

1. **Beach nourishment (Attached OB-1)**

Information was provided by Coastal Planning and Engineering, Inc. (CPE) to the Board of Commissioners as a result of discussions at the March 28, 2012 meeting. It provided details on costs, benefits and risks of pursuing the Section 206 reimbursable beach nourishment project compared with a local project without the possibility of federal funding.

Commissioner Hogan initiated Board comment on this item and explained that although the presentation at the last meeting was comprehensive he was unprepared to make a final decision on the direction Kill Devil Hills should take on beach nourishment - whether the Town should pursue a 206 project that includes the possibility of federal reimbursement funds, or if Kill Devil Hills should go after beach nourishment independently in a manner similar to Nags Head's project. (If the Town opts to not pursue a 206 project at this time, and does not have the Project Information Document (PID) prepared to potentially pursue a 206 project, then Kill Devil Hills would lose the option of selecting to pursue a 206 project in the future. The difference in cost for preparing a 206 PID is about \$8,000 more.) Commissioner Hogan suggested the Board authorize CPE to move forward, by contract, with preparing the PID that, he believed, will provide them with information that will be valuable in making a final decision.

Commissioner Woodard agreed that the information provided by the PID is going to be critical in the decision making process. He stated his support for the contract with CPE.

Commissioner Rheubottom stated that although she does not support a full-on beach nourishment project at this time, she is supporting the concept of entering into a contract with CPE for the PID because of the information it will provide.

Mayor Davies confirmed that the PID would include information on the length of the beach nourishment project, density of fill, dimensions of the fill, sand sources, construction methods, an inventory of the available biological and physical data and erosion rates and calculations. The erosion rate was not covered in the scope of work submission but Mr. Loy verified with Ken Willson from CPE that erosion rates would be part of the scope.

Commissioner Buske agreed with the other members of the Board and cited the importance of obtaining the necessary information any future governing board may need to make a decision on the question of beach nourishment. He also spoke about the importance of keeping an open mind to other options (which could include, artificial reef construction, for example) to build the beach up; dredging is only one way of nourishing the beach, he stated.

Planning Director Greg Loy explained that beach nourishment is a "legal" process in the State of North Carolina and other options may, at this time, not be legal.

Mayor Davies stated that she and other members of the Board have spoken with many citizens since the March 28, 2012 meeting and there was a common concern expressed that the Board is moving too quickly with this item. She explained that Nags Head had fast-tracked its beach nourishment project and the actual process could take seven to eight years just to obtain the necessary permits. She added that she felt there should be, and will be, many opportunities for the public to comment on this matter as it may move forward.

Mayor Davies added that she felt the Town should move forward with development of a Catastrophic Recovery Plan (CRP), an all-hazard plan for response to for catastrophic events, including the development of integrated planning communities, plans, protocols, and procedures

to manage a catastrophic event, within the next 18 months or so. Whether beach nourishment moves forward, or not, a CRP could be of vital importance to the Town and its citizens and property owners should a life-altering disaster occur. Federal funds are available to help prepare CRPs, which are typically completed with community-wide participation. She asked the Board to keep this in mind and stated her intent to include this on a future agenda.

In response to a question from Commissioner Buske, Commissioner Woodard explained that the Dare County Shoreline Management Commission had taken action to deny engineering studies be funded through the County's shoreline protection fund. This action was taken after the commission had already funded one municipality's beach nourishment engineering study.

Commissioner Buske asked if the Board was prepared to begin generating support at the federal level for a potential 206 plan. It was agreed that, although 206 plans have not been successful lately when pursued by other locations, Kill Devil Hills should hope for better results in the future and plan for potential 206 federal reimbursements that could be as much as \$8-9 million. Mayor Davies added that going down the 206 route requires a much longer permitting time period.

Commissioner Woodard made a motion for the Board of Commissioners to engage CPE to provide Kill Devil Hills with the Project Information Document in an amount not to exceed \$88,670 and to authorize the Town Manager to expend that amount from the Beach Nourishment Capital Reserve Fund, and to authorize the Town Manager to execute the contract for these services upon review and approval by the Town Attorney. Commissioner Buske seconded that motion. Approval was unanimous, 5-0.

Commissioner Rheubottom reiterated her trepidation on expending the additional funds up front for the doubtful federal reimbursement for a 206 project.

New Business

1. Water System Master Plan Update – GHD Consulting Engineers, PLLC

The GHD Consulting Engineers, PLLC firm recently completed its report documenting the Water System Master Plan for the Town. Engineers John Eick and Sandra Tripp of the firm were present to review the Master Plan on the update and to answer questions. Copies of this extensive document were provided to the Board of Commissioners in March.

Along with evaluation of the system, the report also cited a number of key points, which include but are not limited to: the Town's excellent management of the water system both physically and fiscally; and, the quality and quantity of water supplied by Dare County meets applicable standards and should meet the Town's demands through at least 2030.

Using a PowerPoint presentation Ms. Tripp and Mr. Eick explained that the update to the 2002 Water System Master Plan focuses on the following:

- Update the distribution system model to reflect system improvements;
- Evaluate source water (from Dare County) quantity and quality;
- Review and make recommendations regarding the water system operational procedures and policies;



TOWN OF KILL DEVIL HILLS

Land Where Flight Began

MEMORANDUM

April 9, 2012

TO: Mayor and Board of Commissioners

FROM: Debora P. Diaz, Town Manager 

REF: Old Business

1. Beach nourishment (Attached OB-1)

Attached is information provided by Coastal Planning and Engineering, Inc. to the Board of Commissioners as a result of discussions at the March 28, 2012 meeting. It details costs, benefits and risks of pursuing the Section 206 reimbursable beach nourishment project compared with a local project without the possibility of federal funding.

Board guidance will be appreciated.

COASTAL PLANNING & ENGINEERING OF NORTH CAROLINA, INC.

4038 MASONBORO LOOP ROAD, WILMINGTON, NC 28409

910-791-9494 PHONE 910-791-4129 FAX
INTERNET: www.coastalplanning.com

May 11, 2012

Debora Diaz
Town of Kill Devil Hills
102 Town Hall Drive
Kill Devil Hills, North Carolina 27948

Subject: Project Information Document

Dear Ms. Diaz:

This letter is in response to the Board of Commissioners approval at their April 9, 2012 meeting to accept a proposal from Coastal Planning & Engineering of North Carolina, Inc. (CPENC) to prepare a Project Information Document.

The scope of Professional Services is included herein as Exhibit A. The work will be performed for a lump sum fee of \$88,670. Barring any unforeseen circumstances, CPENC anticipates completing the Project Information Document and providing the Town with draft language for formal correspondence within 8 months of receipt of your written authorization to proceed.

CPENC's performance of the proposed services will be governed by the Scope of Professional Services (Exhibit A), the Schedule of Deliverables (Exhibit B), and the terms and conditions of its Service Agreement.

If this proposal is acceptable to you, please sign it where indicated below and return a copy of it to me along with two executed copies off the attached Agreement. CPENC will then sign the Agreement and return a fully signed copy to you for your records.

Very truly yours,

COASTAL PLANNING & ENGINEERING OF NORTH CAROLINA, INC.



Howard Sparrow, P.E.
President

CLIENT ACCEPTANCE & AUTHORIZATION
TO PROCEED:



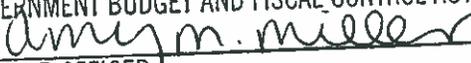
Signature of Authorized Client Representative

Debora P. Diaz - Town Manager

Printed Name

May 23, 2012

Date

THIS INSTRUMENT HAS BEEN PREAUDITED
IN THE MANNER REQUIRED BY THE LOCAL
GOVERNMENT BUDGET AND FISCAL CONTROL ACT.


FINANCE OFFICER

COASTAL PLANNING & ENGINEERING OF NORTH CAROLINA, INC.
SERVICES AGREEMENT
FIXED PRICE BASIS

All in accordance with the following terms and conditions.

1. **SCOPE OF SERVICES: COASTAL PLANNING & ENGINEERING OF NORTH CAROLINA, INC. ("CPE-NC") agrees to perform for the undersigned CLIENT, engineering and consulting ("Services") described in attached Proposal dated May 11, 2012.**

2. **FEES, INVOICES AND PAYMENTS:** The Services will be performed on a fixed price basis for: \$88,670.00

Invoices will be submitted by CPE-NC no more frequently than monthly in accordance with Exhibit B Payment Schedule, with payment due upon CLIENT'S receipt of invoice. Payment shall be in U.S. Dollars. A service charge equal to one and one-half percent (1 1/2 %) per month, or the maximum rate permitted by law, whichever is less, will be added to all accounts which remain unpaid for more than thirty (30) calendar days beyond the date of the invoice. Should there be any dispute as payments to be made on a percent complete basis to any portion of an invoice, the undisputed portion shall be promptly paid.

3. **CLIENTS COOPERATION:** To assist CPE-NC in performing the Services, CLIENT shall (i) provide CPE-NC with relevant material, data, and information in its possession pertaining to the specific project or activity, (ii) consult with CPE-NC when requested, (iii) permit CPE-NC reasonable access to relevant project sites, (iv) ensure reasonable cooperation of CLIENT's employees in CPE-NC's activities, and (v) notify and report to all regulatory agencies as required by such agencies.

4. **CONFIDENTIALITY:** In the course of performing Services, to the extent that CLIENT discloses to CPE-NC, business or technical information that CLIENT clearly marks in writing as confidential or proprietary, CPE-NC will exercise reasonable efforts to avoid the disclosure of such information to others. Nonetheless, CLIENT shall treat as confidential information and data furnished to it by CPE-NC in connection with this Agreement to the extent it includes CPE-NC's technology, formulae, procedures, processes, methods, trade secrets, ideas, inventions, and/or computer programs; and CLIENT shall not disclose such information to any third party.

