptismal Site.

Additionally, a 40-acre site for a proposed borrow area was surveyed for cultural resources with no historic properties identified. The USACE determined that the Recommended Plan would have no effect on historic properties. These findings were provided to the SHPO by letter dated April 9, 2009 (Attachment D).

By letter dated May 8, 2009 (copy in Attachment D), the SHPO concurred that no known historic properties would be affected by the alignment within existing road rights of ways.

The SHPO, by letters dated February 18, 2014 and May 6, 2015, indicated that the proposed location for the earthen dike from US 258 to NC 111 is within a high probability area for the presence of Native American archaeological resources. The SHPO recommends that a comprehensive survey of the area be completed prior to construction.

Construction of the earthen levee within the new alignment along HWY 64 will be predominantly in previously disturbed areas, so no adverse effects to cultural resources are anticipated at this location; however, a comprehensive archaeological survey of this area, as well as the area mentioned above (dike from US 258 to NC 111), will be performed during PED to evaluate the significance of archaeological remains and potential project impacts. The USACE will continue to coordinate with the SHPO as the project moves forward to avoid and minimize impacts to the greatest extent practicable. Six federally recognized tribes have been invited to participate in the Section 106 consultation process.

8.8 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

Impacts of the No-Action Alternative

Flooding events within the Town of Princeville create the potential for underground storage tanks (USTs) to become damaged and possibly leak due to becoming submerged or displaced by flood waters. A release from a leaking UST can lead to soil, surface water, and groundwater contamination. The No Action alternative could result in potential negative environmental impacts due to HTRW releases within Princeville during future floods.

Impacts of the Recommended Plan

During the onsite inspection of June 30 and November 30, 2005, no drums or containers, above ground storage tanks, oily sheen on land or water, chemical smells, burn sites, or any unusual discoloration or subsidence in the soil or vegetation adjacent to the proposed levee extension alignments were observed in the project area.

Prior to construction, a Phase I HTRW assessment will be conducted within the footprint of the proposed levee alignments and the proposed borrow area. The Phase I HTRW assessment will be conducted in accordance with USACE Regulation ER 1165-2-132, dated June 26, 1992 and the American Society of Testing and Material (ASTM) Standard E 1527-05, Standard Practice for Environmental Site Assessments, Phase I Environmental Site Assessment process.

Hazardous and toxic substances used during the Proposed Action will be limited to fuel, oil, and other lubricants. The contractor is responsible for properly managing these materials using Best Management Practices, industry-accepted safety and operating standards and practices as well as proper techniques for on-site re-fueling. In accordance with federal and state regulations, any waste generated within the project area will be contained in proper storage, removed from the project area and disposed of in accordance with applicable regulations.

No hazardous or toxic waste sites are known to occur in the project area, nor will any toxic substances be introduced as a part of this project. No long-term impacts on HTRW are anticipated as a result of the Recommended Plan.

8.9 PRIME FARMLAND

Impacts of the No-Action Alternative

By not constructing the proposed Recommended Plan, there would be no adverse impacts to prime farmland.

Impacts of the Recommended Plan

Construction of a levee associated with the Recommended Plan would impact the following acreages of Prime Farmland Soils: 3.3 acres for the levee extension along U.S. Highway 258 and 5.9 acres along the eastern extension of the levee (Alignment I).

The 3.3 acres of Prime Farmland Soils along U.S. Highway 258 are located underneath the existing paved highways and the grassed road shoulders (non-agricultural areas). The additional 5.9 acres of Prime Farmland Soils are located in a farm field where the levee extension will be constructed.

The USACE is currently working with representatives from NRCS to identify impacts to prime farmlands. Per NRCS request the following tasks will be completed during the PED phase: A Form AD-1006 will be submitted to NRCS with accompanying maps showing project location and soil layers. After form submittal, NRCS will evaluate any impacts the project has on prime farmlands. No mitigation component is expected.

8.10 WETLANDS

A Princeville site visit took place on March 11, 2015 to field assess the modification to the levee alignment, specifically the area along the west side of US HWY 64. Participants included: USACE Wilmington District Princeville PDT members, USFWS, NC Division of Mitigation Services, NCDOT and the Town Manager for Princeville.

The primary goal of the onsite field visit was to evaluate Section 404 wetland impacts associated with the modification to the levee alignment from the east side of US HWY 64 to the west side of US HWY 64 (Segment 2) and potential mitigation measures to offset the impacts. The primary focus was the wetland impact areas adjacent to the west side of US HWY 64. There are three areas of wetlands that will be impacted by construction of the levee on this west side. Wetland areas to be impacted in Segment 2 consist of approximately 1.4 acres, 1.1 acres, and 1.7 acres, respectively, labeled on Figures 8.1 and 8.2 as wetland areas A, B, and C. There is also a small 0.34 acre wetland area referred to as Site D that will be impacted where the Segment 4 levee intersects with NC 111 (Figure 8.2).

Wetland Function Analysis

Ideally, functional assessment methodology would include the use of an approved model; however, there are no USACE-certified models suitable for the small riparian wetland areas to be impacted. Therefore, a qualitative analysis was used to evaluate wetland function for the purpose of determining appropriate mitigation.

The interagency team conducted a wetland functional evaluation field visit to analyze and determine:

- the level of hydraulic connectivity to the natural Tar River floodplain,
- general habitat classification
- hydrological modifications in the area
- possible sources of pollution
- verify if discharges into the wetland exist

Hydrology: The evaluation for the hydraulic connectivity to the Tar River floodplain concluded that two of the wetland areas to be impacted toward the southern portion of the US HWY 64 alignment (wetlands A and B) were significantly separated from the Tar River riparian floodplain by the old existing earthen levee and a large borrow pond. Several culverts did exist that provided conveyance of surface water between these two wetland areas and the borrow pond; however, the natural hydrology of the system had been severely altered by the addition of the levee and borrow pond features. There was no visible surface water within wetland area A. However, at the time of the field visit, there was standing surface water in wetland area B, partly due to debris blocking the culverts leading under the old levee.

Wetland area C, located alongside US HWY 64, is hydrologically connected to the natural Tar River floodplain since there was no obvious indication of any manmade alterations disconnecting this wetland area from the Tar River floodplain. There was also no evidence of surface water at this location during the field visit. Also, wetland D, the small 0.34 acre wetland area adjacent to NC 111, is hydrologically connected to the Tar River through an abutting unnamed tributary. At the time of the site visit, this small wetland area contained surface hydrology. Based on field observations wetland areas C and D exhibit a more natural, higher functioning hydrologic connection; while wetland areas A and B are lower functioning based on the restriction of natural connection to the Tar River and manmade alterations such as the existing levee with culverts. Additionally, all of the wetland areas evaluated still functioned in providing flood attenuation for the area.

Hydrologic modifications to the area: The hydrology of wetland areas A and B has been severely impaired by the modifications associated with the construction of the old earthen levee and borrow pond. Water flowing into these two wetland areas also includes increased stormwater flows from US HWY 64 which is directly abutting the features.

Hydrology of the 1.7 acre wetland area C exhibited only slight modifications. Specifically, the main areas that were modified were where the US HWY 64 road shoulder fill encroached into the wetland area. This wetland area was still hydrologically connected to the Tar River floodplain via a small tributary located on the northwestern side of the wetland adjacent to the powerline utility corridor. No modifications to hydrology were apparent at the small 0.34 acre wetland area D. This small area directly abutted a large road side ditch along NC 111 and a farm irrigation ditch, both of which connected the wetland area to the Tar River.

Habitat classification: The general habitat found in wetland areas A and B was highly disturbed by the construction of the US HWY 64, which resulted in alteration of many of the naturally occurring plant species and habitat. The prevalent tree species found within these two wetland areas were young red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), small loblolly (*Pinus taeda*) and pond pines (*Pinus serotina*). The majority of the tree species on the site were determined to be young due to most having a diameter at breast height (dbh) of less than 6 inches. The understory included many invasive species including: Chinese privet (*Ligustrum sinsense*), multiflora rose (*Rosa multiflora*), and Japanese honeysuckle (*Lonicera japonica*).

Wetland area C more closely resembled a Coastal Plain Levee Forest type, which is what would be expected for this type of area. The Coastal Plain Levee Forest is a palustrine system which is seasonally to intermittently flooded. The trees observed in this area included sweet gum (*Liquidambar styraciflua*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), river birch (*Betula nigra*), and Water hickory (*Carya aquatica*). The understory was sparsely scattered with small patches of giant cane (*Arundinaria gigantea*), muscadine vines (*Vitis rotundifolia*),

Virginia creeper (*Parthenocissus quinquefolia*), greenbrier (*Smilax rotundifolia*) and Rattan vine (*Berchemia scandens*).

Wetland area D consists of a Coastal Plain Small Stream Swamp (Schafale and Weakley 1990). Trees observed within this community included: baldcypress (*Taxodium distichum*), swamp chestnut oak (*Quercus michauxii*), black oak (*Quercus nigra*), sweet gum (*Liquidambar styraciflua*) and green ash (*Fraxinus pennsylvanica*). The understory within this wetland area contained American holly (*Ilex opaca*), giant cane (*Arundinaria gigantea*), red maple (*Acer rubrum*), and swamp ash (*Fraxinus caroliniana*).

Although, no significant fish or wildlife habitat would be impacted there are several common species of mammals that have been documented to occur in the riparian woodlands along the river. Observed species include: the whitetail deer (*Odocoileus virginianus*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), and cottontail (*Sylvilagus floridanus*). Common bird species documented from the Tar River area include the red-eyed vireo (*Vireo olivaceus*), kingfisher (*Megaceryle alcyon*), barn swallow (*Hirundo rustica*), Carolina wren (*Thryothorus ludovicianus*), cardinal (*Cardinalis cardinalis*), mourning dove (*Zenaidura macroura*), bobwhite quail (*Colinus virginianus*), and mockingbird (*Mimus polyglottos*).

Discharges and pollutants into the wetland: All of the wetlands to be impacted along the western side of US HWY 64 are subject to pollution from stormwater runoff from the highway. Along with the increased stormwater comes increased pollutants such as fertilizers, pesticides, suspended sediments, petroleum products (oil and grease), and metals such as iron, copper, mercury and chromium. Wetland area D is to a lesser extent similarly affected by stormwater runoff from NC 111.

In summary, the evaluation of the existing wetlands concluded that the project, as currently proposed, would adversely impact approximately 2.5 acres (wetlands A and B) of low habitat/low functional value Section 404 wetlands and approximately 2.04 acres (wetlands C and D) of high habitat/ high functional value Section 404 wetlands. A Section 404(b)(1) Evaluation is included in Attachment A. The Evaluation will be updated to include additional information, as appropriate, during PED.

Screening of Mitigation Alternatives

Compensatory mitigation can be carried out through four methods: the restoration of a previously-existing wetland or other aquatic site, the enhancement of an existing aquatic site's functions, the establishment (i.e., creation) of a new aquatic site, or the preservation of an existing aquatic site.

In-lieu fee Program: Payment into the in-lieu fee program would allow for a combination of the above methods based on the evaluation of the wetland sites available to NCDMS within the Tar River watershed. One of the benefits of using the NCDMS is that the selection, planning, building and monitoring of the project (to ensure success) will be executed by the NCDMS program, optimizing outputs for the site chosen and avoiding long-term involvement and commitment by the USACE. The wetlands impacts associated within the current levee alignment occur within the lower Tar River Hydrologic Unit Code (HUC) 03020103. During a site visit on March 11, 2015, NCDMS stated that mitigation credits were available within this HUC for purchase as mitigation for impacts associated with the Princeville levee alignment. Proposed mitigation for the wetland impacts associated with the current alignment of the Princeville levee is as follows:

- Approximately 2.5 acres of low habitat/low functional value Section 404 wetlands (wetlands A and B) will be mitigated for with purchase of 2.5 acres of in-lieu fee mitigation credit from the North Carolina Division of Mitigation Services (NCDMS). Since wetland areas A and B are considered low quality and have low functional value, mitigation would require no more than 2.5 acres of mitigated acreage to compensate for the wetland impacts. The 2.5 acres of mitigation will meet the “no net loss” requirement for wetland impacts.
- Approximately 2.04 acres of high habitat/high functional value Section 404 wetlands (wetlands C and D) will be mitigated for with the purchase of 4.25 acres of in-lieu fee mitigation credit from the NCDMS. Because wetland areas C and D provide higher habitat/ higher functional value, payment for the exact acreage as that impacted would not adequately mitigate for the impacts to these high quality wetlands. The NCDMS would select the appropriate mitigation area within the watershed, construct the restoration project, plant trees and vegetation and monitor for hydrologic functionality. The riparian wetland site would take many years for the trees/vegetation to reach maturity and for the hydrology to meet that of a high functioning wetland. Since wetland areas C and D are high functioning wetlands, then more acreages is required to compensate for the amount of time that it will take for the restored wetland area to provide a high ecological output.

The NCDMS fee for wetland impacts within the study area is \$39,428 per acre. The total mitigation acres needed for purchase will be 6.75 acres, for a total cost of \$266,139.

Onsite wetland restoration: Onsite restoration was not considered a viable option for mitigation due to the lack of state land available for restoration within the project foot print. Also, onsite compensatory mitigation projects often have limited success due to surrounding development or altered landscapes (in this case a levee project) that could adversely affect the functionality and sustainability of the restoration.

Offsite wetland restoration: Offsite wetland restoration was eliminated as an alternative for mitigation due to high cost. The estimated costs to construct offsite restoration are shown in the table below and would involve: real estate acquisition of land within the same Tar River watershed, development of a mitigation plan, design, preparation of plans and specifications, construction (equipment, labor, plantings, and construction materials), long-term monitoring and corrective action, as needed.

Task	Estimated Cost	Notes
Development of Mitigation Plan	\$25,000	plan development & coordination
Land	\$14,000	~\$2,000 per acre
SAS Real Estate Administration	\$7,000	SAS-RE labor
Design	\$50,000	based on actual costs for similar project
Preparation of Plans and Specifications	\$25,000	based on actual costs for similar project
Construction	\$200,000	based on actual costs for similar project
Construction materials	\$60,000	based on actual costs for similar project
Mobilization & Demobilization	\$20,000	based on actual costs for similar project
Plantings (plants & installation)	\$100,000	based on actual costs for similar project

Site Monitoring	\$35,000	based on actual costs for similar project
Corrective Action (replanting, if needed)	\$10,000	based on actual costs for similar project
TOTAL:	\$546,000	
TOTAL w/ 20% contingency	\$655,200	

Conclusion:

Use of North Carolina’s established in-lieu fee mitigation program has been identified by the USACE and resource agencies as an effective replacement of aquatic resources that will be adversely impacted by the placement of fill for the proposed construction in wetlands. This approach is also the most cost effective option, \$266,139 versus \$655,200 for offsite mitigation. The use of the NCDMS in-lieu fee program for mitigation will also help maintain the overall quality of the watershed since the USACE in-lieu fee payment would be utilized in an established restoration area within the Tar River watershed. The planned restoration by NCDMS would provide wetland mitigation that exhibits the operational watershed functions (hydrology and hydromorphology) and biological functions. As part of the in-lieu fee program, the NCDMS would also be responsible for meeting the approved wetland monitoring requirements and taking corrective action, as needed, to ensure that the wetland success criteria were being met.

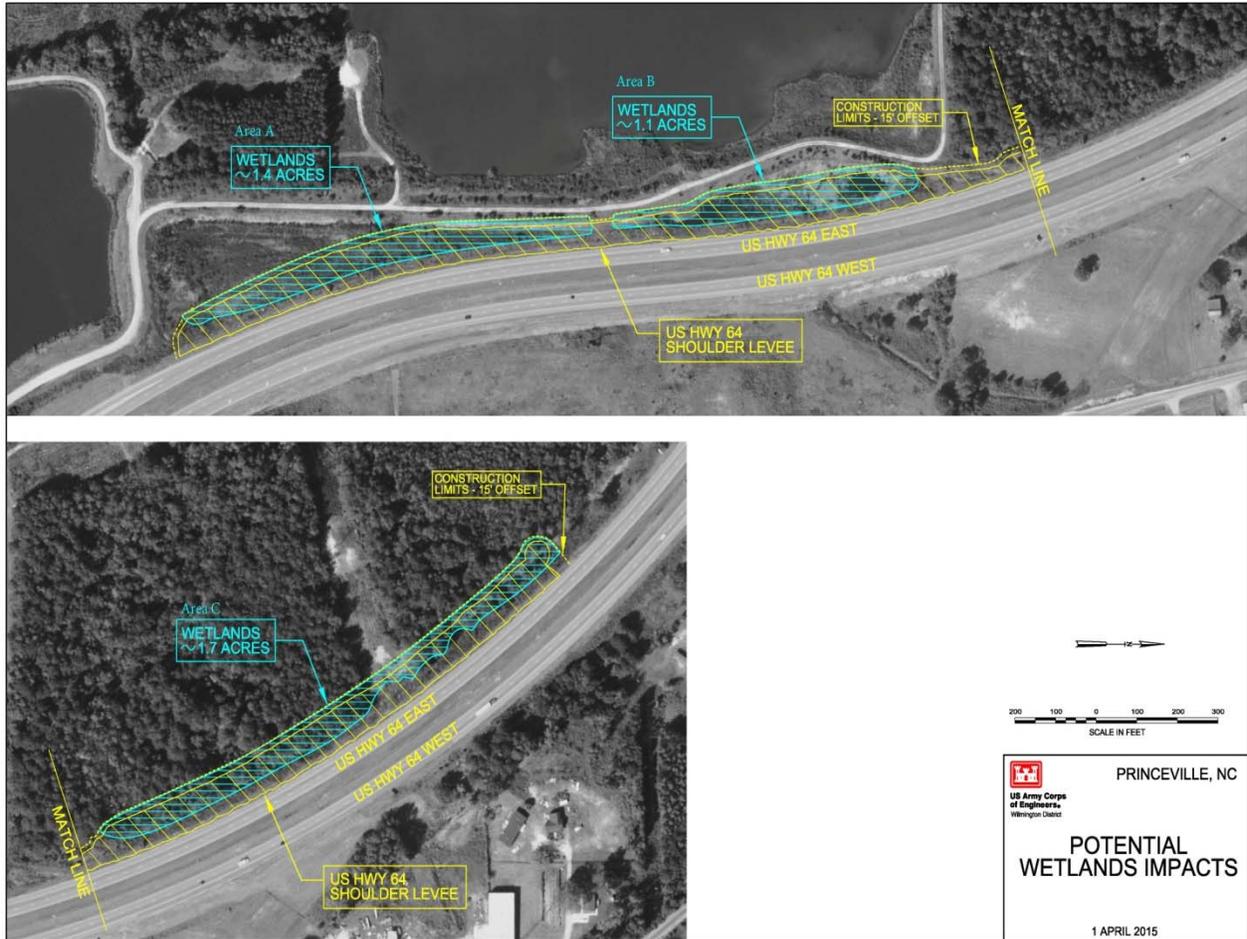


Figure 8.1:Wetland_Areas_A,B,C

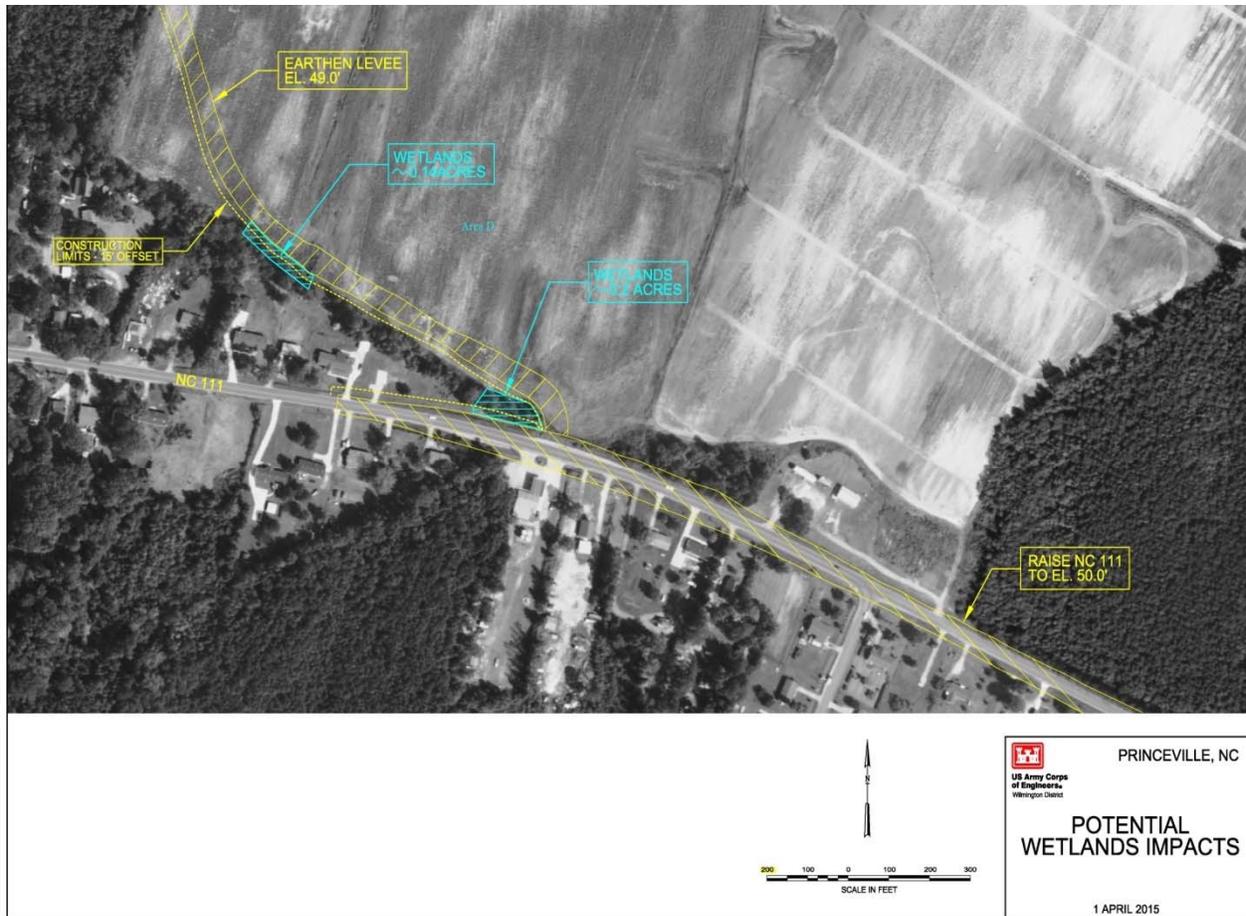


Figure 8.2: Wetland_Area_D

Impacts of the No-Action Alternative

The No Action alternative would not result in any deposition of fill in wetlands or land use alterations associated with the construction of a levee. Therefore, the No Action alternative would not have any anticipated adverse impacts to wetlands within the project area.

Impacts of the Recommended Plan

The Recommended Plan has been evaluated for wetlands and it is estimated that approximately 5 acres of wetlands (along US HWY 64 and NC 111) will be impacted as part of the levee construction. Compensatory mitigation will be completed by payment into North Carolina's established in-lieu fee mitigation program.

8.11 AIR QUALITY

Impacts of the No-Action Alternative

The No Action alternative would not create any new regulated air emissions or result in any increase in air emissions. Therefore, the No Action alternative would have no long-term effect on air quality in the vicinity of the project area.

Impacts of the Recommended Plan

The type of equipment used in the project area may include: bulldozers, backhoes, pans, and/or dump trucks. This equipment would be working in a window of 730-days (2-years) to clear and grub the proposed levee extension alignments, haul the borrow material to the job site, replace roadways, and construct the flood control levees. Work would be only during daylight hours and 5 days a week (Monday through Friday). Any vegetation removed from the project site would be trucked to a suitable disposal area or chipped in place. No open burning of vegetation material (i.e., stumps, limbs, leaves, etc.) will be allowed. The equipment used for the proposed action would be substantially less than 50 tons/year of VOC's and 100 tons/year of NOx and therefore a conformity determination is not required (Personal Communication, Regional Supervisor, North Carolina Department of Environment and Natural Resources, Division of Air Quality, Raleigh Regional Office, September 22, 2009). Moreover, dust emissions resulting from site preparation during the construction phase would be minor and subject to fugitive dust control measures.

Therefore, the Recommended Plan is not expected to have any long-term effect on air quality within the vicinity of the project area.

8.12 AESTHETICS

Impacts of the No-Action Alternative

Future flooding of the Princeville community may cause adverse impacts to this historic community. Continued flood damage to Princeville's infrastructure, homes, and commercial properties may cause individuals to abandon their property which could cause these areas to become blight on the landscape. These abandoned structures would also depress the aesthetics of the remaining properties in the project area. The No Action alternative would cause long-term adverse impacts to the aesthetics of the project area.

Impacts of the Recommended Plan

During project construction, the proposed action may extend the existing flood control levees along U.S. Highways 64 and NC 33, U.S. Highway 258, and Shiloh Farm Road, and remove fill material from the proposed 40-acre borrow area.

The proposed work along US Highway 64 and NC Highway 33 would be located within the existing highway right-of-way and behind a small residential area. A few small and immature pine trees would be removed along the proposed levee extension within the US Highway 64 right-of-way. No relocations of any homes or any non-structural measures are planned for this area.

