

North Topsail Beach Shoreline Protection Plan Update and Options to Complete All Beach Phases



December 15, 2017

Brief History

The Town's Shoreline Protection Project began significantly with a Request for Qualifications (RFQ) issued in 2002 by the Town Manager. The RFQ requested a feasibility study to "protect the 11.1 mile shoreline from storm and long term erosion, and an inlet management plan of the New River Inlet that will eliminate the inlet related erosion problems." The RFQ requested options, to include an environmental study for the selected option. The Environmental Impact Statement was completed in 2009 and the Town's Shoreline Protection Permit was issued thereafter with the selected option:

Inlet Management Plan and Beach/Dune nourishment. This became the Town's official "Plan of Record." It said:

1. The Town would dredge channel at a preferred location (perpendicular to NTB northern shore) to form the ebbtide delta which would offer wave sheltering protection and sand accretion for the north end inlet hazard area.
2. The dredged sand from the ocean bar (600,000CY) would be piped down the length of the beach in five consecutive annual phases, beginning with Phase 1.
3. Offshore sand would be used also in phases 2-5, primarily to complete phases 2 and 5.
4. The beach would be completed, provided funds were sufficient, in five years, with maintenance scheduled every four years from maintenance channel dredges plus offshore sand.

The major original goals of the original plan:

1. Coastal protection of the Town tax base and infrastructure;
2. Protect tourist/vacation economy;
3. mitigate the impact of accelerated inlet erosion, threatening adjacent property.

II. 2017 Factual Update of the original Plan of Record and Lessons Learned:

A. General:

- **Phase 1** sand deposition (600,000 CY) was completed in 2013 at a cost of \$5,600,000 using a bank loan that was amortized in 2017.
- **Phase 5** was completed in 2015 (1,300,000 CY) at a cost of \$16,800,000 with three payments made on a 30 year USDA loan (3.25% interest with an 11 year pre-payment agreement with the Local government Commission). 1,800 LF at the north end remain to be completed, but 18,520 of the total were constructed.

B. Phase 1 & 5 Project Specifics:

1. Inlet Area & Phase 1:

- the 2012-13 channel realignment brought beach compatible sand to Phase 1 area over 7,300LF, and some formation of the ebb tidal delta at a southern location, but 3,000LF eroded and returned to the inlet.

- The channel itself shoaled above the 85% maintenance threshold and the channel thalweg relocated within 18 to 24 months.
- The remaining 4,300LF in Phase 1 beyond the immediate inlet hazard area continued to perform and even accrete.
- The erosion at the inlet area accelerated in August 2014, necessitating a 2,000 LF sand bag revetment to halt acceleration that threatened homes and infrastructure at the north end area adjacent to the New River Inlet road.
- The area adjacent to the inlet erodes quickly, threatening not just shoreline homes but utility infrastructure and the entire north end area; a more permanent solution to the erosion cycle is a hardened structure. Design/permitting are underway for a hardened structure through inter-local agreement with Onslow County to split the \$500,000 cost design/permitting costs. Hardened structure construction cost estimates are unclear, but will exceed \$5,000,000.
- Goal of the Structure design is an optimal design which meets a dual purpose of New River navigation protection, inlet area shoreline erosion mitigation, while maintaining the ability for the Town to use the inlet as a sand source as clean beach compatible sand that matches closely the native beach grain size of .23mm.
- Concerns as to the impact of dredge channelization on adjacent shoreline erosion emerged from legal action initiated by owners adjacent to the revetment.
- Town attorney advises that to consider re-dredging the ocean bar channel, prior to installation of a hardened structure, would require legal releases from the owners behind the revetment. **A more prudent course of action would be to await installation of the hardened structure before proceeding to re-dredge the channel, with the hardened structure acting a barrier to any possible accelerated erosion.**
- State support: NC appropriated \$2,000,0000 for the hardened structure.
- Federal support: interest exists from the Department of Defense, which has called to inquire as to the cost of hardened structure.