Nothing herein is meant to prevent nor shall be interpreted as preventing either party from disclosing and/or using any information or data (i) when the information or data are actually known to the receiving party before being obtained or derived from the

©2012 Coastal Planning & Engineering of North Carolina, Inc.
All Rights Reserved

transmitting party, (ii) when information or data are generally available to the public without the receiving party's fault at any time before or after it is acquired from the transmitting party; (iii) where the information or data are obtained or acquired in good faith at any time by the receiving party from a third party who has the same in good faith and who is not under any obligation to the transmitting party in respect thereto; (iv) where a written release is obtained by the receiving party from the transmitting party; (v) three (3) years from the date of receipt of such information; or (vi) when required by process of law; provided, however, upon service of such process, the recipient thereof shall use reasonable efforts to notify the other party and afford it an opportunity to resist such process.

5. **DELAYS AND CHANGES IN CONDITIONS:** If CPE-NC is delayed or otherwise in any way hindered or impacted at any time in performing the Services by (i) an act, failure to act or neglect of CLIENT or CLIENT's employees or any third parties that CLIENT is responsible for; (ii) changes in the scope of the work requested by CLIENT; (v) delay authorized by CLIENT and agreed to by CPE-NC, then 1) the time for completion of the Services shall be extended based upon the impact of the delay, and 2) CPE-NC shall receive an equitable compensation adjustment. Any such equitable adjustment shall be based on CPE-NC's then current Time and Material Rates, as may be provided in a Rate sheet attached hereto.

Neither party shall be deemed in default of this Agreement to the extent that any delay or failure in the performance of its obligations (other than the payment of money) results, without its fault or negligence, from any acts of force majeure (such as fires, floods, riots, and strikes).

6. **INSURANCE:** CPE-NC is presently protected by Worker's Compensation Insurance as required by applicable law and by General Liability and Automobile Liability Insurance (in the amount of \$1,000,000 combined single limit) for bodily injury and property damage. Insurance certificates will be furnished to CLIENT prior to beginning work. If the CLIENT requires further insurance coverage, CPE-NC will endeavor to obtain said coverage, and CLIENT shall pay any extra costs therefor.

7. **INDEMNITIES:** CPE-NC shall defend, indemnify and hold harmless CLIENT from and against loss or damage to tangible property, or injury to persons, to the extent arising from the negligent acts or omissions or willful misconduct of CPE-NC, its borrowed servants and their employer and its subcontractors, and their respective employees and agents acting in the course and scope of

their employment. CLIENT shall defend, indemnify and save harmless CPE-NC (including its borrowed servants and their employers and its and their affiliated companies and their officers, directors, employees, and agents) from and against, and any indemnity by CPE-NC shall not apply to, loss, damage, injury or liability arising from the acts or omissions of CLIENT, its contractors, and their respective subcontractors, employees and agents, or of third parties.

8. **RESERVED**

9. **GOVERNING LAWS:** This Agreement shall be governed and construed in accordance with the laws of the State of North Carolina.

10. **TERMINATION:** Either party may terminate this Agreement with or without cause upon twenty (20) days' written notice to the other party. Upon such termination, CLIENT shall pay CPE-NC for all Services performed hereunder up to the date of such termination. In addition, if CLIENT terminates, CLIENT shall pay CPE-NC all reasonable costs and expenses incurred by CPE-NC in effecting the termination, including, but not limited to non-cancelable commitments and demobilization costs.

11. **ASSIGNMENT:** Neither CPE-NC nor CLIENT shall assign any right or delegate any duty under this Agreement without the prior written consent of the other, which consent shall not be unreasonably withheld.

12. **MISCELLANEOUS:**

a. **ENTIRE AGREEMENT, PRECEDENCE, ACCEPTANCE MODIFICATIONS:** The terms and conditions set forth herein constitute the entire understanding of the Parties relating to the provisions of the Services by CPE-NC to the CLIENT. All previous proposals, offers, and other communications relative to the provisions of these Services by CPE-NC, oral or written, are hereby superseded, except to the extent that they have been expressly incorporated by reference herein. In the event of conflict, the three pages of this Agreement and Exhibits A and B shall govern. CLIENT may accept these terms and conditions by execution of this Agreement or by authorizing CPE-NC to begin work. Any modifications or revision of any provisions hereof or any additional provisions contained in any purchase order, acknowledgement or other document issued by the CLIENT is hereby expressly objected to by CPE-NC and shall not operate to modify the Agreement.

b. **DISPUTES, ATTORNEY FEES** - Any dispute regarding this Agreement or the Services shall be resolved first by exchange of documents by senior management of the parties, who may be assisted by counsel. Any thereafter unresolved disputes shall be litigated in the state whose law governs under Section 9 hereunder. In any litigation, the Prevailing Party shall be entitled to

recover their reasonable attorneys fees and costs as allowed by the Court.

c. **WAIVER OF TERMS AND CONDITIONS** - The failure of CPE-NC or CLIENT in any one or more instances to enforce one or more of the terms or conditions of this Agreement or to exercise any right or privilege in the Agreement or the waiver by CPE-NC or CLIENT of any breach of the terms or conditions of this Agreement shall not be construed as thereafter waiving any such terms, conditions, rights, or privileges, and the same shall continue and remain in force and effect as if no such failure to enforce had occurred.

d. **NOTICES** - Any notices required hereunder may be sent by orally confirmed US Mail, courier service (e.g. FedEx), orally confirmed telecopy (fax) or orally confirmed email (further confirmed by US Mail) to the addresses set forth below.

e. **SEVERABILITY AND SURVIVAL** - Each provision of this Agreement is severable from the others. Should any provision of this Agreement be found invalid or unenforceable, such provision shall be ineffective only to the extent required by law, without invalidating the remainder of such provision or the remainder of this Agreement.

Further, to the extent permitted by law, any provision found invalid or unenforceable shall be deemed automatically redrawn to the extent necessary to render it valid and enforceable consistent with the parties' intent. The terms and conditions set forth herein shall survive the termination of this Agreement.

13. **USE OF DOCUMENTS:**

The project information document, beach profile surveys, borrow source information, construction cost estimates, and other information produced shall be the property of CLIENT and may be used by CLIENT for any purpose it deems appropriate. If used for a purpose other than that contained in the Kill Devil Hills Shoreline Protection Project Scope of Professional Services Project Information Document included in Attachment A, then CPE-NC will have no liability for any use other than those stated in the document.

CLIENT and CPE-NC agree to the foregoing and have caused this Agreement to be executed by their duly authorized representatives as of the date set forth below.

Executed on May 23, _____, 2012

(signature page is the following page)

COASTAL PLANNING & ENGINEERING OF NORTH CAROLINA, INC.

By (Sign):

Howard Sparrow

Print Name:

Howard Sparrow

Title:

President

Address:

Three Independence Pointe
Suite 107

Greenville SC 29615

Phone:

864-289-8554

Fax:

E-mail:

howard.sparrow@shwgrp.com

(CLIENT)

Town of Kill Devil Hills

By (Sign):

Deborah P. Diaz

Print Name:

Deborah P. Diaz



Title:

Town Manager

Address:

P. O. Box 1719

102 Town Hall Drive

Kil Devil Hills, NC 27948

Phone:

252-449-5300

Fax:

252-441-7946

E-mail:

debbie@kdhnc.com

EXHIBIT A
KILL DEVIL HILLS SHORELINE PROTECTION PROJECT
SCOPE OF PROFESSIONAL SERVICES
PROJECT INFORMATION DOCUMENT

Development of Project Information Document

Coastal Planning & Engineering of North Carolina, Inc. (CPENC) will develop a project information document which will describe, in detail, the conceptual beach plan proposed by the Town of Kill Devil Hills (TOWN) including the length of the beach nourishment project, density of fill, dimensions of the fill, sand sources, construction methods, and an inventory of the available biological and physical data. The project information document will compare the project being proposed by the Town to the U.S. Army Corps of Engineers (USACE) Federally Authorized Dare County Storm Damage Reduction Project. The information document will also provide a detailed description and schedule of tasks associated with constructing the project under Section 206 Authorization. This document will be utilized for three distinct purposes:

- **Provide the USACE with an official project description of the beach fill project so that they can provide written guidance for pursuing project implementation under Section 206 Authorization;**
- **Provide the USACE with necessary information to allow them to make a permitting process determination; and**
- **Provide the USACE official notification of the Town's intent to pursue the beach fill project under Section 206 Authorization**

Project Management / Coordination:

This task includes those efforts to monitor and control costs, and to coordinate with the TOWN on project schedule and to provide periodic project updates. It is anticipated that there will be 2 project meeting associated with this study. The first meeting will be a project kick-off meeting to establish timelines and any specific directives associated with this scope. The second meeting will be at the conclusion of the development of the project information report to discuss the findings and coordinate the next phase of implementation the Town's shore protection program. It is also anticipated that significant coordination will be required between CPENC and Federal/State regulatory agencies. In addition we anticipate continued coordination with USACE staff with regards to the 206 process.

Development of Project Description

At a meeting on 4 October 2011 between Town, CPENC, and USACE Wilmington District Staff, the USACE suggested that in order for them to provide further insight on the ability for the District to support the Town through the Section 206 process, it would be necessary for the TOWN to submit a formal letter including the details of the project plan. This task includes

those efforts associated with developing the information, as requested by the USACE, to be included.

Because most of the project details are identical to the current USACE formulated Dare County Storm Damage Reduction Project, we would rely heavily on information readily available in the current USACE project documents. We would provide information on the linear extent of the project, fill densities, elevation of the fill, estimated volumes, construction methods and timelines, and sand sources.

As part of the process of updating project fill requirements, it will be necessary to update the current beach profile surveys for the oceanfront shoreline along the project area. CPENC is proposing to conduct beach profile surveys every 500 feet along the USACE established baseline for an approximate shoreline length of 3.9 miles of ocean shorefront. This area is centered around the main fill section which covers a 2.1 mile section from the northern boundary of the Town of Kill Devil Hills (at Kitty Hawk) south to a point approximately 500 ft. south of 1st Street. In addition to this main fill area there is a 3000 ft. taper section on either end. In addition, CPENC is recommending an additional 2000 ft. section on either side to be surveyed. The survey will adhere to USACE hydrographic and topographic survey standards set forth in (EM 1110-2-1003 and EM 1110-1-1005).