The levee extension work along U.S. Highway 258 would increase the height of the existing highways up to 4.5 feet. The proposed action will require the ramping of driveways up to the new roadway level, which would impact approximately 27 residential or farm drives, plus the raising of Strickland Drive. The proposed order of work would be the following: US Highway 64 surface will be raised first and the pertinent ramped driveways constructed. The property owners would be able to access their residences from Shiloh Farm Road. Once the work on US Highway 258 is completed, then work will proceed to raising two sections of Shiloh Farm Road. This levee extension will directly impact property owners living off US Highway 258 and Shiloh Farm Road, but these impacts are temporary with no long term affects. Additionally, these properties will not have any substantial change in their views or perspectives.

Once this work has been completed on US Highway 258 and the intersection of 258 and Shiloh Farm Road, the two portions of Shiloh Farm Road (near NC Highway 111) would be elevated by 2 feet. During construction, access to property would be either from NC Highway 111 or US Highway 258. Additionally, these properties will not have any substantial change in their views or perspectives.

Once work has been completed along US Highways 64, NC Highway 33, and US Highway 258, the levee extensions would be stabilized and grassed. Once the proposed levee extensions have been completed, the overall aesthetic appearance of the project area should not be adversely impacted.

Excavation of the proposed borrow area off NC Highway SR 1524 would not adversely impact the aesthetics of the community since there are many ponds and water features in the project area.

Any aesthetic impacts would be minor and temporary, occurring during construction. No substantial long-term impacts are anticipated as a result of implementing the Recommended Plan.

A potential positive impact to the town would come with risk reduction and preservation of the existing structures from flooding events.

8.13 OTHER SIGNIFICANT RESOURCES

Section 122 of Public Law 91-611 identifies other significant resources that should be considered during project development. These resources, and their occurrence in the study area, are described below.

8.13.1 AIR, NOISE AND WATER POLLUTION

Air and water quality are discussed in Sections 8.11 and 8.5. Noise is not a prominent feature of the project area due to its low density of development, lack of commercial and industrial sites,

and lack of adjacency to any high noise sources. The town is primarily residential with some adjacent farm fields. No major industry is located within the town limits.

Impacts of the No-Action Alternative

The No Action alternative would not involve construction of a levee project therefore, it would not result in any increase in air emissions, additional noise, or water pollution. Therefore, the No Action alternative would have no long-term effect on air, noise and water pollution within the project area.

Impacts of the Recommended Plan

No blasting or use of explosives will be used in this project. Construction will elevate noise levels somewhat and may be noticeable in the residential area along U.S. 258 and Shiloh Road (N.C. Highway SR 1523). However, construction contractors will be required to comply with all local noise ordinances. No long-term adverse impacts are anticipated regarding any significant resources identified by Section 122 of Public Law 91-611 of the Recommended Plan.

8.13.2 CONSTRUCTED AND NATURAL RESOURCES, AESTHETIC VALUES, COMMUNITY COHESION AND THE AVAILABILITY OF PUBLIC FACILITIES AND SERVICES

Constructed resources are defined as bridges, parking lots, utility lines, roads, businesses, industries, residences or parklands. Natural resources are discussed in the Vegetation and Wildlife, and Wetlands sections.

Impacts of the No-Action Alternative

Continued future flooding would adversely impact constructed resources, aesthetic values (Section 8.12), community cohesion and the availability of public facilities and services in the project area to operate. The No Action alternative would cause long-term adverse impacts to the project area.

Impacts of the Recommended Plan

The work along NC-111, U.S. Highway 258 and Shiloh Farm Road would increase the height of the existing highways by about 4.5 feet. This levee extension and road raise will require the ramping of drives up to the new roadway level, which includes approximately 27 residential or farm drives, and 1 subdivision entrance, Strickland Drive. However, these impacts are not anticipated to be significant. Natural resources and aesthetic values are discussed above. During construction of the proposed action, some temporary short term impacts may affect community cohesion. However, once the work is completed the proposed action offers no long-term barriers for movement of the population in the area and therefore has little bearing on community cohesion. Moreover, the completion of the proposed action would support Princeville's community cohesion by reducing flood damages to the area from the 1% chance event. Public facilities and services exist throughout the project area in the form of highways and utility lines. None of these resources would suffer any long-term impacts by the project. No long-term adverse impacts are anticipated regarding any significant resources identified by Section 122 of Public Law 91-611 of the proposed action.

8.13.3 EMPLOYMENT, UNEMPLOYMENT, INCOME, AND PROPERTY VALUE

Between 2006 and 2010 about 880 residents of the Town of Princeville (16 years and older) were employed, primarily in manufacturing & production (34.9%), service industries (28.9%), sales (18.0%), and management/professional (12.8%). The unemployment rate for the 2006-2010 period was 14.0%, compared to the 9.0% rate statewide. Median 2006-2010 per capita income was \$12,000, median household income is \$21,000, and median house value is \$77,300 (U.S. Census Bureau Fact Sheet; 2006-2010 Estimate).

Impacts of the No-Action Alternative

Future continued flooding within the Princeville community would increase unemployment by minimizing remaining job opportunities, reduce income, and further reduce property values. Inhabitants could walk away from their flood damaged properties, thereby causing the value of the remaining properties to be reduced. The No Action alternative would cause long-term adverse impacts to the project area.

Impacts of the Recommended Plan

No long-term adverse impacts are anticipated regarding any significant resources identified by Section 122 of Public Law 91-611 with implantation of the Recommended Plan.

8.13.4 DISPLACEMENT OF PEOPLE, BUSINESSES AND FARMS

Impacts of the No-Action Alternative

A levee would not be constructed with the No Action alternative therefore, no anticipated long-term impacts are anticipated.

Impacts of the Recommended Plan

As indicated in Section 8.12, once U.S. Highway 258 and Shiloh Farm Road surfaces would be raised an estimated 4.5 feet, the proposed action would require the ramping of drives up to the new roadway level, which is approximately 27 residential or farm drives, and 1 subdivision entrance, Strickland Drive. Construction associated with the Recommended Plan would have long-term impact to some driveways located within the town, however, the benefit from the reduced flooding would be a positive impact.

8.13.5 COMMUNITY AND REGIONAL GROWTH

In recent years, Edgecombe County has experienced population decline, employment stagnation, high unemployment, and substantial manufacturing plant closings and layoffs. This decline occurred during a period of strong economic growth for North Carolina and the United States (USDOT 2010).

Impacts of the No-Action Alternative

Future continued flooding within the Princeville community would adversely impact community growth. Inhabitants could walk away from their flood damaged properties, thereby causing the value of the remaining properties to be reduced. The No-Action alternative would cause long-term adverse impacts to the project area.

Impacts of the Recommended Plan

The proposed action would provide flood risk reduction for the 1% chance event in the project area, thereby improving the community and growth climate of the project area.

During construction of the Recommended Plan, individuals will be temporarily inconvenienced either while their driveways are being ramped to the new roadway level. However, once all work has been completed, the proposed action has been considered, and would not cause, any long-term adverse economic, social, and environmental effects regarding resources identified by Section 122 of Public Law 91-611.

8.13.6 POTENTIAL IMPACTS DUE TO CLIMATE CHANGE

With the support of the Corps' Institute of Water Resources' Climate Preparedness and Resiliency Community of Practice, three tools were applied to the Tar-Pamlico Basin and the Tar River, to evaluate vulnerability due to climate change: USACE Screening-Level Climate Change Vulnerability Assessment (VA) Tool; ECB-2014-10 Tool; and Non-Stationary Detection Tool. The VA Tool indicated that the Tar-Pamlico Basin is not one of the 20% most vulnerable watersheds for wetter or drier conditions. The ECB 2014-10 Tool indicated that over time, the change for trending toward drier conditions is near 0%, and the trend toward wetter conditions is near 2%. Annual maximum stream flow has been constant, and stream flow variability has been consistent through time. The Non-Stationary Detection Tool allows a more project-specific focus within the watershed, and shows that the hydrology of the location has been stationary over time. All of these suggest that the proposed project is not vulnerable to climate change impacts.

8.14 SOCIOECONOMIC CHARACTERISTICS

Impacts of the No-Action Alternative

Flooding will continue at present frequency in the project area for the No-Action alternative, thereby adversely impacting socioeconomic characteristics such as population growth, existing infrastructure resources, and urban development. Princeville's residents and their property would continue to be damaged by future flooding which could result in adverse impacts to the residents and their property.

The existing levee at Princeville does not provide the town with flood damage reduction from events ranging from 5% chance to approximately 0.5% chance events, since waters can enter from either end of the existing levee along U.S. Highway 64 and 258. Princeville's infrastructure (roads, bridges, utility lines, etc.), commercial facilities, residents and their property would continue to be adversely impacted by being flooded.

Impacts of the Recommended Plan

Once completed the Recommended Plan would provide Princeville with an approximate 76% assurance that the 1% event would not inundate the town. The Recommended Plan would not adversely impact any socioeconomic characteristics such as population growth, existing infrastructure resources, and urban development.

8.15 CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) for implementing the National Environmental Policy Act (NEPA) requires an assessment of the

effects of a Recommended Plan on the environment. Those effects are to include the following components:

... ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

According to the CEQ, a cumulative effect:

...is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

An assessment of cumulative effects helps one identify the significance of an impact. The assessment sets the stage for determining the importance of the incremental effect produced by a Recommended Plan. When considering significance, one should examine whether the action is related to other actions with individually insignificant, but cumulatively significant impacts. The CEQ regulations state that "significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment".

An analysis of cumulative effects does not need to be performed on every natural resource in the project area or potential avenue of environmental impact. Such an analysis is warranted only for those resources or issues that are likely to be affected by the proposed alternatives in a substantial manner.

8.15.1 IDENTIFICATION OF SIGNIFICANT RESOURCES

The State and Federal Agencies within the Princeville PDT reviewed a list of potential means by which the Princeville Flood Risk Project could adversely affect the human environment and agreed that the following were the major resources or issues of concern for this project:

- Wetlands
- Wildlife Habitat
- 1% Chance Event Floodplain
- Increased adjacent and downstream flooding
- Farmlands (i.e., Prime Farmland Soils)
- Endangered and Threatened Species
- Cultural / Historic Resources
- Tar River Riparian Buffer Area
- Socio-economic Resources

8.15.2 PAST ACTIONS

Since the late 19th century, the USACE has worked to reduce flood impacts by removing snags and other debris from the river channel and has reduced flood risk to the Towns of Princeville and Speed by constructing flood control levees. According to the USACE, Wilmington District, Project

Maps FY-90, dated 30 September 1990, the following USACE projects have been completed within the Tar River basin:

- Act dated March 3, 1879, authorized the clearing of snags from the Tar River channel from Washington to Tarboro.
- Act dated September 19, 1890, authorized snagging debris from a 40-mile long reach of Fishing Creek, a tributary of the Tar River.
- Act dated June 22, 1936, authorized clearing of snags from the Tar River channel from Tarboro to Rocky Mount.
- Authorized under Section 2 of the Flood Control Act of August 28, 1937, clearing snags between Washington and Rocky Mount (mile 17 and 89, respectively) on the Tar River.
- Act dated September 3, 1954 (Section 208), authorized clearing snags from about 20-miles of Conetoe Creek, a tributary of the Tar River.
- Authorized February 6, 1964, under Section 205 of the 1948 Flood Control Act, as amended, construction of the 2.89-mile long earthen flood control levee to protect Princeville. Work was completed in September 1967.
- Authorized February 18, 1977 under Section 205, as amended, construction of a flood control levee around the Town of Speed, channel excavation and snagging of Deep Creek, a tributary of Fishing Creek, which is a tributary of the Tar River. Work was completed in 1983.

The following dams are located on the Tar River:

- **Tar River Reservoir:** In 1971, the City of Rocky Mount constructed the 1,860-acre Tar River Reservoir. The impoundment extends about 11 miles upstream of the dam. Water supply was the primary purpose but it also provides recreational uses such as boating, fishing, hunting, and water skiing. Pursuant to the N.C. Dam Safety Act, the Tar River Reservoir Dam is required to provide a continuous downstream release of 80 cubic feet per second (cfs) in the Tar River (NCDENR 2004).
- **Rocky Mount Mills Dam:** This dam is also located in Rocky Mount and is the lowest dam on the Tar River (i.e., no other dam between it and Pamlico Sound). In 1909, Rocky Mount Mills constructed the 15-foot high stone dam, which is considered a “run of the river” impoundment. “Run of the river”, means that there is no flood pool and all waters reside within the existing river channel. Rocky Mount Mills Dam, an unlicensed hydropower facility, is required to provide, under the N.C. Dam Safety Act, a continuous, instantaneous minimum flow of 60 cfs in the natural channel directly below the dam, the bypassed reach. The dam is also required to have a calibrated staff gage on the dam crest or in the bypassed reach to monitor the flow requirement (NCDENR 2004).

8.15.3 PRESENT ACTIONS

The Recommended Plan consists of:

- Constructing flap gates on twelve (12) ungated culverts, and construction of several new culverts to address floodflow penetration and interior drainage issues, respectively;
- Modifying the intersection of N.C. Highway 33 and U.S. Highway 64, increasing elevations of the interchange of N.C. Hwy 33 and U.S. Hwy 64, by up to 4.5 feet;
- Installation of a “Shoulder Levee” parallel and adjacent to a low spot on Highway 64;

- Extension of the existing levee at the point of its current northern-most terminus along Highway 258, to the east, and then south, to its juncture with the approximate southern terminus of the project.
- Non-structural measures that consist of: Flood Warning and Evacuation Plan updates, Flood Risk Management Education and Communication Plans for both adult and young person forums, and updating of Floodplain Management, Building and Zoning Code plans. This element also includes upgrading of existing evacuation route signage.

Evaluations by the USACE, along with discussions with representatives from the State and Federal agencies indicated that the proposed project would not have a significant impact on wetlands, wildlife habitat, 1% floodplain, farmlands (i.e., prime farmland soils), Threatened and Endangered species, cultural/historic, and socio-economic resources. These resource-specific impacts are described in the preceding section of this report. The proposed action would affect about 5.9 acres of cultivated field (within the proposed borrow area), 9.2 acres of prime farmland soils (3.3 acres of which is found underneath the raised paved road and grassed shoulders), and approximately 5 acres of wetlands in the floodplain adjacent to Highway 64. No adverse impacts to endangered and threatened species, cultural resources, and socio-economic resources would occur.

8.15.4 REASONABLY FORESEEABLE FUTURE ACTIONS

Currently, discussions with USACE, Regulatory Division, the NCDOT, and NCDNR indicate that no major new future foreseeable projects are proposed within the Tar River Basin that would adversely impact the following: Wetlands, Wildlife Habitat, 1% Floodplain, Farmlands (i.e., Prime Farmland Soils), Endangered and Threatened Species, and Tar River Riparian Buffer Area.

To verify the fact that no major future foreseeable projects would take place within the Tar-Pamlico River Basin, the NCDWR, 2004 Tar-Pamlico River Basin-wide Water Quality Plan indicates that within the Tar River Basin only 1% of the land falls into the urban/built-up category (or 348,166 acres). Moreover, the following information in *Table 8.1* reflects the current and estimated population in Edgecombe County.

Table 8.1: Current and estimated population in Edgecombe County (NC Office of State and Budget Management)

	Population 2010	Population 2020	Estimated Population 2030	Population Change 2010 to 2020	Estimated Population Change 2020 to 2030
Edgecombe County	56,552	54,348	52,308	-2,204	-2,040

There does not appear to be any significant development pressure either within Edgecombe County or the Tar-Pamlico River basin that would adversely impact these important resources (i.e., wetlands, wildlife habitat, 1% floodplain, farmland (Prime Farmland Soils), Endangered and Threatened Species, Cultural Resources, Tar River Riparian Buffer area, and socio-economic resources).

Impacts of the No-Action Alternative

No adverse impacts are anticipated.

Impacts of the Recommended Plan

An analysis of cumulative effects does not need to be performed on every natural resource in the project area or potential avenue of environmental impact. Such an analysis is warranted only for those resources or issues that are likely to be affected by the proposed alternatives in a substantial manner. Notwithstanding, the project review area was expanded to include all of Edgecombe County for the cumulative effects analysis, and personal communication with Mr. Craig Brown of the USACE Raleigh Regulatory office on September 9, 2015 indicated there are currently no ongoing or future projects planned for the Edgecombe County area. This is consistent with other coordination efforts with State and local municipalities in the watershed. As the area upstream is not one of the highly-developing areas of North Carolina, or in close proximity to those, and the watershed area so large, cumulative effects of unforeseen development are viewed as minimal. Since there are no upcoming projects, no comprehensive list is necessary. The following sections provide greater detail on this analysis.

8.16 FINDING OF NO SIGNIFICANT IMPACT

Based on the assessment of impacts in this report and results of public review of the Draft report, the proposed action is not expected to significantly affect the quality of the human environment. This determination has been confirmed through further coordination of this Integrated Feasibility Report and Environmental Assessment, therefore an Environmental Impact Statement will not be required. A Finding of No Significant Impact (FONSI) has been prepared; it is also attached to this Report.

SECTION 9 -PLAN IMPLEMENTATION

9.1 DIVISION OF PLAN RESPONSIBILITIES

Federal policy requires that costs for water resources projects be assigned to the various purposes served by the project. These costs are then apportioned between the Federal government and the non-Federal sponsor according to percentages specified in Section 103 of the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662).

COST SHARING

Cost sharing for construction of the Recommended Plan would be consistent with that required for structural flood risk management projects by Section 103 of the Water Resources Development Act of 1986, as amended (33 USC 2213). Non-Federal sponsors for structural flood control projects are required to provide a minimum cost share of 35 percent and a maximum of 50 percent of project costs, including a minimum cash contribution of 5 percent. Non-Federal interests also are required to provide all lands, easements, rights-of-way, and disposal areas and perform all necessary relocations (LERRD) required for the project, with credit afforded toward the non-Federal interest's cost share for the value of any such LERRD contributions. The value of the non-Federal portion of the LERRD is currently estimated at \$5,614,460 (of an estimated \$5,830,000 total)

Annual OMRR&R costs, such as inspection costs are 100 percent non-Federal responsibility. The Federal government is responsible for preparing and providing an OMRR&R manual to the Sponsor.

The current estimated first cost of the Recommended Plan is \$21,540,000. Cost-sharing for the Recommended Plan would be 65% Federal / 35% non-Federal, or \$14,001,000 Federal/\$7,539,000 Non-Federal). The benefit to cost ratio is currently 0.5 to 1.

Cost allocation and apportionment is shown in *Table 9.1*.

Table 9.1: Cost Allocation and Apportionment (October 2015 price levels)

Project purpose	Project First Cost	Apportionment %		Apportionment \$	
		Nonfederal	Federal	Nonfederal	Federal
Initial project construction costs					
Flood risk management	\$21,540,000	35%	65%	\$7,539,000	\$14,001,000
LERRD credit	-	-	-	\$5,729,000	-
Cash portion	-	-	-	\$1,810,000	

Note: Estimated RE project costs in Real Estate Appendix reflect October 2014 price levels and are not differentiated per cost apportionment policies; Project First Costs shown above in Table 9.1 have been brought to October 2015 price levels and reflect Federal/non-Federal cost apportionment requirements.

9.1.1 FINANCIAL ANALYSIS

The North Carolina Department of Environment and Natural Resources, is the non-Federal cost sharing sponsor. The Sponsor has provided a self-certification of financial capability, which is provided in the Supplemental Materials binder.

9.1.2 Project Partnership Agreement

The model Project Partnership Agreement will be used.

9.1.3 ITEMS OF LOCAL COOPERATION

Federal implementation of the recommended project would be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

a. Provide a minimum of 35 percent, but not to exceed 50 percent of total project costs as further specified below:

1. Provide 35 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;
2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;
3. Provide, during construction, a contribution of funds equal to 5 percent of total project costs;
4. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;
5. Provide, during construction, any additional funds necessary to make its total contribution equal to at least 35 percent of total project costs;

b. Not use funds from other Federal programs, including any non-federal contribution required as a matching share therefore, to meet any of the non-Federal sponsor's obligations for the project unless the Federal agency providing the funds verifies in writing that such funds are authorized to be used to carry out the project;

c. Not less than once each year, inform affected interests of the extent of risk reduction afforded by the project;

d. Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;

e. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project cooperation agreement, and to implement such plan not later than one year after completion of construction of the project;

f. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to

prevent unwise future development and to ensure compatibility with risk reduction levels provided by the project;

g. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of risk reduction the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

h. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

i. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

j. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

k. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

l. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

m. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act

(formerly 40 U.S.C. 327 *et seq.*), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);

n. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

o. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;

p. Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

q. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

9.2 VIEWS OF THE NON-FEDERAL SPONSOR

The Recommended Plan is acceptable to the non-Federal sponsor as the most cost-effective plan to provide needed flood risk reduction to the Town of Princeville.

SECTION 10 – COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

The following paragraphs summarize the relationship of the Recommended Plan to the most pertinent Federal, state, and local requirements.

10.1 EXECUTIVE ORDERS

EXECUTIVE ORDER 12898 (FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW INCOME POPULATIONS)

The Town of Princeville consists of a population that is both minority and low-income. The population is over 96% African-American. The median dollar value of owner-occupied residences in Princeville (\$77,300) is 41% of the national average (\$188,000). Per capita income (\$12,000) is 44% of the national average (\$27,300). Median household income (\$21,000) is 40% of the national median (\$51,900). The proposed project would have no more than a minimal adverse impact on the residents of Princeville or other communities; conversely, it would provide distinctly positive impacts. The intent of this project is to increase the level of flood risk management for the town and some adjoining residents. Risk of gentrification of the town is extremely low; there is substantially more desirable property available in the Town or Tarboro on the opposite bank of the river, and which is itself, already re-developing and attracting new residents. Risk of displacement of residents due to rising property values is extremely unlikely. The project should therefore provide positive influences on the sustainability and potential growth of the community, as well as exerting a positive influence on the daily lives of the residents.

EXECUTIVE ORDER 11988 (FLOODPLAIN MANAGEMENT)

The Town of Princeville is located in the floodplain of the Tar River; The objective of the E.O. is to avoid development in the base floodplain unless it is the only practicable alternative. The following discussion documents the eight steps outlined in ER 1165-2-26:

(1). The proposed actions are both within and outside the base flood plain (1% chance floodplain). The proposed culvert modifications, interchange raise, most of the shoulder levee, and the base of and most of the new earthen levee and portions of the raised highway (NC-111) are within the base flood plain. The upper portions of these features are above the water surface elevation of the 1% chance event.

(2). There are no practicable alternatives to the features provided in the proposed plan. In order to provide the Town of Princeville with a practicable level of risk reduction, structural features consisting of culvert modifications, interchange raising, a shoulder levee, a short section of new earthen levee and raised highway segments (NC-111) are the only, and smallest footprint, solution. There are no other practicable measures by which flooding from those sources might be devised (i.e., outside the floodplain) that would either or both become impracticably expensive, or would cause greater impacts to the floodplain (more floodplain impacted by either inclusion in the project footprint, or more floodplain covered by project features).

(3). The public has had the chance to comment on the proposed action during Public Information Sessions held in the Town of Princeville, and through a Public Review period. No negative comments were received on use of the floodplain. The public will have more time to comment during State and Agency review.

(4). Beneficial and adverse impacts are discussed in Sections Five, Six, Seven and Eight of the Main Report, and summarized in Table 5.5 and 5.6. Losses to flood plain values are minimal, and far offset by the benefits of the proposed action. No actions taken place outside the base flood plain are expected to affect the base flood plain.

(5). The proposed action is not expected to induce development of the base flood plain. This low-income community has few economic opportunities, and has exhibited little growth, except for the massive re-development effort following destruction of the community following Hurricane Floyd in 1999. Growth has largely been due to births and family expansion, not new development. The out-flux of businesses has been due to Hurricane Floyd, and it is not anticipated that the proposed project would cause many of those businesses to return, due to the availability of existing commercial structures immediately across the river in the Town of Tarboro.

(6). The planning process was used to thoroughly evaluate the potential for adverse impacts, including induced development (see "e" above), and included comparison of alternatives to the "No-Action" alternative. The benefits of the proposed action far outweigh the small adverse impacts to the existing floodplain.

(7). If the proposed action is approved, the general public will be informed of the effects of the proposed action, and will also be involved in the development of a Risk Education and Communication Plan, and in the updating of the existing floodplain management plan.

(8). The Recommended Plan is the most responsive plan to the planning objectives established for the Town of Princeville, and also best addresses Executive Order 13146, which directed the multi-agency team to "to the extent practicable, protect the Town of Princeville from future floods"

Critical facilities within the floodplain include fire and police, Town services including operations and maintenance, and the Town's school complex.

EXECUTIVE ORDER 11593 (PROTECTION AND ENHANCEMENT OF THE CULTURAL ENVIRONMENT)

This Executive Order states that the Federal Government shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. Agencies of the executive branch of the Government (hereinafter referred to as 'Federal agencies') shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation, institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-Federally owned sites, structures and objects of historical, architectural, or archaeological significance.