2. Phase Five Project:

- Due to CBRS restrictions in phases 2-4, NTB jumped from phase 1 at the north end to Phase 5 at the south, where the Town could obtain federal funding due to Phase 5 exclusion from CBRS, using a USDA loan. The loan totaled \$16.8M (3.25% interest, 30 year note with an eleven year pre-payment agreement with the LGC).

- The 2015 Project concluded within the \$17M budget for 3.5 Miles at 65CY/LF for 1.3 million CY sand for 18,520 LF of phase 5. 1,800 LF remain to complete the phase.
- The Offshore borrow area anticipated for use in the original plan for Phases 2-5 is problematic as it contains high volumes of >3" rock. This rock caused a brief shutdown of the Phase 5 project, increased costs and required the extensive use of rock screening and berm remediation. **Future projects will require an additional \$2/CY unit cost to handle either intake or outfall screening, and possibly rock collection/transport off the beach, rendering this option not cost-effective.**
- The beach is a FEMA designed beach, allowing for FEMA reimbursement after storm damage with a Presidential declaration. The designation means that significant hurricanes will provide the means to maintain Phase 5 at low cost. FEMA covers direct construction costs but not indirect legal and financial costs.
- Hurricane Matthew in 2016 caused an initial sand loss of 160,000CY. NTB received a \$7,000,000 FEMA 2017 authorization to restore the sand and is pursuing a truck haul project estimated at \$5.3 million. NTB awaits the final FEMA award letter and permit, expected January 2018.

C. **Beach Vulnerability study** was performed to assess objectively NTB risk from storm surge, using density of buildings and proximity to road infrastructure, by priority of the remaining phases. The result is an order of priority, with Phase 2 as clearly the number one priority, with Phase 4 having the most buildings at risk with Phase 3 having most roadway threatened.

D. **New Funding Sources and Stakeholders:**

- With the advent of the new **State Shallow Draft Inlet fund**, 67% of costs of navigational dredging cost of the New River are covered by the State. The 33% local match can be split with the County to get sand deposition cost down to 16.5%, as was done with the 2016 Cedar Bush cut project, which placed 130,000 CY at the north end of Town.
- A new **State Beach Nourishment Fund** now exists to finance 50% of beach projects. The fund is expected to monetize in 2018. It is important to have NTB projects shovel ready, prior to funds materialization.
- **New River Working Group**— now exists a group of stakeholders with mutual interests in rendering the New River operational from a navigation perspective, including the US Coast Guard, Marines at Camp Lejeune, Onslow County, commercial fisherman, the State, and Federal government. USACE agreed to coordinate the meetings after quarterly Shallow Draft meetings.

III. Future Plan:

Based on the factual history since inception of the original Plan, and new information on funding sources and potential partners, it is time to update and re-write the original Plan, and to include a realistic construction Plan for the remaining Phases 2-4.

Overall Strategy Statement:

Phase 1 and Phase 5, with original construction projects completed and follow-up maintenance projects done or underway, including both hard and soft engineering solutions, should be viewed as ongoing Plan maintenance projects, requiring specific external County/State/Federal funding sources. The focus of the Shoreline Plan going forward should be ***how to complete the remaining phases 2-4, while continuing Phases 1 and 5 as ongoing maintenance projects.***

1. Phase 1 Maintenance:

- can be maintained with **completion of the hardened structure**; design and permit underway as a long-term solution. The hardened structure will require combination of County/State/Federal government funding contribution with perhaps a special tax district, so should be viewed as a separate project with a separate accounting fund. All stakeholders must be approached with a clear definition of benefit.
- Further strengthening Phase 1 is the **Revetment improvement** project, a joint public- private partnership with north end owners, with current dedicated funds of \$650,000.
- Periodic **USACE sponsored ICWW dredges**, as will occur Fall of 2018, can be expanded into the Jacksonville navigation channel or Cedar Bush cut to bring additional sand to the area.
- USACE is pursuing **advanced maintenance dredging of the ocean bar; this will result in additional sand deposition**, with expansion of the original permit (6'+2' x 90) to 12' x 150' for 225,000 CY of sand, enough to maintain phase 1. See Phase 1 Beach Fill Optimization Study.

