AGENDA

TOWN OF NAGS HEAD BOARD OF COMMISSIONERS
NAGS HEAD MUNICIPAL COMPLEX - BOARD ROOM
WEDNESDAY, JULY 3, 2024, 9:00 A.M.

A. CALL TO ORDER / MOMENT OF SILENCE / PLEDGE OF ALLEGIANCE

B. ADOPTION OF AGENDA

C. RECOGNITION

1. Recognition

   NEW EMPLOYEE - Public Services - Facilities Maintenance Technician Kevin McFarland - June 17, 2024

   NEW EMPLOYEE - Public Services - Sanitation Equipment Operator Donnie Brown - June 24, 2024

   RECOGNITION - Town Engineer David Ryan awarded the American Society of Civil Engineers' Coasts, Oceans, Ports and Rivers Institute - 2024 Orville T. Magoon Sustainable Coasts Award

   Documents:

   7 C RECOGNITION SUMMARY.PDF

D. PUBLIC COMMENT

E. CONSENT AGENDA

1. Consideration Of Budget Amendment #1 To FY 24/25 Budget

   Documents:

   7 E1 BUD AMEND TO FY 24-25 SUMMARY.PDF
   7 E1 BUD AMEND TO FY 24-25 WORKSHEET.PDF

2. Consideration Of Tax Adjustment Report

   Documents:

   7 E2 TAX ADJ REPORT SUMMARY.PDF
   7 E2 TAX ADJ MSD REPORT.PDF
   7 E2 TAX ADJ TOWN-WIDE REPORT.PDF

3. Consideration Of Order To Collect Taxes

   Documents:

7 E3 ORDER TO COLLECT TAXES SUMMARY.PDF
7 E3 ORDER TO COLLECT TAXES NOTICE.PDF

4. Consideration Of Business License/Registration Fee Debt Release/Write-Offs

   Documents:

   7 E4 BUS LIC AND REGIS FEE DEBT RELEASE SUMMARY.PDF
   7 E4 BUS LIC AND REGIS FEE DEBT RELEASE MEMO.PDF

5. Consideration Of Modifications To Consolidated Fee Schedule

   Documents:

   7 E6 CFS MODIFICATION SUMMARY.PDF
   7 E6 CFS POLICE DEPT MEMO.PDF
   7 E6 CFS MODIFICATION AFFECTED PAGES.PDF

6. Consideration Of Reimbursement Resolution For Workforce Housing and Town Campus Master Plan - Phase 1 (Fitness Facility)

   Documents:

   7 E7 REIMB OR HOUSING FITNESS FACILITY SUMMARY.PDF
   7 E7 REIMB OR HOUSING FITNESS FACILITY RES.PDF

7. Consideration Of Resolution Authorizing Higher Federal Micro-Purchase Thresholds

   Documents:

   7 E8 MICRO PURCHASE THRESHOLDS SUMMARY.PDF
   7 E8 MICRO PURCHASE THRESHOLDS RES.PDF

8. Consideration Of Interlocal Agreement With Dare County/Municipalities re: connection to Motorola FLEX Public Safety Software System

   Documents:

   7 E9 MOTOROLA FLEX INTERLOCAL AGREE SUMMARY.PDF
   7 E9 MOTOROLA FLEX INTERLOCAL AGREEMENT - DC.PDF

9. Consideration Of Amendment To MOU Between Town Of Nags Head and Town of Kill Devil Hills for shared Eighth Street Beach Access maintenance

   Documents:

   7 E10 KDH NH EIGHTH ST RENEWAL SUMMARY.PDF
   7 E10 KDH NH EIGHTH ST ACCESS ADDENDUM.PDF

10. Consideration Of Resolution Authorizing The Town Manager To Execute a contract on behalf of the Town with the State for a Coastal Storm Damage Mitigation Grant

    Documents:

7 E11 CSDM GRANT SUMMARY.PDF
7 E11 CSDM GRANT RES.PDF

F. PUBLIC HEARINGS

1. Public Hearing To Consider NC Public Beach And Coastal Waterfront Access Grant Application

   Documents:

   7 F1 PH JUNE ST ACCESS COASTAL WATERFRONT GRANT SUMMARY.PDF
   7 F1 PH JUNE ST ACCESS COASTAL WATERFRONT GRANT APP.PDF
   7 F1 PH JUNE ST ACCESS COASTAL WATERFRONT GRANT PN.PDF

G. REPORTS AND RECOMMENDATIONS FROM THE PLANNING BOARD AND THE PLANNING AND DEVELOPMENT DIRECTOR

1. Update From Planning Director

   Documents:

   7 G1 PLANNING DIRECTOR SUMMARY.PDF
   7 G1 PLANNING DIRECTOR REPORT.PDF

2. Discussion Of Accessory Dwelling Units (ADU)

   Documents:

   7 G2 ADU DISCUSSION SUMMARY.PDF

3. Modification To Site Plan Submitted By House Engineering, P.C. For Construction Of a four-story, 90-unit Hotel (Inn at Whalebone). The property is zoned SPD-C, Village Hotel is located within the Hotel Overlay District at 6632 W Pheasant Avenue - approved at October 2023 Board meeting

   Documents:

   7 G3 WHALEBONE SITE PLAN SUMMARY.PDF
   7 G3 WHALEBONE SITE PLAN MEMO.PDF

H. OLD BUSINESS TABLED FROM PREVIOUS MEETINGS

1. From May 1st Board Meeting - Discussion/Review Of Multi-Use Path Pavement Markings

   Documents:

   7 H1 MUP SIGNAGE REQUEST SUMMARY.PDF

2. From Feb 7th Board Meeting – Consideration Of Approval for Beach Nourishment Master Plan

   Documents:

7 H2 BEACH NOURISHMENT MASTER PLAN SUMMARY.PDF
7 H2 BEACH NOURISHMENT MASTER PLAN REPORT.PDF

I. NEW BUSINESS

1. Committee Reports

   Documents:

   7 I1 COMMITTEE REPORTS SUMMARY.PDF

2. Consideration Of Amendment To Traffic Control Map Re: Bonnett Street And Wrightsville Avenue

   Documents:

   7 I2 TCM - BONNETT-WRIGHTSVILLE NP-TAZ SUMMARY.PDF
   7 I2 TCM - BONNETT-WRIGHTSVILLE NP-TAZ MEMO.PDF
   7 I2 TCM - BONNETT-WRIGHTSVILLE NP-TAZ MAP.PDF
   7 I2 TCM BONNETT-WRIGHTSVILLE NP-TAZ ORD.PDF

J. ITEMS REFERRED TO AND PRESENTATIONS FROM TOWN ATTORNEY

K. ITEMS REFERRED TO AND PRESENTATIONS FROM TOWN MANAGER

1. Update On Construction Of The Public Services Facility

   Documents:

   7 K1 TM PUBLIC SVCS FACILITY UPDATE SUMMARY.PDF

2. Town Projects - Year In Review

   Documents:

   7 K2 TM PROJECTS IN REVIEW SUMMARY.PDF

L. BOARD OF COMMISSIONERS AGENDA

1. Comr. Kevin Brinkley - Discussion Of High-Flying Kites On The Beach

   Documents:

   7 L1 COMR BRINKLEY KITES ON BEACH SUMMARY.PDF
   7 L1 COMR BRINKLEY KITES ON BEACH EMAILS.PDF

M. MAYOR'S AGENDA

N. CLOSED SESSIONS

1. Request For Closed Session To Confer With The Board
   re: matters related to attorney/client privilege, to include use of Town site at 105 W Seachase Drive, and to preserve that privilege,
   pursuant to GS 143-318.11(a)(3) and to discuss possible acquisition of real property located at 4222 S Croatan Highway pursuant
   to GS 143-318.11(a)(5)

   Documents:

7 N1 RCS ATTORNEY-CLIENT AND PROPERTY SUMMARY.PDF

O. OTHER BUSINESS

P. ADJOURNMENT

Agenda Item Summary Sheet

Item No: **C**
Meeting Date: **July 3, 2024**

Item Title: Recognition

Item Summary:

Recognition at the July 3rd Board of Commissioners meeting includes the following:

NEW EMPLOYEE – Public Services – Facilities Maintenance Technician Kevin McFarland – June 17, 2024

NEW EMPLOYEE – Public Services - Sanitation Equipment Operator Donnie Brown – June 24, 2024

RECOGNITION – Town Engineer David Ryan awarded the American Society of Civil Engineers' Coasts, Oceans, Ports and Rivers Institute - 2024 Orville T. Magoon Sustainable Coasts Award

Number of Attachments: 0

Specific Action Requested:

Provided for Board recognition.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

Welcome and Congratulations!

Signature: Andy Garman Date: June 26, 2024

Agenda Item Summary Sheet

Item No: **E-1**
Meeting Date: **July 3, 2024**

Item Title: Consideration of Budget Amendment #1 to FY 24/25 Budget

Item Summary:

Attached please find Budget Amendment #1 to the FY 24/25 Budget which is provided for Board review and approval at the July 3rd Board of Commissioners meeting. Budget Amendment #1 is in accordance with the FY 24/25 Budget Ordinance, adopted at the June 5, 2024 meeting.