CPENC will coordinate with and obtain from both the USACE and the Town of Nags Head existing data for the offshore borrow sources for the Dare County Storm Damage Reduction Project. CPENC will develop a GIS with the available data that can be used to develop borrow sources and inventory the availability of sand for the proposed project. CPENC will provide information on what sources are readily permitted and what sources exist that may require additional analysis to satisfy permitting requirements.

The project information document will clearly compare the project being proposed by the TOWN to the Federally Authorized Dare County Storm Damage Reduction Project. This portion of the report will provide the USACE with valuable information needed to comment on the project as it relates to constructing under Section 206 Authorization.

In addition to developing the information described herein, CPENC will use the available information to update construction costs. These estimates will provide the Town with better estimates to be used for planning purposes.

Development of Environmental Data Inventory

During the pre-application interagency meeting held on 14 September 2011, the project manager from the USACE indicated that a federal Individual Permit (IP) issued by the Department of Army would be required for the proposed beach nourishment project at Kill Devil Hills. It remains to be determined, however, if an Environmental Impact Statement (EIS) or an Environmental Assessment (EA) would be required to support the permit application. The implications of this decision are substantial from both a timeframe and monetary point of view. The development of an EIS for a beach nourishment project typically takes between 18-36 months. However, should an EA be required, the time frame and cost would be reduced

considerably. In order to determine which document would be required, the USACE stated they would need to evaluate the amount of existing relevant environmental data.

CPENC will coordinate with and obtain from both the USACE and the Town of Nags Head existing biological data that was developed for both the Dare County Storm Damage Reduction Project (including the project EIS) and the Nags Head Interim Project, which was constructed in the summer of 2011. This information will be reviewed and inventoried for future documentation. In addition we will provide a list of available information and a summary of the relevance of existing data to the proposed Kill Devil Hills Project.

Development of Formal Correspondence

This proposal includes the development of three separate formal correspondences to be sent from the TOWN to the USACE. These letters include:

- A letter to the USACE Wilmington District to provide a detailed project description of the beach fill project being proposed by the Town of Kill Devil Hills as requested by the USACE at the 4 October 2011 meeting. This letter will allow the USACE the opportunity to provide written guidance for pursuing project implementation under Section 206 Authorization.
- A letter to the USACE Regulatory Chief providing a detailed inventory of the available relevant environmental documentation for recent projects in the vicinity of Kill Devil Hills. This information is intended to allow the USACE Regulatory Division to make a determination on the type of IP necessary to permit the proposed Kill Devil Hills Project.
- A letter to the Assistant Secretary of the Army's (ASA) office informing them of the Town's intentions to move forward with the construction of the proposed project under Section 206 Authorization. This is a formal step required by law to pursue a Section 206 Project.

CPENC will provide draft language for each of these letters to the Town. CPENC will work with the Town to further develop the letter into a final version approved by the Town.

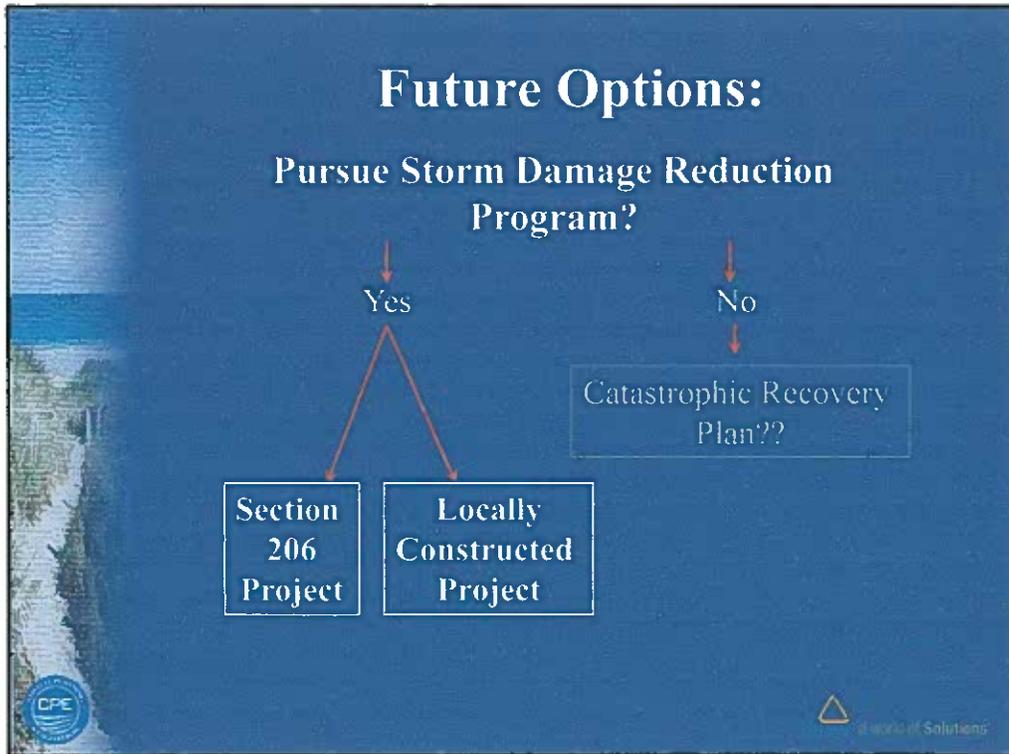
Breakdown of Costs:

Task	Cost
Project Management and Coordination	\$4,754.00
Development of Project Description	\$28,432.00
Beach Profile Survey	\$38,572.00
Development of Environmental Data Inventory	\$12,600.00
Development of Formal Correspondence	\$4,312.00
TOTAL:	\$88,670.00

EXHIBIT B
SCHEDULE OF DELIVERABLES
PROJECT INFORMATION DOCUMENT

The following list of subtasks is established as the anticipated performance schedule for the development of the Project Information Document associated with a storm damage reduction project for the Town of Kill Devil Hills under the agreement dated May 23, 2012.

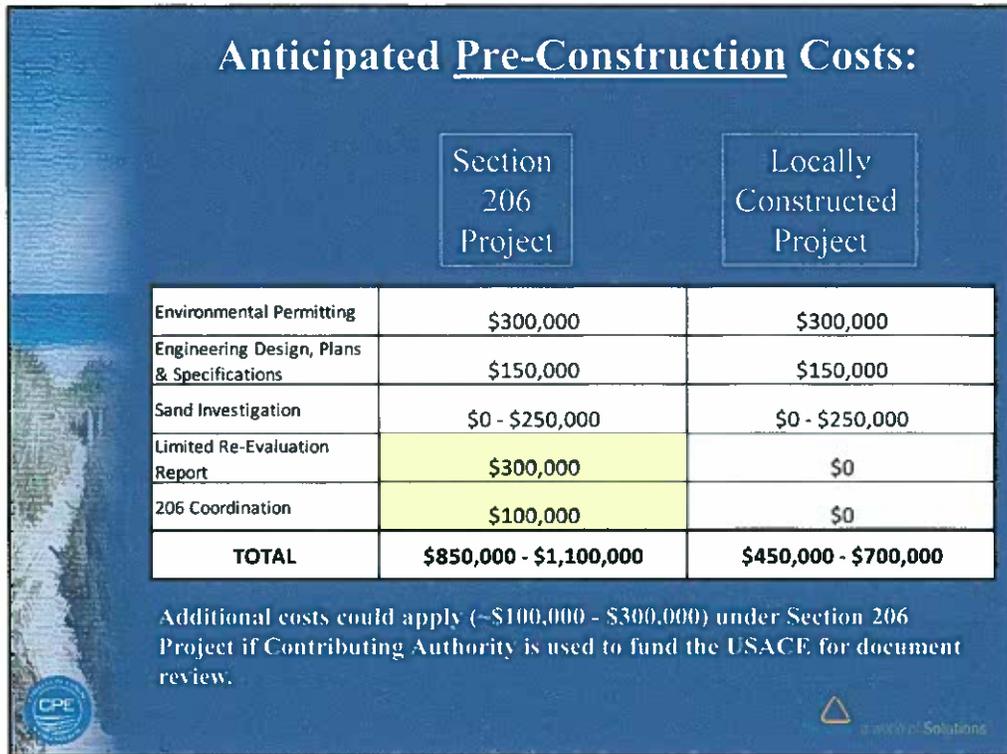
1. Day 0 – Date on which CPENC receives Town of Kill Devil Hills’ notice to proceed
2. Day 30 – CPENC will have held a project kickoff meeting with the Town and will have compiled an outline for the letter to the USACE regulatory chief to request a decision on the permitting process.
3. Day 60 – CPENC will have conducted beach profile surveys along the Town of Kill Devil Hills and provided a Draft survey report to the Town.
4. Day 120 – CPENC will submit a DRAFT Project Information Document to the Town for review.
5. Within 30 days of receiving comments back from the Town on the DRAFT Project Information Document, CPENC will provide the Town with a final Project Information Document and draft letters to be submitted to the USACE. These draft letters will include:
 - A letter to the USACE Wilmington District to provide a detailed project description of the beach fill project being proposed by the Town of Kill Devil Hills as requested by the USACE at the 4 October 2011 meeting. This letter will allow the USACE the opportunity to provide written guidance for pursuing project implementation under Section 206 Authorization.
 - A letter to the USACE Regulatory Chief providing a detailed inventory of the available relevant environmental documentation for recent projects in the vicinity of Kill Devil Hills. This information is intended to allow the USACE Regulatory Division to make a determination on the permitting approach necessary to permit the proposed Kill Devil Hills Project.
6. Based on the information developed for the Project Information Document, verbal comments received from the USACE, and formal written comment received by the USACE in response to the letters described herein, the Town may elect to submit a letter to the Assistant Secretary of the Army’s (ASA) office informing them of the Town’s intentions to move forward with the construction of the proposed project under Section 206 Authorization. This is a formal step required by law to pursue a Section 206 Project. Upon receiving notice from the Town that they wish to submit such a letter, CPENC will provide a draft letter within 14 days.