2. Phase 5 Maintenance:

- As a FEMA designed beach, Phase 5 will be maintained continuously by any Presidentially-declared hurricane, e.g. Hurricane Matthew. Indirect costs not funded by FEMA will still leave sand at <\$1/CY (\$100,000 interim finance, financial and legal advisors/160,000CY).
- The **Surf City/NTB federal project** will bring over 1,000,000 CY of sand to NTB Phase 5. The local share is 35%, split 50/50 with the State. The 17.5% municipal amount is then split 61% SC to 39% for NTB based on LF. Therefore, NTB pays **6.8% of the total cost**, which is about \$8M over four

years (See Table 1 page 13). Mitigating this, NTB has an interlocal agreement with Surf City for a credit for any sand remaining from the 2015 Phase 5 project that fills the USACE template.

- Timing of federal project: if the full cost of \$129,000,000 were awarded, SC/NTB would need 1-3 years to obtain the State match, estimated at \$23,000,000. Additionally, SC still needs 700 easements and a parking plan before can begin, still years away.

3. Completion of Phases 2-4: What Should We Do? How Much will it Cost?

A. Background:

1) There are 3 potential sand sources to complete these phases: **New River Inlet (ocean bar and navigation channel west of the COLREG line), DA143 spoil island, and offshore.**

However, offshore sand is:

- ✓ Full of rocks -- adds an additional \$2unit cost to screen at intake or outfall site;
- ✓ Requires raking and off-island transportation for rocks;
- ✓ majority is fine grain sand, less than native .23mm grain size;
- ✓ has only 350,000 CY coarse sand out of the 6,000,000 CY total to meet the 715,000 CY coarse grain sand requirements in Phases 2 and 4, which is insufficient;
- ✓ affected by weather due to operation in open ocean during winter dredge window;

Conclusion: offshore sand is cost prohibitive, particularly with DA 143 available, and should not be used except in emergency.

2) Phase 2 and 4 hardbottom areas: station 1020-1090 in Phase 2; proximity to hardbottom nearshore areas requires coarse sand under the requirements of the original permit (5,000 LF x 65 CY/LF = 325,000CY). Phase 4 stations 840-900 have similar requirement: 6,000 LF x 65 CY/LF = 390,000 CY requires coarse grain sand.

3) The native beach average grain size is .23MM. DA143 is finer at .22MM but can be used in all areas except the Phase 2 & 4 hardbottom areas, under the permit expected to arrive in Spring 2018 (Aptim submitted to USACE and is nearing completion of State submission).

However, it may be possible to modify the 143 permit, according to one engineering report, to allow DA 143 for the remaining phases, including hardbottom areas.

B. Options to Complete Phases 2-4—Sequence and Cost:

Option 1:

- **Phase 2:** modify permit for an **expanded Cedar bush cut dredge project**, from current permit dimensions of 8' x 90' to 16' x 300', for navigation channel **west of COLREG line**, to use more channel sand, at 33% of costs with Shallow draft grant funds.
- **Phases 3 and 4**—use DA143, requesting permit modification to use 143 in hardbottom area of Phase 4. Phase 3 has no hardbottom so not an issue there.
- ***After hardened structure in place***, use ocean bar for maintenance of entire beach.

Pro:

- Uses coarser inlet sand for one hardbottom area (Phase 2), avoiding issue about adjacent shoreline erosion near ocean bar.
- Inlet sand qualifies for Shallow draft fund 67% grant.
- Use the State grant we have for \$1,500,000 for the DA 143 project.

Con:

- County holds the permit for channel west of COLREG line and would have to agree to modify. However, this would be advantageous to them due to improved navigation.
- Permitting agencies may not allow DA143 in hardbottom area of Phase 4, so hardbottom area of 4 would have to wait until hardened structure in place, to use ocean bar sand.