The intent of Executive Order 11593, Section 2.c, has been met through NHPA Sec. 106 coordination with the State Historic Preservation Officer. Major project features, such as the levee alignments, drainage features, and major cultural resources issues, such as the status of the Princeville historic district, have been addressed by the USACE and no adverse effects have been found. These USACE findings were provided to the SHPO (NC Division of Archives and History) by letter dated March 30, 2009 (Attachment D). Additionally, an archaeological field survey was conducted in March 2009 at the proposed 40-acre borrow area, which is located off N.C. Highway

SR 1524 near U.S. Highway 64 (Figure 15). This area is a cultivated upland farm field which is about 4 miles east of the project area. This Phase I study was performed by the staff archaeologist with the Wilmington District, USACE. No archaeological sites were discovered during the survey and no further archaeological studies are justified at this 40-acre borrow area. These findings were also provided to the SHPO by letter dated March 30, 2009 (Attachment D).

By letter dated May 8, 2009 (Attachment D), the North Carolina State Historic Preservation Officer (SHPO) has concurred that none of the remaining historic properties are believed to be affected by the USACE project, but consultation with the SHPO shall be on-going until the final project features are selected, coordinated, and mitigated as necessary.

FEMA has conducted extensive documentation of individual structures within Princeville. Several structures have been determined eligible for the NRHP, and a coordinated determination with the SHPO indicates that a historic district nomination is not justified.

A more comprehensive archaeological survey will be performed during PED. Continued coordination with the N.C. SHPO is anticipated. The Recommended Plan is not anticipated to have any significant long-term impacts.

EXECUTIVE ORDER 11990 (PROTECTION OF WETLANDS)

This Executive Order mandates each Federal agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.

The Recommended Plan would impact jurisdictional wetlands and waters; As referenced in Section 8.3 Wetlands, there are three areas of wetlands that will be impacted on the west side of US HWY 64 and a small area where the levee intersects with NC 111, for approximately 5 acres of total impact. Prior to construction, USACE will obtain the required Section 401 Water Quality Certificate from the NC Division of Water Resources. Any mitigation required for unavoidable impacts to wetlands and waters within the project area will be coordinated with NCDMS In Lieu Fee program prior to construction. Therefore, no significant impacts to wetlands or waters are expected to occur.

EXECUTIVE ORDER 13045 (PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS)

This Executive Order mandates Federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children as a result of the implementation of Federal policies, programs, activities, and standards.

As indicated in Other Significant Resources above, children may be located within the residences adjacent to US Highway 64, along US Highway 258 and Shiloh Farm Road, and along Shiloh Farm Road.

The proposed levee extension work along US Highway 258, NC 111, and Shiloh Farm Road would increase the height of the existing highways up to 4.5 feet. The Recommended Plan will require the ramping of driveways up to the new roadway level, which would impact approximately 27 residential or farm drives, and 1 subdivision entrance, Strickland Drive. The proposed order of work would be the following: Construction of a temporary access road from Shiloh Farm Road into the Southern Terrace development would be constructed first. US Highway 258 and NC 111 road surfaces would then be raised and the pertinent ramped driveways constructed. The property owners would be able to access their residences from Shiloh Farm Road. Once the work on US Highway 258 and NC 111 is completed, then work will proceed to Shiloh Farm Road. Residences on Shiloh Farm Road could then access their property from US Highway 258. The contractor will install safety fencing, which will keep children away from the construction site. Moreover all equipment will have back-up alarms. The contractor's onsite supervisor will be responsible to provide a safe and secure work place.

No long-term adverse impacts on schools, residential and commercial areas, or other known gathering places for children are anticipated.

EXECUTIVE ORDER 13112 (INVASIVE SPECIES)

This Executive Order mandates Federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

The Recommended Plan will not likely promote invasive species proliferation within the project area. Any subsequent occurrence of any invasive species in the project vicinity should not solely be the result of the implementation of the Recommended Plan. The project is in compliance with EO 13112.

EXECUTIVE ORDER 13186 (PROTECTION OF MIGRATORY BIRDS)

This Executive Order mandates Federal agencies to protect and conserve migratory birds and their habitats.

The Recommended Plan will not have a measurable negative effect on migratory bird populations.

EXECUTIVE ORDER 13146 (PRESIDENT'S COUNCIL ON THE FUTURE OF PRINCEVILLE, NORTH CAROLINA)

As a result of the flooding, on February 29, 2000, President Clinton signed Executive Order 13146, which established a president's council on the future of Princeville, North Carolina. This council was to develop recommendations for the President on further agency and legislative actions that can be undertaken to address the future of Princeville. A Memorandum for the President, dated August 11, 2000, provided recommendations for the future of Princeville (Attachment D). The council was chaired by the Office of Management and Budget and twelve federal agencies participated in development of the recommendations. Participation was delegated to staff level including members of the existing Federal Interagency Working Group on Environmental Justice that was established under Executive Order 12898. Several Federal agencies provided millions of dollars in grants and loans to help the community rebuild. The Recommended Plan would provide approximately 76% assurance that the 1% event would not inundate Princeville, which would reduce risks to the Federal investment provided as a result of E.O. 13146.

10.2 STATE OF NORTH CAROLINA LAWS

PROTECTION OF TAR RIVER RIPARIAN BUFFER AREAS

One of the goals of the project is to provide flood risk management benefits with minimal potential impacts to the Tar River Buffer areas. The proposed alternative may have some impact on the Tar River Buffer areas. Part of the process will be to request exceptions to the requirements, if necessary, of the buffer regulations (<http://portal.ncdenr.org/web/wq/ps/nps/tarpamlicobuffer>) for any project elements which may encroach into the buffers.

10.3 SUMMARY OF RECOMMENDED PLAN TO ENVIRONMENTAL REQUIREMENTS

Table 10.1: Relationship of Recommended Plan to Environmental Requirements

Federal Laws and Policies	Recommended Plan
Abandoned Shipwreck Act of 1987	N/A
Clean Water Act of 1977, as amended	Full Compliance
Clean Air Act, as amended	Full Compliance
Coastal Zone Management Act of 1972, as amended	N/A
Coastal Barrier Resources Act of 1982	N/A
Endangered Species Act of 1973, as amended	Full Compliance
Estuary Protection Act of 1968	N/A
Federal Water Project Recreation Act of 1968, as amended	N/A
Fish and Wildlife Coordination Act of 1934, as amended	Full Compliance
Fishery Conservation and Management Act of 1976	Full Compliance
Hazardous and Toxic Materials Issues	Full Compliance
Land and Water Conservation Act of 1964, as amended	Full Compliance
Marine Protection, Research, and Sanctuaries Act of 1972, as amended	N/A
Marine Mammal Protection Act of 1972, as amended	N/A
Migratory Bird Treaty Act of 1918, as amended	Full Compliance
National Historic Preservation Act of 1966, as amended	Full Compliance
National Environmental Policy Act of 1969, as amended	Full Compliance
River and Harbor Act of 1970, Public Law 91-611, Section 122	Full Compliance
Submerged Lands Act of 1953, as amended	N/A
Water Resources Development Act of 1986, Section 906	Full Compliance
Watershed Protection and Flood Prevention Act of 1954, as amended	Full Compliance
Wild and Scenic Rivers Act of 1968, as amended	N/A
Executive Orders (EO), Memoranda, etc.	
EO 11593, Protection and Enhancement of the Cultural Environment	Full Compliance
EO 11988, Floodplain Management	Full Compliance

EO 11990, Protection of Wetlands	Full Compliance
EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations	Full Compliance
EO 13045, Protection of Children From Environmental Health Risks	Full Compliance
EO 13112, Invasive Species	Full Compliance
EO 13186, Protection of Migratory Birds	Full Compliance
CEQ Guidance on Prime and Unique Farmlands	Full Compliance
State Law	
Coastal Area Management Act (CAMA) of 1974	N/A
Tar-Pamlico River Riparian Buffer Protection Rules of 2000 (15A NCAC 2B.0233)	Full Compliance

Note: Full compliance is defined as having met all the requirements of the statute, Executive Order, or other environmental requirement for the Recommended Plan milestone phase of study completion. N/A is defined as not applicable.

SECTION 11 – SUMMARY OF AGENCY AND PUBLIC INVOLVEMENT*

11.1 ENVIRONMENTAL COMPLIANCE

Public participation in the planning and NEPA process promotes open communication between the public and the USACE and, consequently, better analysis and decision making. Public and agency involvement has been an important and continuing part of the Princeville study. Persons and organizations having a potential interest in the Recommended Plan, including minority, low-income, and disadvantaged groups, have been urged to participate in the study and environmental assessment process. Additionally, efforts were made to gather information in Princeville, to allow persons directly affected to participate in planning. A Town Hall held in September 2013 gathered additional input and support for the proposed project. Information and ideas provided by the participating public and agencies to date have been considered and incorporated in the study process. Additionally, a Public Notice Modified Design was circulated for a 30-day public review and comment on April 17, 2015 (Attachment F). This public notice was used to address the NEPA requirement for the changes to the levee alignment. Comments received on the Public Notice were minor and did not result in changes to the feasibility report.

The USACE Wilmington District is responsible for the overall management of the Princeville Flood Risk Management Study and the report preparation. The State of North Carolina, Division of Environment and Natural Resources (NCDENR), is the non-Federal sponsor for the study. A Project Delivery Team (PDT) consisting of Federal and state resource agencies, and local government was established to:

- Involve agencies and public in scoping and identifying issues and concerns
- Recommend and evaluate potential measures and alternatives
- Evaluate anticipated impacts
- Evaluate significance of environmental resources in the area
- Inform the agencies and public of the study progress and status.

This study effort was accomplished with the participation of the following agencies, local governments, and stakeholders through an on-going and engaging series of scoping meetings, public input meetings, agency and stakeholder meetings, and on-site meetings. Participants included:

- USACE Wilmington District
- Town of Princeville
- City of Tarboro
- Edgecombe County
- North Carolina Division of Environment and Natural Resources
- North Carolina Department of Transportation
- North Carolina Wildlife Resources Commission
- U.S. Fish and Wildlife Service.
- National Marine Fisheries Service

11.1.1 FEASIBILITY STUDY COORDINATION

For over 10 years the USACE has been working with representatives from the Town of Princeville, the City of Tarboro, Edgecombe County, the town's Congressional Representative (i.e., Congressman's Butterfield's office), NCDENR, and NCDOT regarding the proposed flood risk management study at Princeville. Additionally, we have conducted onsite inspections of the existing levee and some of the proposed levee extensions with members of the Raleigh Regulatory Field Office, N.C. Wildlife Resources Commission (.WRC), USFWS, and NC Division of Water Resources (NCDWR). All of these mentioned agencies are considered on the Project Delivery Team (PDT). We have also held numerous conference calls with members of the PDT regarding the status of the proposed project. The following is a list of key agency and stakeholder meetings conducted:

- November 19, 2004 meeting with NCDOT and NCDWR in Raleigh to discuss the proposed flood risk management study in Princeville.
- February 10, 2005 meeting in Princeville with NCWRC, USFWS, NCDWR to inspect the existing levee and proposed levee extensions along U.S. Highways 64 and 258.
- May 17, 2007 meeting in Princeville with the following stakeholders; Princeville, Tarboro, Edgecombe County, Congressman Butterfields office, and NCDWR. Later that day at 1900 a Public Workshop was held at the Princeville Town Hall.
- May 22, 2008 meeting in Princeville with the following stakeholders; Princeville, Tarboro, Edgecombe County, and NCDWR. Purpose of the meeting was to discuss project alternatives, in Princeville, with the following stakeholders; Princeville, Tarboro, Edgecombe County, and NCDWR.
- June 24, 2008 meeting in Princeville with representatives of the Raleigh Regulatory Field Office and Tar River Riparian Buffer Rules (N.C. Division of Water Resources, Aquifer Protection Section). The purpose of this meeting was to walk and inspect levee extension alternatives (Note: the eastern extension of the existing levee – Alignment I was not inspected as that alignment was more completely developed later in the study).
- September 8, 2008 meeting in Tarboro with the following stakeholders: City of Tarboro's Mayor, Attorney, Town Manager, Planning Director, and Building Inspector. Additionally, about 30 interested private citizens attended this meeting. Purpose of this meeting was to discuss with the city representatives the potential of the Princeville levee extension project causing increased flooding in Tarboro.
- September 25, 2008 meeting in Princeville with representatives of the USACE Wilmington District Raleigh Regulatory Field Office and Tar River Riparian Buffer Rules (N.C. Division of Water Resources, Aquifer Protection Section).
- August 3, 2010 meeting in Princeville with representatives of the Raleigh Regulatory Field Office and Tar River Riparian Buffer Rules (N.C. Division of Water Resources, Aquifer Protection Section). The purpose of this meeting was to walk and inspect the levee extension alternatives and the proposed 40-acre borrow area (Note: the eastern extension of the existing levee – Alignment I was not inspected as that alignment was more completely developed later in the study).
- March 11, 2015 meeting in Princeville with representatives of the USACE PDT, USFWS, WRC, NCDMS, NCDOT and the Town Manager for Princeville. The purpose of this meeting was to evaluate impacts (specifically wetland impacts) with the modification of the design which relocated the levee alignment to the west side of US HWY 64.

11.1.2 NEPA SCOPING

On June 10, 2005, a scoping letter was sent to agencies, interest groups, and the public to request identification of significant resources and issues of concern (Attachment D). The purpose of the scoping letter was to solicit comments from various private, local, state, and federal agencies on this proposal to ensure that the development of a recommended plan considers the concerns of other agencies and the public. In response to the scoping letter, the public and review agencies expressed the following major concerns: fishery resources and habitats, waters and wetlands, short-term and long-term impacts of the proposed activity, whether the Recommended Plan would increase the flood impacts upstream, within adjacent neighboring communities, or downstream of the project area, endangered/threatened species, cultural resources, sediment contamination, and other natural resources. All concerns were considered and have been addressed in the Recommended Plan.

Letters and/or emails were received, or individuals were contacted, from the agencies listed below.

- U.S. Fish and Wildlife Service
- USDA, Natural Resources Conservation Service
- North Carolina Department of Administration
- North Carolina Department of Environment and Natural Resources
- Division of Parks and Recreation
- Division of Water Resources
- Division of Marine Fisheries
- Division of Environment Health
- Division of Coastal Management
- North Carolina Wildlife Resources Commission
- The City of Tarboro
- Mr. Steven L. Cummings
- Ms. Teresa Muse

11.1.3 FISH AND WILDLIFE COORDINATION

As required under the Fish and Wildlife Coordination Act of 1958, this project has been coordinated with USFWS (48 Stat. 401; 16 U.S.C. 661-667e, as amended). On August 23, 2005, the USFWS provided a Draft Fish and Wildlife Coordination Act report on this project. Since that time, we have periodically been in contact with USFWS regarding the status of this project. This coordination act report was used as input for this project and is found in Attachment B. The USFWS provided a list of project-related recommendations. The USACE response to each of the Service's recommendations is provided in Attachment C. On May 11, 2015, USFWS provided a Final Coordination Act report/Final Section 7 letter which stated that the proposed project as described in this EA is in compliance with both the USFWS Coordination Act and the Endangered Species Act (Attachment B).

11.1.4 PUBLIC DISTRIBUTION OF PRINCEVILLE FLOOD RISK MANAGEMENT FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

The Princeville Flood Risk Management Feasibility Study and Environmental Assessment (EA) and the Public Notice Modified Design (PN) has been provided to a standard list of Federal, state, and local agencies; elected officials; environmental groups; and known interested individuals for review and comment. Additionally, it was made available on the Wilmington District's website. All input received was considered in review of environmental impacts. The following is a list of recipients of the Princeville Flood Risk Management Feasibility Study (Draft Report) and Environmental Assessment and the Public Notice Modified Design:

Representatives

- Honorable Richard Burr, Senate
- Honorable Tom Tillis, Senate
- Honorable G. K. Butterfield, House of Representatives
- Honorable Clark Jenkins, N.C. Senate
- Honorable Joe P. Tolson, N.C. General Assembly

Federal Agencies

- U.S. Environmental Protection Agency, Office of Federal Activities
- U.S. Environmental Protection Agency, Region IV
- Forest Service, USDA
- HUD, Atlanta Regional Office
- Executive Director, Advisory Council on Historic Preservation
- Environmental Conservation Office, Department of Commerce, NOAA
- Center of Disease Control
- Beaufort Marine Fisheries Center, National Marine Fisheries Service
- Director, Office of Environmental Policy & Compliance, DOI
- Raleigh Field Office, U.S. Fish and Wildlife Service
- Commander, Fifth Coast Guard District
- Federal Highway Administration
- Office of the Solicitor, Energy and Resources, U.S. Department of the Interior
- Director, Office of Environmental Compliance, Department of Energy
- Seymour Johnson AFB

Tribes

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Catawba Indian Nation
- Cherokee Nation
- United Keetoowah Band of Cherokee Indians
- Shawnee Tribe
- Tuscarora Nation

State Agencies

- North Carolina State Clearinghouse
- North Carolina Department of Environment and Natural Resources
- North Carolina Division of Water Resources
- North Carolina Department of Transportation
- North Carolina Division of Archives and History

Local Government

- Mayor, Town of Princeville
- Mayor, City of Tarboro
- Mayor, City of Rocky Mount
- Mayor, City of Greenville
- Mayor, City of Washington
- Edgecombe County Register of Deeds
- Town Manager, Princeville
- City Manager, Tarboro
- City Manager, Rocky Mount
- City Manager, Greenville
- City Manager, Washington
- County Manager, Edgecombe County
- Edgecombe County Building Inspections

Independent Groups and Individuals

- Conservation Council of North Carolina
- Cape Fear Group Sierra Club
- Sierra Club Legal Defense Fund
- Defenders of Wildlife
- National Parks and Conservation Association
- National Audubon Society, Southeastern Regional Office
- North Carolina Wildlife Commission
- National Wildlife Federation
- North Carolina Environmental Defense Fund
- North Carolina Coastal Federation

Newspapers

- Rocky Mount Telegram
- Tarboro Daily Southerner
- Greenville, the Daily Reflector
- Washington, Daily News

Libraries

- Edgecombe County Memorial Library, in Tarboro, N.C.
- Pinetops Branch Library, Pinetops, N.C.

11.2 AGENCY TECHNICAL REVIEW DOCUMENTATION

11.2.1 PEER REVIEW

The Peer Review Plan was approved on January 11, 2008. The Princeville Review Plan was revised and approved on February 28, 2013, and again updated on July 20, 2015 to incorporate the schedule and ATR roster associated with review of the Final Report. As the July 2015 revisions are minor in nature, they were not provided to the MSC for approval but were provided to the ATR Team Lead prior to the start of Final Report ATR.

11.2.2 AGENCY TECHNICAL REVIEW (ATR)

ATR for the Princeville Flood Risk Management Project AFB Read-ahead materials was certified in January 2009. Initial review by Office of Water Project Review led to concerns with plan formulation. The proposed project was then revised based on HQ and ASA(CW) comments, and a new alignment chosen. Final ATR was conducted in August 2015; comments received that were pertinent to better explanation of the plan selection process, or contributing to better explanation of technical analyses have been addressed in the Main Report/EA and appendices. One may refer to the ATR package for prior comments, evaluations, backchecks, actions taken, and certification of ATR.

11.2.3 HEC REVIEW OF PRINCEVILLE FLOOD RISK MANAGEMENT PROJECT RAS APPLICATION

The Hydrologic Engineering Center, Davis, CA, conducted a review of the Tar River RAS model in August 2007. Results of the review and USACE-Wilmington's responding comments are documented in Appendix A, Hydrology and Hydraulics. Additional HEC review of technical analyses was conducted in late 2009, in support of report revision. Additional review of updated modeling, if required, will be coordinated with the Flood Risk Management Center of Expertise.

11.2.4 VALUE ENGINEERING

A Value Engineering study was conducted with an independent team to review proposed alternatives, determine if new ideas warranted consideration, and to identify potential cost saving measures for consideration during further development of alternatives. Refer to document [Value Engineering Study Summary Report, Town of Princeville Flood Risk Management Project, Edgecombe County, N.C.](#) Recommendations generally involved potential design changes to Measures already outlined, which could result in cost reduction, while maintaining the intended performance. These recommendations will be considered in further detail during design phase. No recommendations resulted in the development of new Measures or Alternatives. The proposed project was later revised based on HQ and ASA(CW) comments, and a new alignment chosen, that resembles Proposal #1 in the Value Engineering study.

SECTION 12 – LIST OF PREPARERS*

The people listed in *Table 12.1* provided major support in developing and preparing this Flood Risk Management Feasibility Report and EA for the Town of Princeville, N.C.

Table 12.1: List of Preparers

Name	Expertise	Discipline
Elden Gatwood, Chief, Planning and Environmental Branch	Water Resources Planning, Risk Reduction, Plan Formulation, Policy	Planning, Policy, and Plan Formulation
Jennifer Owens, Chief, Environmental Resources Section	Water Resources and Environmental Planning	Biology
Mitch Hall, Chief, Geotechnical and Environmental Remediation Section	Geology	Geotechnical
Lee Danley, Chief, Design and General Engineering Section	Engineering	Design
Hugh Heine	EA Preparation	Biology
Chris Graham	Economics	Economics
Teresa Bullard	EA Preparation	Biology
Carl Baynard	Slope Stability & Seepage Analysis	Geotechnical
Pamela Castens	Project Management	Project Management
Belinda Estabrook	Real Estate	Real Estate
John Caldwell	Cost Estimator	Cost Estimation, Risk
Wesley Brown	Hydrology & Hydraulics	Hydrology & Hydraulics
John Mayer	Cultural Resources Management	Archaeology

SECTION 13 – RECOMMENDATIONS

I concur with the findings of this report. In due consideration of all significant aspects of the study area, in particular the high degree of flood risk threatening the Town of Princeville, and in the overall public interest, while recognizing the environmental and mitigation requirements, social and economic effects, and engineering feasibility of the proposed action, and the following considerations, I recommend for implementation, the Recommended Plan presented in this document. The plan is being recommended with such modifications thereof as in the discretion of the Commander, HQUSACE, may be advisable.

I have reviewed and evaluated the flood risk management issues of the study area with regard to the overall public interest and in consideration of engineering, economic, environmental, social and cultural concerns. Accordingly:

- I have concluded that the Town of Princeville, North Carolina is currently subject to flooding from events of approximately 5% chance and greater magnitude. I have determined that damages are substantial by the 1.5% chance event, and by the 1% chance event, begin to have life-safety concerns associated with depth of floodflows, severance of access to evacuation routes, and trapping of residents in sections of town.
- I have identified that the Recommended Plan is the most cost-effective plan that would provide a substantial level of risk reduction, in particular those associated with circumvention of the northern levee terminus, and that it addresses, to the maximum extent practicable, the objectives of Executive Order 13146.
- The Recommended Plan would provide an approximate 76% assurance that a 1% event would not inundate the town. While events greater than that would still cause substantial flood impacts to the town, I have determined that the Recommended Plan will substantially reduce the number and frequency of flooding events.
- I have determined that any plan that provides a higher level of risk reduction than the Recommended Plan would require a substantial ring levee around the entire town and also induce damages in the Town of Tarboro, North Carolina and downstream.
- I have determined that the per capita income for Princeville is approximately \$12,024, which is approximately 44% of the national average of \$27,334. The average structure value was determined to be \$77,300 in 2010, which was approximately 41% of the national average of \$188,400.
- I have determined that the Recommended Plan is feasible, based on engineering criteria and is acceptable by environmental, cultural and social standards.
- I have coordinated the Recommended Plan with the State of North Carolina, the Town of Princeville, and Edgecombe County. The State of North Carolina will work with the Town and County to provide non-Federal requirements.
- Based upon detailed technical evaluation, I have concluded that the Recommended Plan is not expected to negatively affect the quality of the human environment. If this judgment is confirmed after consideration of comments generated by coordination of this Integrated Report, an Environmental Impact Statement will not be required, and a Finding of No Significant Impact (FONSI) will be signed prior to the initiation of the Recommended Plan. The signed FONSI will be available to the public.
- After thorough review and evaluation, I have identified that the Recommended Plan would aid in preserving the historic importance of the Town of Princeville, minimize impacts to cultural resources, maintain social bonds and connectedness, promote community cohesion, minimize risks to life and safety, improve economic vitality, reduce vulnerability of the

population, preserve access to evacuation routes, reduce the potential for excessive flood depths, promote resiliency, and reduce damage potential to structures and contents.

- I recommend implementation of the Recommended Plan with requisite Items of Local Cooperation as contained in Section 9.1.3 of this report.
- I have determined that this report satisfies the USACE study objectives in providing substantial relief from flood risks, as requested by the Executive Order.
- The current estimated first cost of the Recommended Plan is \$21,540,000. Cost-sharing for the Recommended Plan would be 65% Federal / 35% non-Federal, based on current guidance on Flood Risk Management projects (cost-shared first cost = \$14,001,000 Federal/\$7,539,000 Non-Federal). The benefit to cost ratio is currently 0.5 to 1.

My recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, these recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.



KEVIN P. LANDERS, SR.

Colonel, EN

Commanding

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Personal Communication, Mr. Martin Richmond, Environmental Specialist, NC Division of Water Quality, August 3, 2010.

