

Analysis of Proposed DeBordieu Groin and Beach Nourishment Project



Kendra Rudeen, Graduate Student Assistant

Program for the Study of Developed Shorelines

Western Carolina University

September 2, 2011

History of DeBordieu

DeBordieu Island has a rich and storied past. One of the oldest East Coast beachside communities, the region was given its name in 1777. Proclaimed “borderland of God” by Marquis de Lafayette, the French translation “D’aborde Dieu” became “DeBordieu” or “Debidue” from the local Gullah dialect.¹

In Pre-Civil War times, the area was one of the largest rice-producing regions in the world, leading to the construction of many colony and vacation homes. Much of the area was later purchased by Dr. Isaac Emerson, a wealthy businessman from Baltimore, and later inherited by his grandson, George Vanderbilt. The land and homes remained in the family until 1970, when Lucille Vanderbilt, George Vanderbilt’s daughter, sold a portion of the property to developer Wallace F. Pate. That was the beginning of what is now known as DeBordieu Colony.²

Today DeBordieu Colony is a private gated community covering 2,700 acres of land and wildlife preserve. The community has 1,250 home sites, 1,223 of which are currently developed. The island has three distinctive areas; 1) North beach, 2) South beach, where the Colony is centered, and 3) The southernmost end of the island which includes the Hobcaw tract and DeBordieu Island spit.

Changes in the downdrift sediment transport, wave action, currents, and storms have made the island susceptible to accelerated erosion rates and, as a result, forty years after DeBordieu Colony was first developed, property owners are faced with a dilemma: What to do about threatened buildings placed behind a migrating/eroding beach.

¹ http://www.debordieucandc.com/outside_home.asp

² <http://www.debordieu.com/about/history/>

DeBordieu Coastal Management

Since its inception, DeBordieu Colony has undertaken a number of alteration/stabilization projects (Table 1) designed to protect threatened oceanfront development, and has settled on beach nourishment - the emplacement of sand on an eroding beach - to provide a protective buffer against storm and wave damage.³

1970s	Dune scraping
1970s	Two groins, now barely visible, installed south of DeBordieu Colony on the Hobcaw forested tract.
1981	Timber seawall construction along 4,500 ft. The seawall begins at the southern edge of the Beach Villas and extends south.
1990	Beach nourishment of an 8,060-foot section of beach using 192,000 cubic yards from an upland source, hauled by truck. The project cost \$855,000 and was paid for with private funding. In 1990, 800 ft of the 4,500 ft seawall was also rebuilt following Hurricane Hugo.
1998	Beach nourishment of the same 8,000-foot section of beach using 262,386 cubic yards of upland sand. The project cost \$1,586,108 and was paid for with private funding. In 2001, Coastal Science and Engineering estimated that erosion losses in DeBordieu Colony were 35,000 cy in year one, 31,000 in year two, and 48,000 cy in year three, totaling approximately 45 percent of the nourishment volume within three years.
2006	Beach nourishment along 8,500 ft of beach and primary dune enhancement along 3,000 ft using 590,000 cubic yards dredged from an offshore shoal. The project cost \$6,200,000, was paid for with private funding and was the first private beach nourishment in SC to use a hopper dredge.

Table 1: DeBordieu Colony Beach Stabilization Actions

Beach alteration projects like those undertaken by DeBordieu currently fall under the South Carolina “Beachfront Management Act” ([Coastal Tidelands and Wetlands Act, as amended, §48-39-250 et seq.](#)) and require a Department of Health and Environmental Control Office of Ocean and Coastal Resource Management permit.

³ Applied Technology and Management. “Downdrift Impacts Analysis for the Debidue Island Groins Project.” July 2009.

Current Beach Stabilization Efforts

DeBordieu's current effort to nourish and stabilize its beach was originally submitted to DHEC-OCRM in 2008. The plan is to dredge 795,000 cubic yards of sand, using either hydraulic hopper or cutterhead dredge, from two offshore borrow areas and pump this sand via pipeline along 9,500 feet of shoreline.