At this time, the Board is faced with several decisions. The information herein is aimed at defining the decisions and providing the best available data to assist the Town in making those decisions. This information is a combination of material presented at the March 28 Board meeting and supplemental information that may provide further clarification.

This slide illustrates the first two decisions the Board is faced with regarding how to prepare for the risk of storm damage. Aside from the obvious recreational and environmental benefits, beach nourishment is a proven tool for reducing storm damage. The Board must first decide if they want to move in the direction of beach nourishment as a way of mitigating the damages caused by long term erosion, tropical storms, and extra-tropical storms (Nor'easters). If they do not feel that this is the best way of managing risk, it may be prudent to consider developing a Catastrophic Recovery Plan.

If the Board decides to pursue beach nourishment as a form of storm damage reduction, the second decision they must make is whether to pursue a Section 206 project or a locally constructed project (similar to the project recently constructed by the Town of Nags Head).



This slide lists the Pre-Construction costs associated with both a Section 206 project and a locally constructed project. Pre-Construction costs or “Soft Costs” are costs associated with designing and permitting a project and developing a bid package to solicit construction costs from contractors. The items listed in the table above as “Environmental Permitting” and “Sand Investigations” are items associated with obtaining State and Federal permits for the project. The process of obtaining permits for these two types of beach nourishment projects is the same. Permits for such project are issued by the State of North Carolina and the USACE. The “Engineering Design, Plans & Specification” item is associated with developing bid documents for the project.

In order to understand the different responsibilities delegated to the U.S. Army Corps of Engineers (USACE) for different types of beach nourishment projects we must first define each type of project. The first type of beach nourishment project is a Federal Storm Damage Reduction Project (Type-1), such as the Dare County, Wrightsville Beach, and Carolina Beach projects. The second type is a locally constructed non-federal project (Type-2) such as the project Nags Head recently constructed. The third type (type-3) is the Section 206 project which is constructed by the locals and reimbursed by the Federal Government.

For Type-1 projects, the USACE **Civil Works Section** designs the project, develops the environmental documentation for the project, and manages construction of the project. No permits are issued, but rather an Authorization to build the project is issued by Congress. The State of North Carolina makes a determination whether the project is consistent with the State’s coastal management program. On Type-2 projects, the USACE **Regulatory Branch** is involved in issuing a permit for the project to the non-federal sponsor. The **Civil Works Section** does not play a role in Type-2 projects.

With Section 206 projects (Type-3), a non-federal or local sponsor must work with both the **Civil Works Section** and the **Regulatory Branch**. **Civil Works** reviews and provides concurrence with the engineering design aspects of the projects. The “Limited Re-Evaluation Report” and “206 Coordination” items are associated with the additional coordination necessary to obtain concurrence from the USACE **Civil Works Section**. Since the project is built by the locals on a reimbursable basis, Federal permits are also required, which are issued by the USACE **Regulatory Branch**.

Anticipated Construction Cost Sharing:

	Section 206 Project		Locally Constructed Project
TOTAL CONSTRUCTION COST	\$15,548,000		\$15,548,000
Federal	\$10,106,200		\$0
State	\$2,720,900	High Estimate	\$7,774,000
		Mid Estimate	\$5,441,800
		Low Estimate	\$0
Local Cost Share (Dare County / Kill Devil Hills)	\$2,720,900	High Estimate	\$7,774,000
		Mid Estimate	\$10,106,200
		Low Estimate	\$15,548,000

Total construction costs are assumed to be the same for both the Section 206 Project and the Locally Constructed Project.

This slide shows the anticipated construction costs associated with constructing a Locally Preferred 206 Project and the same project as a locally constructed non-federal project.

The total construction cost for both options is shown at the top of the chart as \$15,548,000. This estimate is based on a \$13,270,000 construction cost, \$250,000 worth of construction administration, and a 15% contingency (\$2,028,000). Note the construction cost for both projects are the same.

It is important to point out that the project must first be constructed with non-federal funds (could be a combination of State, County, and Local funds), and then up to 65% of the construction costs are eligible for reimbursement by the Federal Government. The **\$10,106,200** is the upper estimate for the Federal portion of the Locally Preferred Section 206 project. Obtaining this money is the primary objective of the Section 206 project. Under the Section 206 process, the State portion of the project is shown at \$2,720,900. Recently, the State of North Carolina has been far more supportive of projects with Federal cost-sharing than those projects without. It is assumed that being eligible for Federal reimbursement through Section 206 could help prioritize the project for State funding. The State share shown herein reflects a 50% share of the non-federal portion of the project cost or 17.5% of the total cost. After full reimbursement, the County/Town's share of the cost for the project would be \$2,720,900 plus any interest paid on money borrowed. (This does not include pre-construction costs shown on the previous page)

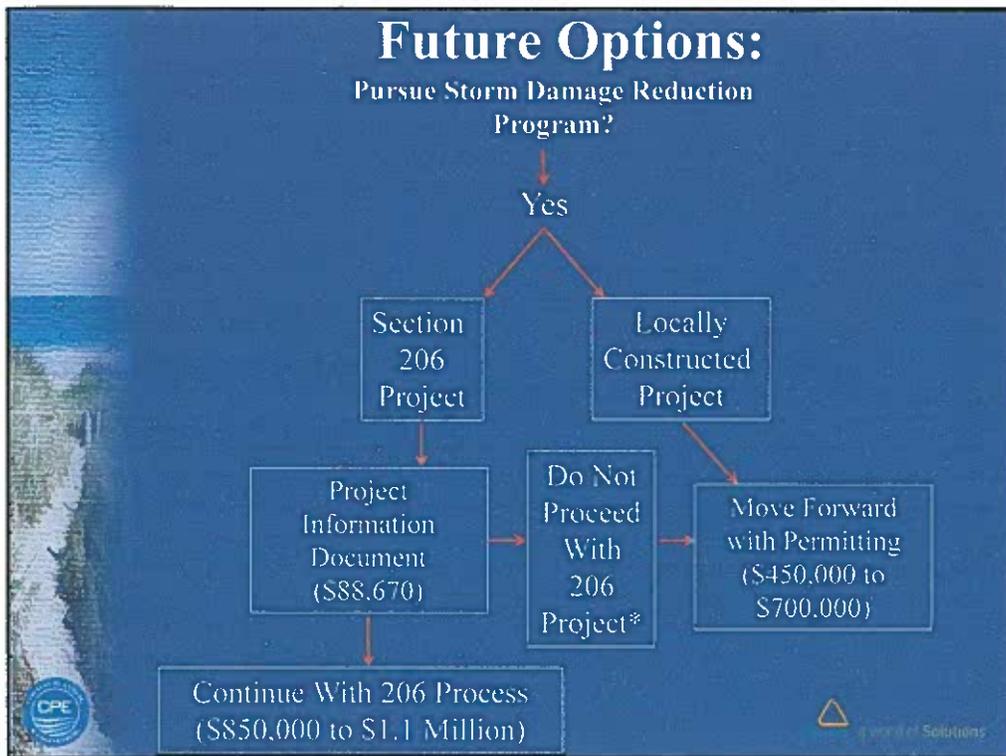
If the Town elects not to pursue the 206, there would be no Federal cost sharing. Three potential cost sharing scenarios have been presented for the State of North Carolina. The "High estimate" reflects a 50% cost sharing, the "Mid estimate" reflects a 35% cost sharing, and the "Low estimate" reflects no State cost sharing. Local costs reflect the total cost minus any State cost sharing.

Pros and Cons of Section 206:

<p style="text-align: center;">Pros:</p> <ul style="list-style-type: none"> • Gives the Town a Chance at Federal Funds • If Federal Funds are Authorized, Chances of Receiving State Funds May Increase • More Control Over Timeline than Other Federal Project 	<p style="text-align: center;">Cons:</p> <ul style="list-style-type: none"> • Additional Reviews • Added Time • Added Money • Non-Federal Partners Must Front the Money • Risk of Not Being Reimbursed • USACE Will Not Prioritize the Project • Wilmington District Has Not Participated in a Section 206 Project to Date
---	--

This slide lists some of the “Pros” and “Cons” of pursuing a Section 206 Project. The biggest “Pro” in pursuing a Section 206 project is that it gives the Town a chance at Federal Funds through a reimbursement. Based on estimated costs for the Locally Preferred Section 206 Project, the Federal Share that the Town could be eligible for would be **\$10,106,200**. Recently, the State of North Carolina has prioritized projects with a Federal cost share when determining which projects to support with State funds. If the Town is successful in obtaining the 206 Authorization, this may increase their chances of obtaining State Funds. Aside from the money, one of the main reasons local sponsors have constructed Federal Projects under Section 206 in the past is because it provides the local with more control in moving the project forward in a timely manner. To some extent, it is possible for the locals to avoid delays that are a normal part of Federal Projects due to the fact that projects are rarely fully funded up front.