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ATTACHMENT A - SECTION 404(B)(1) EVALUATION

**PRINCEVILLE, NORTH CAROLINA
FLOOD RISK MANAGEMENT
INTEGRATED FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
EVALUATION OF SECTION 404 (b) (1) GUIDELINES
40 CFR 230**

ATTACHMENT A
PRINCEVILLE FLOOD RISK MANAGEMENT REPORT
Preliminary Evaluation of Section 404 (b) (1) Guidelines 40 CFR 230

Section 404 Public Notice No. CESAW-

	Preliminary <u>1/</u>	Final <u>2/</u>
1. <u>Review of Compliance (230.10(a)-(d))</u> A review of the NEPA Document indicates that:		
a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and NEPA document);	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	YES <input type="checkbox"/> NO <input type="checkbox"/>
b. The activity does not: 1) violate applicable State water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of federally listed endangered or threatened species or their habitat; and 3) violate requirements of any federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies);	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	YES <input type="checkbox"/> NO <input type="checkbox"/>
c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organism's dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2);	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	YES <input type="checkbox"/> NO <input type="checkbox"/>
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 3.03).	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> *	YES <input type="checkbox"/> NO <input type="checkbox"/>

2. Technical Evaluation Factors (Subparts C-F)

N/A Not Significant Significant

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

- (1) Substrate impacts.
- (2) Suspended particulates/turbidity impacts
- (3) Water column impacts.
- (4) Alteration of current patterns and water circulation.
- (5) Alteration of normal water fluctuations/hydroperiod.
- (6) Alteration of salinity gradients.

	X	
	X	
	X	
	X	
	X	
NA		

b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)

- (1) Effect on threatened/endangered species and their habitat.
- (2) Effect on the aquatic food web.
- (3) Effect on other wildlife (mammals birds, reptiles, and amphibians).

NA		
	X	
	X	

c. Special Aquatic Sites (Subpart E)

- (1) Sanctuaries and refuges.
- (2) Wetlands.
- (3) Mud flats.
- (4) Vegetated shallows.
- (5) Coral reefs.
- (6) Riffle and pool complexes.

NA		
	X	
NA		

d. Human Use Characteristics (Subpart F)

- (1) Effects on municipal and private water supplies.
- (2) Recreational and commercial fisheries impacts
- (3) Effects on water-related recreation.
- (4) Aesthetic impacts.
- (5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

NA		
NA		
NA		
	X	
NA		

3. Evaluation of Dredged or Fill Material (Subpart G) 3/

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

- (1) Physical characteristics
- (2) Hydrography in relation to known or anticipated sources of contaminants
- (3) Results from previous testing of the material or similar material in the vicinity of the project
- (4) Known, significant sources of persistent pesticides from land runoff or percolation
- (5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances
- (6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources
- (7) Known existence of substantial material deposits of substances, which could be released in harmful quantities to the aquatic environment by man-induced discharge activities
- (8) Other sources (specify).

List appropriate references.

Reference: Princeville, North Carolina Flood Risk Management Integrated Feasibility Report and Environmental Assessment, dated March 2014.

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to result in degradation of the disposal site.**

YES NO

4. Disposal Site Determinations (230.11(f)).

a. The following factors as appropriate, have been considered in evaluating the disposal site.

- (1) Depth of water at disposal site
- (2) Current velocity, direction, and variability at disposal site
- (3) Degree of turbulence
- (4) Water column stratification
- (5) Discharge vessel speed and direction
- (6) Rate of discharge
- (7) Dredged material characteristics (constituents, amount and type of material, settling velocities).
- (8) Number of discharges per unit of time
- (9) Other factors affecting rates and patterns of mixing (specify)

Reference:

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable. YES NO *

5. Actions to Minimize Adverse Effects (Subpart H).

All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77, to ensure minimal adverse effects of the proposed discharge. YES NO *

For water quality see Section 8 of the Integrated Report. For fisheries see Section 8 of the Integrated Report. For threatened and endangered species see Section 8 of the Integrated Report

6. Factual Determinations (230.11).

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:

- a. Physical substrate at the disposal site
(review sections 2a, 3, 4, and 5). YES NO *
- b. Water circulation, fluctuation, and salinity
(review sections 2a, 3, 4, and 5). YES NO *
- c. Suspended particulates/turbidity
(review sections 2a, 3, 4, and 5). YES NO *
- d. Contaminant availability
(review sections 2a, 3, and 4). YES NO *
- e. Aquatic ecosystem structure and function
(review sections 2b and c, 3, and 5). YES NO *
- f. Disposal site
(review sections 2, 4, and 5). YES NO *
- g. Cumulative impact on the aquatic ecosystem. YES NO *
- h. Secondary impacts on the aquatic ecosystem. YES NO *

7. Findings.

a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines

b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions:

Mitigation as described in Section 8.9 will be completed prior to wetland and stream impacts.

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reasons(s):

(1) There is a less damaging practicable alternative.

(2) The proposed discharge will result in significant degradation of the aquatic ecosystem

(3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem.

Elden J. Gatwood
Chief, Planning
and Environmental Branch

Kevin P. Landers
Colonel, U.S. Army
District Commander

Date _____

Date _____

*A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

1/ Negative responses to three or more of the compliance criteria at this stage indicate that the proposed projects may not be evaluated using this "short form procedure." Care should be used in assessing pertinent portions of the technical information of items 2 a-d, before completing the final review of compliance.

2/ Negative response to one of the compliance criteria at this stage indicates that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form evaluation process is inappropriate."

3/ If the dredged or fill material cannot be excluded from individual testing, the "short-form" evaluation process is inappropriate.

ATTACHMENT B – FISH AND WILDLIFE COORDINATION ACT REPORT



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

August 23, 2005

Colonel John E. Pulliam, Jr.
District Engineer
U.S. Army Corps of Engineers
P.O. Box 1890
Wilmington, North Carolina 28402-1890

Attention: Hugh Heine, Planning and Environmental Branch

Dear Colonel Pulliam:

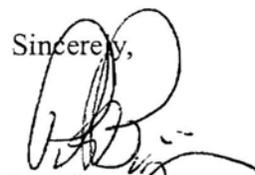
In accordance with our Transfer Funding Agreement and Scope of Work for FY 2005, the U. S. Fish and Wildlife Service (Service) has enclosed our Draft Fish and Wildlife Coordination Act (FWCA) Report for the Princeville Flood Damage Reduction Project, Edgecomb County, North Carolina. This draft identifies fish and wildlife resources in the project area; provides our assessment of project impacts on these resources; and lists the Service's recommendations for avoiding, minimizing, and compensating for impacts on these resources. This report, when finalized, will constitute the Service's report in accordance with Section 2(b) of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Please be aware that this draft is not the 2(b) report required by the FWCA. This draft may require revision based on changes in project plans, the development of new information on resources in the area, and comments from other resource agencies. Your Planning and Environmental Branch should coordinate the release of any Finding of No Significant Impact (FONSI) with this office and we will work with your staff to finalize the Section 2(b) requirements for this project. If the draft report does not require modification, we may choose to provide you with a letter stating that the draft report stands as the final 2(b) report. We welcome any comments which the Corps may have on this report.

A copy of this Draft FWCA Report will be provided to the appropriate state and federal agencies. By copy of this letter we are requesting comments on this report from these agencies. By separate letter we are providing the report to the North Carolina Wildlife Resources Commission and seeking their comments or concurrence with our recommendations. All comments received will be considered in drafting the Final FWCA Report.

The Service appreciates the opportunity to provide this report. Please continue to inform the Service of your planning schedule. If you have any questions or comments, please contact Howard Hall at 919-854520, ext. 27 or by e-mail at Howard_Hall@fws.gov.

Sincerely,



Pete Benjamin
Ecological Services Supervisor

Attachment

cc (with attachment):

Gerald Miller, US EPA, Atlanta, GA
John Morris, NC Division of Water Resources, Raleigh, NC
John Dorney, NCDWQ, Raleigh, NC
Linda Pearsall, NC Natural Heritage Program, Raleigh, NC

PRINCEVILLE FLOOD DAMAGE REDUCTION PROJECT
EDGECOMB COUNTY, NORTH CAROLINA
DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

Prepared by:

Howard F. Hall

Under the Supervision of:

Pete Benjamin
Ecological Services Supervisor

U.S. Fish and Wildlife Service
Ecological Services Raleigh Field Office
Raleigh, North Carolina

August 2005

Section 1. Introduction

The Princeville Flood Damage Reduction Feasibility Study is being carried out under the General Investigation (GI) Program of the Wilmington District, U. S. Army Corps of Engineers (Corps). The purpose of the feasibility study is to develop and evaluate alternatives for implementing solutions to provide protection against flooding at least sufficient to reduce flood damage from a 100-year flood event (an event with a one percent chance of occurrence in any year) to the Town of Princeville, Edgecombe County, North Carolina. There is currently a 15,600-foot dike to the north and west of the town.

The town has a unique historical significance. Newly freed slaves settled the area in 1865, shortly after the Civil War. The settlement, originally known as “Freedom Hill,” was incorporated in 1885 and thus the community is the first town chartered by African American in the United States.

Authority

This report is provided under authority of Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661-667d). This Act established two important federal policies which are: (1) fish and wildlife resources are valuable to the nation; and, (2) the development of water resources is potentially damaging to these resources. In light of these principles, the FWCA mandates that:

“. . . wildlife conservation shall receive equal consideration and be coordinated with other factors of water-resource development programs through effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation.”

The FWCA essentially established fish and wildlife conservation as a coequal purpose or objective of federally funded or permitted water resources development projects.

In order to fully incorporate the conservation of fish and wildlife resources in the planning of water resources development, the FWCA mandates that federal agencies consult with the U. S. Fish and Wildlife Service (Service) and the state agency responsible for fish and wildlife resources in the project area. The state agency for this report is the North Carolina Wildlife Resources Commission (NCWRC).

Consultation during project planning is intended to allow state and federal resource agencies to determine the potential adverse impacts on fish and wildlife resources and develop recommendations to avoid, minimize, and/or compensate for detrimental impacts. Therefore, this report will:

1. Describe the fish and wildlife resources at risk in the project area;

2. Evaluate the potential adverse impacts, both direct and indirect, on these resources;
3. Develop recommendations to avoid, minimize, or compensate for any unavoidable, adverse environmental impacts; and,
4. Present an overall summary of findings and the position of the Service on the project.

This draft report will be submitted to the North Carolina Wildlife Resources Commission (NCWRC) for their review and comments. The report, when finalized, will include a letter of concurrence from the NCWRC and will constitute the formal report of the Service under Section 2(b) of the FWCA.

Scope of this Report

The geographic scope of this report includes all areas that would be directly or indirectly impacted by the major alternatives for flood damage reduction along the Tar River near Princeville. The project area includes not only the Tar River adjacent to Princeville, but those areas upriver and down river of Princeville which could be hydrologically affected by flood control alternatives. The project area also includes uplands that could be used by an alternative which relocates structures away from the most vulnerable flooding area. In all cases these areas represent habitat for fish and wildlife resources, and these resources will be considered.

The temporal scope of this report extends from direct, immediate impacts of potential flood damage reduction measures to long-term, indirect impacts that may occur as a result of these measures. The report also considers the cumulative impacts of major structural alternatives.

Prior Studies and Reports

The Service has provided previous comments on flood damage reduction in Princeville. Early scoping comments were provided by letter dated February 26, 2001. These comments noted that the Tar River is one of the most environmentally sensitive on the Atlantic slope. The Service provided a detailed Planning Aid Report (PAR) in June 2003 (U. S. Fish and Wildlife Service [hereafter USFWS] 2003). In October 2003, the Service supplied the Corps with scoping comments on a possible flood damage reduction project on Greens Mill Run in Greenville (Pitt County), downstream from Princeville.

The Corps has initiated a reconnaissance study the Tar River and Pamlico Sound. The study would determine whether planning for flood damage reduction, environmental restoration and protection, and related purposes should proceed. The study will consider both structural and nonstructural measures to address flood control and environmental quality improvements. The Service provided the Corps scoping comments on this basinwide study (USFWS 2004).

Section 2. Project Area Description

Location

Princeville, located in Edgecombe County, North Carolina, is a town surrounded on two sides by the Tar River (Figure 1). The Town of Tarboro is located across the river to the north of the project site. Princeville had a population of approximately 940 people in 2003. The elevation of the town is between 10 and 15 feet above mean sea level. Princeville is located within the floodplain of the Tar River and was extensively flooded following the storms of September 1999 (which included Hurricanes Dennis, Floyd and Irene).

The project area has been designated as Subbasin 03, Middle Tar River, within the Tar River watershed (North Carolina Division of Water Quality [hereafter] NCDWQ 2003, p. 14). This subbasin includes approximately 40 river miles of the Tar River from the confluence of Swift Creek in Edgecombe County to the confluence of Conetoe Creek in Pitt County. It also includes the catchments of Cokey Swamp and Conetoe, Otter, and Town Creeks. Tarboro is the largest urban area. Land use is primarily forest and agriculture.

This is also a physiographically diverse subbasin in the Rolling Coastal Plain, Southeastern Floodplain and Low Terraces, and the Mid-Atlantic Flatwoods ecoregions. Many streams were channelized 30 or more years ago when "stream improvement" included dredging and straightening the channel and removal of most riparian vegetation. The practice continues to this day in the Conetoe Creek watershed.

Significant Geologic and Hydrologic Features

The Service provided the Corps with an extensive discussion of the geologic features of the Tar River (USFWS 2003). Near Tarboro the character of the Tar River changes, probably reflecting the input of the Swift and Fishing Creeks tributaries (Riggs and Ames 2003 as cited in USFWS 2003). The gradient of the river changes, likely as a result of the input of sand from the two tributaries, which flow along the Surry Scarp and carry a lot of sediment into the Tar. The river orientation takes a sharp bend to the south at Tarboro, almost at a right angle. Two more bends to the east and then south occur at Princeville, forming a box-like shape. Thus the immediate project area of Tarboro and Princeville are located at a distinct change in the river's morphology. These sharp bends, along with a comparative straightening of the river downstream of Princeville, is thought to be a reflection of a change in the underlying geology (Riggs and Ames 2003 as cited in USFWS 2003). From Tarboro to Greenville the Tar River is incised with steep bluffs along the river banks in many locations.

Streams in the Coastal Plain are slow-moving, blackwater waterways, low-lying swamps, and productive estuarine waters (NCDWQ, 2004, p. 10). The Coastal Plain is flat and the larger water bodies are meandering and often lined with swamps and bottomland hardwoods. The swamp streams often stop flowing in the summer and are stained by



Figure 1.

Tarboro/Princeville is located in Edgecombe County along the Tar River (shown located across the river to the north). The river flows from upper left to lower right in the photo. Locations are shown on a 1998 color infrared aerial digital orthophoto quadrangle from the U.S. Geological Survey.

tannic acid. These streams have limited ability to assimilate oxygen-consuming wastes. Swamp streams often have naturally low dissolved oxygen and pH. Coastal Plain soils are deep sands that have a high groundwater storage capacity.

There are several natural and man-made constrictions on the Tar River floodplain (USFWS 2003, Figure 6). Many older roads in eastern North Carolina were constructed on fill across the floodplain with only a culvert or small bridge open for the flow of water. While adequate during period of low flow, such causeway approaches may block water flow during high discharge periods, essentially forming "road dams." Several road dams in Greenville formed man-made constrictions on the Tar River floodplain, backing floodwater upstream during large storm events (USFWS 2003). The bridge at the Greenville airport, for instance, blocks approximately 75% of the floodplain conveyance (Riggs and Ames 2003 as cited in USFWS 2003, p. 7). The bridge at Hastings Ford may block 90% of the floodplain conveyance, forming a potentially more serious flooding problem upstream of Greenville (Riggs and Ames 2003 as cited in USFWS 2003, p. 7).

As a response to the problems associated with nutrient loading and the resulting eutrophication, the entire Tar River Basin was designated as Nutrient Sensitive Waters (NSW) in 1989 (NCDWQ 2003, p. 12). In 1999 the Tar River was considered to have the highest rates of erosion and sedimentation among all North Carolina rivers (Alderman 1999). In December 1999 the North Carolina Environmental Management Commission adopted rules to protect 50-foot wide riparian buffers along waterways in the Tar-Pamlico Basin (15A NCAC 02B.0259). The Tar-Pamlico riparian buffer protection rules became effective on August 1, 2000. The rules require a 50 foot buffer from each bank of all streams, lakes, ponds and estuarine waters. Both intermittent and perennial streams require the 50-foot buffers. The first 30 feet of the buffer (Zone 1) must consist of undisturbed vegetation zone on all sides of surface water. The remaining 20 feet (Zone 2) must consist of stable, managed vegetation. The rules do not apply to uses that existed in the zones as of January 1, 2000. While the rules were primarily intended to maintain the nutrient removal functions of riparian vegetation, they also provided measures to reduce surface runoff and thereby minimize flooding. Item five of the rules notes that diffuse flow of runoff shall be maintained in the riparian buffer by dispersing concentrated flow. The NCDWQ issues permits for impacts to the riparian buffers.

Major Biological Communities

There are several major habitat types that require consideration in the Princeville project area, including both aquatic and terrestrial resources. According to the North Carolina Gap Analysis Program (NC GAP), the non-fluvial biological communities found in Edgecombe County along the Tar River corridor and its tributaries include:

- Cypress Gum Floodplain Forest,
- Coastal Plain Oak Bottomland Forest,
- Pocosin Woodlands and Shrublands,
- Coastal Plain Mixed Bottomland,
- Peatland Atlantic White Cedar,
- Coastal Plain Non-riverine Wet Flat Forest,

- Seepage and Streamhead Swamp, and
- Piedmont Mixed Successional Forests.

Schafale and Weakley (1990) provide descriptions of these community types. These biological communities exist in a complex mosaic of habitats; many of them are wetland communities that are hydrologically connected to the Tar River and its tributaries. Each provides valuable habitat to fish and wildlife resources. Fragmentation of the habitats may be caused by agricultural and urban development, management of cultivated plantations, and mining activities.

Section 3. Fish and Wildlife Resource Concerns and Planning Objectives

The purpose of federal action in Princeville is the reduction of flood damage which is a worthwhile goal. The key issue is the alternatives that will be considered and the extent to which all short- and long-term adverse environmental impacts of each alternative will be weighed in the selection of the preferred alternative. Within the project area, well understood geologic processes driven by encroachment on the floodplain are creating hazardous conditions for man-made structures. As the distance between structures and the river decreases over time, these structures are at greater risk of flood damage. Efforts to protect these structures by putting a flood control structure in the path of the river may provide some temporary protection, but when viewed from a perspective of several decades such measures have little chance of provide long-term protection.

Fish and Wildlife Resource Concerns

The Service recognizes that Tar River, its tributaries, its floodplains, and the adjacent uplands represent valuable habitats for fish and wildlife resources. The Service seeks to maintain and enhance these riverine and riparian habitats. Nationally these habitats are becoming scarcer in their natural, undisturbed form. Therefore, the selection of a method for reducing flood damage should look beyond the short-term advantages or disadvantage of any particular technology and fully evaluate and compare the long-term consequences of each alternative. Any manipulation of sensitive natural areas will be harmful, to some degree, to certain organisms within those habitats. In the past, these manipulations were smaller and impacted a smaller geographical area. Many organisms could simply move to other, less disturbed areas. With increasing development within the Tar River watershed, there may be limited opportunities for animals using riverine habitats to move to nearby, undisturbed areas. In some cases, the species that depend on the river-upland interface are running out of undisturbed options. Therefore, a complete consideration of the cumulative impacts of any construction alternative must be made.

The Service is concerned that constructing a barrier between Princeville and the Tar River would significantly constrict the flow of water in the area and lead to flooding in other areas. If a barrier approach is used at Princeville and the barrier creates flood conditions elsewhere, there are likely to be additional requests for structural barriers

separating the river from its natural floodplain. The creation of additional barriers would further reduce fish and wildlife habitat along the Tar River.

Planning Objectives

The Service recognizes that the residents of Princeville have chosen to stay at the present location of the town rather than accept financial assistance in relocating. At the present location, the town will continue to be at risk from flooding. To minimize flood damage effort can be directed at creating a barrier between structures and the river or adapting the structures to withstand periodic flooding. Certain aspects of the two approaches can be combined to minimize flood damage.

The Service recommends that planning fully evaluate the risk of future flooding. Based on the risk there should be an assessment of whether a barrier to overbank flooding provides the best long term protection for residents of the town. This assessment should consider whether a barrier would provide protection from minor floods, but prove ineffective during larger flood events. There should also be an assessment of whether design changes for development within the town, such as elevating structures, offers a better long-term solution for reducing damage in future major flood events.

Planning should also fully assessment the potential for any solution to increase the risk of flooding elsewhere along the Tar River. Major storms, such as the 1999 hurricanes, produce tremendous amounts of rainfall. Historically, this rainfall would be dispersed over a wide floodplain as it moved down to the coastal sounds. The ability for wide dispersal reduced the height, or depth of flood waters. By constricting flood waters to a narrow channel, a given discharge of water would occur at a greater depth and thus create more damage.

Therefore, the Service recommends that planning objectives include long-term protection for structures being rebuilt and new structures which will be constructed. There should also be a goal of ensuring that flood damage reduction measures in the immediate vicinity of Princeville do not contribute to greater flood problem in other areas.

Section 4. Evaluation Methods

The Service is familiar with floodplain processes on the coastal plain in the project area and ongoing efforts to protect structures in the area. Descriptions of natural resources present within the study area and the preliminary assessment of the environmental impacts of the proposed project are based on previous studies for similar projects, published literature, and personal communications with knowledgeable individuals. Published reports and studies were examined to determine their relevance to the proposed project. Material which describes potential environmental impacts of similar projects and methods of reducing these impacts are incorporated by reference in this report.

Several excellent reports on the Tar River Basin have been prepared by the North Carolina Division of Water Quality. These include the Basinwide Assessment Report - Tar River Basin (NCDWQ 2003) and the Tar-Pamlico River Basinwide Water Quality Plan (NCDWQ 2004). Both reports are available on the internet.

Section 5. Existing Fish and Wildlife Resources

Much of the area in and around Princeville consists of residential, commercial, and agricultural development. Such areas do provide habitat for migratory birds, reptiles, amphibians, and small mammals. While coastal plain forests have been logged and cleared for agriculture, the small, remaining woodlots may provide homes for the pine warbler (*Dendroica pinus*), tufted titmouse (*Parus bicolor*), cardinal (*Cardinalis cardinalis*), and rufous-sided towhee (*Pipilo erythrophthalmus*) (Potter et al. 1980, p. 23). Young forests usually support large numbers of species that prefer edge and shrub habitat (Wigley and Lancia 1998, p. 212). Small patches of trees and shrubs throughout the area may provide important refuges to smaller vertebrate species. However, there is limited habitat for those species requiring large areas of undisturbed land.

However, the area does represent a major alluvial floodplain which, depending on the degree of disturbance, constitutes one of the most important wildlife habitats in southern forests (Kellison et al. 1998). Broad, flat, alluvial floodplains adjacent to coastal plain rivers are invariably forested unless altered by man. Such riparian forests are referred to as bottomland hardwoods (BLH) (Kellison et al. 1998, p. 300). While the developed areas within Princeville may not support the broad range of vertebrate species characteristic of an undisturbed floodplain, the rich animal diversity commonly associated with a major alluvial floodplains indicate the wildlife potential of the project area and suggests that areas adjacent to the Tar River once supported, and thus could be restored to, BLH.

Some of the most productive and valuable fish and wildlife habitats in the United States are found in BLH. These forests provide food and cover for wildlife throughout the year. Forested alluvial floodplains are important to many birds as breeding, wintering, and migrating stop over habitats (Kellison et al. 1998, p. 314). A wide variety of birds are associated with southern forested wetlands (Scharitz and Mitsch 1993, p. 354; Wigley and Lancia 1998, pp. 219-222). Such wetlands may also support a variety of mammals (Scharitz and Mitsch 1993, p. 354-355; Wigley and Lancia 1998, pp. 223-224). While the present project area may not support such a broad range of birds and mammals, the species commonly associated within floodplains indicate the wildlife potential of the project area and suggest a potential goal for any restoration or conservation work along this waterway.

Mid-Atlantic river basins have a diverse vertebrate fauna dominated by birds and fish. Flooded BLH forests are nurseries for many fish species. Many of these species are dependent on the resources of the river, its tributaries, and its floodplain during all or part of their life cycle or seasonal cycle. Seasonal flooding produces shallow, warm water

areas where many kinds of water life spawn and feed (Harris et al. 1984, p. 7). The Tar River basin extends from Person County, North Carolina, to the Pamlico River estuary in Beaufort County, North Carolina. The Princeville project area is in the lower half of the river basin, below the fall line of the river. The river basin provides valuable habitat to a variety of fish and wildlife resources.

Biological monitoring in Subbasin 03 of the Tar River indicated relatively stable water quality (NCDWQ 2003, p. 14). The Tar River was rated good (at Tarboro) and excellent (at NC 42) based upon benthic macroinvertebrates although low dissolved oxygen concentrations were occasionally recorded at two Tar River sites. Tributary streams, however, had severe water quality problems. Conetoe Creek and its tributaries drain agricultural areas and were rated as having moderate to severe stress. A two-year study of the Conetoe Creek catchment documented a variety of water quality, nutrients, and habitat quality problems in these streams. Cokey Swamp (draining parts of the Town of Rocky Mount) was also rated as having severe stress. Low flows during 2002 may have affected some of these bioclassifications. Fish community sampling in Otter Creek noted the highest percentage of tolerant fish of any site in the basin and this site had very low dissolved oxygen when sampled.