In addition, three groins will be constructed of aluminum sheet pile, concrete fill, marine mattress and granite rock. The groins will be located along the southern half of the project area, just south of the oceanfront bulkhead (Figure 1).⁴ Each groin will be 3 feet wide, have a maximum height of +5 feet NGVD, and vary in length from 276 to 313 feet. The stated purpose of the project is to renourish and stabilize the shoreline along DeBordieu Beach. The stated purpose of building the groins is to extend the life of the nourishment projects, thereby reducing the frequency and need for future nourishment activity.⁵ A presentation to homeowners by the DeBordieu Colony Community Association Beach Advisors (DCCA) states the groins will hold an additional 100,000 cubic yards of sand in place, extend the life of the nourishment project to 7-10 years and save the community at least \$500,000 per year.^{6,7}

⁴ Beach Advisors, DeBordieu Colony Homeowners' Presentation

⁵ Charleston District, Corps of Engineers and S.C. Department of Health and Environmental Control Office of Ocean and Coastal Resource Management, P/N #2008-01003-3I

⁶ Beach Advisors, DeBordieu Colony Homeowners' Presentation

⁷ Applied Technology and Management. "Downdrift Impacts Analysis for the Debidue Island Groins Project." July 2009.



Figure 1: Location of Proposed Groins

DHEC-OCRM issued a permit for the construction on March 1, 2011 and attached 14 special conditions. Stipulations include beach fill material quality and criteria for monitoring the impact of the project within the proposal area, as well as at the downdrift region. Also included is a provision that DeBordieu agree to a financial commitment to future beach renourishment and for modification and/or removal of the groins should they be shown to have adverse impacts.^{8,9}

Project Cost

The estimated cost of the project is \$11.5 million (Table 2).¹⁰ This is based on previous history, recent renourishments at other communities, non-binding quotes,

⁸ Swenson, Charles. "Beaches: DeBordieu gets permit for groins, appeals follow." *Coastal Observer*, March 17, 2011.

⁹ S.C. Department of Health and Environmental Control, Critical Area and Water Quality Certification Permit, Permit Number 2008-1003-3IV

¹⁰ Beach Advisors, DeBordieu Colony Homeowners' Presentation

estimates from the U.S. Army Corps of Engineers (Corps), and other sources of information. The project cost includes assumes 3% inflation.

Engineering and Consulting	\$658,903
Legal and Permitting	\$234,871
Monitoring and tilling	\$359,917
Dredging (sand and mobilization)	\$7,750,000
Groin Construction	\$1,500,000
Total project cost without contingency	\$10,503,691
Contingency (10% and excludes spent to date)	\$1,021,572
TOTAL PROJECT COST	\$11,525,263

Table 2: Current Estimated Project Costs

Potential Impacts and Associated Concerns

Among both development residents and environmental groups, there seems to be little objection to the beach nourishment aspect of the proposal. It is largely accepted that a wide beach offers benefits in the form of storm damage reduction.¹¹ Of great concern, however, is the construction of the three-groin system.

Although S.C. law does allow for construction of groins as a part of an ongoing beach nourishment project in areas with high erosion rates, groins can only be permitted after a thorough analysis shows there will be no negative downdrift impacts.¹² The

¹¹ <http://www.csc.noaa.gov/beachnourishment/html/geo/scitech.htm>

¹² <http://www.scstatehouse.gov/code/t48c039.htm>

foremost concern related to the proposal of groin construction is, therefore, that of downdrift impacts.

Downdrift Impact:

The three-groin system being promoted would be placed near the southern property line (Figure 2). Downdrift shorelines include the Hobcaw Barony tract and DeBordieu Island Spit.