Number of Attachments: 1

Specific Action Requested:

Request Board approval of attached Budget Amendment #1.

Submitted By: Administrative Services Date: June 26, 2024

Finance Officer Comment:

Request Board approval of attached Budget Amendment #1.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff's request.

Signature: Andy Garman Date: June 26, 2024

TOWN OF NAGS HEAD

BUDGET AMENDMENT REQUEST
FY 2024-2025

BUDGET AMENDMENT NO. 1
Amendment 1.1

SOURCE OF FUNDS				USE OF FUNDS		
CODE	ACCOUNT	AMOUNT		CODE	ACCOUNT	AMOUNT
	General Fund				**General Fund**	
	Revenues				**Revenues**	
10-434000	CAMA Grant	89,313.00		10-499000	Appropriated Fund Balance	111,334.00
10-430400	Visitors Bureau Grant	60,477.00				
					General Fund	
					Expenditures Facilities Maintenance	
				530-577350	Capital Outlay Improvements	38,456.00
	General Fund				**General Fund**	
	Revenues				**Expenditures-Planning**	
10-430400	Visitors Bureau Grant	112,000.00		490-577350	Capital Outlay Improvements	112,000.00
TOTAL CHARGES		$ 261,790.00		TOTAL CREDITS		$ 261,790.00

JUSTIFICATION

Rebudget grants and capital projects in FY 24/25.
Governor Street walkover and Whalebone Park restrooms.

ADMINISTRATIVE SERVICES 6/27/2024
RECOMMENDED BY DATE

APPROVED BY BOC: DATE

POSTED TO GENERAL LEDGER:

INITIALS

Agenda Item Summary Sheet

Item No: **E-2**
Meeting Date: **July 3, 2024**

Item Title: Consideration of Tax Adjustment Reports

Item Summary:

Attached please find the list of adjustments to the 2023 Tax Levy (per information received from Dare County) for the monthly Property and MSD valuations.

These reports are submitted for your approval at the July 3rd Board of Commissioners meeting.

Number of Attachments: 2

Specific Action Requested:

Tax reports provided for Board review and approval.

Submitted By: Linda Bittner, Tax Collector Date: June 26, 2024

Finance Officer Comment:

No unbudgeted fiscal impact.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff.

Signature: Andy Garman Date: June 26, 2024

Town of Nags Head, North Carolina
Schedule of Ad Valorem 2023-2024 Taxes Receivable
2023 Tax Levy As of June 26, 2024 for the July 3, 2024 BOC Mtg

	BEACH NOURISHMENT DISTRICT					
	MSD Valuation	Rate	Total Levy	MSD Excluding Registered Motor Vehicles	Registered Motor Vehicles	
Original MSD Levy:						
MSD Beach Nourishment at Current 2023 Dist 1 Rate	578,093,598	0.00143	826,674.06	826,674.06		
MSD Beach Nourishment at current 2023 Dist 2 Rate	473,945,007	0.00143	677,741.67	677,741.67		
MSD Beach Nourishment at Current 2023 Dist 3 Rate	1,053,729,707	0.00005	52,687.93	52,687.93		
MSD Beach Nourishment at Current 2023 Dist 4 Rate	665,352,580	0.00010	66,535.07	66,535.07		
MSD Beach Nourishment at Current 2023 Dist 6 Rate	374,308,126	0.00005	18,716.25	18,716.25		
Registered Motor Vehicles at Current 2023 Dist 1 Rate	1,644,947	0.00143	2,352.30		2,352.30	
Registered Motor Vehicles at Current 2023 Dist 2 Rate	1,939,243	0.00143	2,773.14		2,773.14	
Registered Motor Vehicles at Current 2023 Dist 3 Rate	5,421,212	0.00005	271.07		271.07	
Registered Motor Vehicles at Current 2023 Dist 4 Rate	4,468,605	0.00010	446.91		446.91	
Registered Motor Vehicles at Current 2023 Dist 5 Rate	417,625	0.00000	0.00		0.00	
Registered Motor Vehicles at Current 2023 Dist 6 Rate	3,439,622	0.00005	168.93		168.93	
Registered Motor Vehicles at 2022 Dist 1 Rate	272,667	0.00143	389.90		389.90	
Registered Motor Vehicles at 2022 Dist 2 Rate	354,796	0.00143	507.37		507.37	
Registered Motor Vehicles at 2022 Dist 3 Rate	1,312,015	0.00005	65.65		65.65	
Registered Motor Vehicles at 2022 Dist 4 Rate	899,152	0.00010	89.99		89.99	
Registered Motor Vehicles at 2022 Dist 5 Rate	59,870	0.00000	0.00		0.00	
Registered Motor Vehicles at 2022 Dist 6 Rate	1,159,114	0.00005	58.00		58.00	
Registered Motor Vehicles at 2021 rate	22,000	0.00143	5.28		5.28	
Penalties			0.00			
Total	**3,166,839,886**		**1,649,483.52**	**1,642,354.98**	**7,128.54**	
Discoveries & Adjustments:						
Current year discoveries & adjustments	8,221		7.64	7.64		
Total	**8,221**		**7.64**	**7.64**		
Releases & Adjustments:						
DMV Current year valuation adjustments	0		0.00	0.00	0.00	
DMV Current year tax releases	0		(0.12)	0.00	(0.12)	
Real/Personal Current year releases & adjustments and circuit breakers	127,576		(102.61)	(102.61)		Dist.3&6
Total	**127,576**		**(102.73)**	**(102.61)**	**(0.12)**	
Write-offs (under $1.00) or Adjustments:			0.00	0.00		
Total MSD Valuation	**3,166,975,682**					
Net levy		**1,649,388.43**		**1,642,260.01**	**7,128.42**	
TOTAL UNCOLLECTED MSD AS OF 06/26/24:		**(10.00)**		**(10.00)**	**0.00**	
CURRENT YEAR MSD COLLECTED:		**1,649,378.43**		**1,642,250.01**	**7,128.42**	
CURRENT MSD COLLECTION PERCENTAGE:		**99.999%**		**99.999%**	**100.000%**	

Town of Nags Head, North Carolina
Schedule of Ad Valorem 2023-2024 Taxes Receivable
2023 Tax Levy As of June 26, 2024 for the July 3, 2024 BOC Mtg

	Town-Wide Tax			Total Levy	
	Property Valuation	Rate	Total Levy	Property Excluding Registered Motor Vehicles	Registered Motor Vehicles
Original levy:					
Property taxed at current 2023 rate	3,057,530,927	0.003300	10,089,869.38	10,089,869.38	
Registered Motor Vehicles at current 2023 rate	44,921,573	0.003300	148,224.45		148,224.45
Registered Motor Vehicles at 2022 year's rate	13,000,156	0.002875	37,375.45		37,375.45
Registered Motor Vehicles at 2021 year's rate	102,612	0.002875	295.01		295.01
Penalties	0		7,355.82	7,355.82	
Total	**3,115,555,268**		**10,283,120.11**	**10,097,225.20**	**185,894.91**
Discoveries & Adjustments:					
Current year discoveries & adjustments tax	1,837,704		5,032.44	5,032.44	
Town wide beach nourishment tax			463.16	463.16	
Corporate Utilities discoveries & tax	22,654,828		69,097.22	69,097.22	
Corporate Utilities town wide beach nourishment			5,663.71	5,663.71	
Penalty Discoveries			1,746.31	1,746.31	
Total	**24,492,532.00**		**82,002.84**	**82,002.84**	
Releases & Adjustments:					
Current year releases/adjustments/circuit breaker	(2,053,128)		(7,629.60)	(6,754.59)	(875.01)
Town wide beach nourishment/circuit breaker			(472.60)	(472.60)	
Penalty Releases			(1,453.65)	(1,453.65)	
Total	**(2,053,128)**		**(9,555.85)**	**(8,680.84)**	**(875.01)**
Write-offs (under $1.00) or Adjustments:			(4.13)	(4.13)	
Total Property Valuation	**3,137,994,672**				
Net levy		**10,355,562.97**		**10,170,543.07**	**185,019.90**
Uncollected Taxes & Penalties		(2,197.43)		(2,197.43)	0.00
Uncollected Town Wide Beach Nourishment		(172.39)		(172.39)	0.00
TOTAL UNCOLLECTED TAXES AS OF 06/26/24:		**(2,369.82)**		**(2,369.82)**	**0.00**
CURRENT YEAR TAXES COLLECTED:		**10,353,193.15**		**10,168,173.25**	**185,019.90**
CURRENT LEVY COLLECTION PERCENTAGE:		**99.977%**		**99.977%**	**100.000%**

Agenda Item Summary Sheet

Item No: **E-3**
Meeting Date: **July 3, 2024**

Item Title: Consideration of Order to Collect Taxes

Item Summary:

Attached please find the Order to Collect Taxes for Board consideration. This direction is given to the Tax Collector each year.

Number of Attachments: 1

Specific Action Requested:

Provided for Board consideration on July 3rd.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

No unbudgeted fiscal impact.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff.