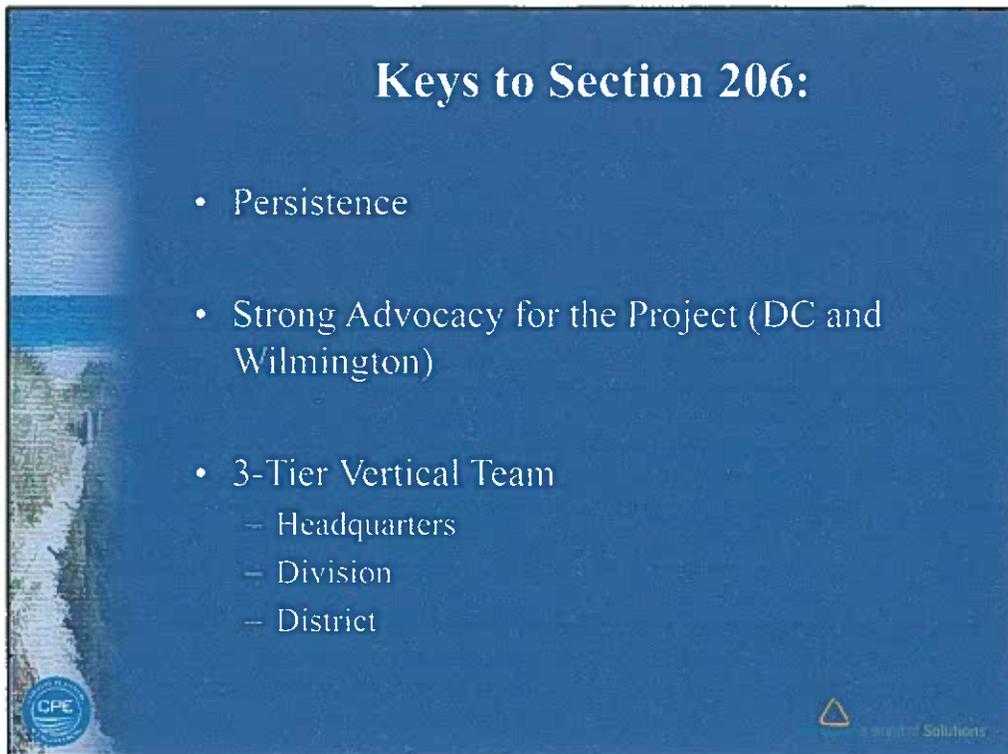
In comparing the Section 206 process with constructing a non-federal project, one of the major “Cons” of the process is the additional reviews required by the USACE **Civil Works Section**. The additional review and coordination results in added time and added money, which are evident in the chart shown on page 2. One negative aspect to constructing a 206 Project as opposed to other Federal Projects is that the non-federal partners must front all of the pre-construction and construction costs. The Federal portion of the construction costs could be reimbursable, but it is unlikely that the Town would be reimbursed for any of the pre-construction costs. There is some inherent risk in building a 206 Project that Congress may not authorize reimbursement funds. This is particularly concerning if the policy of no earmarks continues. In addition, when the time comes for the USACE to prioritize funding requests, it is unlikely that a 206 Project would get a high priority as these projects are not looked upon favorably by USACE Districts. Without a congressional designation, reimbursement would be subject to the Wilmington District USACE funding decisions. One final complicating factor for this particular 206 project is that the Wilmington District has not participated in a 206 Project in the past and are unfamiliar with the process.



As previously discussed, if the board moves forward with beach nourishment, they are faced with the decision between a 206 Project or a Locally Constructed non-federal project. This chart shows the progression of pre-construction tasks associated with each option.

If the Board decides to pursue the Section 206 Project, the logical next step would be to move forward with the Project Information Document. CPENC has provided a proposal to develop this document for the lump sum fee of \$88,670. If after the completion of the report, the Town decides Not to Proceed With the 206 Project they could then Move Forward with Permitting the locally constructed project. The range of costs associated with permitting and developing a bid package for the Locally Constructed Project is \$450,000 to \$700,000. The variability in the range is primarily based on uncertainties regarding the need for sand search investigations. The asterisk (*) associated with Do Not Proceed With 206 Project signifies that some of the efforts to develop the Project Information Document would be applied to the \$450,000 to \$700,000 cost. It is estimated that approximately \$81,946 or 92.4% of the proposed cost of the Project Information Document could be applied to the estimated cost of Moving Forward with Permitting (\$450,000 to \$700,000). If after the completion of the report, the Town decides to Continue With the 206 Process, all of the cost of the Project Information Document would be applied to the cost to Continue With 206 Process (\$850,000 to \$1.1 Million).

If at the present time, the Town elects not to pursue the Section 206 Project but rather pursue a Locally Constructed Project, they could skip the Project Information Document and Move Forward with Permitting.



This slide lists several keys to successful Section 206 Projects based on our experiences.

The first is persistence. In order for the Section 206 process to be successful the local sponsor must be persistent with its desire to keep the process moving forward. This ties directly into the second point, which is “Strong Advocacy for the Project”. This means being a strong advocate for the project both at the Congressional level and at the USACE level. With regards to advocacy at a Congressional level, it will be very important to get your congressional delegates on board with this project sooner than later. It would be beneficial to provide them a briefing on the project in the near future and to get their opinion on current policies and how they may contribute to the 206 process. In the past the majority of Section 206 projects have been funded through earmarks. Without earmarks it is unlikely that the Town would receive reimbursement funds. Recently we have heard discussions that suggest earmarks may be coming back. This would be something to discuss with your congressional delegation. Also, with regards to advocacy it will be necessary for the Town to be an advocate for the project in Wilmington and in DC at the USACE District and Headquarters, respectively. Internal USACE support will be very important to see this project through.

The third key is to develop a 3-Tier Vertical Team. If the Town decides to move forward with the Section 206 Project a 3-Tier Vertical Team will help with coordination between the three levels of the USACE, those being the Headquarters, the South Atlantic Division, and the Wilmington District. Establishing this team up front and having personnel assigned to the team from each level will help make reviews of the project more efficient.

Closing Thoughts:

- Beach Nourishment is a viable and economic method to mitigate long-term shoreline erosion and provide storm damage reduction
- USACE will not construct this project on their own
- Section 206 or some Federal credit is still viable, BUT you must be your own advocate
- Active public affairs campaign (DC/Raleigh)
- If you pursue 206, seek County blessing
- There are other advocates that are in the same position (We can put you in contact with them)
- You have the right team working with you!!



CONTACT INFORMATION:

Ken Willson

(910) 791-9494 (Office)

(910) 443-4471 (Cell)

Kenneth.Willson@Shawgrp.com

Tom Jarrett

(910) 791-9494 (Office)

(910) 264-2166

James.Jarrett@Shawgrp.com

Kill Devil Hills Shoreline Protection Project
DRAFT: Scope of Work
Project Information Document

Development of Project Information Document

Coastal Planning & Engineering, Inc. (CPE) will develop a project information document which will describe, in detail, the conceptual beach plan proposed by the Town of Kill Devil Hills (TOWN) including the length of the beach nourishment project, density of fill, dimensions of the fill, sand sources, construction methods, and an inventory of the available biological and physical data. The project information document will compare the project being proposed by the Town to the U.S. Army Corps of Engineers (USACE) Federally Authorized Dare County Storm Damage Reduction Project. The information document will also provide a detailed description and schedule of tasks associated with constructing the project under Section 206 Authorization. This document will be utilized for three distinct purposes:

- **Provide the USACE with an official project description of the beach fill project so that they can provide written guidance for pursuing project implementation under Section 206 Authorization;**
- **Provide the USACE with necessary information to allow them to make a permitting process determination; and**
- **Provide the USACE official notification of the Town's intent to pursue the beach fill project under Section 206 Authorization**

Project Management / Coordination:

This task includes those efforts to monitor and control costs, and to coordinate with the TOWN on project schedule and to provide periodic project updates. It is anticipated that there will be 2 project meeting associated with this study. The first meeting will be a project kick-off meeting to establish timelines and any specific directives associated with this scope. The second meeting will be at the conclusion of the development of the project information report to discuss the findings and coordinate the next phase of implementation the Town's shore protection program. It is also anticipated that significant coordination will be required between CPE and Federal/State regulatory agencies. In addition we anticipate continued coordination with USACE staff with regards to the 206 process.

Development of Project Description

At a meeting on 4 October 2011 between Town, CPE, and USACE Wilmington District Staff, the USACE suggested that in order for them to provide further insight on the ability for the District to support the Town through the Section 206 process, it would be necessary for the TOWN to submit a formal letter including the details of the project plan. This task includes those efforts associated with developing the information, as requested by the USACE, to be included.

Because most of the project details are identical to the current USACE formulated Dare County Storm Damage Reduction Project, we would rely heavily on information readily available in the current USACE project documents. We would provide information on the linear extent of the project, fill densities, elevation of the fill, estimated volumes, construction methods and timelines, and sand sources.

As part of the process of updating project fill requirements, it will be necessary to update the current beach profile surveys for the oceanfront shoreline along the project area. CPE is proposing to conduct beach profile surveys every 500 feet along the USACE established baseline for an approximate shoreline length of 3.9 miles of ocean shorefront. This area is centered around the main fill section which covers a 2.1 mile section from the northern boundary of the Town of Kill Devil Hills (at Kitty Hawk) south to a point approximately 500 ft. south of 1st Street. In addition to this main fill area there is a 3000 ft. taper section on either end. In addition, CPE is recommending an additional 2000 ft. section on either side to be surveyed. The survey will adhere to USACE hydrographic and topographic survey standards set forth in (Site USACE standards

CPE will coordinate with and obtain from both the USACE and the Town of Nags Head existing data for the offshore borrow sources for the Dare County Storm Damage Reduction Project. CPE will develop a GIS with the available data that can be used to develop borrow sources and inventory the availability of sand for the proposed project. CPE will provide information on what sources are readily permitted and what sources exist that may require additional analysis to satisfy permitting requirements.

The project information document will clearly compare the project being proposed by the TOWN to the Federally Authorized Dare County Storm Damage Reduction Project. This portion of the report will provide the USACE with valuable information needed to comment on the project as it relates to constructing under Section 206 Authorization.

Development of Environmental Data Inventory

During the pre-application interagency meeting held on 14 September 2011, the project manager from the USACE indicated that a federal Individual Permit (IP) issued by the Department of Army would be required for the proposed beach nourishment project at Kill Devil Hills. It remains to be determined, however, if an Environmental Impact Statement (EIS) or an Environmental Assessment (EA) would be required to support the permit application. The implications of this decision are substantial from both a timeframe and monetary point of view. The development of an EIS for a beach nourishment project typically takes between 18-36 months. However, should an EA be required, the time frame and cost would be reduced considerably. In order to determine which document would be required, the USACE will need to evaluate the amount of existing relevant environmental data.