Hobcaw Barony, a 17,500 acre research preserve, is one of the few undeveloped tracts on the Waccamaw Neck. Although privately owned, the University of South Carolina University operates the Baruch

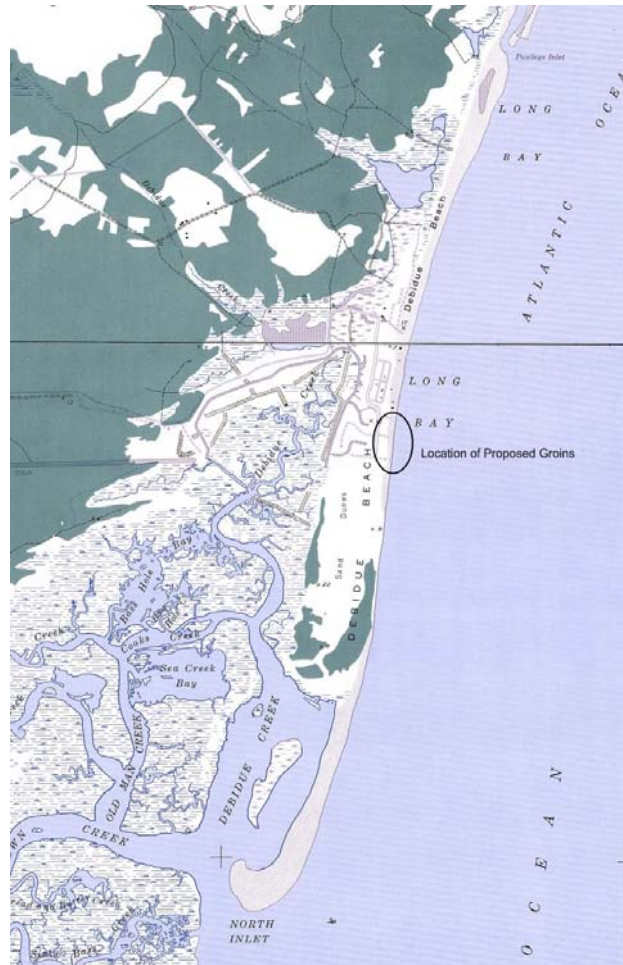


Figure 2: Proposed Location of Groins

Institute for Marine & Coastal Sciences and Clemson University has its Belle W. Baruch Institute of Coastal Ecology & Forest Science on the property.¹³ North Inlet, one of the nation's most pristine tidal estuaries and a focal point of the University of South Carolina's Baruch Marine Field Laboratory is critical to the study of marine life in a pollution-free environment.¹⁴

¹³ <http://www.hobcawbarony.org/History.HB.html>

¹⁴ Fretwell, Sammy. "Beach landowners in DeBordieu clash with scientists." TheSunNews.com, June 9, 2011.

The ‘Question and Answer’ section of the DCCA presentation contains an admission that “the groins will have a negative erosion effect on the beaches immediately to the south of the southernmost groin.”

DCCA contends, however, that “over-nourishing [the] beach to allow for more than enough sand [will] offset erosion caused by [the] groins initially” and that placing almost 46,500 cubic yards of sand south of the southernmost groin will act as “advance mitigation.”¹⁵ ATM, the Colony’s coastal engineer, also claims that “the proposed fill volume will far exceed the volume of material that the preferred groin system is capable of trapping and therefore the excess nourishment material will, similar to the effects of the 2006 project, migrate to downdrift shores.”¹⁶

Coastal experts however are increasingly aware and responsive to adverse impacts associated with the emplacement of shore protection structures such as groins. Much of this focus has been the result of research showing that groins often impede the supply of sand to downdrift beaches. According to the Western Carolina University Program for the Study of Developed Shorelines (PSDS), the adverse impact of groins is widely documented. “When a groin works as intended, sand moving along the beach in the so-called downdrift direction is trapped on the updrift side of the groin, causing a sand deficit and increasing erosion rates on the downdrift side.” Although difficult to determine when or the extent to which negative impacts will occur, “it is clear that on a shoreline where sand is transported laterally, groins will always cause erosion.”¹⁷

¹⁵ Beach Advisors, DeBordieu Colony Homeowners’ Presentation

¹⁶ Applied Technology and Management, “Downdrift Impacts Analysis for the Debidue Island Groin Project.” July 2009.