Signature: Andy Garman Date: June 26, 2024

Benjamin Cahoon
Mayor

Michael Siers
Mayor Pro Tem

Andy Garman
Town Manager

Town of Nags Head
Post Office Box 99
Nags Head, NC 27959
Telephone 252-441-5508
Fax 252-441-0776
www.nagsheadnc.gov

Kevin Brinkley
Commissioner

Bob Sanders
Commissioner

Megan Lambert
Commissioner

ORDER TO TAX COLLECTOR

State of North Carolina / Town of Nags Head

To the Tax Collector of the Town of Nags Head:

You are hereby authorized, empowered, and commanded to collect the taxes set forth in the tax records filed in the office of the Tax Collector and in the tax receipts herewith delivered to you, in the amounts and from the taxpayers likewise therein set forth for the tax year 2024 plus all delinquent taxes from tax years 2015 to 2023. Such taxes are hereby declared to be a first lien upon all real property of the respective taxpayers in the Town of Nags Head, and this order shall be a full and sufficient authority to direct, require, and enable you to levy on and sell any real or personal property of such taxpayers, for and on account thereof, in accordance with law.

Witness my hand and official seal, this 3rd day of July 2024.

Attest

_____
Town Clerk, Town of Nags Head

_____
Mayor, Town of Nags Head

Agenda Item Summary Sheet

Item No: **E-4**
Meeting Date: **July 3, 2024**

Item Title: Consideration of Business License and Registration Fee debt release

Item Summary:

Attached please find a list of businesses for license/registration fee release as well as a memo from Tax Collector Linda Bittner. This report is provided for the Board's information and is in accordance with Town Code Sec. 12-33 Releases (below).

Sec. 12-33 - Releases. If it is determined that upon the issuance date of a renewal license or registration the business has been discontinued, the finance director may release a tax of less than $100.00. The tax collector shall annually report to the board of commissioners releases made pursuant to this section and the tax collector's annual report shall be recorded in the minutes of the board of commissioners. This report will be included with the annual request to the board to write off uncollectible accounts pursuant to section 12-32.

Number of Attachments: 1

Specific Action Requested:

Provided for Board information for those businesses more than three years in debt. The total amount for release is $575.

Submitted By: Linda Bittner, Tax Collector Date: June 26, 2024

Finance Officer Comment:

Every effort has been made to collect this debt; I concur with the Tax Collector's request to release this debt in the amount of $575.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff.

Signature: Andy Garman Date: June 26, 2024

Administrative Services
Finance

Town of Nags Head
Post Office Box 99
Nags Head, North Carolina 27959
Telephone 252-441-5508
Fax 252-441-4680
www.nagsheadnc.gov

Amy Miller
Finance Officer

To: Mayor and Commissioners

From: Linda Bittner, Tax Collector

Date: July 3, 2024

Subject: Business License and Registration Fee Debt Owed More Than Three Years

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As per section 12-33 of the Town of Nags Head Code of Ordinances (copy attached), the current outstanding balance that was released for businesses that were no longer active in the Town of Nags Head for the year 2021 is as follows (list of businesses attached):

2021 Business Licenses/Registration Fees	$ 575.00

Sec. 12-32. - Collection of deficiency or delinquent taxes.

(a) The tax collector may use any of the following methods to collect a deficiency or delinquent taxes:

(1) A civil penalty with subsection 1-6(c);

(2) Equitable relief in accordance with subsection 1-6(d);

(3) The remedies of levy and sale and attachment and garnishment, in accordance with G.S. 160A-207;

(4) The remedies of levy and sale of real and personal property of the taxpayer within the town in accordance with the provisions of G.S. 105-109.

(b) Any person who commences or continues to conduct a business taxed under this chapter without payment of the tax is liable for the additional tax of five percent each 30 days, imposed by G.S. 105-109.

(c) Any business/privilege license or registration invoice older than three years, regarding a business that the town no longer regards as active, may be removed from the list of receivable accounts in the town's financial statement. At least annually, the tax collector will present the board of commissioners with a list of uncollectible accounts, requesting the board's approval for a formal write-off of such accounts. The town will use all available means to collect these accounts to include but not be limited to: bank attachment and payroll garnishment where applicable, debt set-off, etc.

(Ord. No. 15-07-025 , Pt. I, 7-1-2015; Ord. No. 16-07-018 , Pt. I, 7-6-2016; Ord. No. 18-11-016 , Pt. I, 11-7-2018)

Sec. 12-33. - Releases

If it is determined that upon the issuance date of a renewal license or registration the business has been discontinued, the finance director may release a tax of less than $100.00. The tax collector shall annually report to the board of commissioners releases made pursuant to this section and the tax collector's annual report shall be recorded in the minutes of the board of commissioners. This report will be included with the annual request to the board to write off uncollectible accounts pursuant to section 12-32.

(Ord. No. 15-07-025 , Pt. I, 7-1-2015; Ord. No. 16-07-018 , Pt. I, 7-6-2016; Ord. No. 18-11-016 , Pt. II, 11-7-2018)

2021 BUSINESS REGISTRATIONS RELEASED

Customer #	Customer Name	Property ID	Property Location	Category	Bill Year	Bill #	Billings
30341	ABODE RESTORATION	ABODE200	152 THE DOGWOODS	55	2021	2404	$25.00
20836	AFFORDABLE FRAMING, LLC	AFFOR200	503 S CROATAN HWY, STE	55	2021	2410	$25.00
20450	AMERICAN HOME IMPROVEMENTS & ROOFI	AMERI200	171 S SPOT ROAD	55	2021	2423	$25.00
10087	ATLANTIC CARPET CLEANING OBX	ATLAN020	5138 THE WOODS RD	55	2021	2431	$25.00
21108	BISTRAM CONTRACTING INC	BISTR200	5129 LULLABY LANE	55	2021	2460	$25.00
30166	BROWN, CAMERON	BROWN201	2011 PHOEBUS ST	55	2021	2479	$25.00
10255	CLARK, LEE	CLARK040	4802 PALMER DR	55	2021	2506	$25.00
30364	CLARK, CRAIG	CLARK200	119 MICHAEL ST	55	2021	2505	$25.00
30340	DESTRO, RUSSELL	DESTRO200	200 E BONNETT STREET	55	2021	2547	$25.00
20180	HERBIN, KEVIN	HERBIN200	205 ATLAS STREET	55	2021	2634	$25.00
10581	FCX PERFORMANCE	INSTR010	10525 GRANITE ST C	55	2021	2581	$25.00
20730	JOHNSON HOME SERVICES	JOHNS201	504 HOLLY ST	55	2021	2669	$25.00
21036	MCANDREWS, DENNIS	MCAND200	510 LOBLOLLY CT	55	2021	2703	$25.00
10793	NORMAL MAINTENANCE	NORMA010	326 TERN COURT KDH NC	55	2021	2746	$25.00
30151	OBX DECK AND FENCE	OBXDE200	24 EIGHTH AVE	55	2021	2754	$25.00
10895	PEG LEG PETE'S	PEGLE010	3009 S WRIGHTSVILLE AVE	55	2021	2813	$25.00
20115	RADEGAST PAINTING AND OBX COATING	RADEG200	408 HOLLY STREET	55	2021	2836	$25.00
20149	RINALDI CONSTRUCTION	RINAL200	300 SUFFOLK STREET	55	2021	2853	$25.00
30474	ROANOKE CARE & REPAIR LLC	ROANO201	105 LIBBS WAY	55	2021	2855	$25.00
30158	RR&R CONSTRUCTION	RR&RC200	503 BURNS DR	55	2021	2860	$25.00
11144	SYSCO FOOD SERVICES OF HAMPTON	SYSCO010	7000 HARBOUR VIEW BLV	55	2021	2921	$25.00
11168	THREE SEAS, INC.	THREE010	355 SIR CHANDLER DR	55	2021	2942	$25.00
21013	TRUE TRIM	TRUET200	3049 MAIN STREET EXT	55	2021	2956	$25.00

$575.00

Agenda Item Summary Sheet

Item No: **E-6**
Meeting Date: **July 3, 2024**

Item Title: Consideration of modifications to the Consolidated Fee Schedule

Item Summary:

Request approval of listed modifications to the Consolidated Fee Schedule:

- *$17.50 plus tax - Dowdy Park T-shirt*

The cost of the Town's Dowdy Park T-shirt is being requested for reduction from $25 to $17.50 to facilitate additional sales.

- *No Charge – For accident/investigative reports to those involved in crashes or crimes in the Town*

The Police Department is requesting a change in the language of the Consolidated Fee Schedule pertaining to "Copies of Accident Reports" and Copies of Investigative Reports". The department does not charge victims or others involved in vehicle crashes or crimes within the town. We would request the language read "Copies of Accident Reports" (non-victim / involved others) and "Copies of Investigative Reports" (non-victim / involved others) to be placed under the Police Department section of the Fee Schedule.

A copy of the two affected pages from the Fee Schedule as well as the Police Dept memo are attached.