The North Carolina Natural Heritage Program has identified several Significant Natural Heritage Areas (SNHA) within the vicinity of Princeville (USFWS 2003, Table 1 and Figure 7). The primary (active) floodplain of the Tar River has been identified as a SNHA from the eastern Edgecombe County line to the river crossing of NC 97. This includes the floodplain in the immediate vicinity of Tarboro and Princeville. Upstream of the Princeville area, other SNHA include the Swift Creek Swamp Forest, the Shocco Creek/Centerville Bluffs, the Reedy Creek Hardwood Forests, the Fishing Creek/Enfield Bottomland, and several sections of river bank on the main stem of the Tar River in Franklin and Granville Counties. Such SNHAs are useful in planning tool as they identify significant natural resources in a project area. Impacts to these areas should be avoided if at all possible in order to preserve their high habitat value.

General Fish and Wildlife Resources

The Tar River basin provides habitat to a diverse array of fish and wildlife resources. The river and its tributaries, for example, provide spawning habitat for anadromous fish (Figure 8). Diadromous fish that use the Tar River, Fishing Creek, Swift Creek, Deep Creek, and other tributaries include hickory shad (*Alosa mediocris*), American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), striped bass (*Morone saxatilis*), and American eel (*Anguilla rostrata*).

Several species of fish utilize the watercourses of the project area for spawning. These include white perch (*Morone americana*), redbreast sunfish (*Lepomis auritus*), several sucker species (Family Catostomidae), and Roanoke bass (*Ambloplites cavifrons*) (T. Wayne Jones, NCWRC, June 23, 2003, personal communication). Smith and Bayless (1964, p. 15) found that Fishing Creek contained "an excellent population of Roanoke bass, redbreast sunfish, bluegill [*Lepomis macrochirus*], and largemouth bass

[(*Micropterus salmoides*].” Deep Creek was found to be “a good fishing stream for redbfin pickerel [*Esox americanus*]” (Smith and Bayless 1964, p. 15). Swift Creek was noted for its populations of redbreast sunfish, largemouth bass, redhorse suckers (*Moxostoma* spp.), and large channel catfish (*Ictalurus punctatus*). High use by spawning anadromous fish led Smith and Bayless (1964, p. 16) to recommend that Swift Creek in Edgecombe County be designated as one of “The Best Fishing Streams.”

The NCDWQ has monitored and classified the fluvial habitat within the Tar River and many of its tributaries in the Princeville project area (NCDWQ 2003). This monitoring includes biological surveys of macrobenthos and fish, bank erosion and vegetation, fluvial benthic habitat, water quality parameters (e.g., dissolved oxygen, nitrogen), and fish tissue contaminants. The NCDWQ Basinwide Assessment Report, most recently issued in April 2003, should be consulted for historical and existing conditions of riparian resources in the project area.

The project area also provides habitat to terrestrial fish and wildlife resources. The North Carolina Gap Analysis Program predicts suitable habitat for 59 species of birds, 14 mammals, 13 reptiles, and 7 amphibians in Edgecombe County. The avian fauna include large species such as three hawk species, three owl species, American kestrel (*Falco sparverius*), and bald eagle (*Haliaeetus leucocephalus*). Waterbirds include anhinga (*Anhinga anhinga*), Canada goose (*Branta canadensis*), two species of heron, three duck species, pied-billed grebe (*Polilymbus podiceps*), least bittern (*Ixobrychus exilis*), and osprey (*Pandian haliaetus*). Neotropical migrant species include ten species of warblers, including the Cerulean warbler (*Dendroica cerulea*), sparrows, swallows, finch, flycatchers, gnatcatchers, and others. Northern bobwhite quail (*Colinus virginianus*) habitat is also known or predicted to be present.

Some of the mammalian species for which habitat is predicted in Edgecombe County include two species of bat, black bear (*Ursus americanus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and eastern fox squirrel (*Sciurus niger*). Of the thirteen reptilian species predicted, two are lizards, nine are snakes and two are turtles. The seven amphibian species are dominated by salamanders (with four of the seven species).

Special Status Species

The Tar River basin provides habitat for several federally and/or state-listed species. The federally listed species known to occur in Edgecomb County can be found on the Service web site at < <http://nc-es.fws.gov/cntylist/edgecomb.html> >. A more comprehensive list of both state and federal special status species can be found on the web page of the North Carolina Natural Heritage Program (NCNHP). The list of occurrence records can be accessed at < <http://www.ncnhp.org/Pages/heritagedata.html> >. At this site select “Database Search” and “County Search Form.” The NCNHP database can also be accessed by topographic quadrangle (quad) of the U. S. Geological Survey (USGS). The project area is located in the Tarboro quad.

Among the eight vertebrate species with NCNHP records in Edgecomb County, three

have only obscure or historic records. These are the red-cockaded woodpecker (*Picoides borealis*), a federally endangered species; the southern hognose snake (*Heterodon simu*), a federal species of concern (FSC); and the loggerhead shrike (*Lanius ludovicianus ludovicianus*).

The five vertebrates with current NCNHP records include the Roanoke bass (*Ambloplites cavifrons*), a FSC with a State designation of Significantly Rare; Neuse River waterdog (*Necturus lewis*), an amphibian and State species of Special Concern; the Carolina madtom (*Noturus furiosus*), a fish, State species of Special Concern, and FSC; the eastern fox squirrel (*Sciurus niger*), and Henslow’s sparrow (*Ammodramus henslowii*), a FSC with a State designation of Significantly Rare.

The three aquatic vertebrates could be impacted by major alterations in the flow of the Tar River. The two terrestrial vertebrates could be impacted by structures built as a barrier to the river. Henslow’s sparrow could be impacted by the construction of flood control measures. The species is a winter resident of North Carolina from mid-October to mid-April. The species can be found in low lying old fields, lush meadows, and the margins of waterways. The NCNHP database contains two occurrence records in the Speed quad, northeast of the project area.

Another species listed by the Service for Edgecomb County is the pinewood shiner (*Lythrurus maututinus*). This species is endemic to North Carolina and is only known to inhabit the Neuse and Tar River basins. Within the Princeville project area, this fish is present in Fishing Creek, Swift Creek, White Oak Swamp (a tributary to Swift Creek), and the main stem of the Tar River. This small fish prefers the midwater areas in sandy runs and pools in creeks and small rivers (Rohde et al. 1994, p. 91).

None of the four vascular plants listed in the county have current records. These four plants are all listed as critically imperiled in the state

The majority of special status species known to occur in the county are invertebrates. Among the 14 invertebrates listed, ten are freshwater mussels and nine of these species have current records. These nine species with a special state and/or federal status include:

Common Name	Scientific Name	State Status	Federal Status
Triangle Floater	<i>Alasmidonta undulata</i>	threatened	none
Yellow Lance	<i>Elliptio lanceolata</i>	endangered	FSC
Roanoke Slabshell	<i>Elliptio roanokensis</i>	threatened	none
Tar River Spinymussel	<i>Elliptio steinstansana</i>	endangered	endangered
Atlantic Pigtoe	<i>Fusconaia masoni</i>	endangered	FSC
Yellow Lampmussel	<i>Lampsilis cariosa</i>	endangered	FSC
Eastern Lampmussel	<i>Lampsilis radiata radiata</i>	threatened	none
Green Floater	<i>Lasmigona subviridis</i>	endangered	FSC
Creeper	<i>Strophitus undulatus</i>	threatened	none

Section 6. Future Fish And Wildlife Resources Without Project

This section presents the opinion of the Service on the condition of fish and wildlife resources in the project area which could be reasonably anticipated in the absence of efforts to reduce flood damage by storms at or below the 100-year flood event (a one percent change of occurrence in a given year).

The Princeville area would periodically be flooded by waters of the Tar River. Since 1995 there has been an increase in sea surface temperatures compared to the decade from 1985 through 1994 (Carroll 2005). This rise in ocean temperature has increased the number of hurricanes. Carroll (2005) states that a recent study using the latest computer climate model predicts warming of the tropical sea surface will strengthen hurricane winds and rainfall by the end of the 21st century.

Allowing natural overbank flow would allow the area to serve as a natural floodplain. The forested, alluvial floodplains would continue to provide important breeding, wintering, and migrating stop-over habitats for many birds. Flooded areas along the river would continue to serve as nurseries areas for fish.

The threat of periodic flooding may limit development in the area. Any limitation on development would preserve habitats for a wide variety of mammals, birds, reptiles, and amphibians. In time, the riparian areas directly along the Tar River, the areas most likely to flood, might be recognized for their recreational value. The areas subject to natural flooding could serve to attract tourists seeking outdoor recreation to the Princeville area. The use of the floodplain for outdoor recreation could create sustainable economic development within the Princeville area.

Section 7. Potential Alternatives

While recognizing the flooding which has occurred in the area, the Corps should consider Executive Order (EO) 11988 of 1978, Floodplain Management, in developing alternatives. This EO seeks to avoid, to the extent possible, the short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

In general, the reduction of flood damage within developed areas can be divided into two broad types of action. These are non-structural and structural approaches. Dunne and Leopold (1978, pp. 398-423) give an excellent discussion of "Human Adjustments to Floods." While this work is almost 30 years old, the basic concepts are relevant.

While the definitions of these approaches may vary, for the purposes of this report, structural approaches are defined as engineered projects designed to keep floodwaters in

the channel or out of certain areas. Dunne and Leopold (1978, p. 401) state that engineered flood-protection works are the most familiar response to flood hazard and they have been the most highly developed and heavily funded in “technological societies.” Levees and floodwalls are one form of the structural approach and such structures are designed to keep flood water in the channel or out of certain areas.

Alterations to the size and shape of the channel are other forms of a structural approach. Channel “improvement” such as deepening, widening, lining, or straightening the channel, as well as removing vegetation and debris, can increase the conveyance capacity so that high discharges can pass without increasing the river stage (Dunne and Leopold 1978, p. 403).

Another structural approach is the creation of channel diversion (Dunne and Leopold 1978, p 404). Such high-flow, bypass channels, or floodways, to divert flood waters away from communities during periods of exceptional high water. The channel diversion can return the flood water back into the original channel below the area to be protected. Between flood events the land may be used for agriculture, grazing, recreation, or other uses which are not harmed by flooding.

The construction of a dam to create a flood detention reservoir may be considered a structural alternative since the goal is to hold water rather than allowing it to spread out over a downstream floodplain. This approach may not be appropriate for the broad, flat area of the coastal plain.

On the other hand, non-structural approaches would retain the hydrologic connection between the waterway and its natural floodplain, but reduce damage by adaptations to, or reduction in the number of, vulnerable structures on the floodplain. The application of two of the major non-structural approaches, relocation and structural elevation, are discussed by Tibbetts (1999) in relation to flooding in North Carolina following Hurricane Fran in 1996.

Three broad types of non-structural approaches could be considered at Princeville. First, the residents could be given the financial resources to relocation to an area not subject to flooding. This would be the buyout and relocation options. Tibbetts (1999) provides a good discussion of the problems and social resistance to this approach when it was considered in Kinston, North Carolina (about 45 miles south of Princeville along the Neuse River in Lenoir County) following Hurricane Fran in September 1996. In Kinston some residents considered the buyout program to be a “conspiracy” to force them off their property so it could be developed by others at a profit.

The Service is aware that a federal buyout was considered for Princeville following Hurricane Floyd. However, the offer was defeated by a vote of 3-to-2 by the Board of Commissioners. While this decision by Board should be considered in selecting a preferred alternative, the National Environmental Policy Act (NEPA) requires the development of this alternative. The development should provide more than a vague discussion of funds to be given to residents. The full development of this alternative

should discuss a specific location, or several potential locations, for the residents to resettle. There should be discussion of the ability to preserve community cohesion. That is, all the social ties of the community should be maintained if the structures are relocated. If the social structure of the town can be completely preserved and a definite site selected for the town, there may be greater acceptance of the idea that the historical significance represented by Freedom Hill, the original name of Princeville, could be retained. The significance of the first town independently governed African-Americans could live on away from the swampy lowlands available to newly freed slaves in 1865.

A second non-structural alternative would be the flood-proofing of all the structures within the community. This approach would generally involve elevating all structures above a specified level of flooding. There would be improved building codes and zoning requirements to limit new building in flood prone areas. Tibbetts (1999) provides a good discussion of this approach in the Town of Belhaven, North Carolina (Hyde County). Flood proofing also involves measures to make building and their contents less vulnerable to flood damage. This primarily consists of restricting the contents of the lowest levels of a structure. Dunne and Leopold (1978, Figure 11-6, p. 400) present some measures to allow flood waters to pass through the lowest level of a structure without producing significant damage.

A third course of action which can be considered a non-structural approach would be the modification of bridge and/or railway structures across the floodplain (USFWS 2003). Existing man-made constrictions on the Tar River floodplain may be exacerbating flooding along the river. Several road dams in Greenville form man-made constrictions on the Tar River floodplain, backing floodwater upstream during large storm events. The Town of Speed, a few miles northeast of Princeville, faced a similar problem during the 1999 flooding event. A three-sided dike protects Speed, which is upstream of Princeville on Deep Creek. Road dams in and around Speed led to backside flooding, leaving a reservoir of floodwaters after the event had passed. The replacement of earthen causeways along the river, which act as small dams, would allow flood water to spread out over a wider area, but at a reduced height.

The Service recommends that the NEPA document contain a single section that discusses the alternatives that would address the stated project purpose. This section should be completely free of any evaluation of the alternatives and no alternative should be eliminated for reasons other than failure to address the project purpose. If a given action, other than the required consideration of the no action alternative, would not address the stated project purpose, it should not be introduced. There is no point in discussing an alternative that does not address the project purpose. The Corps planning effort should not introduce an alternative that is clearly inappropriate in order to give the appearance that several options were considered. Likewise, a single alternative should not be fragmented into several design and construction options that are presented as project alternatives. Variations in the height and/length of the levee are merely features of a single alternative, and these features should not be presented as project alternatives.

The alternatives section should conclude with a clear list of options for addressing the stated project purpose. The extent to which a given alternative succeeds in reducing flood damage should be considered in the selection of the preferred alternative, but not in the development of alternatives. As noted, the evaluation of alternatives should be separated from their development. It may be that there is only a single action option and the no action alternative.

Section 8. Selection of the Preferred Alternative

The selection of a preferred alternative may be based on any number of criteria. The National Environmental Policy Act (NEPA) does not, as some believe, require a federal agency to select the least environmentally damaging alternative. The law does require that a range of alternatives be developed and the impacts on both the human and natural environment of each alternative be examined. Based on the consideration of impacts, both adverse and beneficial, the federal agency may select the preferred alternative which may create adverse environmental impacts, but also provides significant, offsetting social benefits.

While recognizing the flooding which has occurred in the area, the Corps should consider Executive Order (EO) No. 11988 of 1978 while developing alternatives. The EO seeks to avoid, to the extent possible, the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

The major recommendation of the Service is that the decision process be fully explained. The factor or factors that lead to the elimination of a given alternative should be explained in this section. Any economic limitation on the overall flood damage reduction effort may be introduced in the section. If economics is the overriding factor in the selection of the preferred alternative, this fact should be introduced in this section.

Overall, the Service requests that planning for flood damage reduction in Princeville have the maximum “transparency” leading up to the selection of a preferred alternative. That is, planning documents should present a clear, logical path from the project need to the selection of the preferred alternative. The Service recommends that the Corps’ planning follow the broad outline given above. In brief, this process would include:

1. A statement of need, or a problem to be addressed, that is phrased in a manner that does not favor or eliminate any broad type of action;
2. A statement of purpose that would state the level of flooding, the type(s) of flood damage, and the portion of the project area for which protection is sought;
3. A section on the development of a range of reasonable alternatives that meet the project purpose, but is free from concurrent evaluation and exclusion of any reasonable alternative;

4. A section that evaluates each alternative for costs and impacts on the human and natural environment, but only compares the alternatives; and,
5. A distinct section that identifies a preferred alternative and the factors that led to its selection

Section 9. Description of the Preferred Alternative

In a letter of June 10, 2005, requesting scoping comments, the Wilmington Corps District stated that in order to provide flood protection for Princeville, the existing dike would be extended. Most of the existing dike would not be modified since the structure is already at the 100-year flood protection elevation. The dike extension may consist of the construction of earthen dikes, the installation of concrete and/or metal sheet piling flood control walls, installation of flood gates, the possible raising of portions of existing highways, and/or raising a portion of the existing dike that parallels U. S. Highway 64.

Subsequent information provided by the Corps in July 2005 indicated that three modifications are likely to be made to the existing dike (Figure 2). First, a new dike structure would be built from a point near the northern end of the dike. This new structure would extend across agricultural fields and eventually follow an alignment along State Road 44 to Shiloh Farm Road where it would run south for a short distance. Second, two relatively short section of the western part of the dike would be raised. Third, a flood gate would be constructed where a road passes under US Highway 64. This gate would allow water to flow after from, but not toward, the town.

In January 2005, the Corps informed the Service that the flood control measures under consideration included:

1. The construction of earthen dikes up to 5-foot high, approximately 10-foot top width, 3 to 1 side slopes, and a bottom width of about 45-feet. Before construction of the earthen dike, a 45-foot wide easement would need to be cleared and graded. All vegetative debris (roots, stumps, etc.) would need to be removed before any construction was initiated;
2. The installation of flood control walls consisting of concrete and/or metal sheet pilings up to 5-foot high with a concrete cap on top to provide added integrity. Additional fill material could be used to cover the upland side of the structure. This alternative would require up to a 10-foot wide easement and could be constructed along the existing cleared and upland toe of highway embankments; and,
3. Raising portions of the existing highways up to 5-foot high to act as a flood control structure. All work would be located within the existing cleared road right-of-way.

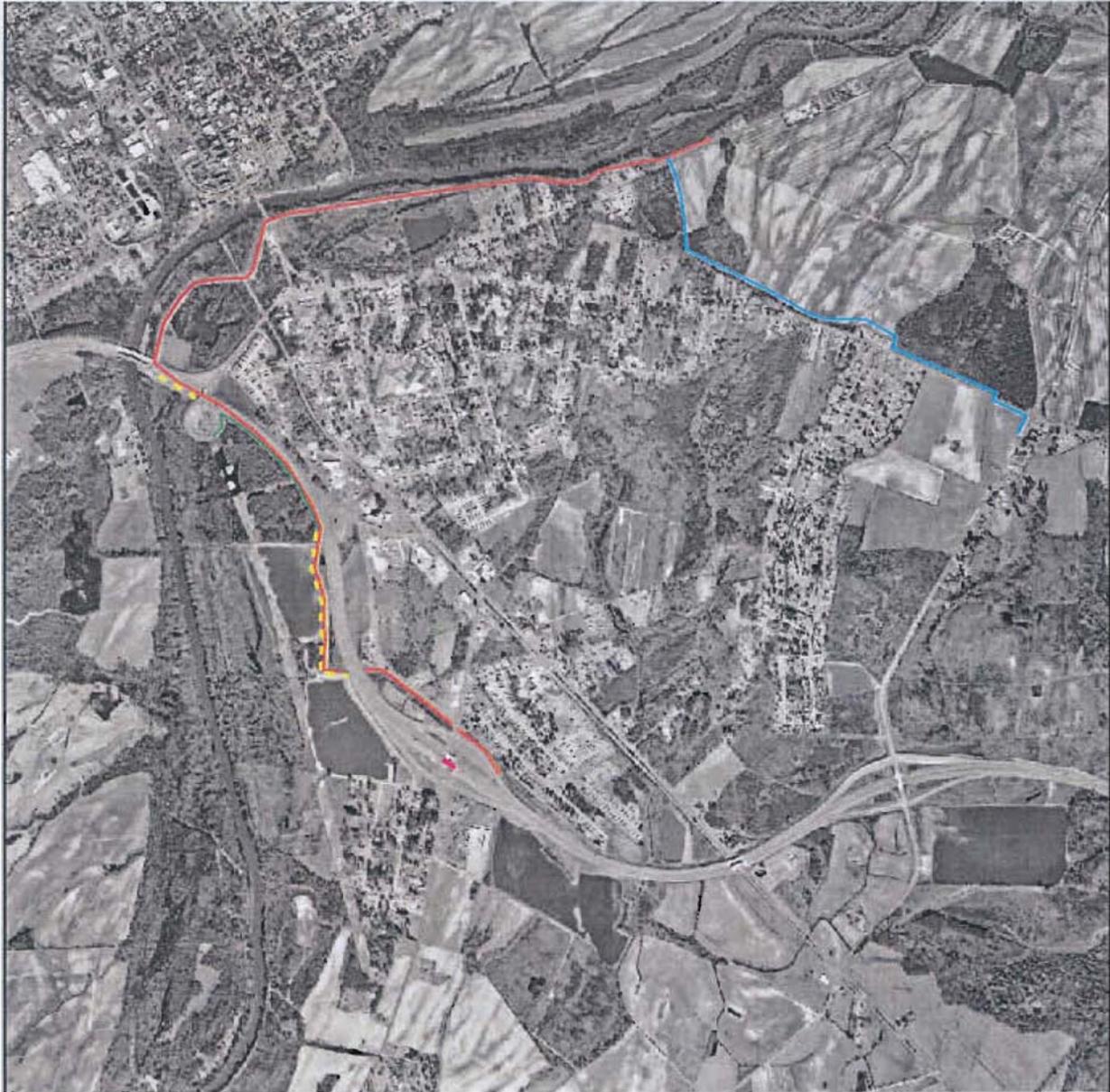


Figure 2. Location of a potential levee extension, areas of the existing levee to be raised, and a new floodgate. Such modifications are one of several alternatives under consideration for the Princeville Flood Damage Reduction Project in Edgecombe County, North Carolina. Source: Wilmington District, U. S. Army Corps of Engineers. July 2005.

All fill material is to be obtained from existing upland commercial borrow area's. No fill material will be placed and/or retained in any waters of the Tar River. The proposed dike extensions would be aligned predominantly on high ground, but Section 404 wetlands adjacent to the existing borrow areas next to US Highway 64 may be impacted. To the greatest extent practical, wetland impacts would be avoided and/or minimized.

The Service concludes that some forms of modification to the existing dike along with possible dike extensions north and east of the town are now the preferred courses of action by the Corps. No similar details have been provided for other structural alternatives. Similarly, we have not received any indication of advance planning for any of the non-structural approaches.

Section 10. Impacts of the Preferred Alternative

As noted, it appears that even before the release of an Environmental Assessment the preferred course of action includes modification to, and extensions of, the existing dike/levee around Princeville. While specific plans have been provided on these measures, the Service is not aware of any similar development of other alternatives.

There are environmental impacts associated with constructing levees around communities on a recognized floodplain. When floodwaters are confined to the channel by a levee or floodwall instead of being allowed to flow over the banks and be stored in the valley floor (or floodplain) the water level (or stage) will be higher for the same discharge than it was before the river was confined (Dunne and Leopold 1978, p. 402). As an example, flood stage by the Mississippi River at St. Louis was reached by a discharge of 19,000 cubic meters per second (m^3/sec) before levee construction, but after levee construction, a discharge of 14,200 m^3/sec produced flood stage (Dunne and Leopold 1978, p 402).

Dunne and Leopold (1978, p. 403) also discuss flood control measure in the Snoqualmie River Valley in Washington State. This effort sought to protect the small, flood-prone towns of the valley from spring snowmelt by surrounding them and some valuable agricultural land with 35 miles of levees. The structures were intended to deny the river to an area of the valley floor that was historically used to store a portion of the floodwater during period of exceptionally high discharge. These authors noted that confining the high runoff between the levees would "cause higher flood levels downstream." In order to protect downstream areas from the flooding that would be caused by the dike system, a flood control dam was considered necessary in the mountainous portion of the basin to reduce the volume of the flood. While this situation may not be completely analogous to the Princeville area, it does suggest the possibility that removing Princeville from the natural floodplain of the Tar River may transfer flood problems to other area and lead directly to public demands for additional flood protect construction elsewhere.

Dunne and Leopold (1978, p. 403) also mention another problem with dike construction. This is the "danger that the floodwall will be breached." They note that if the levee is breached, floodwaters rapidly enter the formerly protected area. The rapid movement of water through a levee breach is "more dangerous that the slow rise" of the waterway.

In a similar vein, the Princeville levee is not intended to provide protection against all flood events. The current proposal would protect against the 100-year flood. The flooding produced by a storm similar to Hurricane Floyd, considered to be a 500-year flood event (two tenth of one percent chance of occurrence in a given year) could produce damage similar to that which occurred in September 1999.