¹⁷ Western Carolina University Program for the Study of Developed Shorelines, “Coastal Scientist Groin Statement.”

Both the Corps and the National Oceanic and Atmospheric Administration (NOAA) have also acknowledged the impact groins can have on downdrift beaches. Groins were once the preferred choice of stabilization structures for controlling beach erosion. Currently, however, NOAA finds “groins function to trap sediment out of the system and have an associated adverse effect on the downdrift shorelines.” NOAA warns that careful consideration of potential adverse effects on adjacent shorelines must be given when using them as a method to prolong the life of beach nourishment projects.¹⁸

The Corps, in its Shore Protection Projects Manual, describes groins as: “...probably the most misused and improperly designed of all coastal structures...Over the course of some time interval, accretion causes a positive increase in beach width updrift of the groin. Conservation of sand mass therefore produces erosion and a decrease in beach width on the downdrift side of the groin.”¹⁹

Property Value:

The DCCA also alleges the “stabilized beach with a monitoring plan in place should enhance everyone’s property values in [the] community.”²⁰ A statistical study on the return-on-investment (ROI) conducted by the Heinz Center in 2002, however, does not draw the same conclusion. The study found that although oceanfront homes may show an increase in value, shoreline stabilization actually decreases the values of non-waterfront properties. Ironically for beachfront property owners, an interesting caveat exists: property values decrease as more neighbors rely on shoreline stabilization.

¹⁸ <http://www.csc.noaa.gov/beachnourishment/html/geo/scitech.htm>

¹⁹ USACE, Chapter 3 EM 1110-2-1100, Shore Protection Projects, (Part V), 1 August 2008, (Change 2)

²⁰ Beach Advisors, DeBordieu Colony Homeowners’ Presentation

Furthermore, if the groins impact recreation values, aesthetics or the natural environment, all properties in the Colony may lose value and become unattractive to potential buyers.

Project Funding:

The proposed project funding allocation and accompanying zone map (Figure 3)²¹ were developed after the Beach and Long Range Planning Committee combined a fiscal impact model produced in 2006 by consultant Fishkind & Associates with an estimate of changes in post-project property values.²²

