

July 22, 2019

David Hallac Superintendent Cape Hatteras National Seashore 1401 National Park Drive Manteo, NC 27954

RE: Comments on NCDOT's shoreline protection proposal on Ocracoke Island

Dear Mr. Hallac:

On behalf of the North Carolina Coastal Federation, please accept the following comments on the N.C. Department of Transportation's (NCDOT) shoreline protection proposal on Ocracoke Island.

The Coastal Federation is a non-profit organization dedicated to protecting and restoring the North Carolina coast. Our organization represents 16,000 supporters statewide and works with the public, state and federal agencies and local governments to communicate and collaborate towards solutions that lead to the stewardship and resiliency of our coast. Since 1982, the federation has been working with coastal communities and other partners to protect and restore coastal water quality, natural habitats, and public beach access, which are intricately tied to our coastal economy. We strive to support and enhance the natural coastal environment. In doing so, we continue to promote stronger and more resilient coastal communities.

NCDOT proposes structural solutions, such as breakwaters and terminal groins to mitigate severe erosion on the north terminus of Ocracoke Island and protect the stacking lanes and bulkhead at the South Ferry Dock. The proposed solution is short-sighted and does not take into account a long-term, holistic approach to the regional coastal processes. Long-term armoring of the shoreline warrants an Environmental Impact Statement (EIS) that would thoroughly analyze and compare all viable alternatives.

Cumulative Effects of Existing and Proposed Shoreline Armoring Warrant an Environmental Impact Statement

The Hatteras South Ferry Dock is located in the Estuarine Shoreline Area of Environmental Concern (AEC) and an Inlet Hazard AEC.¹ Defined under the N.C. Coastal Area Management Act, AECs have environmental, economic, social and aesthetic value to the state.² Development in these AECs is

 ¹ Variance Request by the N.C. State Ports Authority. The N.C. Coastal Resources Commission <u>https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Coastal%20Resources%20Commission%20-%20Meeting%20Agendas%20-%20Minutes/DOT-FERRY-STAFF-REC-TO-CRC.pdf</u>
² Coastal Area Management Act

https://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_113A/Article_7.html

discouraged and strictly regulated since they carry inherent development risks, as stated in 15 NCAC 7H.0302 (a):

"The primary causes of the hazards peculiar to the Atlantic shoreline are the constant forces exerted by waves, winds, and currents upon the unstable sands that form the shore. During storms, these forces are intensified and can cause significant changes in the bordering landforms and to structures located on them.... Ocean hazard areas are critical, therefore, because of both the severity of the hazards and the intensity of interest in the areas." and

(b) "The location and form of the various hazard area landforms, in particular the beaches, dunes, and inlets, are in a permanent state of flux, responding to meteorologically induced changes in the wave climate. For this reason, **the appropriate location of structures on and near these landforms must be reviewed carefully in order to avoid their loss or damage** [emphasis added]."

The project area is already about to be heavily armored. To respond to an increased erosion in the project area in June of this year, under an emergency measure NCDOT has been allowed to construct a 1000-foot long sheet pile bulkhead. On July 17, 2019 the N.C. Coastal Resources Commission expedited and granted a variance request to NCDOT for the temporary placement of over-sized sandbag structure adjacent to the bulkhead. In light of these circumstances and the coming installation of the temporary erosion structures that will provide temporary protection to the area the federal agency will have ample time to thoroughly analyze the best shoreline management alternative for the proposed area through an EIS.

Environmental consequences of terminal groins alone have long been considered significant enough to warrant an EIS under the National Environmental Policy Act (NEPA). In fact, the state law 113A – 115.1(e)2 requires preparation of "an environmental impact statement pursuant to the National Environmental Policy Act" for the construction of terminal groins. In addition, the statute lays out specific requirements that must accompany the terminal groin proposal:

- 113A-115.1(e)(4) requires that a groin plan includes a "beach fill project prepared by a professional engineer"
- 113A-115.1(e)(5) requires an inlet management plan that will:
 - (a) describe the post-construction activities;
 - (b) define the baseline for assessing adverse impacts;
 - (c) provide for mitigation measures in case of adverse impacts; and
 - (d) provide for removal of the structure if the adverse impacts cannot be mitigated.

Each of the recently proposed terminal groins in North Carolina has been considered a "major" federal agency project requiring a full NEPA review process and an EIS.³ These consequences can be further exacerbated by the existing shoreline hardening, making the negative effects on the natural environment and the overall coastal processes of the region significant.

We therefore request, as it is recommended by the Council of Environmental Quality that the NCDOT provides "full and fair discussion of significant environmental impacts.... and inform the decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or

³ Since the ban on terminal groins has been lifted in N.C. in 2011 four EIS analyses have been produced for the towns of Bald Head Island, Holden Beach, Ocean Isle Beach and Figure Eight Island.

enhance the quality of human environment."⁴ In addition 40 CFR 1502.14 states that EIS must (a) "rigorously explore and objectively evaluate all reasonable alternatives..."; and (b) "devote substantial treatment to each alternative examined in detail including the proposed action so that reviewers may evaluate their comparative merits.