Number of Attachments: 2

Specific Action Requested:
Provided for Board review and approval.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:
No unbudgeted costs associated with this agenda item.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:
N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:
I concur with the request.

Signature: Andy Garman Date: June 26, 2024

Nags Head Police Department

5401 S. Croatan Hwy.
Post Office Box 99
Nags Head, North Carolina 27959
Telephone (252) 441-6386
Fax (252) 441-7335
www.nagsheadnc.gov

Service – Professionalism – Integrity – Strength

Perry Hale
Chief of Police

Chris Montgomery
Deputy Chief of Police

MEMORANDUM

TO: Andy Garman, Town Manager

FROM: P. Hale, Chief of Police

DATE: June 24, 2024

RE: Consolidated Fee Schedule Language Change

The Police Department is requesting a change in the language of the Consolidated Fee Schedule pertaining to "Copies of Accident Reports" and Copies of Investigative Reports". The department does not charge individuals involved in crashes or victims of crimes within the town for copies of reports.

We would request the language read "Copies of Accident Reports" (non-victim / involved others) and "Copies of Investigative Reports" (non-victim / involved others) to be placed under the Police Department section of the Fee Schedule.

Administrative Services (cont.)

Applications		
Massage Therapy Business	Application	$150
Zoning Permit Business Establishment	Business Location	$50
Zoning Permit Business Owner/Operator	Business Owner/Operator	$50
Business Registration	w/verification of State license	N/C
Vehicle for Hire (business)		
Taxicab or Limousine	Application	$50
Driver permit	Application includes fingerprint fee	$90
	Driver permit annual renewal	$7.50
Dowdy Park		
Sponsorship	Movie & licensure (includes set up/tear down; equipment; popcorn treat)	$650
Music in the Park	Includes fee for band and professional sound	
	Level I	$1,100
	Level II	$1,500
	Level III	$2,000
T-shirts		$17.50 + tax
General donations accepted for Dowdy Park events		
Farmers Market Membership Fee	Annual	$240
Farmers Market Drop-In Fee	Per market date	$25
Holiday Market	Per market date	$25
Winter Market	Per market date	$25
Family Fun Night	Per event date	$25

Police Department

Town Ordinance Violation		$50
Permit 24-hr parking at beach accesses for fishing Sep 1 - Feb 1		$25
Copies of Accident Reports (non-victim/involved others)		$5
Copies of Investigative Reports (non-victim/involved others)		$5 or 0.15/pg. < 33 pgs.
Off-Duty Security Vehicle Use		$19.75 per day
Fingerprint charges		$5/set
Use of public building	Refundable clean-up deposit	$50

Civil Penalties as listed below:	**$50 each**

Traffic Violations		**$50 each**
Section 42-41	Failure to obey traffic control devices	
Section 42-92	Prohibited riding coasters, roller skates, or similar devices	
Section 42-92	Motorized vehicles prohibited on multi-use/pedestrian path	
Section 42-132	Obstructing passage of other vehicles	
Section 42-138	Prohibited parking in certain places	

Police Department (cont.)

Section 42-139	Parking in front of driveway or fire hydrant	
Section 42-140	Parking in Fire Lane	
Section 42-141	Parking on certain streets	

Taxi Cab Violations		**$50 each**
Section 46-8	Exceed maximum number of passengers	
Section 46-9	Failure to properly mark taxi cab	
Section 46-11	Failure to post rates and fares	
Section 46-13	Failure to maintain daily manifest	

Agenda Item Summary Sheet

Item No: **E-7**
Meeting Date: **July 3, 2024**

Item Title: Consideration of reimbursement resolution for Workforce Housing and Town Campus Master Plan – Phase 1 (Fitness Facility)

Item Summary:

Attached please find a reimbursement resolution for the Board's consideration on July 3rd. The two projects that the Town will reimburse itself from the General Fund are as follows:

- Ocean Rescue/Workforce housing (located at 425 W Health Center Drive); and
- Phase I of a Town Hall Campus Master Plan (Fitness Center – location to be determined)

Request Board adoption of attached resolution declaring the intention to reimburse the cost of these expenditures.

Number of Attachments: 1

Specific Action Requested:

Resolution provided for Board review and approval.

Submitted By: Finance Officer Amy Miller Date: June 26, 2024

Finance Officer Comment:

No unbudgeted costs associated with this agenda item.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff.

Signature: Andy Garman Date: June 26, 2024

Resolution No. 24-07-008
Direct borrowing installment finance
Fitness Facility
BOC Meeting July 3, 2024

REIMBURSEMENT RESOLUTION – FISCAL YEAR 2024-2025
OF THE TOWN OF NAGS HEAD
DECLARING THE INTENTION TO REIMBURSE
THE COST OF CERTAIN EXPENDITURES

WHEREAS, The Town Manager and the Finance Officer have described to the Board of Commissioners the desirability of adopting a resolution, as provided under federal tax law, to facilitate the Town's use of financing proceeds to restore Town funds when the Town makes capital expenditures prior to closing on installment financing.

BE IT HEREBY RESOLVED by the Board of Commissioners of the Town of Nags Head, North Carolina as follows:

Section 1. The projects are the financing of building construction and associated professional costs (including but not limited to design, engineering, surveying, etc.) for projects identified in the fiscal year 2024/2025 adopted budget:

- Ocean Rescue/Workforce housing (located at 425 W Health Center Drive in Nags Head); and
- Phase I of a Town Hall Campus Master Plan (Fitness Center-Nags Head address to be determined)

Section 2. The projects are to be financed. The currently expected type of financing (which is subject to change) is an installment finance contract(s). The currently expected maximum amount to be financed for the projects is $2,500,000.

Section 3. The Town presently intends, and reasonably expects, to reimburse itself for the original expenditures incurred and paid by the Town from the General Fund within 60 days of adoption of this Resolution from a portion of the financing proceeds.

Section 4. This Resolution shall become effective immediately upon the date of its adoption.

This the 3rd day of July 2024.

_____
Benjamin Cahoon, Mayor
Town of Nags Head

ATTEST:

_____
Carolyn F. Morris, Town Clerk

Agenda Item Summary Sheet

Item No: **E-8**
Meeting Date: **July 3, 2024**

Item Title: Consideration of resolution authorizing higher federal micro-purchase thresholds

Item Summary:
The micro-purchase threshold regulation suggests that a unit of local government in North Carolina may raise its micro-purchase threshold via annual self-certification to $30,000 for the purchase of "apparatus, supplies, materials, or equipment" or the purchase of "construction or repair work", and to $50,000 for service contracts other than those subject to the Mini-Brooks Act.

The Town of Nags Head is eligible to raise the micro-purchase thresholds to the levels identified below, which are consistent with North Carolina law:
$30,000, for the purchase of "apparatus, supplies, materials, or equipment"; and
$30,000, for the purchase of "construction or repair work"; and
$50,000, for the purchase of services not subject to competitive bidding under North Carolina law; and
$50,000, for the purchase of services subject to the Mini-Brooks Act (Article 3D of Chapter 143), but only where the unit of local government exercises, in writing, an exemption to the Mini-Brooks Act for a particular project pursuant to G.S. 143-64.32. Where the unit does not exercise an exemption to the Mini-Brooks Act for a particular project, the micro-purchase threshold shall be $10,000 (as adjusted periodically for inflation pursuant to 48 CFR Subpart 2.1).

This regulation allows the Town to align its federal micro-purchases subject to Uniform Guidance ($10,000 threshold) with the informal purchase thresholds consistent with North Carolina law and the Town of Nags Head purchasing and bid requirements policy.

This will make conformity standards clear and consistent in working with projects at any funding level (local, state, or federal).

Number of Attachments: 1

Specific Action Requested:
Request Board adoption of attached resolution.

Submitted By: Administrative Services Date: June 26, 2024

Finance Officer Comment:
Adoption of attached resolution would raise micro-purchase thresholds to be consistent with NC law.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:
N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:
I concur with staff's request.