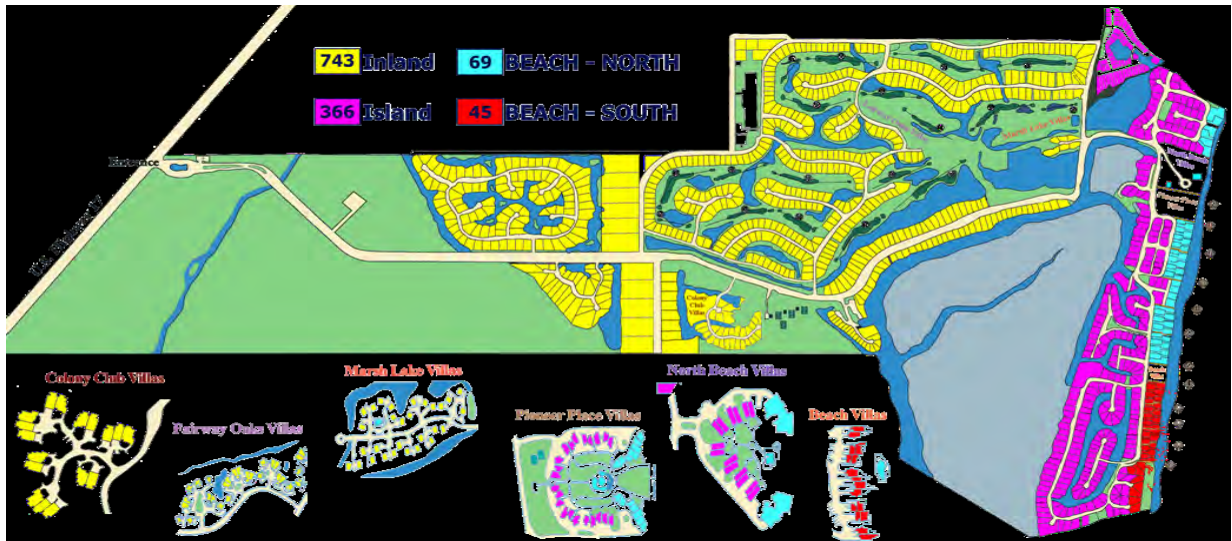


Figure 3: DeBordieu Funding Zones

Zone	# of Properties	Payment Per Property	Total Contribution	% of Total
Inland	743	\$4,650	\$3,454,950	29.98%
Island	329	\$11,700	\$3,849,300	33.4%
Island-Villas	37	\$11,700	\$432,900	3.76%
Beach-North	41	\$26,250	\$1,076,250	9.34%
Beach-N Villa	28	\$12,000	\$336,000	2.91%
Beach South	29	\$72,000	\$2,088,000	18.11%
Beach S Villas	16	\$18,000	\$288,000	2.50%
	1223	\$22,328.57	\$11,525,400	100.00%

²¹ Beach Advisors, DeBordieu Colony Homeowners' Presentation

²² Beach Advisors, DeBordieu Colony Homeowners' Presentation

Based on the proposed fee structure, inland property owners will cover nearly a third of the project cost. Property owners a few rows off beachfront that face a potential decrease in property values due to the groins will pay an additional 37%. Oceanfront homes on the erosion baseline (highlighted red in Figure 4), who are likely to see an increase in property values, are paying a little over 15% of the total cost.

The DCCA believes the beachfront property owners are paying their “fair share” and that “all of the property owners in the community reap the benefits of a more secure and stabilized beach, with a monitoring plan in place to keep it that way.”²³



Figure 4: Properties in the Vicinity of the Proposed Groins

Fiscal Impacts of Losing/Protecting Private Property

According to DCCA attorney Ellison Smith, “The groin project will protect homes that are vital to Georgetown County. DeBordieu produced some \$10 million in county taxes last year.”²⁴ Although this figure has not been verified, it most certainly pertains to the entire development.

²³ Beach Advisors, DeBordieu Colony Homeowners’ Presentation

²⁴ Fretwell, Sammy. “DHEC gives its blessing to Debordieu project.” TheSunNews.com, June 10, 2011.

An examination of properties most vulnerable to natural coastal processes – and that stand to benefit most from the proposed shoreline stabilization project - include ten properties positioned immediately behind the seawall (denoted Red 1-9 and Yellow 15 in Figure 4), seven second-row properties behind the seawall (denoted Yellow 7-14 in Figure 4) and six oceanfront properties in the proposed groin field (denoted Yellow 1-6 in Figure 4). These 24 properties generated \$485,379 in county property taxes in 2010 (Table 3).

Georgetown County's 2010 fiscal year budget states that the county took in \$10,860,000 in property tax revenue.²⁵ Therefore, if no action is taken to protect the 24 most vulnerable properties in DeBordieu Colony (denoted Red 1-9 and Yellow 1-15 in Figure 4) and they are eventually lost, Georgetown County stands to lose 4.47% of its property tax base. In other words, the long-term, worst-case fiscal impact to Georgetown County of taking no action is minimal.