CPE will coordinate with and obtain from both the USACE and the Town of Nags Head existing biological data that was developed for both the Dare County Storm Damage Reduction Project (including the project EIS) and the Nags Head Interim Project, which was constructed in the summer of 2011. This information will be reviewed and inventoried for future documentation.

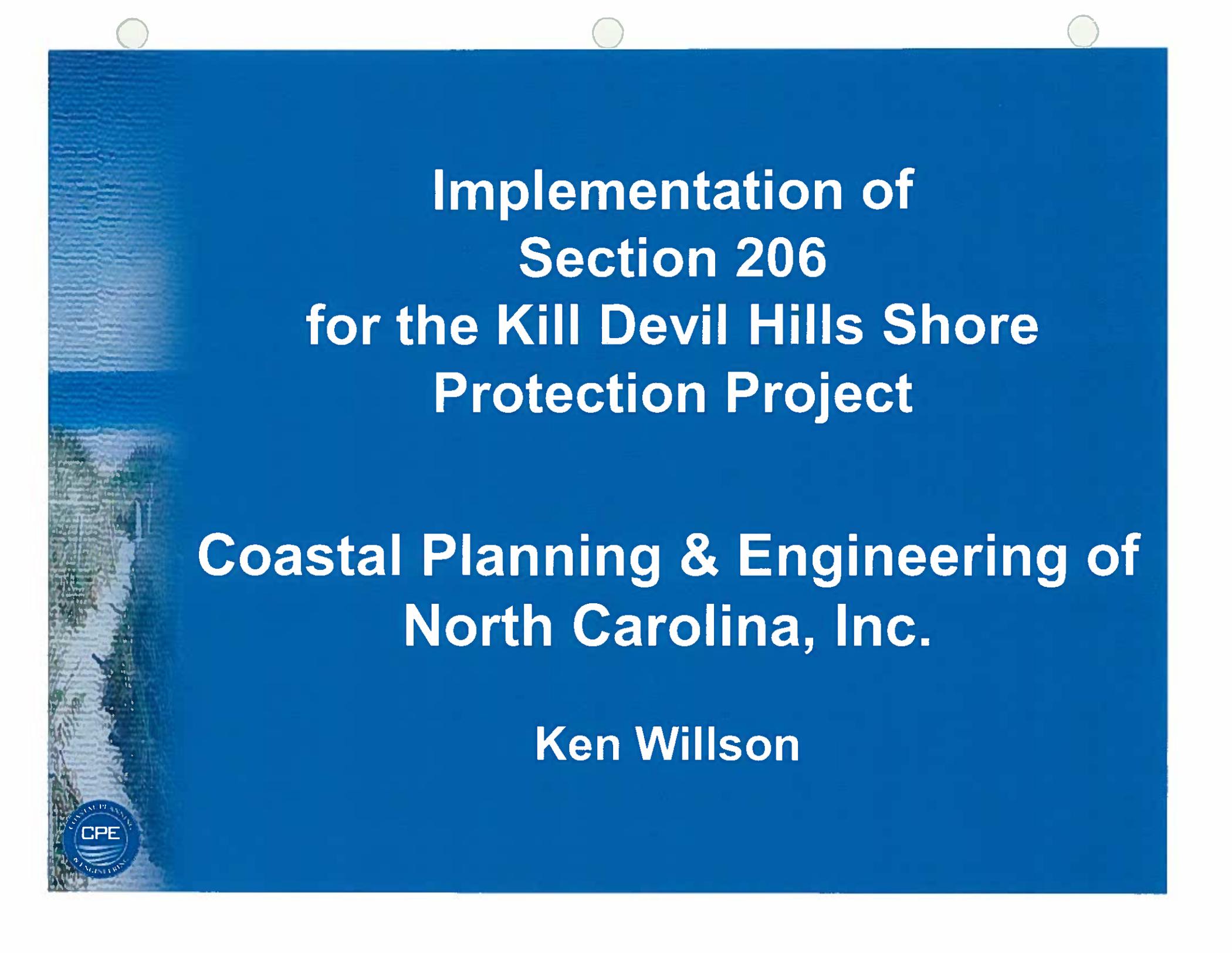
In addition we will provide a list of available information and a summary of the relevance of existing data to the proposed Kill Devil Hills Project.

Development of Formal Correspondence

This proposal includes the development of three separate formal correspondences to be sent from the TOWN to the USACE. These letters include:

- A letter to the USACE Wilmington District to provide a detailed project description of the beach fill project being proposed by the Town of Kill Devil Hills as requested by the USACE at the 4 October 2011 meeting. This letter will allow the USACE the opportunity to provide written guidance for pursuing project implementation under Section 206 Authorization.
- A letter to the USACE Regulatory Chief providing a detailed inventory of the available relevant environmental documentation for recent projects in the vicinity of Kill Devil Hills. This information will allow the USACE Regulatory Division to make a determination on the type of IP necessary to permit the proposed Kill Devil Hills Project.
- A letter to the Assistant Secretary of the Army's (ASA) office informing them of the Town's intentions to move forward with the construction of the proposed project under Section 206 Authorization. This is a formal step required by law to pursue a Section 206 Project.

CPE will provide draft language for each of these letters to the Town. CPE will work with the Town to further develop the letter into a final version approved by the Town.



**Implementation of
Section 206
for the Kill Devil Hills Shore
Protection Project**

**Coastal Planning & Engineering of
North Carolina, Inc.**

Ken Willson



Dare County Shoreline Protection Project



NOTES:

1. SATELLITE IMAGERY PROVIDED BY MICROSOFT VIRTUAL EARTH.
2. USACE BORROW AREAS PROVIDED BY USACE WILMINGTON DISTRICT.

LEGEND

-  USACE PROJECT FILL LIMITS (EXCLUDES TRANSITIONS)
-  USACE BORROW AREAS (FULLY DEVELOPED)
-  USACE BORROW AREAS (PRELIMINARY)



Feasibility Analysis

- Developed Four (4) Alternatives to compare
- Developed timelines and cost estimates for all alternatives



Alternatives:

1. USACE Constructed NED Plan: The current plan being proposed by the USACE (Comparison Purposes)
2. Locally Constructed NED Plan: The current plan proposed by the USACE with the exception of using S1 vs. N1 (Section 206)
3. Locally Constructed Locally Preferred Plan: Elimination of Dune Plan (reduce volume), and modification of Borrow Sources (Section 206)
4. Locally Constructed Emergency Plan: Same Scope as (3) but a one year time savings is included with the elimination of Federal Cost Share Process.



		Plan Options			
Plan Number		1	2	3	4
Costs	Description	Corps Constructed NED	Locally Constructed 206 NED	Locally Constructed 206 Locally Preferred	Locally Constructed Emergency Interim
	Extent of Fill	Dune & Beach	Dune & Beach	Beach	Beach
	Borrow Area	N1	S1	S1	S1
	Total Volume (cy, millions)	3.2	1.8	1.3	1.3
Total Construction Cost		\$28,900,000	\$24,700,000	\$19,000,000	\$19,000,000
Soft	206 Agreement Process	N/A	\$100,000	\$100,000	\$0
	Permitting	N/A	\$300,000	\$300,000	\$300,000
	Easements	\$250,000	\$250,000	\$250,000	\$250,000
	LRR	\$867,000	\$300,000	\$300,000	\$0
	Engineering Design, Plans, Specs	\$578,000	\$150,000	\$150,000	\$150,000
	Sand Investigation	\$0*	\$0*	\$0*	\$0*
	Construction Administration / Inspections	\$1,445,000	\$350,000	\$250,000	\$250,000
Estimate		\$32,040,000	\$26,150,000	\$20,350,000	\$19,950,000
Contingency (20%)		\$6,408,000	\$5,230,000	\$4,070,000	\$3,990,000
Total Estimate (2009)		\$38,448,000	\$31,380,000	\$24,420,000	\$23,940,000
Estimate Year of Construction		2015	2012	2012	2011
Inflation Through Cons. (3%/year)		\$7,460,923	\$2,909,773	\$2,264,393	\$1,457,946
Total Estimate		\$45,908,923	\$34,289,773	\$26,684,393	\$25,397,946
Cost Sharing	Federal	\$29,840,800	\$21,573,353	\$16,629,856	\$0
	Upper State	\$12,051,092	\$9,537,315	\$7,540,903	\$12,698,973
	Lower State				\$6,349,487
Local Cost Share		\$4,017,031	\$3,179,105	\$2,513,634	\$19,048,460
					\$12,698,973
Estimate Year of Construction		2015	2012	2012	2011

*Assumes Corps sand investigation meets state requirements



Kill Devil Hills Pursuing Beach Nourishment

Contract with CPE:
Conduct Feasibility Study

OPTION 1

OPTION 2

OPTION 3

OPTION 4

KDH Supports
Option 3

Initiate Meetings
With Agencies

CONSTRUCTION

Inform USACE of Section 206 and Begin Process

Project Cooperation
Agreement (PCA)

Limited Re-evaluation
Report (LRR)