Signature: Andy Garman Date: June 26, 2024

RESOLUTION AUTHORIZING INCREASE IN MICRO-PURCHASING THRESHOLD

WHEREAS, from time to time, the Town of Nags Head purchases goods and services using federal funding subject to the procurement standards in 2 C.F.R. Part 200, Subpart D; and

WHEREAS, the Town of Nags Head's procurement of such goods and services is subject to the Town of Nags Head's purchasing and bid requirements policy, as most recently amended on September 8, 2023; and

WHEREAS, the Town of Nags Head is a non-Federal entity under the definition set forth in 2 C.F.R. § 200.1; and

WHEREAS, pursuant to 2 C.F.R. § 200.320(a)(1)(ii), a non-Federal entity may award micro-purchases without soliciting competitive price or rate quotations if the non-Federal entity considers the price to be reasonable based on research, experience, purchase history or other information and documents that the non-Federal entity files accordingly; and

WHEREAS, pursuant to 2 C.F.R. § 200.320(a)(1)(iii), a non-Federal entity is responsible for determining and documenting an appropriate micro-purchase threshold based on internal controls, an evaluation of risk, and its documented procurement procedures; and

WHEREAS, pursuant to 2 C.F.R. § 200.320(a)(1)(iv), a non-Federal entity may self-certify on an annual basis a micro-purchase threshold not to exceed $50,000 and maintain documentation to be made available to a Federal awarding agency and auditors in accordance with 2 C.F.R. § 200.334; and

WHEREAS, pursuant to 2 C.F.R. § 200.320(a)(1)(iv), such self-certification must include (1) a justification for the threshold, (2) a clear identification of the threshold, and (3) supporting documentation, which, for public institutions, may be a "higher threshold consistent with State law"; and

WHEREAS, G.S. 143-129(a) and G.S. 143-131(a) require the Town of Nags Head to conduct a competitive bidding process for the purchase of (1) "apparatus, supplies, materials, or equipment" where the cost of such purchase is equal to or greater than $30,000, and (2) "construction or repair work" where the cost of such purchase is greater than or equal to $30,000; and

WHEREAS, North Carolina law does not require a unit of local government to competitively bid for purchase of services other than services subject to the qualifications-based selection process set forth in Article 3D of Chapter 143 of the North Carolina General Statutes (the "Mini-Brooks Act"); and

WHEREAS, G.S. 143-64.32 permits units of local government to exercise, in writing, an exemption to the qualifications-based selection process for services subject to the Mini-Brooks Act for particular projects where the aggregate cost of such services do not exceed $50,000; and

WHEREAS, pursuant to 2 C.F.R. § 200.320(a)(1)(iv), the Board of Commissioners of the Town of Nags Head now desires to adopt higher micro-purchase thresholds than those identified in 48 C.F.R. § 2.101.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF THE TOWN OF NAGS HEAD:

1. In accordance with 2 C.F.R. § 200.320(a)(1)(iv) and the applicable provisions of North Carolina law, the Town of Nags Head hereby self-certifies the following micro-purchase thresholds, each of which is a "higher threshold consistent with State law" under 2 C.F.R. § 200.320(a)(1)(iv)(C) for the reasons set forth in the recitals to this resolution:

A. $30,000, for the purchase of "apparatus, supplies, materials, or equipment"; and

B. $30,000, for the purchase of "construction or repair work"; and

C. $50,000, for the purchase of services not subject to competitive bidding under North Carolina law; and

D. $50,000, for the purchase of services subject to the qualifications-based selection process in the Mini-Brooks Act; provided that such threshold shall apply to a contract only if the Unit has exercised an exemption to the Mini-Brooks Act, in writing, for a particular project pursuant to G.S. 143-64.32. If the exemption is not authorized, the micro-purchase threshold shall be $0.

2. The self-certification made herein shall be effective as of the date hereof and shall be applicable until June 30, 2025, but shall not be applicable to Federal financial assistance awards issued prior to November 12, 2020, including financial assistance awards issued prior to that date under the Coronavirus Aid, Relief, and Economic Support (CARES) Act of 2020 (Pub. L. 116-136).

3. In the event that the Town of Nags Head receives funding from a federal grantor agency that adopts a threshold more restrictive than those contained herein, the Unit shall comply with the more restrictive threshold when expending such funds.

4. The Unit shall maintain documentation to be made available to a Federal awarding agency, any pass-through entity, and auditors in accordance with 2 C.F.R. § 200.334.

5. The Town Manager, or in absence designee, of the Town of Nags Head is hereby authorized, individually and collectively, to revise the Purchasing Policy of the Unit to reflect the increased micro-purchase thresholds specified herein, and to take all such actions, individually and collectively, to carry into effect the purpose and intent of the foregoing resolution.

Adopted this the 3rd day of July 2024.

_____
Benjamin Cahoon, Mayor
Town of Nags Head

ATTEST:

_____
Carolyn F. Morris, Town Clerk

Agenda Item Summary Sheet

Item No: **E-9**
Meeting Date: **July 3, 2024**

Item Title: Consideration of Interlocal Agreement with Dare County/Municipalities re: connection to Motorola FLEX Public Safety Software System

Item Summary:

Attached please find the Interlocal Agreement between Dare County and the local towns for use of the Motorola Flex Public Safety Software System – maintained in the Dare County Sheriff's Office. The original agreement was approved by the Board in April 2022 – the attached agreement has been updated to include superusers and details concerning the sharing of information.

Duck Police Chief Jeff Ackerman notes that the Dare County Board of Commissioners approved and executed the agreement on June 3, 2024; it is being requested that this updated agreement be reviewed and approved by the local governing bodies of all six municipalities (the "Connected Sites").

Police Chief Perry Hale is available to answer any questions.

Number of Attachments: 1

Specific Action Requested:

Request that the Board provide authorization for the Town Manager to sign the attached interlocal agreement. This agreement updates the agreement from 2022.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

No fiscal changes are being proposed.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff's request.

Signature: Andy Garman Date: June 26, 2024

NORTH CAROLINA
DARE COUNTY

INTERLOCAL AGREEMENT

This INTERLOCAL AGREEMENT entered by and between Dare County and Town of Southern Shores, Town of Nags Head, Town of Kitty Hawk, Town of Kill Devil Hills, Town of Duck, and Town of Manteo, hereinafter referred to individually as a "party" and collectively as "the parties," is executed pursuant to all applicable governing laws of the State of North Carolina. The parties acknowledge they have read and understand the terms and conditions contained herein. This Agreement sets forth provisions identifying the distribution of responsibilities, system management, and software services pertaining to the Motorola FLEX public safety software system. Each party does agree as follows:

1.0 DEFINITIONS

PARTIES: The entities directly associated with the Motorola FLEX public safety software system, which include Dare County and the Town of Southern Shores, Town of Nags Head, Town of Kity Hawk, Town of Kill Devil Hills, Town of Duck, and Town of Manteo.

SERVER SITE: The Dare County Sheriff's Office will herein be referred to as the Server Site. As such, the dedicated server(s) for the software applications will be maintained and stored at the Server Site and its associated facilities.

CONNECTED SITES: Town of Southern Shores Police Department, Town of Nags Head Police Department, Town of Kity Hawk Police Department, Town of Kill Devil Hills Police Department, Town of Duck Police Department, and Town of Manteo Police Department will herein be referred to as the Connected Sites. As a shared entity utilizing the server(s) at the Dare County Communication Center, the software owned and operated by the Connected Sites will use the server(s) at the Server Site.

MOTOROLA FLEX SYSTEM: All references to the system, software, Motorola FLEX, Motorola FLEX system, or Motorola FLEX public safety system software refer to any version or parts of the public safety software applications provided by Motorola, Inc.

AUTHORIZED INDIVIDUAL: An Authorized Individual is one who has been given a unique username and password login to the Motorola FLEX System. Each Authorized Individual must be a current Employee In Good Standing, as defined below, of Dare County, Town of Southern Shores, Town of Nags Head, Town of Kity Hawk, Town of Kill Devil Hills, Town of Duck, or Town of Manteo, or an authorized IT Contractor in Good Standing designated by the Server Site, or a Connected Site, to assist or perform maintenance on the Motorola FLEX public safety software system at the Server Site or a Connected Site.

HIGH PRIORITY ISSUE: Issues that are critically impacting the Motorola FLEX public safety software system and the job performance of multiple users.

MEDIUM PRIORITY ISSUE: Issues that are impacting the Motorola FLEX public safety software system and the job performance of at least one user.

LOW PRIORITY ISSUE: Issues that are impacting the Motorola FLEX public safety software system but have a minimal impact on the job performance of users.

EMPLOYEE IN GOOD STANDING: An employee of one of the parties who has not been terminated for any reason; has not been relieved of duty pursuant to a criminal or administrative investigation; has not had his or her access to the Motorola FLEX public safety system software revoked oterminated for any reason; and has not been charged with a felony offense, or a misdemeanor offense listed in the most recent publication of the North Carolina Criminal Justice Education & Training Standards Commission/North Carolina Sheriffs' Education and Training Standards Commission Class B Misdemeanor Manual.

IT CONTRACTOR IN GOOD STANDING: An employee of an IT company that is under a current contract to provide IT services and assistance to Dare County, Town of Southern Shores, Town of Nags Head, Town of Kity Hawk, Town of Kill Devil Hills, Town of Duck, or Town of Manteo; and who has not had his or her contract to provide such services and assistance terminated directly or indirectly for any reason; and who has not been charged with a felony offense, or a misdemeanor offense listed in the most recent publication of the North Carolina Criminal Justice Education & Training Standards Commission/North Carolina Sheriffs' Education and Training Standards Commission Class B Misdemeanor Manual; has been fingerprinted and remains in full compliance with all FBI Criminal Justice Information Services (CJIS) and NC SBI Division of Criminal Information (DCI) requirements.

SYSTEM APPLICATIONS ADMINISTRATOR: Often referred to as a "Super User," is a user of the Motorola FLEX public safety system software who has been given the ability to access all programs in the Motorola FLEX public safety software system and has "Administration Mode" privileges. Further, a Super User can view all partitions, and can access, add, modify, and delete all records on the Motorola FLEX public safety system software. System Applications Administrators are responsible for adding all new Authorized Individuals, Agency Administrators, and System Applications Administrators to the system. Only employees of the Server Site who are assigned to administer the Motorola FLEX public safety software system and who are sworn law enforcement officers or who have a need to assist in administering the Motorola FLEX public safety system software may possess System Applications Administrator rights.