Among these properties, four are available as vacation rentals. The rest are classified as second homes.²⁶ According to the DeBordieu Rentals website, the average weekly rental rate for these homes for the 14-week period between Memorial Day and Labor Day is \$5,224. Because Georgetown County levies a 3% accommodations tax, these four properties - when rented at full capacity for 14 weeks each year - generate an additional \$1,880.70 in county tax revenue that will be foregone lost if these properties are lost (Table 4).^{27 28}

²⁵ <http://www.georgetowncountysc.org/docs/budget10-11.pdf>

²⁶ <http://www.debordieurentals.com/>

²⁷ <http://www.debordieurentals.com/>

²⁸ <http://www.georgetowncountysc.org/default.html>

Property Address	Location on Figure 4	2010 Property Tax
Properties Immediately Behind Seawall:		
1121 DeBordieu Blvd	Yellow 15	\$22,910.67
1153 DeBordieu Blvd	Red 9	\$25,715.82
1187 DeBordieu Blvd	Red 8	\$23,693.92
1247 DeBordieu Blvd	Red 7	\$25,036.03
1277 DeBordieu Blvd	Red 6	\$29,482.26
1307 DeBordieu Blvd	Red 5	\$20,250.01
1325 DeBordieu Blvd	Red 4	\$21,897.83
1383 DeBordieu Blvd	Red 3	\$21,607.86
1415 DeBordieu Blvd	Red 2	\$21,677.79
1441 DeBordieu Blvd	Red 1	\$19,258.11
	Subtotal	\$231,530.30
Properties One Row Behind Seawall:		
1141 DeBordieu Blvd	Yellow 14	\$19,292.17
1173 DeBordieu Blvd	Yellow 13	\$19,629.39
1207 DeBordieu Blvd	Yellow 12	\$24,577.61
1289 DeBordieu Blvd	Yellow 11	\$15,664.32
1341 DeBordieu Blvd	Yellow 10	\$18,830.02
1367 DeBordieu Blvd	Yellow 9	\$6,358.13
1405 DeBordieu Blvd	Yellow 8	\$24,741.04
1425 DeBordieu Blvd	Yellow 7	\$8,891.06
	Subtotal	\$137,983.74
Properties Immediately Behind Proposed Groin Field:		
5 Ocean Green	Yellow 6	\$17,309.88
25 Sable Court	Yellow 5	\$27,349.48
61 Cheraw Way	Yellow 4	\$8,402.06
54 Cheraw Way	Yellow 3	\$25,871.25
43 Eastland Way	Yellow 2	\$23,928.29
44 Eastland Way	Yellow 1	\$13,004.33
	Subtotal	\$115,865.29
	Grand Total	\$485,379.33

Table 3: Property Tax of Vulnerable Properties in DeBordieu

Property Address	Rental Revenue			Total	County Revenue
	May 27-June 9	June 10-Aug 20	Aug 21-Sept 1		
1415 DeBordieu	\$4,926.00	\$5,727.00	\$4,952.00	\$15,605.00	\$468.15
1341 DeBordieu	\$4,053.00	\$4,725.00	\$4,079.00	\$12,857.00	\$385.71
1289 DeBordieu	\$5,655.00	\$5,732.00	\$5,681.00	\$17,068.00	\$512.04
1405 DeBordieu	\$5,427.00	\$6,306.00	\$5,427.00	\$17,160.00	\$514.80
Total	\$20,061.00	\$22,490.00	\$20,139.00	\$62,690.00	\$1,880.70

Table 4: DeBordieu Rental Rates and County Tax Revenue

Conclusion

Currently, DHEC approval of the project is being appealed by five non-governmental organizations including the S.C. Environmental Law Project, Sierra Club and Coastal Conservation League. The funding proposal is also set to go before DeBordieu Colony residents for a vote the first week of September. In order to be approved, the vote must carry with a 51% majority.

This study indicates that terminal groins, even when used in concert with a beach nourishment project, provide limited fiscal benefits and, quite possibly, may negatively impact Colony property values.

With the DCCA assuring residents that this project is necessary to save the beach and, essentially, the entire development, and with the environmental and marine science community reiterating the potential impacts of utilizing groins, perhaps property owners should be asking if beach stabilization really is in the best interest of DeBordieu Colony and, if it is, at what cost?