A collaborative effort by 15 federal agencies, including the Corps of Engineers, produced a guide for stream corridor restoration (Federal Interagency Stream Corridor Restoration Working Group [hereafter FISCRWG]. 1998, available at internet at < http://www.nrcs.usda.gov/technical/stream_restoration/ >). Chapter 3 of this document discusses “Disturbance Affecting Stream Corridors” (available at < http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/CHAPTER3.pdf >). Table 3.3 provides a table which lists the potential effects of various land use activities including dams, levees, and the reduction of floodplain. This table presents 41 potential direct effects of levees and more potential indirect effects. Some of the direct hydrologic and physical effects which can influence habitat quality include:

1. increased levels of fine sediment and contaminants in stream corridor;
2. increased peak flow elevation;
3. reduced ground water recharge and aquifer volumes;
4. increased depth to ground water;
5. increased flow velocities;
6. increased stream gradient and reduced energy dissipation;
7. reduced flow duration;
8. decreased capacity of floodplain and uplands to accumulate, store, and filter materials and energy; and,
9. reduced stream capacity to assimilate nutrients/pesticides

Some of the potential direct effects of levees on biological resources include:

1. increased instream sediment and turbidity;
2. loss of edge and interior habitat;
3. decreased connectivity and width within the corridor and to associated ecosystems;
4. decreased movement of flora and fauna species for seasonal migration and dispersal;
5. loss of vegetative composition, structure, and height diversity;
6. impaired aquatic habitat diversity;
7. reduced invertebrate population in stream;
8. loss of associated wetland function including water storage, sediment trapping, recharge, and habitat;
9. reduced species diversity and biomass; and,
10. confined stream channel with little opportunity for habitat development

We are not suggesting that modifying and extending the Princeville levee would produce a dramatic impact in each of these categories. Some categories may show no significant change after construction of the preferred alternative. However, this information from the FISCRWG does give an indication of the wide range of environmental factors which

could be influenced by the proposed construction. These potential adverse impacts should be evaluated in the environmental documentation and used in the final decision for a preferred alternative.

Section 11. Comparison Of Impacts Among Alternatives

The Corps has identified a range of alternatives for flood control along the Tar River in the Princeville area. Prior to the final selection of an official preferred alternative, the Corps should compare the environmental impacts of the major types of actions. There are several significant areas of environmental concern which should be evaluated in these comparisons.

First, and perhaps more significant, the alternatives should be compared for their potential to increase flooding in other areas. From a fish and wildlife perspective, the creation of additional flood risk would lead to new requests for flood control measures which could result in additional habitat losses for structural control measures. For example, in discussing channel "improvement" for flood control Dunne and Leopold (1978, p. 404) state that such measures may have "undesirable side effects," such as increased flood peaks downstream.

Second, the comparison should consider the efficacy of each alternative in preventing flood damage in Princeville. Dunne and Leopold (1978, p. 411) state there has been a realization that "structural solutions to flood control often do not reduce flood losses." They also note that dams and other flood-control structures have encouraged downstream development in flood prone areas. Thus when large storms overwhelm the flood control structure there is greater flood damage than would have occurred without the structure.

Third, there should be a comparison of the degree to which each alternative creates significant alterations of wildlife habitat in the area. The flood conveyance benefits of channelization and diversion are often offset by ecological losses resulting from increased stream velocities and reduced habitat diversity (FISRWG 1998, p. 3-8). Alternatives that utilize dams, upstream reservoirs, or channel modifications are likely to generate significant impacts to fish and wildlife resources and would not be supported by the Service. Modification of the Rocky Mount dam for flood control purposes would not control the discharges of the two largest tributaries of the Tar River (Swift and Fishing Creeks), which drain into the Tar downriver of the existing dam. The Service generally supports the removal of existing dams rather than the construction of new ones due to their significant ecological impacts.

There should also be comparisons of beneficial aspects of the alternatives. For the purposes of the environmental documentation, it should be noted that government acquisition of the land (the buyout alternative) would allow the development of greenbelts, wildlife refuges, and other desirable breaks in the urban environment (Dunne and Leopold 1978, p. 411). As the Service mentioned in our June 2003 PAR, the removal, or replacement, of bridges and/or railway structures across the floodplain such

Grimesland Bridge over the Tar River in Pitt County, would allow water to flow across the entire primary floodplain and thereby reduce flow velocities and flood height. Allowing flood waters to flow over the natural floodplain can enhance ground water recharge and increase aquifer volumes. This beneficial effect should be compared among the various alternatives.

Finally, there should be a comparison of the degree to which each alternative achieves the goals of Executive Order 11988, Floodplain Management. The statement by President Carter accompanying the EO notes that unwise use and development of riverine floodplains not only destroys many of the special qualities of these areas but pose “a severe threat to human life, health, and property.” For these reasons the EO direct federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

Section 12. Conservation Measures

The information provided above on environmental impacts is intended to assist the Corps in achieving the objectives of the FWCA by giving fish and wildlife resources equal consideration with other aspects of water resources development. As planning moves forward, the Service offers the following conservation measures to achieve the worthwhile goal of flood damage reduction while protecting the important environmental qualities important to the residents of Princeville.

First, after developing clear statements on the need and purpose for federal action, a broad range of practicable alternatives should be developed. The range of alternatives should include non-structural approaches, measures which allow flood water to flow over the natural floodplain without producing major damage or threats to the health and safety of residents. Structural alternatives should also be developed. These would be measures which seek to protect residents and their property by blocking flood water from the floodplain and confining such flows to the low flow channel. All alternatives should be developed before the start of the evaluation process. That is, no alternative should be prematurely eliminated due to a perception that the approach might not ultimately be implemented.

Second, once all alternatives have been developed, there should be a complete discussion of the environmental impacts of each course of action. This should include both positive and negative impacts. As a starting point for the potential impacts of such structural alternatives as levees and measures reducing floodplains, Table 3.3 of the interagency report on “Stream Corridor Restoration” should be considered (available at < http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/CHAPTER3.pdf >).

The Corps has stated that before a levee extensive alternative is implemented, a Hydrologic Engineering Center-River Analysis System (HEC-RAS) model would be run to ensure that the proposed action would not increase flood impacts upstream, within

adjacent communities, or downstream of the project area. The Service supports this aspect of project planning. Planning documents should provide a brief, non-technical description of this model. There should be a discussion of the data used in the model, any recognized limitations, and, perhaps most important, examples of the accuracy of the model in predicting actual changes in flood intensity in areas similar to the North Carolina coastal plain.

Third, a specific beneficial aspect of constructing a barrier between the river and the town should be developed. This would be formally establishing and protecting a natural riparian zone in the area between the river and the barrier. This area would have a very high risk for flooding and would be unsuitable for commercial or residential use. However, there would be opportunities for low impact amenities such as walking trails. The incorporation of such a protected zone along the Tar River could be balanced against any adverse impacts of the barrier in evaluating the alternative.

Fourth, project planning should consider the long-term efficacy of each alternative in achieving the goal of flood damage reduction. This is especially important because some structural alternatives may fail during very intense storms or increase flood risk in other areas. In such cases, additional structural flood control measure would be required in Princeville or at other locations. An escalating series of structural flood control measures, such as dams, levees, and channel modification, have the potential to produce significant adverse impacts on fish and wildlife resources (FISRWG 1998, Table 3.3).

Fifth, the potential adverse environmental impacts of each alternative should be developed. The impacts to terrestrial wildlife in the riparian zone and the fisheries resources in the river should be considered. There should be a special consideration of adverse impact on special status species, both state and federal. Many aquatic species in the project area are endemic to the Tar and Neuse River basins, and as such should receive high priority for protection in all project designs. As noted earlier, the NCNHP lists ten freshwater mussels with a state and/or federal status of threatened or endangered in Edgecomb County. While only the Tar River spiny mussel is federally listed (endangered), potential impacts to the nine state listed mussels should be considered in project planning.

Sixth, once the impacts of each alternative have been developed, the least environmentally damaging alternative should be selected. While each flood prone area has some unique characteristics, non-structural alternatives generally serve to maintain natural ecosystem functions better than structural alternatives. Non-structural alternatives do not block the flow of flood waters over the historic floodplain. The ability for flood water to spread out over the natural floodplain can significantly decrease the duration of flooding events and potentially reduce the height of floodwaters in some communities. Periodic inundation of historic floodplains also facilitates the conservation of riparian areas which serve as important fish and wildlife habitat. A discussion of the reasoning leading to the selection of the preferred alternative should be provided.

The selection of the preferred alternative should also consider that least damaging course of action could involve a joint effort of several federal agencies. While the historic significance of Princeville should be preserved, recent guidance from the Corps and Congress outlines new economic evaluation techniques for relocation alternatives. Non-traditional funding sources such as the new Corps floodplain buyout program, hazard mitigation grants from the Federal Emergency Management Agency, and stream restoration projects of the Natural Resources Conservation Service could be utilized as part of a non-structural alternative. Elevation of all of the structures within Princeville above the level of flooding experienced in 1999, akin to the elevation project in Belhaven in Beaufort County, as discussed by Tibbetts (1999), could maintain the historic integrity of the town and reduce flood damages.

Seventh, the conservation of fish and wildlife resources would be enhanced by strict compliance with Executive Order No. 11988. To the extent that an enhanced levee would encourage new development on the floodplain, this alternative appears to contradict the goal of this EO which is to “avoid direct or indirect support of floodplain development wherever there is a practicable alternative.” Section 2(a)(2) of the EO requires that if a federal agency finds that the only practicable alternative consistent with the law and with the policy set forth in the EO requires sitting in a floodplain, the agency shall, prior to taking action, prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain. This “notice” should be circulated with the environmental documentation for the project.

SECTION 13. RECOMMENDATIONS

In accordance with the FWCA, the Service offers the recommendations in this section in order to avoid, minimize, and mitigate adverse impacts on fish and wildlife resources. These brief recommendations are the culmination of all the information presented and analyzed in the preceding sections of this report. These recommendations should not be considered without a thorough understanding of the entire report, specifically the conservation measures presented in Section 12. In regard to flood damage reduction in the Town of Princeville, the Service recommends:

1. A comprehensive range of alternatives, including both structural and non-structural methods, should be developed prior to the initiation of more detailed social, economic, hydrologic, and other environmental factors. Specifically, non-structural alternatives should not be eliminated without complete development;
2. Once all alternatives have been developed, the social, economic, and hydrologic impacts of each alternative should be developed. There should be special emphasis placed on an examination of whether each alternative would increase flood risk in areas upstream and downstream of the Princeville area. Any evidence that a given alternative would not increase flood risks in other areas should be explained in a clear and non-technical manner. From the Service perspective, there should be a complete analysis of the impacts on each alternative

on riparian wildlife, fisheries resources, and especially freshwater mussels with an emphasis on the federally endangered Tar River spiny mussel;

3. For those alternatives which would place a barrier between Princeville and the Tar River, plans should be developed to establish and protect a natural riparian zone in the space between the barrier and the low flow channel of the river. Areas which have been cleared should be restored to the appropriate natural community. This protected riparian zone could be used for low-impact activities such as hiking, bird watching, and fishing;
4. All alternatives should be carefully evaluated for their long-term efficacy in reducing flood damage to Princeville. These evaluations should consider the degree of protection provided against a storm similar to Hurricane Floyd which was considered a 500-year flood event. Some structural measures may protect against small flood, but be ineffective against larger floods. If a given alternative would not protect against a Hurricane Floyd level storm, there should be a discussion the additional measures which would need to be implemented in the future. There should be a consideration that certain non-structural alternatives, such as elevating structures or other forms of flood-proofing, are likely to represent effective, one-time damage reduction measures;
5. Project planning should consider the adverse environmental impacts of each alternative. Special attention should be given to adverse environmental impacts of structural alternatives such as those listed in Table 3.3 of the interagency report on "Stream Corridor Restoration" should be considered (available at < http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/CHAPTER3.pdf >).
6. The least environmentally damaging alternative, practicable alternative should be selected for implementation; and,
7. Flood damage reduction in Princeville should comply with EO 11988 (Floodplain Management) which require federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. If the preferred alternative would be sited on the floodplain, environmental documentation should include the "notice," specified in Section 2(a)(2) of the EO, explaining why the action is proposed to be located in the floodplain.

Section 14. Summary and Position of Service

The Service recognizes the need for flood damage reduction and fully supports federal action to achieve this goal if the long-term viability of fish and wildlife resources is fully considered in the selection, design, and implementation of an action alternative. The

consideration of fish and wildlife resources should not be limited to easily defined monetary values, but include the social functions and values which these resources contribute to the quality of life in Princeville and surrounding areas.

This report provides information on the fish and wildlife resources in the project area, the potential adverse impacts of major action alternatives, and actions which the Service believes would serve to minimize adverse impacts. The most critical aspect of any federal action will be the selection of a preferred alternative for reducing flood damages. We hope that the environmental resources presented in this report will be incorporated into the ongoing planning process.

Overall, fish and wildlife resources within and near Princeville and the Tar River will be conserved by an alternative that takes advantage of the natural conditions and processes in the watershed. The Service can support a project if it (1) is ecologically sound; (2) is the least environmentally damaging alternative; (3) has avoided and minimized damage or loss of fish and wildlife resources and uses; and , (4) has adopted, with guaranteed implementation, all important recommended conservation measures to satisfactorily compensate for unavoidable damage or loss to fish and wildlife resources.

The Service appreciates this opportunity to contribute to the early planning of this project.

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May 11, 2015

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Re: Princeville, North Carolina Flood Risk Management Draft Integrated Feasibility Report and Environmental Assessment (EA)

Dear Mr. Garwood:

The U.S. Fish and Wildlife Service (Service) has reviewed your April 7, 2015 letter with updates to the March 2014 EA and the April 17, 2015, EA which includes these revisions. The project, as described in the EA, is expected to have minimal adverse impacts to fish and wildlife resources. Therefore, we have no objection to the activity as described in the EA. Please consider this letter as the conclusion of the Fish and Wildlife Coordination Act process unless major modifications are made to the project.

In accordance with the Endangered Species Act of 1973, as amended, (ESA) and based on the information provided, and other available information, it appears the action is not likely to adversely affect federally listed species or their critical habitat as defined by the ESA. We believe that the requirements of section 7 (a)(2) of the ESA have been satisfied for this project. Please remember that obligations under the ESA must be reconsidered if: (1) new information identifies impacts of this action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

For your convenience a list of all federally protected endangered and threatened species in North Carolina is now available on our website at <http://www.fws.gov/raleigh>. Our web page contains a complete and updated list of federally protected species, and a list of federal species of concern known to occur in each county in North Carolina.

The Service appreciates the opportunity to review and provide comments on the proposed action. Should you have any questions regarding the project, please contact John Ellis at (919) 856-4520, extension 26.

Sincerely,

Pete Benjamin,
 Field Supervisor

cc: NMF'S, Beaufort, NC
 EPA, Atlanta, GA
 WRC, Raleigh

**ATTACHMENT C – CORPS’ RESPONSE TO USFWS RELATED
RECOMMENDATIONS**

As required under the Fish and Wildlife Coordination Act of 1958, this project has been coordinated with USFWS (48 Stat. 40; 16 U.S.C. 661-667d). On August 23, 2005, the USFWS provided a Draft Fish and Wildlife Coordination Act report on this project. This coordination act report was used as input for this project and is found in Attachment B. The USFWS provided a list of project-related recommendations. The Corps of Engineers response to each of the Service's recommendations is provided below.

1. USFWS Recommendation: A comprehensive range of alternatives, including both structural and non-structural methods, should be developed prior to the initiation of more detailed social, economic, hydrologic, and other environmental factors. Specifically, non-structural alternatives should not be eliminated without complete development.

USACE Response: A comprehensive range of alternatives, both structural and non-structural, that meets the project purpose (provide the Town of Princeville with 100-year flood damage reduction), has been developed. There are other options available to the Recommended Plan: these are to move the town out of the floodplain or to raise all the existing structures above the 100 year floodplain. In October 1999, the Town Council voted against accepting the FEMA buyout of the town, moving from its present location to high ground and the cost of elevating all the structures above the floodplain would be prohibitive (a minimum of \$24 million for the approximately 1,200 structures). There are no options available for the Recommended Plan, which does not involve construction in the floodplain. Therefore, feasible alternatives are limited to those that provide flood damage reduction of the town in its present location. Based on a review (which includes social, economic, hydrologic, and environmental factors), alternatives considered feasible will be addressed in detail in the Environmental Assessment (EA).

2. USFWS Recommendation: Once all alternatives have been developed, the social, economic, and hydrologic impacts of each alternative should be developed. There should be special emphasis placed on an examination of whether each alternative would increase flood risk in areas upstream and downstream of the Princeville area. Any evidence that a given alternative would not increase flood risks in other areas should be explained in a clear and non-technical manner. From the Service perspective, there should be a complete analysis of the impacts on each alternative on riparian wildlife, fisheries resources, and especially freshwater mussels with an emphasis on the federally endangered Tar River spiny mussel.

USACE Response: The EA will address the relevant hydrologic, social, and economic impacts of each feasible alternative. In addition, potential impacts of each feasible alternative to Federally threatened and endangered species, as well as riparian wildlife, fisheries resources, freshwater mussels, and other environmental and biological resources will be evaluated.

Alternatives will be developed with a consideration for potential increased upstream or downstream flooding. The preferred alternative will be selected with potential increased flooding being a key consideration. Before the project is implemented, the Hydrologic Engineering Centers – River Analysis System (HEC-RAS vers. 4.1) model will be run to ensure that the preferred alternative will not increase the flood impacts upstream, within adjacent neighboring communities, or downstream of the project area. Should the results of this model run reveal a potential for increased flooding upstream or downstream of the project area, the project will be modified to eliminate or satisfactorily minimize the increased flood potential.

3. USFWS Recommendation: For those alternatives, which would place a barrier between Princeville and the Tar River, plans should be developed to establish and protect a natural riparian zone in the space between the barrier and the low flow channel of the river. Areas that have been cleared should be restored to the appropriate natural community. This protected riparian zone could be used for low-impact activities such as hiking, bird watching, and fishing.

USACE Response: The environmental resource attributes of the riparian zone between the Tar River and any structure constructed to reduce risk to Princeville are acknowledged. As soon as possible in the project's construction phase, this riparian zone will be allowed to return to its natural state, with the exception of the inspection/maintenance corridor described below. Areas within the riparian zone that are presently cleared will be allowed to revegetate naturally. Constructed structures, including ditches and spoil piles, will be evaluated for their threat to the integrity of the proposed project. Those structures determined to pose no risk will likely be left in place.

Within the riparian zone, the corridor immediately adjacent to the constructed project will be maintained to the degree necessary to allow for structural inspection and maintenance. The width of this corridor and the degree of maintenance necessary will depend upon the scope of the constructed project.

4. USFWS Recommendation: All alternatives should be carefully evaluated for their long-term efficacy in reducing flood damage to Princeville. These evaluations should consider the degree of protection provided against a storm similar to Hurricane Floyd, which was considered a 500-year flood event. Some structural measures may protect against small floods, but be ineffective against larger floods. If a given alternative would not protect against a Hurricane Floyd level storm, there should be a discussion of the additional measures that would need to be implemented in the future. There should be a consideration that certain non-structural alternatives, such as elevating structures or other forms of flood-proofing, are likely to represent effective, one-time damage reduction measures.

USACE Response: The State of North Carolina, the Town of Princeville, and Edgecombe County have decided and agreed upon the project purpose; the reduction of flood risk to the Town of Princeville from the 100-year flood. All alternatives will be evaluated for their ability to effectively achieve the project purpose, which will provide the maximum level of risk reduction without having to raise the existing levee.

Reducing flood risk to the Town of Princeville from a "Floyd event" would almost assuredly involve raising the existing levee and/or construction of a ring levee around the town. The cost of reducing risk to the Town of Princeville from a Floyd event is in the \$200 million range, more than can be justified and more than the state or community can afford. In addition, raising the existing levee along the river could increase the level of flooding in Tarboro.

5. USFWS Recommendation: Project planning should consider the adverse environmental impacts of each alternative. Special attention should be given to adverse environmental impacts of structural alternatives such as those listed in Table 3.3 of the interagency report on "Stream Corridor Restoration" (available at [http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/](http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/CHAPTER3.pdf) CHAPTER3.pdf).

USACE Response: Federally threatened and endangered species, as well as riparian wildlife, fisheries resources, freshwater mussels, and other environmental and biological resources will be evaluated for each feasible alternative. The EA will also address potential increased flooding upstream or downstream of the project area, in addition to the relevant hydrologic, social, and economic impacts of each feasible alternative.

6. USFWS Recommendation: The least environmentally damaging alternative, practicable alternative should be selected for implementation.

USACE Response: The least environmentally damaging practicable, feasible alternative that achieves the project purpose will be selected for implementation.

7. USFWS Recommendation: Flood damage reduction in Princeville should comply with EO 11988 (Floodplain Management), which requires federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. If the preferred alternative would be sited on the floodplain, environmental documentation should include the “notice,” specified in Section 2(a)(2) of the EO, explaining why the action is proposed to be located in the floodplain.

USACE Response: The Town of Princeville is located in the 100-year floodplain, but the EA will include discussion of EO 11988 with respect to the project’s alternatives, which will be both structural and non-structural. Structural alternatives involving construction in the 100-year floodplain will address rational for the alternative being located in the floodplain.

Prior to the implementation of the preferred alternative, all required protocol and notification procedures will be complied with.

ATTACHMENT D – PERTINENT CORRESPONDENCE



**North Carolina Department of Cultural Resources
State Historic Preservation Office**

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

July 19, 2005

W. Coleman Long
Chief, Planning and Environment Branch
Department of the Army
Wilmington District, Corps of Engineers
P. O. Box 1890
Wilmington, NC 28402-1890

Re: Princeville Flood Damage Reduction, Princeville, Edgecombe County, CH 01-0473

Dear Mr. Long:

We have received notification from the State Clearinghouse concerning the above project.

We have conducted a search of our maps and files and note the following properties, within the general study area, which have either been listed in the National Register of Historic Places, been determined eligible for listing in the National Register, or were placed on the State Study List for further evaluation for possible inclusion in the National Register. These sites are as follows:

- ED 1113 DOE Abraham Wooten House, 259 Mutual Blvd. Princeville
- ED 1039 SL DOE Princeville School, US 258, Princeville
- ED 1062 DOE Bridge # 24, US 64 over Tar River, Tarboro
- ED 1064 SL Mount Zion Primitive Baptist Church, Princeville
- ED 1065 DOE Baptismal Site, S. side of Tar River, E. of # 24 Bridge, Princeville
- ED 1167 DOE Tarboro Historic District Boundary Expansion, Tarboro

The planned activities are, therefore, subject to Section 106 of the National Historic Preservation Act and the regulations of the Advisory Council on Historic Preservation. However, given the description of the proposed undertaking, it is unlikely to affect the historic properties.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801

March 30, 2009

Environmental Resources Section

Renee Gledhill-Earley
Environmental Review Coordinator
NC Division of Archives and History
4617 Mail Service Center
Raleigh, North Carolina 27699-4617

Dear Ms. Gledhill-Earley:

Enclosed is a summary of the Wilmington District, Army Corps of Engineers' review and findings pursuant to Section 106 of the National Historic Preservation Act of 1966 (36 CFR Part 800) for the Princeville Flood Risk Management Study. The project is currently under feasibility study and we are requesting comments on our determination that the proposed undertaking will have no effect on historic properties.

I appreciate the assistance of the Division staff in our assessment of the proposed undertaking's effects.

If you have questions regarding the cultural resources investigations, please contact John Mayer, Archaeologist, at (910) 251-4696, fax (910) 251-46744, or email john.l.mayer@usace.army.mil.

Sincerely,

W. Coleman Long, Chief
Planning and Environmental Branch

Enclosure

PRINCEVILLE FLOOD RISK MANAGEMENT STUDY

SUMMARY OF 106 REVIEW AND FINDINGS

Project Background and Description

The Town of Princeville is located in Edgecombe County adjacent to the Tar River opposite from Tarboro. In September 1967, the Wilmington District, U.S. Army Corps of Engineers completed a 2.9-mile levee adjacent to Princeville. During Hurricane Floyd (1999) flood waters entered the town around the terminal ends of the existing levee along US Highway 64 and 258. Extending the existing levees would increase these lower elevations to the same level as the existing levee along portions of U.S. Highways 64 and 258 (Figure 1). All levee material would be obtained from a 40 acre borrow area (Figures 1 and 2).

Levee Extension Alignment A is adjacent to US Highway 64 within the cleared highway right of way and consists of about 300 feet of flood wall and about 2,800 feet of berm (Figure 1).

Levee Extension Alignment B consists of raising about 8,650 feet of roadway along US Highway 258 and Shiloh Farm Road to serve as the flood control levee. Road surface elevation and associated work would occur within the existing road right of way (Figure 1).

Levee Extension Alignment K consists of raising two portions of Shiloh Farm Road (1,430 and 2,190 foot long segments or a total of 3,620 feet) about 1-foot (Figure 1).

Recommendations

The Area of Potential Effect (APE) for levee extension was field inspected by the author, but no further work was conducted because project's APE would occur within existing road rights of way (Figure 1).

The project's APE for the borrow area (Figure 2) was previously surveyed in 1989 as part of the US 64 relocation project (Lautzenheiser 1989). While the survey documented numerous nineteenth and early-twentieth century sites in the vicinity, no properties were recorded within the APE for the proposed borrow area. In addition, only one site (31ED130) within a mile of the borrow area APE was proposed for further testing. Site 31ED130 represents a house site associated with the late-eighteenth century Knight Plantation (Gray et al. 1995). The site was determined to be ineligible for the National Register of Historic Places (NRHP) based upon a limited number of early ceramics and no discernible architectural or archaeological features (Gray et al. 1995).

The Knight family cemetery lies approximately 200 m north of site 31ED130. The cemetery is located east of Chinquapin Road (SR 1524) opposite the borrow area APE (Figure 2).

A search of the deeds associated with the property revealed a 1925 survey map confirming the location of nearby sites recorded during the 1989 survey. The map did not, however, depict any structures or historical features within the borrow pit APE (Edgecombe County Deed Books 266:197).