AGENCY ADMINISTRATOR: Appointed by the Agency Head at each Connected Site, Agency Administrators have the ability to access the programs the employing Connected Site has purchased within the Motorola FLEX public safety software system, and the data specific to the Agency Administrator's employing Connected Site. Agency Administrators can also view partitions for the applicable Connected Site; access, add, modify, and delete records for the applicable Connected Site; make administrative changes to program settings for the applicable Connected Site; and have full authorization to modify, and delete their Connected Site's own Authorized Individuals' and Agency Administrators' access, rights, or privileges within the Motorola FLEX public safety software system. Each Agency Head shall have Agency Administrator privileges.

AGENCY HEAD: The chief of police at each Connected Site and the Sheriff at the Server Site.

2.0 DATA ENTRY AND USE

2.1 STANDARDS COMMITTEE

A Standards Committee will be established. The Standards Committee will be chaired by the Dare County Sheriff's Office Director of Communications and will include one member from each Connected Site, who is appointed by the chief of police from each Connected Site. Each appointee should be an Agency Administrator for their respective agency.

The Standards Committee shall initially meet within thirty (30) days after the execution of this Agreement and shall thereafter meet at least monthly to address issues arising with regard to: this Agreement; the Motorola FLEX public safety software system; polices, standards, and changes to the use of the Motorola FLEX public safety software system; or any other issue properly before the Standards Committee. At their initial meeting, the Standards Committee shall establish regular dates and times for its monthly meetings, and procedural rules for its meetings. The Server Site shall be responsible for scheduling the initial meeting of the Standards Committee with the Agency Heads or, if appointed, the Standards Committee member.

The Standards Committee shall also schedule special meetings upon the written request of any member of the Standards Committee or Agency Head, which special meetings may be to address any item set forth in the paragraph above.

Each member of the Standards Committee shall have one vote, with a simple majority needed, when voting to approve or disapprove standards and proposed changes to the Motorola FLEX public safety software system.

Members of the Standards Committee will also serve as the primary point of contact for communication regarding the Motorola FLEX public safety software system, between the Server Site and the Connected Site. Troubleshooting requests will be made electronically using a tracked system. Members of the Standards Committee should receive regular communication from the Server Site regarding the Motorola FLEX public safety software system.

The Standards Committee shall be responsible for making all decisions regarding standards, substantive changes, and policies regarding the Motorola FLEX public safety software system and its design and usage but shall not be responsible for the daily oversight of the said system.

The Server Site will make decisions, without a vote by the Standards Committee, regarding the standards and changes to the Motorola FLEX CAD and Jail modules.

2.2 DATA ENTRY STANDARDS

Terms of consistency are to include consistent vocabulary and references throughout the Motorola FLEX System as well as definitions for all code tables throughout the system.

2.3 GEOBASE SETUP AND ONGOING MAINTENANCE

It will be the responsibility of the Server Site to develop, update, and maintain all GeoBase files for all parties, including street center lines, partial layers, police zones, and common place names. The Connected Sites will have full authorization to work collaboratively with the Server Site to define these specifications for system users, and the Server Site shall update the GeoBase files based on input from the Connected Sites.

2.4 DATA SHARING

The Server Site shall allow the Connected Site to maintain separate records and data specific to each party's Motorola FLEX public safety software system. Each party will have access to computer programs and stored data within the Motorola FLEX public safety software system. Access to the Connected Site's data will be established and directed by the Server Site with the Connected Site's participation and approval. Data entered into the system by any party becomes a part of the server database and will be subject to maintenance or archival procedures as determined by the Server Site, the Standards Committee, or as required by law.

Any Connected Site may partition data applicable to its GeoBase files or entered into the Motorola FLEX public safety software system by its own Authorized Individuals or Agency Administrators into the Motorola FLEX public safety software system, so that no other Connected Site may access that partitioned data ("Partitioned Data"). Each party shall have access to data entered into the Motorola FLEX public safety software system by another party unless that data is Partitioned Data.

2.5 USE OF DATA

No party will sell, give, loan, lease or otherwise transfer title, possession, or allow access or use of any of the data or screens by any person, firm, corporation, or association, other than the party's respective Authorized Individuals, Agency Administrators, or System Applications Administrators, without prior written approval from all parties. Each party acknowledges and agrees that any party may deny the aforementioned acts to be undertaken by the other party.

Dissemination of data or information is the responsibility of each party and shall be consistent with the provisions of this Agreement. Each party shall ensure that its Authorized Individuals, Agency Administrators, and System Applications Administrators, as applicable, do not disclose data obtained through the Motorola FLEX public safety software system except as permitted by this Agreement or as required by law.

2.6 NON-PUBLIC RECORDS

Pursuant to NCGS Sections 132-1.4 and 132-1.4A, records entered into the Motorola FLEX public safety software system may not be subject to disclosure pursuant to the North Carolina Public Records Act, NCGS Section 132-1 et seq. Thus, before any records entered into the Motorola FLEX public safety software system is treated as a public records subject to disclosure under NCGS Sections 132-1 et seq., the party proposing to disclose the records as public records shall make a determination as to whether the records are exempt from such disclosure pursuant to NCGS Sections 132-1.4 and 132-1.4A and shall share its determination with the other parties before any data is disclosed as public records.

2.7 SYSTEM USE

The Motorola FLEX public safety software system is intended for use by the Server Site and Connected Site's public safety employees only, and then only to the extent that the public safety employees are Authorized Individuals, Agency Administrators, or System Applications Administrators.

Use of the Motorola FLEX public safety software system shall be in compliance with U.S. Department of Justice, Federal Bureau of Investigations, Criminal Justice Information Security Policy, and NC State Bureau of Investigation Policy.

3.0 SECURITY

Extent of access shall conform to the regulations set forth in applicable federal, state, and local law.

3.1 SECURED SYSTEM ACCESS

Access to the Motorola FLEX public safety software system will only be allowed through a virtual private network (VPN) established and maintained by Dare County.

3.2 AUTHORIZED INDIVIDUAL USERS

Subject to the limitations provided in this Agreement, each Connected Site will have full authorization to add, modify, and delete that Connected Site's own Authorized Individuals and Agency Administrators' access, rights, or privileges within the Motorola FLEX public safety software system.

The Server Site will not add, modify, or delete any access, rights, or privileges of an Authorized Individual or Agency Administrator employed by a Connected Site within the Motorola FLEX public safety software system without written consent from the applicable Connected Site.

3.3 USER PERMISSIONS

Each user of the Motorola FLEX public safety software system shall have a unique user account with a unique password, thereby identifying the user's identity and the users access authority as an Authorized Individual, Agency Administrator, or System Applications Administrator.

Authorized individual permissions shall include, as appropriate, system rights of the user, accessibility to specific modules and applications, ability to view, modify, delete, and print any aspect of the Motorola FLEX public safety software system as defined by approved permissions for each Authorized Individual user.

A user's account will provide a method of accounting for access to information.

Sharing of accounts within a Connected Site is expressly prohibited.

3.4 SECURITY PRIVILEGES

Connected Sites reserve the right to make decisions and establish all security privileges pertaining to the Connected Site's data stored within the Motorola FLEX public safety software system.

3.5 SECURITY AND INTEGRITY

The Server Site's network shall remain, and the Server Site shall ensure that its network remains protected from internet threats with firewall security to prevent unauthorized access via the internet or internally. The Connected Site is responsible for securing its own organization's computer resources against all unauthorized access.

By the tenth 10th day of each month, the Server Site shall provide each Agency Head with a full audit report for the month just ended that shows: all authorized users of the Motorola FLEX public safety software system; whether each such user is an Authorized Individual, Agency Administrator, or Systems Applications Administrator; which of the appliable Connected Site's files were accessed by each user of the Motorola FLEX public safety software system; and when such files were accessed. Any such report shall also be provided by the Server Site for any specified period upon at least five (5) days prior request from an Agency Head requesting the report and applicable period for which the report shall be provided.

4.0 SYSTEM ADMINISTRATION

The Server site will only allow personnel employed by the Server Site who are assigned to administer the Motorola FLEX public safety software system to possess System Applications Administrator rights. The Server Site shall enact internal policy that prohibits System Applications Administrators from disseminating information protected by law or manipulating or altering, in any way, data within the Motorola FLEX system without the consent of the Standards Committee. The Server Site shall provide each Agency Head with a copy of their internal policy within 90- days of the date this agreement is executed.

By majority vote of the Standards Committee, an Authorized Individual employed by a Connected Site may be granted System Applications Administrator rights. If an Authorized Individual is granted these rights, the employing Connected Site shall enact internal policy that prohibits the System Applications Administrator from disseminating information protected by law or manipulating or altering, in any way, data within the Motorola FLEX system without the consent of the Standards Committee. The Connected Site shall provide the Server Site and each Agency Head with a copy of their internal policy within 90 days of the date an Authorized Individual employed by that Connected Site is granted System Applications Administrator rights.