Option 1 to Complete Initial Beach Construction of Phases 2-4 & Maintain All Phases												
										Total to		Construct
	Phase 2			Phase 3			Phase 4			Construct	Maintenance & Maintain	
	CY	unit cost	total \$	CY	unit cost	total \$	CY	unit cost	total \$			
Construction Cost	780,000	\$19	\$14,896,219	455,000	\$10	\$4,550,000	747,500	\$10	\$7,475,000	\$26,921,219	\$7,796,000	\$34,717,219
Grant Offset			\$9,980,467			\$1,500,000			\$3,737,500	\$15,217,967	\$5,223,320	\$20,441,287
Additional Funds Needed			\$4,915,752			\$3,050,000			\$3,737,500	\$11,703,252	\$2,572,680	\$14,275,932
Grant Source	67% Shallow draft			State Grant			50% Future State Beach Fund				67% Shallow	
Sand Source	Expanded Cedar Bush			DA143			DA143				Ocean Bar	

Option 2:

- use **DA143 for Phases 2-4**, with permit modification to allow finer grain sand in hardbottom areas of phases 2 and 4. Phase 3 is ok to use 143 sand as beach compatible.
- Postpone use of ocean bar sand until after hardened structure in place, as maintenance for entire beach.

Pro:

- no adjacent shore erosion issues caused by use of ocean bar or inlet sand;
- continuous project to complete all phases at one time—saves mobilization costs.
- Can use the \$1,500,000 State grant we have in hand to offset; takes advantage of the new Beach fund 50% grant.
- Timing -- can position project faster than other options for the State Beach fund grant.
- Avoids ocean certified dredge weather delays from ocean bar or offshore.

Con:

- not supported by the higher 67% State Shallow draft fund grant \$\$;
- requires permit modification to overcome hardbottom issue in Phases 2 & 4 to use finer grain DA 143 sand.
- Inlet sand preferred due to coarser grain for shore longevity.

Option 2 to Complete Initial Beach Construction of Phases 2-4 & Maintain All Phases													
										Total to		Construct	
		Phase 2			Phase 3			Phase 4		Construct	Maintenance	& Maintain	
	CY	unit cost	total \$		CY	unit cost	total \$	CY	unit cost	total \$			
Construction Cost	780,000	\$10	\$7,800,000		455,000	\$10	\$4,550,000	747,500	\$10	\$7,475,000	\$19,825,000	\$7,796,000	\$27,621,000
Grant Offset			\$1,500,000				\$2,275,000			\$3,737,500	\$7,512,500	\$5,223,320	\$12,735,820
Additional Funds Needed			\$6,300,000				\$2,275,000			\$3,737,500	\$12,312,500	\$2,572,680	\$14,885,180
Grant Source	State Grant			50% Future State Beach Fund			50% Future State Beach Fund				67% Shall draft		
Sand Source		DA 143		DA143			DA143				Ocean Bar		

Option 3: If DA143 permit not allowed to be modified for fine grain sand:

- use **expanded Cedar Bush cut dredge project** sand for Phase 2;
- Phase 3 use **DA143 and fine grain area of Phase 4**;
- after hardened structure in, complete 4 and maintain beach with **ocean bar coarse sand**.

Pro:

- Uses Shallow draft funds to reduce NTB costs to 33% for Phases 2 and 4;
- Uses the State beach grant of \$1.5 million to offset DA143;
- Avoids ocean bar channel erosion debate.

Con:

Complexity--will require three separate projects due to different sand sources and times, meaning more mobilization and planning cost (however, this cost is offset by the higher 67% Shallow Draft grant for two inlet projects, which keeps it affordable).

Option 3 to Complete Initial Beach Construction Phases 2-4 & Maintain All Phases										
	Phase 2			Phase 3			Phase 4			Total to
										Construct
	CY	unit cost	total \$	CY	unit cost	total \$	CY	unit cost	total \$	Maintenance & Maintain
Construction cost	780,000	\$19	\$14,896,219	455,000	\$10	\$4,550,000	747,500	\$12	\$9,324,016	\$28,770,235
Grant Offset			\$9,980,467			\$1,500,000			\$6,247,091	\$7,796,000
Additional Funds Needed			\$4,915,752			\$3,050,000			\$3,076,925	\$22,950,877
Grant Source	67% Shallow draft			State Grant			67% Shallow Draft			\$2,572,680
Sand source	Expanded Cedar Bush			DA143			Ocean bar			\$13,615,358

Option 4: If **expanded Cedar Bush cut permit** not accepted by County and State, and **DA143 permit hard bottom exemption not allowed**, then construct hardened structure while pursuing DA 143 for Phase 3 and half of the Phase 4 non-hard bottom area; after hardened structure installed, use ocean bar for phase 2.