In our opinion, based upon the above findings, the proposed undertaking would have no effect on historic properties listed or eligible for listing in the NRHP. As always, should changes to the proposed project's APE be required, or unanticipated discoveries occur, all work in that area will cease until consultation with the North Carolina State Historic Preservation Office has taken place.

John L. Mayer, Archaeologist

USACE Wilmington District

REFERENCES

Edgecombe County, North Carolina

1925 *Report to the Commission appointed to make partition of the lands of the Late E. Cromewell Knight* (filed 29 February 1925), Deed Book 266, page 197. Register of Deeds, Edgecombe County, North Carolina.

Gray, Anna, Gerold Glover, and Thomas Padgett

1995 *Archaeological Investigations of Six Sites Along the Proposed Relocation of US 64, Tarboro to Parmele, Edgecombe County, TIP No. R-2111*. North Carolina NC Department of Transportation, Planning and Environmental Branch, Division of Highways, Raleigh, North Carolina.

Lautzenheiser, Loretta

1989 *Archaeological Survey of US 64 Relocation Tarboro to Parmele, Edgecombe, Martin and Pitt Counties, North Carolina R-2111*. Coastal Carolina Research, Inc., Tarboro, North Carolina.



**North Carolina Department of Cultural Resources
State Historic Preservation Office**

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

July 19, 2005

W. Coleman Long
Chief, Planning and Environment Branch
Department of the Army
Wilmington District, Corps of Engineers
P. O. Box 1890
Wilmington, NC 28402-1890

Re: Princeville Flood Damage Reduction, Princeville, Edgecombe County, CH 01-0473

Dear Mr. Long:

We have received notification from the State Clearinghouse concerning the above project.

We have conducted a search of our maps and files and note the following properties, within the general study area, which have either been listed in the National Register of Historic Places, been determined eligible for listing in the National Register, or were placed on the State Study List for further evaluation for possible inclusion in the National Register. These sites are as follows:

ED 1113 DOE	Abraham Wooten House, 259 Mutual Blvd. Princeville
ED 1039 SL DOE	Princeville School, US 258, Princeville
ED 1062 DOE	Bridge # 24, US 64 over Tar River, Tarboro
ED 1064 SL	Mount Zion Primitive Baptist Church, Princeville
ED 1065 DOE	Baptismal Site, S. side of Tar River, E of # 24 Bridge, Princeville
ED 1167 DOE	Tarboro Historic District Boundary Expansion, Tarboro

The planned activities are, therefore, subject to Section 106 of the National Historic Preservation Act and the regulations of the Advisory Council on Historic Preservation. However, given the description of the proposed undertaking, it is unlikely to affect the historic properties.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801



Thank you for your cooperation and consideration. If you have questions concerning this comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above tracking number.

Sincerely,

Renee Gledhill-Earley

P Peter Sandbeck



**North Carolina Department of Cultural Resources
State Historic Preservation Office**

Peter B. Sandbeck, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

April 17, 2007

Richard H. Kimmel, Archaeologist
Contracting Officer's Representative
Department of the Army
Wilmington District, Corps of Engineers
P.O. Box 1890
Wilmington, NC 28402-1890

Re: Phase I Archaeological Survey for a Proposed Borrow Pit, Princeville Flood Reduction Project,
Edgecombe County, CH 01-0473

Dear Mr. Kimmel:

Thank you for your letter of March 27, 2007, transmitting the archaeological survey report for the above project.

The report authors state that no archaeological sites were discovered during the above noted investigation and that no further cultural resources investigations are necessary and/or warranted. We concur with this recommendation.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763 ext. 246. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Peter Sandbeck

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-4763/733-8653
RESTORATION	515 N. Blount Street, Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6547/715-4801
SURVEY & PLANNING	515 N. Blount Street, Raleigh, NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919)733-6545/715-4801



North Carolina Department of Cultural Resources
State Historic Preservation Office

Peter B. Sandbeck, Administrator

Beverly Eaves Perdue, Governor
Linda A. Carlisle, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

May 8, 2009

Coleman Long
Department of the Army
Wilmington District, Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403-1343

Re: Princeville Flood Damage Reduction Project, Edgecombe County, ER 09-0898

Dear Mr. Coleman:

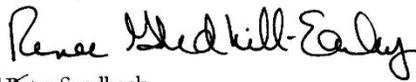
Thank you for your letter of April 9, 2009, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,


Peter Sandbeck



North Carolina
Department of Administration

Pat McCrory, Governor

Bill Daughridge, Jr., Secretary

May 28, 2015

Ms. Teresa Bullard
Department of Army
Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403-1343

Re: SCH File # 15-E-0000-0536; EA: USACE has prepared a draft Flood Risk Management Integrated Feasibility Report and EA for the town of Princeville.

Dear Ms. Bullard:

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act.

Attached to this letter are comments made in the review of this document. The Department of Cultural Resources has requested additional information prior to their concurrence with the above referenced document.

Therefore, pursuant to 1 NCAC 25 .0506(e), this office requests that a supplemental document providing the additional information requested by the Department of Cultural Resources be submitted to the Clearinghouse for further review and comment.

Sincerely,

Crystal Best
State Environmental Review Clearinghouse

Attachments:
cc: Region I.

Mailing Address:
120 Mail Service Center
Raleigh, NC 27699-3661

Telephone: 919/857-2475
Fax 919/733-9571
State (Area) 919-61-69
e-mail: state_clearinghouse@denr.nc.gov

Location Address:
16 West Hargett Street
Raleigh, North Carolina

An Equal Opportunity/Affirmative Action Employer



DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

January 8, 2016

Engineering, Construction, and Planning Division

Mrs. Renee Gledhill-Earley, Environmental Review Coordinator
North Carolina State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Dear Mrs. Gledhill-Earley:

The U.S. Army Corps of Engineers, Wilmington District (Corps) is requesting consultation in accordance with Section 106 of the National Historic Preservation Act associated with the Princeville Flood Damage Reduction Study (Project), Edgecombe County, North Carolina. The N.C. State Historic Preservation Office (SHPO) has assigned reference number ER 09-0898 to this Project.

In response to "revised project description" and "public notice of modified design" Project documents, SHPO provided the Corps recommendations regarding survey needs on February 18, 2014, and May 6, 2015, respectively (Attachments 1 and 2). Specifically, SHPO recommended a comprehensive archaeological survey by an experienced archaeologist of the approximately 10-acre area associated with the earthen levee (Levee) oriented S/SE from US 258 nearly 3,600 linear feet to NC 111 (Figure 1). According to SHPO, this area has never been systematically surveyed to determine the location or significance of archaeological resources and is considered to have a high probability area for the presence of Native American archaeological resources.

The Corps acknowledges the SHPO's recommendations, and will conduct a comprehensive survey of the Levee footprint during the Project's Planning, Engineering, and Design (PED) phase. The PED phase will be completed prior to initiation of construction activities. Furthermore, as requested by SHPO, the Corps will provide SHPO two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, for review and comment in advance of Project construction activities. Should any additional changes develop during the PED phase of the project, the Corps will re-initiate consultation for any portions of the project not previously considered.

If any archaeological site(s)/remains are identified as part of the survey(s), the Corps will consult with the SHPO to determine if they are eligible for listing in the National Register of Historic Places. Any site(s)/remains that are determined eligible for listing will be avoided, if possible. If avoidance is not possible, the Corps, in consultation with the SHPO, will develop and carry out a program of data recovery to insure that the information important to history or prehistory is preserved and available for research.

-2-

The Corps acknowledges that consultation is ongoing and that prior to project implementation, consultation will be finalized pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

At your earliest convenience, please provide your written concurrence with this path forward for completion of consultation under Section 106 of the National Historic Preservation Act for the Princeville Flood Damage Reduction Study. If you have any questions please contact Mr. Justin Bashaw, Environmental Resources Section, at Justin.P.Bashaw@usace.army.mil, or you may call him at (910) 251-4581

Sincerely,



Catheren B. Gill, P.E.
Chief, Engineering, Construction
And Planning Division

Enclosures

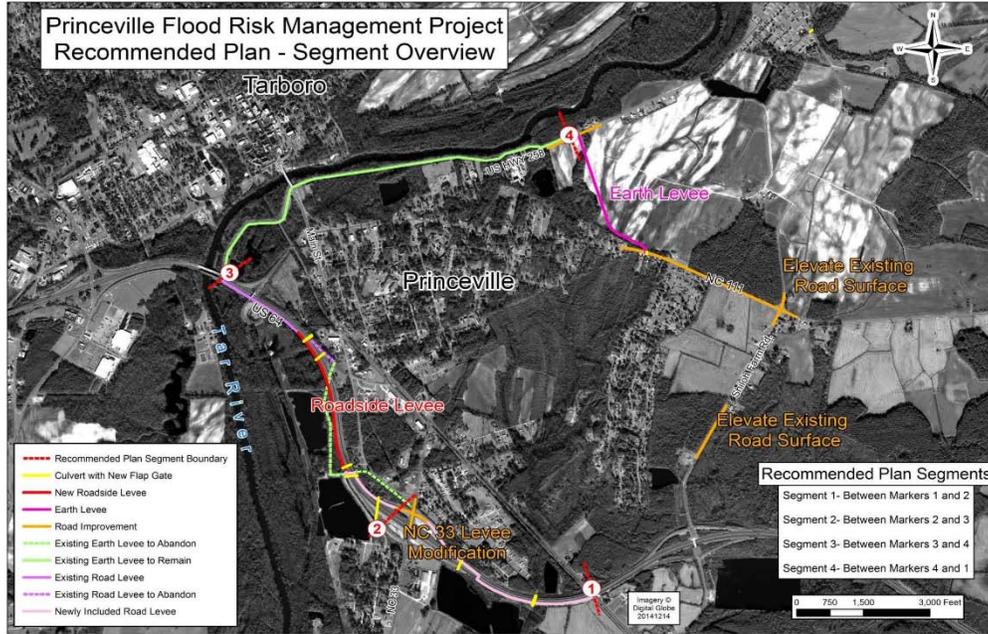


Figure 1. Project location map.

Attachment 1

North Carolina State Historic Preservation Office Response Letter
February 18, 2014



North Carolina Department of Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

February 18, 2014

John Mayer
US Army Corps of Engineers, Wilmington District
69 Darlington Avenue
Wilmington, NC 28403
John.L.Mayer@usace.army.mil

Re: Princeville Flood Damage Reduction Study, Edgecombe County, ER 09-0898

Dear Mr. Mayer:

Thank you for the revised project description we received January 17, 2014.

We understand the project now calls for construction of an earthen dike running S/SE from US 258 approximately 3600 lf to NC 111, with a footprint about 100 feet wide and a total area of disturbance about 10 acres.

There are no known recorded archaeological sites within the project boundaries. However, the project area has never been systematically surveyed to determine the location or significance of archaeological resources. Given the project area's environmental setting we consider it of high probability for the location of significant archaeological sites.

We recommend that a comprehensive survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at <http://www.archaeology.ncdcr.gov/ncarch/resource/consultants.htm>. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

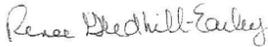
We have determined that the project as proposed will not have an effect on any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Location: 109 East Jones Street, Raleigh NC 27601 Mailing Address: 4617 Mail Service Center, Raleigh NC 27699-4617 Telephone/Fax: (919) 807-6570/807-6599

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or renee.gledhill-earley@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,


for Ramona M. Bartos

Attachment 2

North Carolina State Historic Preservation Office Response Letter
May 6, 2015



North Carolina Department of Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Klutz

Office of Archives and History
Deputy Secretary Kevin Cherry

May 6, 2015

Teresa Bullard
US Army Corps of Engineers
Wilmington District
69 Darlington Avenue
Wilmington, NC 28403-1343

Re: Public Notice, Modified Design, Princeville, North Carolina Flood Risk Management,
Draft Integrated Feasibility Report and Environmental Assessment, CESAW-ECP-PE,
Edgecombe County; ER 09-0898

Dear Ms. Bullard:

We have received the public notice of the modified design of April 17, 2015, for the above cited project and offer the following comments.

Our earlier review of this project noted the addition of an earthen dike from US258 to NC111. As this area contains a high probability for the presence of Native American archaeological resources, we recommended a comprehensive archaeological survey of the dike area in our letter of February 18, 2014 to John Mayer. As this dike is still proposed for construction, our recommendation remains unchanged.

We recommend that the area of potential effect (APE) for the earthen dike be subjected to a comprehensive survey by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed construction. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.archaeology.ncdcr.gov/ncarch/resource/consultants.htm. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

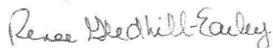
We have determined that the project as proposed will not have an effect on any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Location: 109 East Jones Street, Raleigh NC 27601 Mailing Address: 4617 Mail Service Center, Raleigh NC 27699-4617 Telephone/Fax: (919) 807-6570/807-6599

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,



for Ramona M. Bartos



North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

January 26, 2016

Catheren B. Gill, Chief
Engineering, Construction & Planning Division
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403-1343

Catheren.B.Gill@usace.army.mil

Re: Princeville Flood Damage Reduction Study, Edgecombe County, ER 09-0898

Dear Ms. Gill:

Thank you for your January 8, 2016, letter concerning the above proposed study. We have reviewed the US Army Corps of Engineers' commitment to carry out the archaeological survey recommended by us in 2014 and 2015, its agreement to evaluate any discovered archaeological remains for their National Register eligibility; and, if necessary, to carry out a program of data recovery in the event eligible resources cannot be avoided. These proposals are acceptable to us and, we believe, will fulfill the Corps' responsibility for compliance with Section 106.

Further, given the Corps' commitment to the above process, we do not believe a Programmatic Agreement for the undertaking is warranted. Should you like to discuss this further, we will be pleased to do so, but such an agreement seems unnecessary given the above commitments for the undertaking.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

for Ramona M. Bartos

Location: 109 East Jones Street, Raleigh NC 27601 Mailing Address: 4617 Mail Service Center, Raleigh NC 27699-4617 Telephone/Fax: (919) 807-6570/807-6599

August 11, 2000

MEMORANDUM FOR THE PRESIDENT

**FROM: THE PRESIDENT'S COUNCIL ON THE FUTURE OF PRINCEVILLE,
NORTH CAROLINA**

SUBJECT: RECOMMENDATIONS FOR THE FUTURE OF PRINCEVILLE

On February 29, 2000, you issued Executive Order 13146, creating an interagency Council on the Future of Princeville, North Carolina.

Princeville, North Carolina, is a town of about 2,100 founded at the end of the Civil War by freed slaves. It was chartered in 1885 and is one of the oldest towns in the United States founded by African Americans. Princeville has been flooded several times in its history and in September 1999 was devastated by floods caused by Hurricane Floyd.

In response to the damage, several Federal agencies had already begun repair and recovery efforts. However, given the Town's unique and significant place in our nation's history, you believed that more needed to be done to help the people of Princeville. Accordingly, you tasked the Council to develop recommendations for further agency and/or legislative actions that could be undertaken to address the future of Princeville. This document responds to your request.

Below we have outlined: (1) a brief description of the Council and its mandate; (2) some background information on Princeville and the damage caused by the flood; (3) Federal assistance provided to Princeville immediately following the flood; (4) assistance provided to Princeville after the creation of the Council; and (5) recommendations for further assistance.

Description of the Council

The Council comprises the Secretaries of DoD, USDA, DOC, DOL, HHS, HUD, and DOT, the Administrators of EPA and SBA, the Director of OMB, the Commander of the Army Corps of Engineers, the Director of FEMA, the Assistant to the President for Domestic Policy, the Assistant to the President for Economic Policy, and the Assistant to the President for Intergovernmental Affairs, or their designees. In addition, the Department of Interior, the White House Task Force on Livable Communities, Cabinet Affairs, the Community Empowerment Board, and the Director of Presidential Personnel have participated on the Council.

When developing its recommendations, the Council was to consider, among other things:

- (a) the unique historic and cultural importance of Princeville in American history;
- (b) the views and recommendations of the relevant State and local governments, the private sector, citizens, community groups, and non-profit organizations on actions they could take to enhance the future of Princeville and its citizens; and
- (c) agency assessments and recommendations to repair and rebuild Princeville, and to "protect Princeville from future floods."

Brief History of Princeville

Looking for refuge after the end of the Civil War, newly freed slaves settled just south of Tarboro, North Carolina, on a swampy, mosquito-infested floodplain along the southern bank of the Tar River. Twenty years after the settlement was founded, the former slaves petitioned the State to recognize their town as a legal entity, and in 1885 the Town of Princeville was incorporated.

The legacy of Princeville is one of survivorship. In the 135 years since the Town was founded, the residents of Princeville have struggled to maintain their community identity in the face of much adversity, including racial discrimination, abject poverty, and constant flooding. The Tar River overflowed its banks in 1865, 1889, 1919, 1924, 1940, and 1958, causing serious destruction, sanitation problems, and disease in Princeville. Through it all, the Town worked hard to improve conditions for its residents and to safeguard its unique cultural heritage. However, it wasn't until the U.S. Army Corps of Engineers constructed the Princeville Dike (Levee) in 1965 that flooding of the Tar River was controlled, although localized flooding because of an inadequate drainage system still persists today, and Princeville's population was stabilized.

Princeville and Hurricane Floyd

During Hurricane Floyd, the waters of the Tar River overtopped the Princeville Levee and floodwaters covered the entire town. According to the National Weather Service, the Tar River crested at 43 feet, 24 feet above the flood stage and determined by the U.S. Army Corps of Engineers to be a 500-year flood event. Princeville was under 10 to 15 feet of water, and after nine days that water remained at the rooftops of most houses.

Of the approximately 2,100 people living in Princeville before the flooding caused by Hurricane Floyd, about 97% of the residents were Black, more than 50% of the households had elderly residents, and only roughly 40% of the residents were high school graduates. The median household income was about \$16,000 per year and approximately 60% of Princeville households received public assistance.

Princeville is a bedroom community. It has no independent source of income from industry and has a limited tax base. Businesses located in Princeville before the flood were exclusively small enterprises and most operated out of residents' homes. Most businesses employed fewer than five people.

The flooding caused by Hurricane Floyd forced the Princeville residents to relocate to temporary housing in the nearby towns of Tarboro and Rocky Mount. The floods destroyed most of the preexisting housing, public facilities, and businesses in the town. The Town leadership, who struggled to respond, were themselves victims who had lost their dwellings, their personal possessions and heirlooms, and whose own safety was endangered.

The Town's Decision to Stay

One of the most controversial post-flood decisions made by the Town was whether to stay and rebuild, or to apply for buyout funding from FEMA and move to a new location. Under the buyout program, FEMA buys properties at their estimated market value as of the day before the flood. In return, the town must agree to never build on that land again.

Princeville struggled with this decision. The residents could certainly use the buyout funds, but they had occupied the land for over a century. The residents were not in agreement, nor was the Town Council. After much turmoil and deliberation, the Town Council voted to stay and rebuild Princeville in its current location. It is important to note that the entire town, with the levee back in place, remains in a 500-year floodplain with a relatively low risk of flooding. Also, the land closest to the levee, which is subject to the highest levels of inundation by floodwaters, is now planned for acquisition by the Town and conversion into park land and open space, while cost effective mitigation measures are being strongly encouraged for all new development and redevelopment.

The people of Princeville are very proud of their heritage and their ability to overcome adversity. The flooding caused by Hurricane Floyd is viewed as another major challenge to the community, but not one so great as to overcome the incredible sense of place that has passed down through the generations. Their decision to stay was a courageous one, and the Federal Government can provide Princeville with the opportunity to preserve its place in American history while rebuilding a better, safer, and more disaster resistant community.

Assistance Immediately After the Flood

Immediately following the flood, several Federal agencies and the State of North Carolina provided substantial assistance to Princeville. In fact, with the leadership of Governor Hunt, the State has provided an unprecedented commitment of resources to ensure North Carolina's recovery.

FEMA: FEMA has provided more than \$88 million in temporary housing assistance (other than mobile homes and travel trailers) to the State and more than \$49 million for the State-managed manufactured housing program, including funds to house 244 Princeville families in newly constructed group parks in nearby towns and to house about 50 Princeville families on their private properties in or near Princeville. Approximately 36 FEMA employees, reservists, and local hires were provided to support the operation until the State could hire and train personnel to administer the program.

FEMA also provided more than \$2 million in human assistance grants to Princeville residents, authorized \$1.3 million to the Edgecombe County School District for repairs to the Princeville Montessori School, and funded the Princeville Housing Authority for emergency demolition of the Pioneer Court apartment complex. In addition, FEMA authorized \$250,000 for immediate infrastructure needs, which the Town continues to draw upon for emergency repairs, demolition of unsafe structures, and debris removal.

HUD: HUD immediately deployed community redevelopment specialists to Princeville and began a systematic review of the housing crisis. HUD opened a disaster response office staffed with community builders from HUD's Office of Public and Indian Housing, Multi-Family Housing, and Community Planning and Development, each of whom has lent considerable expertise and funding to assist the people of Princeville. The staff worked to provide technical assistance to Princeville and neighboring areas, and to increase capital improvement funding for public housing. HUD staff also worked with local officials in surrounding areas to develop regional economic revitalization plans.

In addition, HUD provided emergency waivers in both Community Development Block Grant and HOME efforts, giving North Carolina more flexibility to administer these programs.

SBA: SBA approved more than \$8.3 million for 110 disaster assistance loans in Princeville, including \$4.6 million for 75 home loans and \$3.6 million for 35 small business loans. SBA also approved a 7(a) general business loan for \$200,000. In addition, SBA's North Carolina District Office in Charlotte, NC, teamed with its network of service providers and business assistance partners to provide needed support services in Princeville. For example, the North Carolina Small Business and Technology Development Center (SBTDC), partially funded by SBA, helped residents fill out applications for disaster loans and provided business counseling and technical assistance to Princeville businesses. The SBTDC also operated the Business Recovery Assistance Centers which were responsible for the application phase of North Carolina's state-funded recovery program.

USDA: USDA local Service Center employees provided immediate emergency technical assistance to help in the location of stranded residents. With water over 14 feet deep, the local field employees familiar with the area assisted rescue teams in locating stranded residents. As the water receded, the Natural Resources Conservation Service (NRCS) provided emergency on-site technical assistance through the Emergency Watershed Protection program to assess storm damage. These damage survey reports identified debris and sediment deposited in the Town's drainage system as a result of Hurricane Floyd that would need removal. The NRCS also conducted a complete physical inspection of the existing town drainage system after the flood. The inspection revealed that the drainage system was not complete.

USDA also provided roughly \$250,000 for 25 grants and loans to low-income elderly residents for home repairs; granted moratoriums on housing loans to over 40 borrowers; and prequalified many town residents for loan and grant funds to be used for single-family home purchases.

HHS: HHS performed public health assessments; assisted in the evaluation of the potential for vector borne disease; participated in the process, with FEMA, in the development of a mosquito spraying plan; and provided technical published guidance for flood prevention and recovery for the residents of Princeville.

Members of one of the Department's National Disaster Medical System's (NDMS) Disaster Medical Assistance Teams were deployed to the Town to provide medical care to flood victims. A NDMS Disaster Mortuary Operational Response Team was deployed for mortuary support in the recovery of disinterred caskets, identification of the deceased and reburial of the more than 150 remains from disturbed grave sites in cemeteries affected by the flood waters. The local animal humane authorities were supported by the NDMS Veterinary Medical Assistance Teams in the recapture and care of displaced animals.

To ensure personal safety for those residents who returned to their homes to begin clean-up activities, HHS provided sanitarians to address environmental safety concerns for affected dwellings, drinking water and food safety issues, and breathing respirators for residents. HHS also immediately began to assist in the development of response requirements and implementation strategies to provide initial crisis counseling to affected residents. Further assistance included the placement of senior residents in hotels and shelters, giving special care to senior residents with special health risks. Part of a State funding allocation of \$58,400 was also used to provide other aid and assistance to Princeville residents.

Commerce: Pursuant to a special Mission Assignment from FEMA, the Economic Development Administration performed an Economic Impact Assessment for North Carolina, including Princeville, and recommended future actions to help facilitate economic recovery from Hurricane

Floyd. Also, as part of its early response to the Hurricane Floyd disaster, EDA funded a \$1.8 million Economic Adjustment grant to the Edgecombe County Water and Sewer Authority to construct water and sewer systems to serve the Kingsboro 2,700 acre industrial corridor. Located just six miles from Princeville, a new QVC home shopping channel distribution center served by the project will create 900 new jobs and is expected to substantially benefit town residents.

DoD/U.S. Army Corps of Engineers (USACE): USACE dewatered remaining floodwaters from the Town, constructed a temporary levee to provide some flood protection until complete levee restoration could be accomplished, and awarded a contract for restoration of the Princeville Levee.

The North Carolina National Guard manned shelters in the Tarboro area, provided the residents of Princeville with clean drinking water and shower facilities, transportation, and warehouses for food and supplies, in addition to security, for the area. The National Guard also worked together with the U.S. Coast Guard to recover disinterred caskets that surfaced during the flooding.

EPA: EPA helped coordinate emergency response activities, provided technical assistance on drinking and wastewater systems, and assisted in the removal and containment of hazardous substances.

Transportation: DOT coordinated with FEMA and the North Carolina Department of Transportation to clear debris.