NCDOT Must Take a Long-Range Perspective When Planning Shoreline Protection at Ocracoke Island

In the face of uncertainties posed by more frequent and intense storms caused by the global climate change and sea level rise, taking a long-term perspective when planning shoreline protection plan is critical. NCDOT needs to take into account the dynamic nature of barrier islands and shallow draft inlets; the effects of changing climate, the cost analysis of viable alternatives over the life-time of the project, among other factors.

Hatteras Inlet is considered a natural and minimally managed shallow-draft inlet that is not recognized as a federal navigation project. Natural processes in shallow draft inlets result in temporal meandering of the inlet channel. This process dictates the quantity and location of deposited sand in the inlet system, causing the shorelines to erode or accrete over time.

Frequent shoaling and continuously shifting channels are the result of the oscillating and dynamic nature of the inlet (Table 1).⁵ "Despite repeated attempts by the Army Corps of Engineers to keep the channel open, its dredging efforts weren't enough," (NCDOT, 2015). Consequently, the NCDOT Ferry Division decided to shift the Hatteras-Ocracoke ferry route in December 2013 to its current and longer route that extends further into the Pamlico Sound.

Year	Distance to Channel from Hatteras Island (mi)	Channel Width (mi)	Distance to Channel from Ocracoke Island (mi)	Inlet Width (mi)
1993	0.14	0.21	0.21	0.56
2002	0.19	0.10	0.44	0.73
2006*	0.51	0.18	0.36	1.05
2007*	0.53	0.21	0.36	1.10
2010	0.79	0.12	0.23	1.14
2012*	0.92	0.35	0.03	1.30
2016	1.23	0.12	0.65	2.00
*Multiple channels present				

Table 1. Analysis of Hatteras Inlet geomorphology via orthoimagery provided through NC OneMap.

Furthermore, erosion rates on the oceanfront side of the north end of the Ocracoke island ranged from 8 to 18 feet per year in the past 15 years. Figure 1 shows the level of instability that is expected in a barrier island inlet. The dynamic nature of the inlet needs to be taken into account when addressing long-term solutions for the Ocracoke ferry.

^{4 40} CFR S 1502.1

⁵ Mallinson, D., Culver, S.J., Riggs, S.R., Walsh, J.P., Ames, D., Smith, C.W. (2008). Past, Present, and Future Inlets of the Outer Banks Barrier Islands, North Carolina. East Carolina University.



Figure 1: Oceanfront and inlet shoreline positions over time. Source: N.C. Division of Coastal Management.

According to the Terminal Groin Study (2010) prepared for the North Carolina Coastal Resources Commission, the relative impact of constructing a terminal going on adjacent areas is likely increased when sited next to natural or minimally managed shallow-draft inlets. "For these locations, additional care and study (geologic setting, sediment budgets, etc.) is warranted to be sure that the terminal groin's impacts are acceptable or can be mitigated through minimal human activities (dredging and nourishment)."⁶

Frequency, intensity and unpredictability of storms are increasing with the changing climate. Recent studies have shown that certain areas on the Eastern Seaboard are experiencing faster rise of sea level than the global average.⁷ This includes areas north of Cape Lookout, that according to a study have experienced a one-inch rise of sea level per year in the period between 2011-2015.⁸

Hatteras Inlet is located approximately half-way between the two water level stations referenced in the North Carolina Sea level Rise Assessment 2015 Update.⁹ By 2045, the mean amount of relative sea level rise expected to occur is between 4.3" at Oregon Inlet and 3.2" at Beaufort based on tide gauge projections. These projected values are significant especially considering that the current elevation along the roadway crest of the stacking lanes near the South Ferry Dock Terminal is between 2.9' - 3.9' above mean sea level (NAVD88).

Taking the effects of sea level rise into account when planning a groin, while not required by the state terminal groin law is a prudent, and socially and fiscally responsible step. Expending public funds to

⁶ Moffat & Nichol. (2010). Terminal Groin Study Final Report. North Carolina Coastal Resources Commission. Raleigh, NC. ⁷ Valle-Levinson, A., Dutton, A., & Martin, J. B. (2017). Spatial and temporal variability of sea level rise hot spots over the eastern United States. *Geophysical Research Letters*, 44(15), 7876-7882.

⁸ Ibid.

⁹ N.C. Coastal Resources Commission Science Panel. 2016. North Carolina Sea Level Rise Assessment Report 2015 Update to the 2010 Report and 2012 Addendum. Raleigh, NC.

construct a hardened structure with a projected life-span of at least 30 years in an area that could be under water sooner carries along significant consequences.