Option 4 to Complete Initial Beach Construction of Phases 2-4 & Maintain All Phases										
	Phase 2			Phase 3			Phase 4			Total to
										Construct
	CY	unit cost	total \$	CY	unit cost	total \$	CY	unit cost	total \$	Maintenance & Maintain
Construction Cost	780,000	\$12	\$9,729,408	455,000	\$10	\$4,550,000	747,500	\$10	\$7,475,000	\$21,754,408
Grant Offset			\$6,518,703			\$1,500,000			\$3,737,500	\$9,100,000
Additional Funds Needed			\$3,210,705			\$3,050,000			\$3,737,500	\$30,854,408
Grant Source	67% Shallow draft			State Grant			50% Future State Beach Fund			\$4,550,000
Sand Source	Ocean Bar			DA143			DA143			\$14,548,205

Pro:

- Already have ocean bar permit in hand and grant of \$5.6 million;
- Can use the \$1.5 million state grant for DA143;
- Avoid ocean bar channelization erosion issue;
- Low local match, after grant cost.

Con:

- Longer time period to complete beach—will be able to do only Phase 3 and part of 4 until hardened structure in place.
- No Town-wide beach maintenance sand, once ocean bar used; would need to go offshore or obtain permit modification to go back to ocean bar sooner than current permit allows (4 years).

C. Cost Comparison of All Options:

Cost Comparison of Options 1,2,3,4					
				Total to	Total After
	Phase 2	Phase 3	Phase 4	construct	Grant
Option 1	\$14,896,219	\$4,550,000	\$7,475,000	\$26,921,219	\$11,703,252
Option 2	\$7,800,000	\$4,550,000	\$7,475,000	\$19,825,000	\$12,312,500
Option 3	\$14,896,219	\$4,550,000	\$9,324,016	\$28,770,235	\$11,042,678
Option 4	\$9,729,408	\$4,550,000	\$7,475,000	\$17,727,557	\$9,998,205
			Average	\$23,311,003	\$11,264,159

C. Analysis of Options:

- Option 4 has lowest total project cost but will take the longest to complete the beach, while awaiting hardened structure completion. Option 2 will complete beach fastest, but has highest local match due to the State Beach fund's lower 50% contribution versus Shallow draft fund 67%.
- Use of Current Town Beach funds (see Beach/Shoreline Fund below): annual revenues are \$3,400,000. Annual expenses are \$1,500,000 mostly due to the \$900,000 Phase 5 debt. Therefore, the fund currently brings in \$1,900,000 revenue annually and will end next year at \$7.3 million. After USDA reserve requirement this leaves \$4.3 million available, which is about \$7,000,000 short of the local match needed to complete the beach.

- **USDA 5 payment Reserve**—the five payment reserve (three upfront, two in later years) leaves \$4.3 million for use next fiscal year. USDA grants an exemption to the Reserve for Presidentially declared disasters, as they have done with the FEMA Phase 5 Storm Damage Repair project, but cannot be used for the remaining phases. **This means that the Reserve functions only as an emergency bank for NTB in times of storm emergency.**
- The unobligated Reserve can be used for the local match for one, but not more, phases which will require external contributions or large tax increase to complete.