Each Connected Site is entitled to two Agency Administrators, in addition to its Agency Head, who will have full system access to administer the modules and features specific to the Connected Site's Motorola FLEX public safety software system. Each Agency Administrator will have full access and authorization to add, modify, and delete any data or information from the areas within the Motorola FLEX public safety software system that are specific to the Connected Site that employees the Agency Administrator.

5.0 EQUIPMENT & CONNECTIVITY

5.1 EQUIPMENT AT THE SERVER SITE

The Server Site, at its own cost and expense, shall maintain the network, server(s), firewall, backup devices, etc. that run and house the data applicable to the Motorola FLEX public safety software system.

5.2 SERVER CONNECTIVITY

Each party is responsible for maintaining its own internet connectivity to the Server Site.

5.3 HARDWARE MAINTENANCE

The Server Site shall, at its own cost and expense, maintain a maintenance contract, with all hardware vendors at all times, including backup generator(s) or reserved power supplies, for all hardware that supports the Motorola FLEX public safety software system. The Server Site shall renew these hardware contracts as necessary with all involved entities.

5.4 MINIMUM END-USER HARDWARE SPECIFICATIONS

Computers (laptops or PCs) with access to the Motorola FLEX public safety software system that are owned, leased, or otherwise under the control of each Connected Site, will meet or exceed the "minimum hardware specifications" established by Motorola, Inc. for the Motorola FLEX public safety software system.

Each party will be responsible to maintain its own end-user hardware.

5.5 ACCESS TO MOTOROLA FLEX SYSTEM PUBLIC SAFETY SOFTWARE SYSTEM

The Server Site will do everything within reason to ensure that the Connected Sites are able to access to the Motorola FLEX public safety software system 24x7x365. Should availability to the Motorola FLEX public safety software system be disrupted or terminated for any reason whatsoever, the Server Site will immediately notify the Connected Sites of the lapse in system access.

Each party is responsible for its own access to the server. Should access to the server lapse for a party, the individual party is responsible to work with appropriate parties to restore system access as soon as possible, and to further provide notification to the other parties when system availability is restored.

5.6 MOTOROLA FLEX SYSTEM PUBLIC SAFETY SOFTWARE SYSTEM NETWORK AVAILABILITY

The Motorola FLEX public safety software system availability objective is 95% 24x7x365.

5.7 MOTOROLA FLEX SYSTEM PUBLIC SAFETY SOFTWARE SYSTEM NETWORK MAINTENANCE

The Motorola FLEX public safety software system and the Server Site network will be available as set forth in this section with the following exceptions:

5.7.1 SCHEDULED PREVENTATIVE MAINTENANCE

The Server Site reserves the right to schedule preventative maintenance on all systems. Preventative maintenance will be scheduled on a normal cadence. The Server Site will provide the Connected Sites with a minimum of two weeks' notice, via electronic mail, before preventative maintenance is performed. The Server Site will attempt to minimize the

impacts to the Connected Sites while preventative maintenance is being performed.

All parties agree and acknowledge that scheduled preventative maintenance may result in loss of service to the Motorola FLEX public safety software system for a period of time.

5.7.2 SOFTWARE AND HARDWARE UPGRADES OR MODIFICATIONS

If upgrades, additional modules, or new hardware are determined necessary and acceptable by all parties, the Server Site will determine the most appropriate time for scheduled modifications to minimize the impact to all parties.

Software and hardware upgrades or modifications differ from normally scheduled maintenance, in that the Motorola FLEX public safety software system may be unavailable for duration of the upgrade, which conceivably may be 24-hours or longer.

The Server Site will provide the Connected Sites with a minimum of one month's notice, via electronic mail, before software or hardware upgrades or modifications are performed. The Server Site will attempt to minimize the impacts to the Connected Sites while software or hardware upgrades or modifications are being performed.

5.7.3 EMERGENCY MAINTENANCE

The Server Site will coordinate emergency maintenance with the Connected Sites whenever necessary and possible.

5.8 SERVER SITE INFORMATION TECHNOLOGY SUPPORT

The Server Site's Information Technology Department will provide 24x7x365 support for system servers that support the Motorola FLEX public safety software system.

For Low Priority Issues, the Connected Site's designated Standards Committee Member should submit a service ticket to the Server Site's Information Technology Department via the Server Site's automated ticketing system. The Server Site shall use its best efforts to resolve any Low Priority Issues within 72 (seventy-two) hours after being informed of such issue.

For High priority issues that arise during business hours, Connected Site's supervisors should contact the Dare County Sheriff's Office Communications Director by telephone. The Server Site shall use its best efforts to resolve any High Priority Issues within 8 (eight) hours after being informed of such issue. The Server Site shall use its best efforts to resolve any High Priority Issue within 24 (twenty-four) hours after being informed of such issue.

For High priority issues that arise outside business hours, Connected Site's supervisors should call the 9-1-1 Communication Center at 252-473-3444 and report the issue to the on-duty supervisor. The on-duty supervisor will make the appropriate notification to the on-call System Applications Administrator from the Server Site's Information Technology Department.

5.8.1 SERVICE TICKETING

The Server Site will use an automated ticketing system to accept, process, assign a priority level (i.e., Low, Medium, or High) and log the resolution of Motorola FLEX public safety software system issues, regardless of whether such issues are reported by ~~email~~ the Server Sites automated ticketing system or telephone, as set forth in Section 5.8, above. When a support ticket is entered, the automated ticketing system will route the service ticket to the Dare County Sheriff's Office Director of Communications, Agency Heads, Agency Administrators, and the system administrators assigned to administer the Motorola FLEX public safety software system. The Server Site shall also ensure that all Agency Administrators and the Standards Committee shall also receive confirmation dthe issue submission and an explanation of the service ticket resolution.

5.9 MOTOROLA INFORMATION TECHNOLOGY SUPPORT

The Server Site will ensure that Agency Heads,-Agency Administrators, and the IT Contractor in Good Standing at each Connected Site are authorized to contact Motorola technical support via telephone or online portal to obtain technical support related to the functionality of programs and modules within the Motorola FLEX public safety software system.

5.10 CONFIGURATION MANAGEMENT

All configuration changes to the Motorola FLEX public safety software system will be made by the Server Site in coordination with the Connected Sites.

Requests for configuration changes to the Motorola FLEX public safety software system from the Connected Sites may come from the Connected Site's designated Standards Committee Member, or the Agency Administrator.

The Server Site shall not to perform any configuration changes to the Motorola FLEX public safety software system server(s), with the exception of configuration changes to the Motorola FLEX CAD or Jail modules, the without majority consent from the Standards Committee.

If a change is a Motorola FLEX public safety system software or hardware upgrade, modification, or configuration affecting all parties, refer to subsection 5.7.2 for the notification requirement.

Connected Sites shall not perform any configuration changes to the Server Site's hardware.

5.11 DISASTER RECOVERY, BACKUP, & ARCHIVING

The Server Site's is responsible for ensuring full nightly backups are completed successfully. In addition to nightly backups, the Server Site will ensure that disaster recovery procedures are in place and current in order to accommodate system failures, infrastructure failures, etc. so that the Motorola FLEX public safety software system will be accessible from the secondary data center.

The Server Site shall enact an internal data breech policy and an IT disaster recovery plan. The Server Site shall provide each Agency Head with copies of these documents within 90-days of the date this Agreement is executed.
The Server Site, in cooperation with all Connected Sites, shall coordinate and execute a planned

fail-over to the secondary data center on a quarterly basis. The Server Site shall provide to Agency Heads, in writing, documentation of the testing and the outcome of said testing.

6.0 TERMS OF CONTRACT

6.1 TERMINATION OF MOTOROLA FLEX LICENSE OR SUPPORT AGREEMENT

If any party should terminate its Motorola FLEX public safety software system license or support contract with Motorola Inc., the party will provide written notice to the other parties at least 30 days prior to the contract's termination. Upon such termination, said party shall no longer be a party to this Agreement, but this Agreement shall remain in full force and effect as to the other parties.

Any party may terminate its status as a party to this Agreement upon at least sixty (60) days written notice to the other parties. Upon such termination, said party shall no longer be a party to this Agreement, but this Agreement shall remain in full force and effect as to the other parties.

The party maintaining the license or support contract with Motorola FLEX reserves the right to keep its own license and/or support contract with the vendor as well as all system data belonging to the party.

At such time as the Motorola FLEX public safety system software is no longer used by the parties and is replaced with any other software, Dare County, at its own expense, shall be responsible for migrating all data from the Motorola FLEX public safety system software to the new software.