Furthermore, it has been shown that terminal groins cause downdrift erosion and scouring of the adjacent shorelines. Figure 2 shows that the north tip of the island is home to a vast tract of salt marsh wetlands. These wetlands are critical habitat for many estuarine animal and plant species. Erosion caused by a terminal groin could cause significant negative consequences for these natural habitats.



Figure 2: Map of salt marsh wetlands (in purple) surrounding the project area. Source: N.C. Division of Coastal Management.

In examining options for maintaining a ferry link between Hatteras and Ocracoke Islands, it is important to consider the future of the highway that extends from Ocracoke Village to Hatteras Inlet. For the part of the highway near the existing ferry terminal, there is a wide vegetated dune field on the north terminus of Ocracoke Island that provides a buffer between the highway and ocean along a half-mile stretch from the South Ferry Dock to Ramp 59. That buffer continues for another half-mile south of Ramp 59, but the width of the vegetated dune field eventually diminishes to an un-consolidated and non-vegetated pile of sand that stretches for 1.25 miles as a result of a NCDOT management regime that bulldozes the sand from the highway back towards the beach to reform the barrier after overwash events. This is also the location where the width of the barrier island is narrowest, suggesting that the overwash process cannot keep pace with the rate of shoreline change.¹⁰

The distance between the centerline of NC-12 and the oceanfront shoreline along this 1.25 miles stretch of highway is less than 100', and the nearest distance between the centerline of NC-12 and Pamlico Sound is 200' in a location 225' south of Borrow Pit Rd. As result, a high probability for breaching (or

¹⁰ Conery, I. (2014). Decadal-scale evolution of a barrier island: Insights from storm overwash and shoreline change on Ocracoke Island, NC.

inlet formation) during a severe storm event exists for this section of the barrier island.¹¹ This is the same region where a breach occurred during Hurricane Hazel (1954) and the Ash-Wednesday Storm (1962).¹² This site was also completely overwashed during Hurricane Isabel (2003), Hurricane Irene (2011), and Hurricane Florence (2017).^{13,14}

The historical rate of oceanfront shoreline movement suggests that the trend of barrier island width narrowing may persist into the future even when the scale of assessment of the vulnerability of highway is expanded to the 5-mile stretch of NC-12 from a half-mile south of Ramp 59 to Pony Pen Rd. Results from a historical shoreline change analysis indicate that this section of oceanfront is eroding by 6' on average (minimum of 2.8' and maximum of 9.0') according to a linear regression rate derived from a dataset that included shorelines from years 1946, 1988, 1997, 2009, and 2017. The distance measured between the centerline of NC-12 and oceanfront shoreline surveyed by NPS staff in March 2019 is approximately 320' a half-mile south from Ramp 59, 65' at Borrow Pit Rd, 158' at Quork Hammock, 250' at Ramp 63, and 515' at Pony Pen Rd.

This means that the structural integrity of the highway may be threatened in a decade or less for the especially vulnerable 1.25-mile section of NC-12 that straddles Borrow Pit Rd even though the distance between the shoreline and highway is wider on either end. This natural geomorphic phenomenon of barrier island width narrowing may be exacerbated when projected levels of sea level rise for this region are factored in.

Therefore, we recommend that one of the options to be considered in the EIS would be to take a comprehensive approach to developing a shoreline protection plan for the entire transportation network from the Hatteras Island Ferry Dock to the Village of Ocracoke rather than evaluating the sole impacts associated with implementing a shoreline protection plan for the north terminus of Ocracoke Island and South Ferry Dock.

The NCDOT Ferry Division has promoted the launch of the passenger ferry in May of 2019 as successful. If the passenger ferry service is projected to continue or expand, alternatives to the proposed action should include:

- 1. Modifying the location of the stacking lanes since the installation of protective sheet piling is planned to occur between July and December of 2019.
- 2. Relocating the South Ferry Dock closer to the more stable region of the barrier island near Pony Pen Rd.
- 3. Decommissioning the South Ferry Dock and re-routing the vehicle ferry that departs from the Hatteras Island Ferry Dock to the ferry terminal in Silver Lake Harbor.

Finally, we recommend that NCDOT does a thorough cost-benefit analysis over the projected life span of the proposed structure. The CRC's terminal groin study concluded that maintaining a terminal groin

¹¹ Ibid.

¹² Ibid.

¹³ Ibid.

¹⁴ N.C. Department of Transportation. 2015, May 4. Faced With A Shifting Shoreline, North Carolina's Ferry System Charts A New Course. Retrieved from https://www.ncdot.gov/news/pressreleases/Pages/2015/Faced-With-A-Shifting-Shoreline-North-Ca.aspx

could cost up to tens of millions of dollars. It is prudent to consider that these costs will only rise in face of the changing climate and more forceful storms.

In conclusion, for the reasons stated above the federation recommends that the NCDOT provides a thorough analysis of all viable alternatives for the proposed project, including the possibility of relocating the ferry terminal to a more stable location on the barrier island.

Thank you for taking these comments under your consideration.

Sincerely,

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