North Topsail Beach Beach & Shoreline Protection Fund					
		Actual	Forecast		
Revenues		FY16-17	FY17-18	FY18-19	FY19-20
Occupancy Tax		1,009,134	1,311,333	1,350,649	1,418,182
15 Cents dedicated AV		1,288,696	1,290,000	1,290,000	1,290,000
Sales Tax		786,327	770,800	770,800	770,800
Onslow County Tourism Grants:		..	11,700	250,000	250,000
Beach & Beach Access		60,000	150,000	60,000	60,000
Hardened Structure		..	250,000	..	..
FEMA Phase 5 Re-imbursement		44,250	7,028,000	..	..
	Total Revenues	3,339,151	10,823,033	3,733,449	3,800,982
Expenses		FY16-17	FY17-18	FY18-19	FY19-20
Phase One Debt (Bank) -		587,794	577,883	..	..
Phase Five Project (Storm Repair Project)			7,028,000	100,000	
Phase 5 Federal Project w/Surf city		..	..	..	..
Phase 5 Debt Service		900,112	899,250	899,030	899,420
Revetment Maintenance		6,681	200,000	100,000	100,000
Groin/Hardened Structure		..	500,000	..	
Annual Operating		213,261	372,900	380,358	387,965
	Totals Expenses	2,284,831	9,798,033	1,479,388	1,387,385
Revenues/Expense +--		1,054,320	1,025,000	2,254,061	2,413,597
Fund Balance*		3,989,486	5,014,486	7,268,548	9,682,144
duct for USDA Reserve		-2,788,403	-2,878,328	-2,968,231	-3,058,173
Post USDA Reserve		1,201,083	2,136,158	4,300,316	6,623,971

D. Financing Options: There are three ways to pay for the projects:

1. **Apply for grants and seek additional County/State/Fed contributions** -- begin immediately once option is chosen, to defray local match grant cost.
2. **Save and Pay:** NTB should be able to do at least one phase of local match with current revenue structure, but will need external infusion of cash or tax increase to meet the local match requirements and complete the beach, totaling \$7,000,000. The current \$.1571 dedicated tax = \$1,300,000 annually. If the rate were doubled, this is \$2.6 million, which would reach the \$7,000,000 in three years, without outside contribution.

3. **Use Debt:** debt, such as USDA loan for the local match of \$11,264,159 would be an annual debt increase of \$642,716 (30 year, 3.25% interest). This would be added to the current debt of \$900,000 and could be sustained under the current tax structure. However, this would require:
 - A. Local Government Commission re-consideration of the USDA eleven year prepayment agreement, which LGC would want protected;
 - B. Careful financial planning so that funds are not siphoned off into other non-beach nourishment projects such as the hardened structure, weakening the debt payment structure;
 - C. Overcoming the same USDA issue as the Phase 5 debt -- the large Reserve requirement for five payments.

V. Recommendations Forward:

1. Pursue Option 1 first, due to the need for cheap, beach compatible, coarse sand; if County/State disagree with permit modification west of COLREG line, proceed with option 2, DA 143. If neither expanded Cedar Bush cut or DA143 hard bottom exemption permitted, then construct hardened structure, afterward use ocean bar in Phase 2 while simultaneously pursuing DA143 in 3 and part of 4.
2. Issue **Request for Plans** in January 2018 -- a coastal engineer to provide a 2018 Updated Shoreline Protection Plan, with detailed engineering options and costs to construct and maintain the beach. This can be done at little cost to NTB.
3. **Resolve clearly** who will be the overarching "Town Coastal Engineer" coordinating all shoreline work, particularly important as NTB approaches State and USACE agencies on permits, so projects are coordinated with permitting agencies from one primary agent.
4. Decide on priority of phases—do you agree with Beach Vulnerability Study ranking?
5. Choose the desired Plan option and engineer and have them begin design/permitting anticipating the full **funding of the new State Beach fund, to be shovel ready and first in line.**
6. Approach the Hardened Structure as a separate project requiring a unique mix of County, State, Federal contributions. Devise a separate strategy to obtain construction funds, using the State's \$2,000,000 as seed money and leverage to pursue contributions aggressively. Do not let the project distract from completion of all phases for sand deposition on the beach, to be maintain in perpetuity.

Table 1.

**NTB-Surf City Federal
Project—Cost Breakdown**

	<u>Cost Share</u>
Total	\$129,000,000
Federal Government--65%	\$83,850,000
State & Local--35%	\$45,150,000
NTB/SC--17.%	\$22,575,000
Surf City (LF-61% of 17.5%)	\$13,770,750
NTB (LF--39% of the 17.5%)*	\$8,804,250
Each year for four years	\$2,201,063

Town has inter-local agreement with Surf City for credit for our sand filling the USACE template

New River Inlet Ocean Bar and Navigation Channel with COLREG line Demarcation