Labor: The Department of Labor provided \$1.5 million for temporary employment of 46 Princeville residents to clean up and remove debris and to provide humanitarian assistance.

Interior: The National Park Service provided technical assistance to Princeville to complete a conceptual design for a Heritage Trail. The proposed design for the Princeville Heritage Trail is a combination walking, biking, and driving trail around Princeville that would connect the Town's historical, cultural, and recreational resources.

Assistance After the Council Was Established

The President's Council on the Future of Princeville was established in March 2000, about five and one-half months after Princeville was flooded. At that time, nearly all of Princeville's residents remained in temporary housing outside the Town and all of the businesses remained closed. Even the Town Hall was still located outside Princeville.

Since the creation of the Council, member agencies have been working diligently to find ways to help Princeville tackle the most pressing obstacles to rebuilding the town. We worked to ensure that the FY 2000 supplemental included funds to assist Princeville. The Council has been working with the Mayor, the Town Council, the Town Manager, the Recovery Manager, North Carolina Governor's Office and State agencies, non-profit groups, private sector firms, and other interested parties to find the best ways to assist Princeville.

One of the most significant Federal actions was FEMA's designation of a Deputy Federal Coordinating Officer (DFCO) to Princeville to help coordinate and implement the Town's recovery and redevelopment efforts. Under the direction of the DFCO, the temporary town hall was relocated back in Princeville; most of the remaining debris was removed at a substantially accelerated pace; and single-family homes and multi-family housing units that posed immediate public health and safety hazards were condemned and demolished. The DFCO also participated in Princeville Recovery Management meetings and helped oversee the development of the Princeville Recovery Plan to address temporary recovery efforts and future redevelopment.

FEMA has provided eight personnel in support of the Princeville Recovery Plan. These individuals are assisting the State in conducting pre-placement interviews with Princeville residents currently housed in temporary travel trailers and manufactured homes. From these interviews, it has been determined that of the 244 Princeville residents currently living in manufactured homes or temporary travel trailers, 119 will be relocated to mobile homes within the Town of Princeville, and another 125 families—mainly homeowners—will complete their permanent housing plans within the next few weeks. FEMA also has provided technical support in the selection and design input for construction of a 64-unit mobile home park within the Town of Princeville. Current estimates are that all eligible Princeville families now occupying temporary travel trailers and manufactured homes will be relocated back into the Town no later than August 31, 2000.

FEMA also has provided infrastructure personnel and recommended funding for 38 infrastructure projects, from debris removal to building repairs, at a cost of about \$4.6 million.

Finally, FEMA has extended the Recovery Manager position to provide experienced management help for the town leadership. Also, Director Witt has provided a liaison to Eastern North Carolina who has facilitated communication and provided mediation help for the Town and the region. With all of this assistance and the Town's committed leadership, Princeville has a much more enhanced capability to sustain itself.

One major challenge in Princeville has been the lack of insured housing. This is due, in part, to the fact that many of the homes have been passed down from generation to generation free of mortgages and other lien restrictions that would have required insurance. Consequently, few homeowners were required to purchase or did in fact possess insurance coverage. Moreover, many multi-family housing units lacked flood insurance. (Since these units were located in a 500-year floodplain before the flood, flood insurance was not required.) Therefore, HUD made a special effort to provide housing counseling assistance for over 200 single-family homeowners; in addition, HUD provided multi-family housing owners access to its engineering staff. Redeveloping these units required extensive management, including offering advice on financing options within HUD, ensuring that the same communities that had been served continued to be served, and addressing fair housing issues.

HUD has released nearly \$6 million in direct funding to housing redevelopment. The Office of Public and Indian Housing is providing direct assistance to the Princeville Housing Authority to rebuild Pioneer Court, a public housing development. Flooding rendered Pioneer Court inhabitable and 50 families homeless. HUD released a \$4 million grant from the Emergency Capital Fund to facilitate the reconstruction efforts. In order to mentor this process, specialists from HUD's Memphis, Tennessee housing recovery center will be providing significant technical assistance to the Town of Princeville as the redevelopment design, construction, and placement occurs. In addition, the Office of Public and Indian Housing provided housing experts to explain grant availability, to explore ways to secure homeownership through vouchers, and to expedite the processing of grant applications.

HUD's Office of Multi-Family Housing also played a role in assisting Princeville. Hurricane Floyd destroyed the multifamily development of Asbury Park, leaving 49 families without housing. After extensive discussions with the owners, HUD agreed to subordinate nearly \$1.4 million in loans that were on the multifamily development, allowing the owners to rehabilitate or reconstruct the 49 units that were lost. This new construction, which will cost approximately \$3.5 million, would not have been available without HUD's participation through the subordination.

Finally, HUD's Office of Community Planning and Development funded the East Tarboro-Princeville Community Development Corporation (CDC) in Tarboro with a Rural Housing and Economic Grant in the amount of \$200,000. The CDC was formed in response to the devastation caused by the flooding of the Tar River. With this seed support grant, the CDC will be able to staff up and help hundreds of families, farms, and businesses in the Princeville area.

USDA's Natural Resources Conservation Service cleared debris from the town's drainage way, opened channels in and around the town, and prepared a conceptual drainage plan for Princeville's flood water mitigation and stream restoration project. USDA also approved the demolition and plans to restructure the existing debt of the Glenbridge multi-family housing complex. Currently, the USDA Rural Housing Service is working with the nonprofit organization in charge of reconstruction of the original multi-family housing complex to enable them to proceed with reconstruction. USDA expects to fund an additional multi-family complex if there is a demonstrated need. Additionally, the Rural Housing Service has earmarked a \$100,000 grant for the reconstruction of the Princeville Town Hall and may fund the preservation of the original Town Hall as a museum.

The SBA District Director has visited Princeville to assess how SBA could best serve the needs of Princeville's residents. SBA has contacted each of the 108 branches of participating commercial lenders serving the Princeville area and provided information to familiarize them with disaster bridge loans and the various SBA loan guaranty products. Through its intermediaries (the Small Business Development Center at Nash Community College, the local Service Corps of Retired Executives, the North Carolina Institute of Minority Economic Development, and the Self-Help Credit Union), SBA provided technical assistance to homeowners and businesses seeking to obtain SBA guaranteed loans and microloans.

HHS has provided a \$445,700 carryover grant for the cost of repairs to a Head Start Center and assistance with other program issues in Princeville. In conjunction with the State, HHS helped establish an "Adopt-a-Senior" program in the months following the disaster to assure ongoing care and monitoring of older persons needing special attention. Over \$157,000 has been provided to the NC Primary Health Association to assist in the development of community programs that would provide coordinated health care to uninsured, low income residents (primarily adults) in Princeville and other affected areas. A National Health Service Corps position in psychiatry will be assigned to a medical facility in the Princeville area. HHS was awarded funding from FEMA to continue crisis counseling to residents of the affected areas of North Carolina following Hurricane Floyd through fiscal year 2000. Total funding for this State project in the area of the disaster was \$4.9 million. A facility for counseling, Project PROUD, has been opened in the Princeville/Tarboro area to address these issues.

The DoD/U.S. Army Corps of Engineers continued with the \$760,000 restoration of the Princeville Levee, which was substantially complete on August 1, 2000, and initiated a small-scale study to evaluate potential feasible alternatives for providing additional flood protection for Princeville. In addition, a \$1.5 million supplemental was requested (and subsequently appropriated) for the Corps to evaluate options for reducing flood damage. Also, the Corps, in consultation with DOI and FEMA, constructed the first section of the Princeville Heritage Trail on the Princeville Levee.

The DOI/National Park Service Atlanta Office developed the Princeville Heritage Trail Concept Plan, technical drawings, and project estimates as part of a joint partnership effort to leverage \$1.8 million in Department of Transportation Enhancement funds to implement the project.

After the Council was formed, the DFCO worked with DOT and NPS to submit an application for the Princeville Heritage Trail to be designated as a Community Trail under the Millennium Trails Program. On June 3, 2000, the Princeville Heritage Trail was selected as a Community Millennium Trail. Community Millennium Trails receive a certificate of recognition signed by the First Lady, a commemorative millennium marker, and are listed on the Millennium Trails web site and in a national trails database. In addition, designated trails can use the Community Millennium Trails logo to highlight their activities. Princeville also has been designated as an official project of Save America's Treasures.

A non-Federal but dramatically helpful step has been taken by North Carolina Governor Jim Hunt. In addition to the singular contributions the State has made statewide toward the Hurricane Floyd recovery effort, much has been done specifically for Princeville. Governor Hunt has assigned one of his most capable staff as a temporary Town Manager for Princeville, increasing the capacity of the community to carry out its recovery.

One of the purposes of the Executive Order and the formation of the Council was to shine a national spotlight on Princeville, in the hope of attracting private sector and NGO involvement. This has exceeded expectations. Hundreds of church groups, housing organizations, and other private sector volunteers have flocked to Princeville to help. An illustrative, but not comprehensive, list of the groups that have been involved in the Town's recovery effort includes: the United Methodist Committee on Relief, the State Baptist Men Disaster Relief Team, the General Baptist State Convention, Christian Aid Ministries, the Mennonite Disaster Service, the Buffalo Soldiers, the Friendship Baptist Church, the Shiloh Baptist Church, and Habitat for Humanity. These groups have cleaned up debris, gutted uninhabitable homes, supplied clothing, made repairs, built housing, and provided emotional support. In addition, North Carolina Central University has agreed to take the lead in supporting the Town on all historic preservation issues, including mapping and identifying long term maintenance support for the cemetery, and preparing a nomination to the National Register of Historic Places.

Private institutions, like Fannie Mae, also are working with the Town to find innovative ways to support the recovery effort. Perhaps one of the most interesting private sector contributions has been the development of the Princeville 2000 Telethon which will be broadcast nationally on September 17, 2000, the anniversary of Hurricane Floyd. The telethon is one of many activities planned by the Multicultural Tourism Development Alliance--a non-profit organization dedicated to preserving, and promoting America's rich cultural heritage--and the Princeville Town Council. It is our hope that the recommendations set forth below serve not only as a signal of Federal leadership, but also as a catalyst to interested Foundations, Universities, and other groups to help address the unique needs of Princeville.

Recommendations for Further Assistance

A Princeville Recovery Plan has been developed for FEMA in support of flood recovery efforts for the Town of Princeville. This plan describes specific actions for Princeville to take to restore the loss and damage caused by Hurricane Floyd. (A copy of the executive summary of the plan is attached.) In addition to returning the community to pre-flood conditions, flood recovery presents an opportunity to take bolder steps to recognize Princeville's heritage and the cultural legacy it can preserve for future generations.

The Princeville Recovery Plan presents three options for recovery: (1) a basic level of investment that would essentially restore the community to pre-flood conditions; (2) an enhanced program

that would correct long standing deficiencies in services and infrastructure; and (3) growth and development initiatives that would substantially upgrade facilities and infrastructure and pursue new economic development opportunities. The Town adopted the plan and, based on a myriad of options, provided the Council with a list of its priorities. The Mayor, Town Council, and Town Manager indicated that housing and infrastructure development, historical/economic development, and human services development are their priorities for rebuilding Princeville. (See Attachment A for a detailed list of the Town's priorities.)

The Town has taken an ambitious and hopeful approach to its recovery and future development. The flooding has provided Princeville with the opportunity to reassess its future, and the Town is taking advantage of this opportunity. Princeville is not content to return to its pre-flood condition, nor should it be. If the residents are going to invest their time, energy, and resources to improve the Town's infrastructure, expand its tax base, and choose a future of economic sustainability, then the Council believes that the Federal Government should do whatever it can to assist Princeville carry out this plan.

To this end, members of the Council have been working with the Town to identify specific contributions to assist Princeville's recovery and future development. The future of Princeville should be secure—secure from physical harm and secure economically. The Town not only needs an adequate levee and drainage system, and housing that can better withstand natural disasters, but also the capability to create and promote tourism and to attract a few related industries. And sometimes these overlap; for example, economic growth and stability may require certain improvements in infrastructure. Our recommendations are set forth below.

Physical Security and Infrastructure

- The FY 2000 supplemental appropriates \$1.5 million for the DoD/U.S. Army Corps of Engineers to conduct a feasibility study and report of a project to provide additional flood damage reduction for Princeville. This funding requires a 50% match, or \$1.5 million, which the State of North Carolina has agreed to provide.
- HUD has agreed to coordinate a multi-agency initiative to address Princeville's rental housing resources, including development of a proposal to enable small landlords to accept Section 8 vouchers. In addition to the expertise being provided to the Princeville Housing Authority for assistance with the \$4 million grant to redesign and rebuild Pioneer Court, HUD also plans to provide staff support two days a week at the Princeville Housing Recovery Center.
- The FY 2000 supplemental appropriation provides \$50 million to USDA for natural disaster relief. Consequently, the Agency expects ample resources to be made available for housing reconstruction. USDA Rural Housing also can provide funding to finance an additional multi-family development in Princeville if there is a need for this type of additional rental housing. In addition, plans are underway for funding of water and sewer improvements throughout the town. With a legislative change (see Attachment B), NRCS can use its Emergency Watershed Program funds for construction of drainage improvements in Princeville. The Agency also plans to earmark \$100,000 in grant funds, along with \$300,000 in FEMA funds, to build a new Town Hall and Police Station. In addition, USDA may provide additional funding to preserve the old Town Hall as a historic landmark.
- EPA has set aside nearly \$25.5 million in Clean Water State Revolving Funds for North Carolina for FY 2000. These funds can be used for water quality projects, such as wastewater treatment projects and wet weather flow control. EPA has also set aside nearly \$13.5 million in the Drinking Water State Revolving Fund for North Carolina for FY 1999. (The Drinking Water State Revolving Fund is a newer fund, and is running about one year behind the Clean

Water State Revolving Fund.) These funds can be used to install, upgrade or replace infrastructure to ensure the provision of safe drinking water. Depending on the FY 2001 appropriations process, EPA anticipates a similar level of funding for the Drinking Water and Clean Water State Revolving Funds for next year. Whether Princeville receives a portion of either fund is the State's decision. The Town of Princeville has not received money from either fund in the past. The Town should work with the State to ensure that its projects are on the State's priorities list.

- EDA is committed to working with Princeville to explore grant assistance for projects that support the Town's economic recovery and provide a sustainable economic base compatible with the Town's historic character. Such projects, selected in accordance with locally developed priorities, may include engineering consultation and water and sewer improvements that will enable possible expansion of the primary retail, commercial and industrial areas of the Town.
- FEMA and the National Park Service are working with the State historic preservation office to identify grant funding and technical assistance to help purchase some commercial land and wetlands near the levee that could be turned into a historic park.
- Additionally, the FEMA DFCO has worked with volunteers to begin the restoration of the town cemetery. This cemetery, with its old wooden headstones and birth dates reaching into the early nineteenth century, is the final resting place of slaves who became free people and is a neglected treasure. Similarly, Mt. Zion Primitive Baptist Church is another endangered architectural relic of the American living museum. The aging congregation can do little to preserve this structure, but interested groups should give careful attention to this structure in seeking to retain Princeville's rich history.
- DoD is exploring a joint civil and military cooperative program that would assist and support some of the housing, infrastructure, and other needs of the Princeville community, while at the same time provide meaningful readiness training for military personnel.

Future Economic Sustainability

- Recent EDA funded infrastructure in the Tarboro/Edgecombe County area will accommodate new and expanding industries to provide jobs for Princeville residents, among others. Recognizing the Town's goal of achieving sustainability without jeopardizing its historic character, EDA will also seek opportunities to assist with implementing the Upper Coastal Plain's Comprehensive Economic Development Strategy which guides development for the immediate five-county area. These activities will further develop and improve job opportunities in the surrounding regional economy of which the Town is an important part.
- The Federal Highway Administration (FHWA) has committed to support the Princeville grant application to restore the Old Town Hall as part of the Princeville Heritage Trail, and has agreed to try to incorporate components of the Princeville Heritage Trail and construction of a park into the upcoming project to replace the main street bridge over the Tar River. FHWA also will review any state funding that might be left over in FY 2000, and determine if any of these funds can be allocated to North Carolina to be used for Princeville.
- The Department of Labor will collaborate with the Sara Lee Foundation to create a job training center for local residents. The foundation has pledged \$1 million to build the center which will house the Boys & Girls Club, a child care center, a HUD Neighborhood Networks community technology center and the Job Training Center.
- The QVC home shopping channel will be opening an operation near Princeville and will hire at least 900 personnel. In that the Sara Lee Corporation and QVC stress both information technology and manufacture production skills, DOL will design an inter-generational curricula

that will emphasize soft skills, introduction to manufacturers' industries, task-specific skills enhancement training, and information technology training.

- In coordination with the local Workforce Investment Board and Youth Council, DOL will assist in setting up a One-Stop Center to provide residents information on training programs, job opportunities, and other related federal, state, and local assistance. There are also four Job Corps Centers in North Carolina available to provide education and vocational training in a residential setting.
- As part of the Department's Neighborhood Networks Initiative, HUD will provide Internet access, computers and software to low-income Princeville residents. HUD has committed to building a new Neighborhood Networks community technology center in the Pioneer Court Public Housing Authority. However, since that timetable will span many months, HUD is acting now to secure the placement of Internet access, e-mail addresses, computers and related resources in a temporary Neighborhood Networks center. It is anticipated that this center will be located in a trailer donated through the Boys and Girls Clubs.
- SBA will continue to work with its private sector lending partners and microloan intermediaries to meet the small business lending and technical assistance needs of Princeville residents throughout the recovery phase. Specifically, SBA loan programs may assist in the financing of the two light industries being projected for development in Princeville.
- Finally, the Town and the President's Council are working with the United States Postal Service to establish a Princeville zip code, a stamp, and a Post Office--possibly an electronic or "e-post office"--in Princeville, to be located in the new Town Hall.

Conclusion

Princeville is not the first small, rural, impoverished community to be struck by a natural disaster. But it has possibly suffered the most complete devastation. And it is perhaps the most important community, in historical terms, that has been visited by such misfortune. All of these circumstances led to the creation of this Council and to the tremendous work that has been done and to the work that remains.

As with all difficult challenges, this tiny town is a mirror of our history, the way we view that history, as well as our intent to preserve it. Through your action we have turned a bright light on a little known part of our national heritage. We have also stated a commitment to find every opportunity to recapture this history and preserve its heritage.

This memorandum details the extraordinary work that is ongoing in Princeville. It demonstrates a level of commitment by Federal and State governments that is bold, creative, and most importantly, responsive to our citizens and our common history. It is commensurate with the courage of the people of Princeville and the work they are doing.

This memorandum contains priorities suggested by the local community as well as actions by Federal Departments and Agencies that represent a detailed road map for the further recovery of Princeville. It provides many possibilities; not one answer but a myriad of positive steps, and possibly a few challenges for people of good will. Princeville was a small town that was forgotten once and reborn through tragedy. With the work of the Council and the State of North Carolina, and the resolve of the people of Princeville and its supporters across the country, its memory now can and will be lasting.

Attachment D-A

The Town's Priorities

The Town of Princeville has indicated that housing and infrastructure development, historical/economic development, and human services development are the priorities for rebuilding for the future. Specifically, the town's priorities are:

1. Housing
2. Storm Water/Drainage System Improvements
3. Water System Improvements
4. Sanitary Sewer System Improvements
5. Transportation System Improvements
6. New Town Hall & Police Station
7. Restoration of Old Town Hall
8. Riverside Heritage Park
9. Economic Development
10. Heritage Trail/Freedom Hill/Powell Park Elements
11. New Senior Citizens Center
12. Cemetery Maintenance
13. Post Office

These priorities are described in more detail below. The cost estimates are the maximum costs from Option 3 of the Princeville Recovery Plan.

Housing

The goal is to provide adequate resources to enable all Princeville residents to be reestablished in permanent housing in Princeville and to reestablish Princeville's multi-family apartment complexes. This project also includes developing an innovative strategy for reestablishing single-family rental units owned by small landlords and establishing and staffing the Princeville Housing Recovery Center. (Estimated cost - TBD)

Storm Water/Drainage System Improvements

This project would include cleaning and repairing storm water drains under roads, in channels, and in drainage ditches. It would also include designing and constructing a new drainage system to withstand a 10-year, 24-hour storm event. (Estimated cost - \$2,700,000. Legislative language is required for USDA to complete the drainage system. See Attachment B.)

Water System Improvements

Improvements to the water system would include designing and constructing new water mains and all water meters throughout Princeville. It would extend water lines to annexed industrial and

commercial areas and would provide new water service connections to all new homes in the town limits. (Estimated cost - \$4,700,000. Grant applications are being completed for possible USDA and EDA funding.)

Sanitary Sewer System Improvements

Improvements to the sewer system would include designing and constructing new wastewater mains and lift stations throughout Princeville. It would extend mains to serve annexed industrial and commercial areas and would provide new wastewater service connections to all new homes in the town limits. (Estimated cost - \$1,500,000. Grant applications are being completed for possible USDA and EDA funding.)

Transportation System Improvements

Transportation projects would include improving, extending, and repaving all existing roads within the town limits. It would also provide improvements to the Mutual Boulevard intersection and add standard 4-foot wide sidewalks in the school area. (Estimated cost - \$2,300,000)

New Town Hall & Police Station

A new one-story town hall with a police station, EOC, and permanent records and storage would be constructed. (Estimated cost - \$600,000. Already fully funded by FEMA and USDA.)

Restoration of Old Town Hall

The old town hall would be restored to its original Rosenwald Schoolhouse design for adaptive reuse as an African American “First” museum. (Estimated cost - \$600,000. A grant application is pending with the North Carolina DOT for USDOT TEA-21 funding. This project also would likely qualify for USDA Rural Housing Service Community Facilities program funding.)

Riverside Heritage Park

The Riverside mobile home park would be acquired to be developed as a town park. (Estimated cost - \$300,000)

Economic Development

Economic development projects include attracting two light industries to the site employing 15 to 25 workers each; developing a brochure to attract target industries to Princeville; and promoting development of approximately 25 acres of industrial land through provision of water, sewer, and other appurtenant infrastructure. (Estimated cost - \$375,000)

Heritage Trail/Freedom Hill/Powell Park Elements

These projects would include: 1) developing a trail along the levee from Powell park to the cemetery; 2) designing and building a Freedom Hill monument to create a gateway to Princeville; 3) establishing a conservation easement from Freedom Hill to Powell Park; and 4) eliminating Riverview and Cherry Streets and adding a pedestrian path from Mutual Boulevard to the Heritage Trail and burying overhead utilities. (Estimated cost - \$2,100,000. The Army Corps already has constructed a good portion of the trail as part of the levee reconstruction project. Other portions of this project would likely qualify for USDA Rural Housing Service Community Facilities program funding and possibly from DOT TEA-21 funding.)

New Senior Citizens Center

A new building would be developed for senior community programs. (Estimated cost - \$200,000. This project would likely qualify for USDA Rural Housing Service Community Facilities program funding.)

Cemetery Maintenance

Need to identify a sponsor for long-term maintenance. (Estimated cost - TBD)

Post Office

Obtain approval for a Princeville Post Office and zip code from the United States Postal Service, and establish a new e-post office within the new town hall. (Estimated cost - TBD)

Attachment D-B

The following legislative language is proposed for USDA to complete the drainage system in Princeville:

Notwithstanding any other provision of law, provides authorization for the United States Department of Agriculture, Natural Resources Conservation Service to provide technical and financial assistance from the Emergency Watershed Protection Program for the Town of Princeville, North Carolina for implementation of the project known as the “Flood Water Mitigation and Stream Restoration Project—Princeville, North Carolina”.

ATTACHMENT E – EXCEPTION WAIVER



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

JUL 19 2012

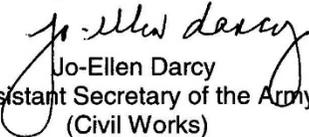
MEMORANDUM FOR DEPUTY COMMANDING GENERAL FOR CIVIL AND
EMERGENCY OPERATIONS

SUBJECT: Princeville, North Carolina – National Economic Development Plan
Exception Request

The CECW-SAD Regional Integration Team (SAD-RIT) Memorandum of June 1, 2012 was received by my office on June 18, 2012. The SAD-RIT requested that I grant an exception to the plan selection rule identified in the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. That rule states that the selected plan is to have, “. . . the greatest net economic benefit consistent with protecting the Nation’s environment (the NED plan), unless the Secretary . . . grants an exception to this rule.”

The NED plan for the Princeville, North Carolina flood risk reduction study would have an estimated cost of about \$6 million to contain the 1-percent chance flood with approximately a 72-percent probability. The draft plan currently recommended by the Corps would contain the 1-percent chance flood with a probability of approximately 99-percent, at a total cost currently estimated at \$31 million. The Corps has concluded that this draft plan is more comprehensive and best balances flood risk reduction, life and safety considerations, cost effectiveness and preservation of the cultural environment, while fully responding to Executive Order 13146 by addressing the flood risk reduction needs of Princeville to the greatest extent practicable.

Based on the information provided by the Corps, I am granting an exception to the NED plan selection rule for the draft plan recommended by the Corps for flood risk reduction at Princeville, North Carolina. Please provide a report of the Chief of Engineers that reflects this NED exception and meets all other Corps planning requirements as soon as possible.


Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

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ATTACHMENT F – DRAFT FINDING OF NO SIGNIFICANT IMPACT (FONSI)