Environmental
Permitting

Contract
Bidding

Plans and
Specs

USACE Review

EIS

No FONSI

EA

Plans and
Specs

USACE Review

Permit

Permit

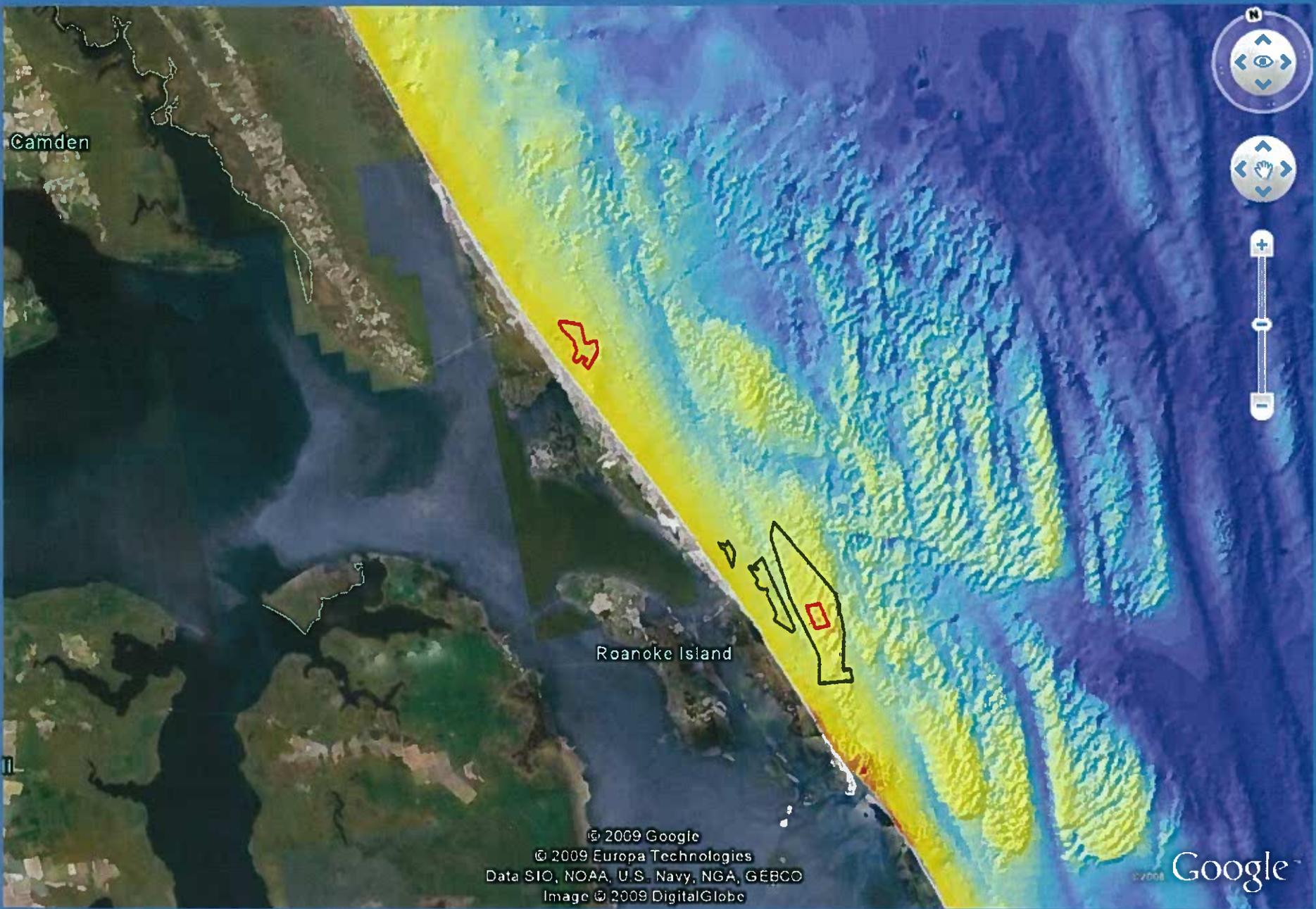
Contract
Bidding

CONSTRUCTION

REIMBURSEMENT

QUESTIONS ?





Camden

Roanoke Island

© 2009 Google
© 2009 Europa Technologies
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2009 DigitalGlobe

Google

	Kill Devil Hills		Nags Head
	Option 2	Option 3 (Similar to 4)	
Project Length	2.7 Miles	2.7 Miles	9.9 Miles
Project Volume	1.5 Million CY	1.1 Million CY	4.0 Million
Project Placement Rate	105.2 cy/Ft.	77 cy/Ft.	76 cy/Ft.
Mobilization Cost	\$3,000,000	\$3,000,000	\$2,000,000
Unit Cost	\$11.80 / CY	\$11.80 / CY	\$7.50 / CY
Contingency	20%	20%	3.90%
Permits/Planning/Construction Admin.	\$1,650,000	\$1,575,000	1,760,000
Construction Cost	\$26,820,000	\$21,090,000	\$35,000,000

CSE found that the Fed Project assumed 3 times the erosion rate they calculated

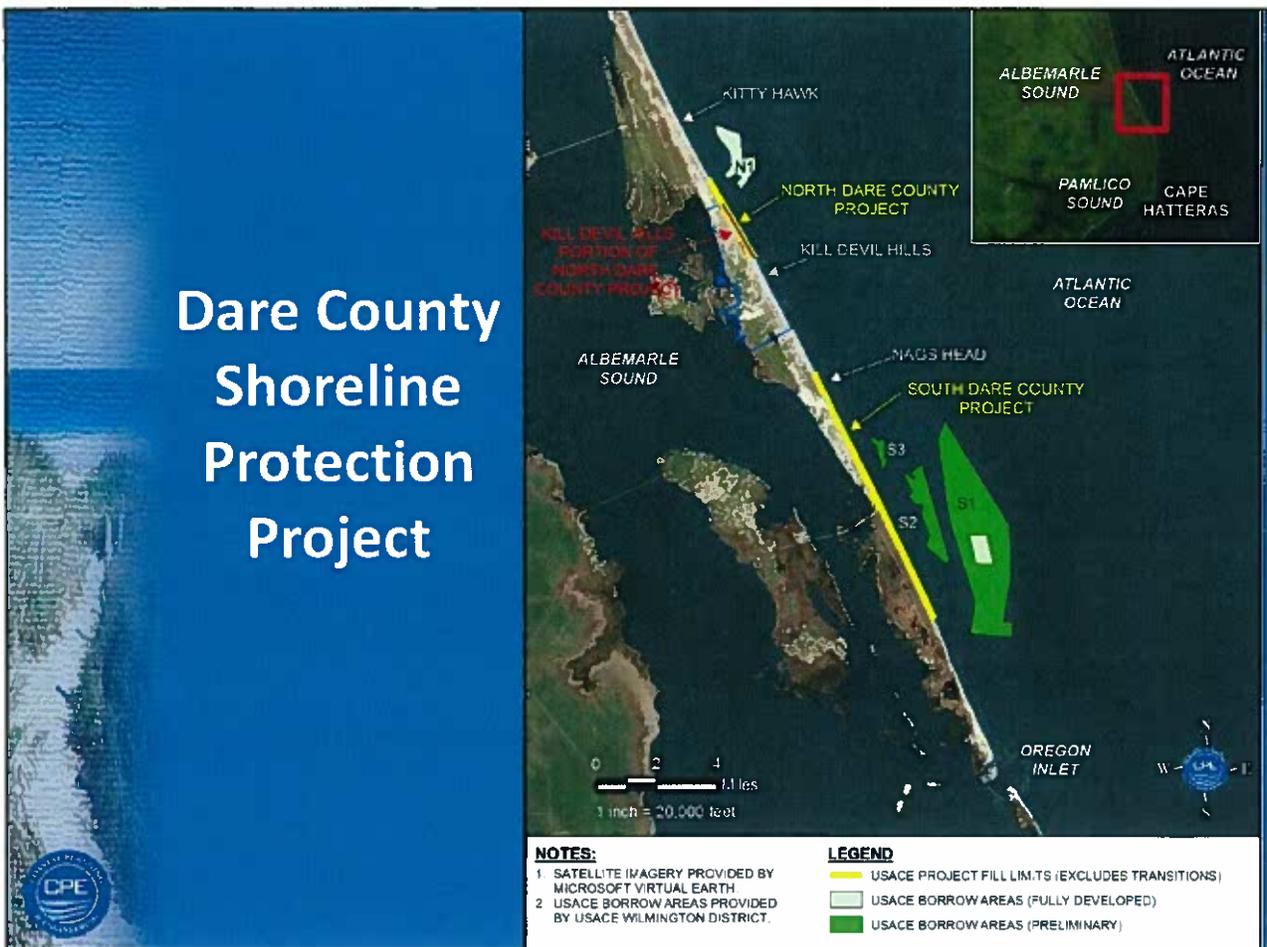
**Implementation of
Section 206
for the Kill Devil Hills Shore
Protection Project**

**Coastal Planning & Engineering of
North Carolina, Inc.**

Ken Willson



Dare County Shoreline Protection Project



Feasibility Analysis

- Developed Four (4) Alternatives to compare
- Developed timelines and cost estimates for all alternatives



Alternatives:

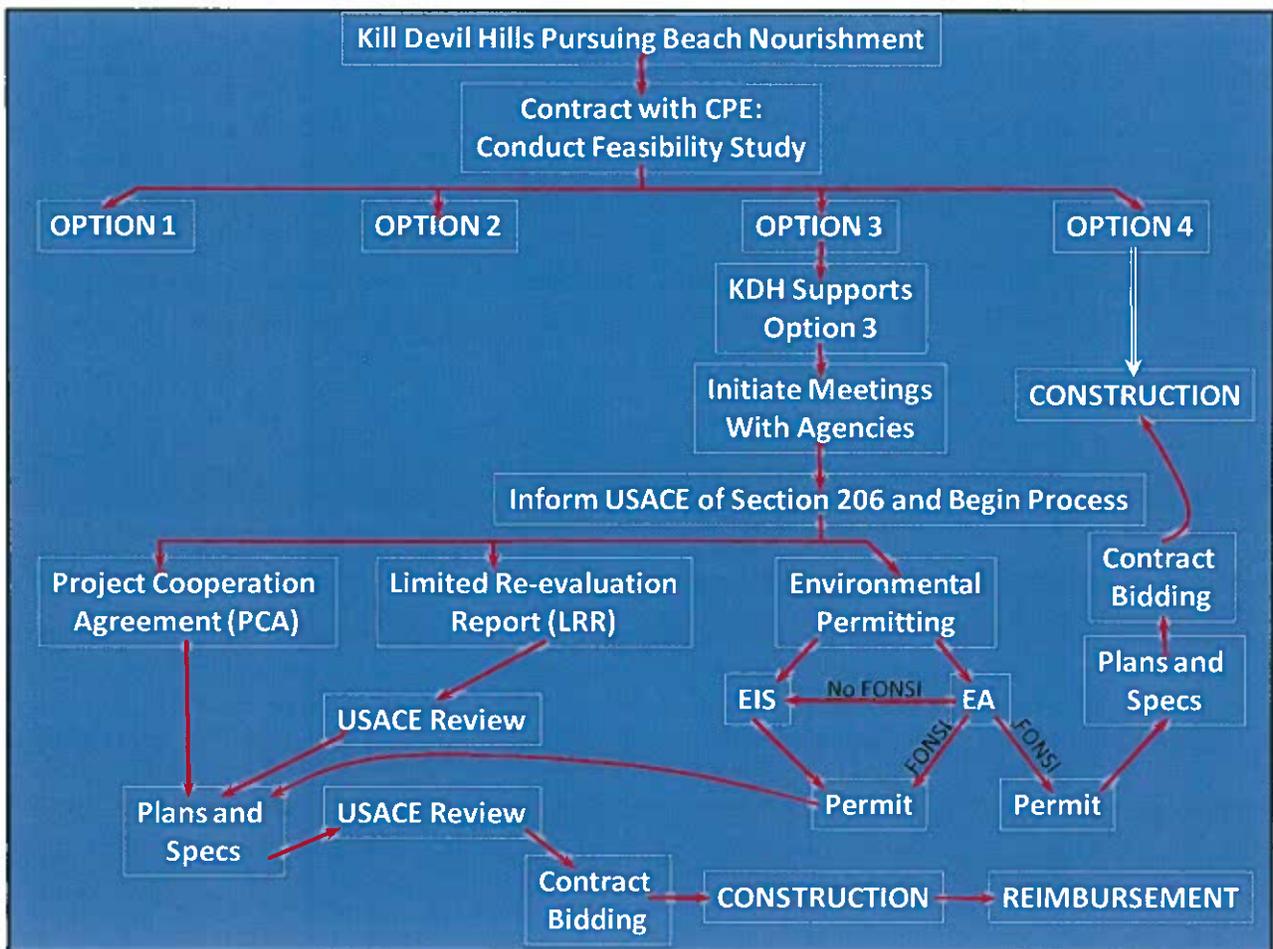
1. USACE Constructed NED Plan: The current plan being proposed by the USACE (Comparison Purposes)
2. Locally Constructed NED Plan: The current plan proposed by the USACE with the exception of using S1 vs. N1 (Section 206)
3. Locally Constructed Locally Preferred Plan: Elimination of Dune Plan (reduce volume), and modification of Borrow Sources (Section 206)
4. Locally Constructed Emergency Plan: Same Scope as (3) but a one year time savings is included with the elimination of Federal Cost Share Process.



		Plan Options			
Plan Number		1	2	3	4
Costs	Description	Corps Constructed NED	Locally Constructed 206 NED	Locally Constructed 206 Locally Preferred	Locally Constructed Emergency Interim
	Extent of Fill	Dune & Beach	Dune & Beach	Beach	Beach
	Borrow Area	N1	S1	S1	S1
	Total Volume (cy, millions)	3.2	1.8	1.3	1.3
Total Construction Cost		\$28,900,000	\$24,700,000	\$19,000,000	\$19,000,000
Soft	206 Agreement Process	N/A	\$100,000	\$100,000	\$0
	Permitting	N/A	\$300,000	\$300,000	\$300,000
	Easements	\$250,000	\$250,000	\$250,000	\$250,000
	LRR	\$867,000	\$300,000	\$300,000	\$0
	Engineering Design, Plans, Specs	\$578,000	\$150,000	\$150,000	\$150,000
	Sand Investigation	\$0*	\$0*	\$0*	\$0*
	Construction Administration / Inspections	\$1,445,000	\$350,000	\$250,000	\$250,000
Estimate		\$32,040,000	\$26,150,000	\$20,350,000	\$19,950,000
Contingency (20%)		\$6,408,000	\$5,230,000	\$4,070,000	\$3,990,000
Total Estimate (2009)		\$38,448,000	\$31,380,000	\$24,420,000	\$23,940,000
Estimate Year of Construction		2015	2012	2012	2011
Inflation Through Cons. (3%/year)		\$7,460,923	\$2,909,773	\$2,264,393	\$1,457,946
Total Estimate		\$45,908,923	\$34,289,773	\$26,684,393	\$25,397,946
Cost Sharing	Federal	\$29,840,800	\$21,573,353	\$16,629,856	\$0
	Upper State	\$12,051,092	\$9,537,315	\$7,540,903	\$12,698,973
	Lower State				\$6,349,487
Local Cost Share	High	\$4,017,031	\$3,179,105	\$2,513,634	\$19,048,460
	Low				\$12,688,973
Estimate Year of Construction		2015	2012	2012	2011

*Assumes Corps sand investigation meets state requirements



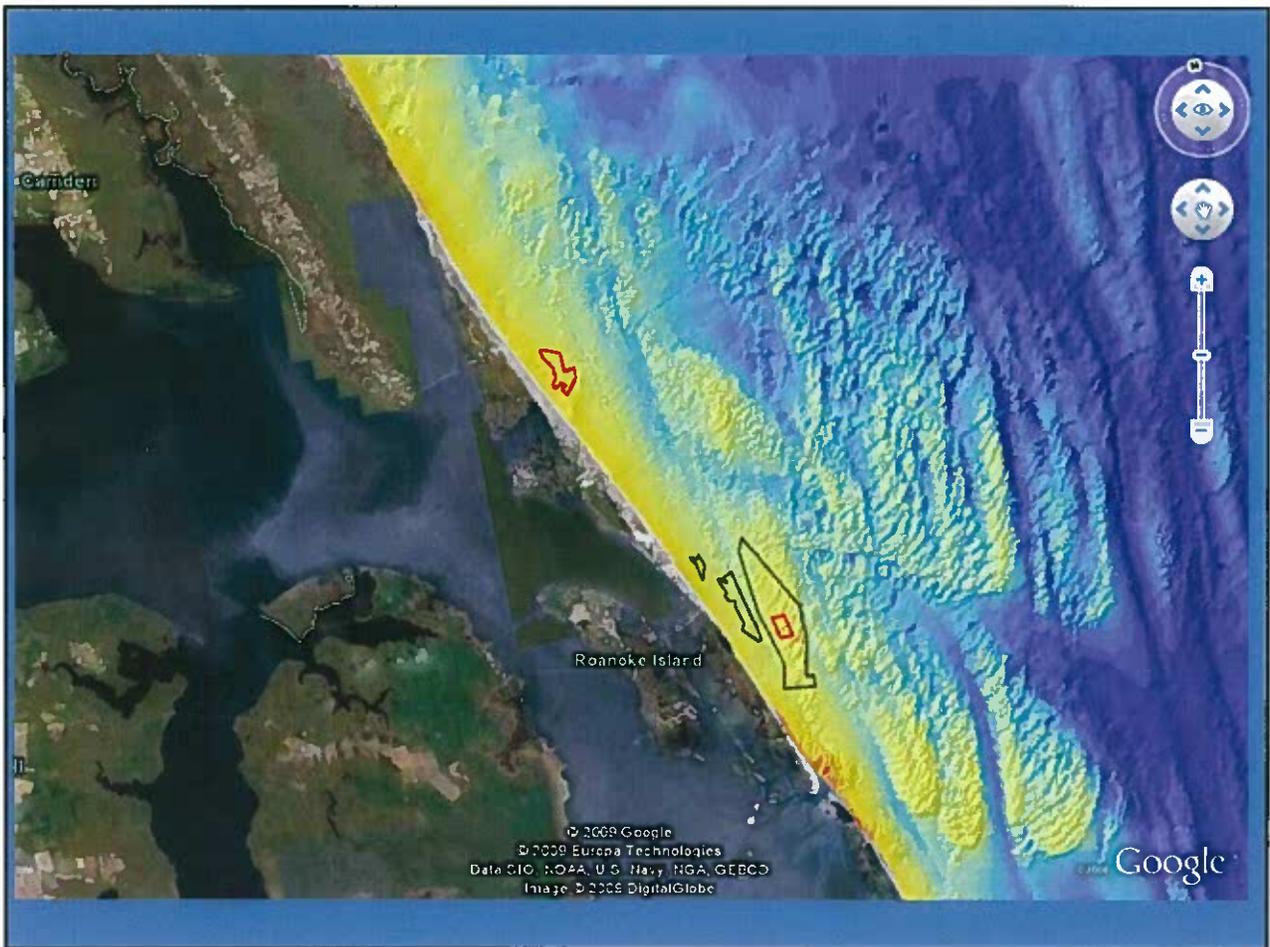


QUESTIONS ?



Timeline





	Kill Devil Hills		Nags Head
	Option 2	Option 3 (Similar to 4)	
Project Length	2.7 Miles	2.7 Miles	9.9 Miles
Project Volume	1.5 Million CY	1.1 Million CY	4.0 Million
Project Placement Rate	105.2 cy/Ft.	77 cy/Ft.	76 cy/Ft.
Mobilization Cost	\$3,000,000	\$3,000,000	\$2,000,000
Unit Cost	\$11.80 / CY	\$11.80 / CY	\$7.50 / CY
Contingency	20%	20%	3.90%
Permits/Planning/Construction Admin.	\$1,650,000	\$1,575,000	1,760,000
Construction Cost	\$26,820,000	\$21,090,000	\$35,000,000

CSE found that the Fed Project assumed 3 times the erosion rate they calculated