6.2 TERMINATION OF INTERLOCAL AGREEMENT BETWEEN SERVER SITE AND CONNECTED SITE

This Agreement may be terminated upon mutual agreement of all parties by providing written notice of such termination. Termination will be effective on the date stated in the notice so long as the notice is properly given at least 120 days prior to such date. This Agreement may be immediately terminated without notice upon an event of default. Should an event of default occur, there will be 10 business days allowed for the defaulting party to remedy the situation prior to Agreement termination. Events of default include but are not limited to the following:

a) One party uses data or gives someone access to data from the Motorola FLEX public safety system software in a manner that is inconsistent with this Agreement.
b) Unauthorized copying of data entered into the Motorola FLEX public safety system software.
c) The Agreement is determined to be in conflict with Federal or state law, or Town resolutions, or ordinances which are in effect at the time of this Agreement or may be imposed in the future and such conflict cannot be remedied by the Standards Committee.
d) One party sells, gives, leases, or loans access to the screens of the data contained in the Motorola FLEX public safety system software to any person other than an Authorized Individuals, Agency Administrators, and System Applications Administrators without the express written approval of the other parties.
e) One party allows access to the screens of the data contained in the Motorola FLEX public safety system software to be used as a list of individuals for commercial purposes.
f) One party allows the connection, directly or indirectly, of a computer network that can access the Motorola FLEX public safety system software when the connecting person or entity is outside of the Server Site's or the Connected Site's control.

6.3 DATA MIGRATION

Upon the termination of this Agreement as to any one or all of the parties, each party whose status as a party to this Agreement is being terminated shall have the right, within 120 days after said termination, to have its data migrated from the Motorola FLEX public safety system software that is governed by this Agreement to the terminated party's own software system. Dare County and the Server Site shall assist and cooperate, at their own cost, with this data migration.

6.4 LIMITATION OF LIABILITY

The information supplied by the Server Site or by any Connected Site described herein is provided on an "as is" basis "with all faults."

The obligations of each party and the rights and remedies of each party set forth in this Agreement are exclusive and in substitution for all the warranties, obligations, and liabilities of the applicable party.

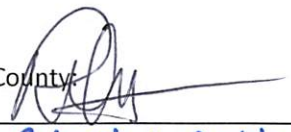
All concerns will be brought forth to the Standards Committee and if required, escalated to the appropriate governing authority. If any legal action is required it will be resolved, if possible, through North Carolina mediation rules. The parties would be responsible for their own costs and split any mediation fees equally.

6.5 REPLACEMENT OF PRIOR INTERLOCAL AGREEMENTS

Dare County and the Town of Duck entered into a certain Interlocal Agreement on or about Dec. 19, 2022 regarding the Motorola FLEX public safety software project (the "Duck Agreement"). Dare County and the Town of Southern Shores entered into a certain Interlocal Agreement on or about Dec. 19, 2022 regarding the Motorola FLEX public safety software project (the "Southern Shores Agreement"). Dare County and the Town of Nags Head entered into a certain Interlocal Agreement on or about Dec. 19, 2022 regarding the Motorola FLEX public safety software project (the "Nags Head Agreement"). Dare County and the Town of Kity Hawk entered into a certain Interlocal Agreement on or about Dec. 20, 2022 regarding the Motorola FLEX public safety software project (the "Kity Hawk Agreement"). Dare County and the Town of Kill Devil Hills entered into a certain Interlocal Agreement on or about Dec. 20, 2022 regarding the Motorola FLEX public safety software project (the "Kill Devil Hills Agreement"). Dare County and the Town of Manteo entered into a certain Interlocal Agreement regarding the Motorola FLEX public safety software project (the "Manteo Agreement"). This Agreement is intended to, and shall, replace the Duck Agreement, Southern Shores Agreement, Nags Head Agreement, Kity Hawk Agreement, Kill Devil Hills Agreement, and Manteo Agreement (collectively, the "Prior Agreements). Upon the execution of this Agreement by all parties, the Prior Agreements shall become null and void and of no force or effect and shall be replaced in their entirety by this Agreement.

7.0 ACCEPTANCE

The governing boards of Dare County and the Town of Southern Shores, Town of Nags Head, Town of Kitty Hawk, Town of Kill Devil Hills, Town of Duck, and Town of Manteo hereby mutually acknowledge and accept the terms and conditions of this Agreement.

Dare County:
By: 
Name: Robert L. Outten
Title: County Manager / Attorney
Date: 6/3/24

Town of Southern Shores:

By:_____
Name:_____
Title:_____
Date:_____

Town of Duck:

By:_____
Name:_____
Title:_____
Date:_____

Town of Manteo:

By:_____
Name:_____
Title:_____
Date:_____

Town of Nags Head:

By:_____
Name:_____
Title:_____
Date:_____

Town of Kity Hawk:

By:_____
Name:_____
Title:_____
Date:_____

Town of Kill Devil Hills

By:_____
Name:_____
Title:_____
Date:_____

[signatures continued on the following pages]

The undersigned hereby agrees to become bound by, and by its signature shall become bound by, the provisions of the Agreement applicable to the Server Site and the Dare County Sherriff's Office.

Dare County Sherriff's Office:

By:_____
Name:_____
Title:_____
Date:_____

Each of the undersigned hereby agrees to become bound by, and by its signature shall become bound by, the provisions of the Agreement applicable to it as a Connected Site and as an Agency Head.

Town of Southern Shores Police Department:

By:_____
Name:_____
Title:_____
Date:_____

Town of Duck Police Department:

By:_____
Name:_____
Title:_____
Date:_____

Town of Manteo Police Department:

By:_____
Name:_____
Title:_____
Date:_____

[signatures continued on the following page]

Town of Nags Head Police Department:

By:_____
Name:_____
Title:_____
Date:_____

Town of Kity Hawk Police Department:

By:_____
Name:_____
Title:_____
Date:_____

Town of Kill Devil Hills Police Department:

By:_____
Name:_____
Title:_____
Date:_____

Agenda Item Summary Sheet

Item No: **E-10**
Meeting Date: **July 3, 2024**

Item Title: Consideration of amendment to MOU between Town of Nags Head and Town of Kill Devil Hills for shared Eighth Street Beach Access maintenance

Item Summary:
The current 3-year agreement between Nags Head and Kill Devil Hills for operation and maintenance of the Eighth St. Beach Access expires on June 30, 2024. An addendum extending the agreement is attached. The MOU provides for the operation, repairs, and improvements to the ocean access that is owned by both towns along the centerline of the right-of-way. The MOU provides for overall management of the site to be the responsibility of the Town of Nags Head with reimbursement for joint costs from Kill Devil Hills.

The agreement has been reviewed and approved at the staff level by both towns; the agreement would be for three years - July 1, 2024 - June 30, 2027.

Number of Attachments: 1

Specific Action Requested:
Request Board review and approval of attached agreement with the Town of Kill Devil Hills to extend for another three years the maintenance of the Eighth Street Beach Access.

Submitted By: Administration Date: June 27, 2024

Finance Officer Comment:
No fiscal changes are being proposed.

Signature: Amy Miller Date: June 27, 2024

Town Attorney Comment:
N/A

Signature: John Leidy Date: June 27, 2024

Town Manager Comment and/or Recommendation:

I concur with the contract amendment which is provided for your consideration. The Kill Devil Hills Town Board approved the amendment at their meeting on Wednesday, June 26th.

Signature: Andy Garman Date: June 27, 2024

EXTENSION TO MEMORANDUM OF UNDERSTANDING

KILL DEVIL HILLS / NAGS HEAD EIGHTH STREET OCEAN ACCESS

OPERATION PLAN

This ADDENDUM is attached to and made a part of the Memorandum of Understanding ("MOU") entered between the Town of Kill Devil Hills and the Town of Nags Head on May 26, 2021. For valuable consideration, the receipt and legal sufficiency of which are acknowledged, the parties to the MOU agree as follows:

A. The parties to this addendum entered into the MOU to establish a joint operation plan for that certain public ocean access located within the corporate districts of each Town.

B. The MOU was entered into in accordance with the requirements of North Carolina Law.

C. The original term of the MOU was for a three-year period of time beginning on July 1, 2021 and running through June 30, 2024.

D. The express provisions of the MOU state that, upon mutual agreement of the parties, the term of the MOU may be extended for additional three-year periods.

E. It is acknowledged by the parties that the Boards of Commissioners for the Towns of Kill Devil Hills and Nags Head have expressed their consent to this extension through vote on the same at a regularly scheduled public meeting, along with issuing authority to their respective Town Managers to execute this Addendum of Extension.

F. By signature of parties below, the Agreement is hereby extended for a period of three (3) years, running from July 1, 2024, through June 30, 2027.

G. The remaining terms of the Agreement shall remain unaltered and in full force and effect.

TOWN OF KILL DEVIL HILLS

_____ (SEAL)

By: Debora P. Diáz, Town Manager

Date: _____

TOWN OF NAGS HEAD

_____(SEAL)

By: Andy Garman, Town Manager

Date: _____

Agenda Item Summary Sheet

Item No: **E-11**
Meeting Date: **July 3, 2024**

Item Title: Consideration of resolution authorizing the Town Manager to execute a contract on behalf of the Town with the State for the Coastal Storm Damage Mitigation Grant

Item Summary:

Attached please find a resolution authorizing the Town Manager to execute a contract with the State for a Coastal Storm Damage Mitigation (CSDM) Grant for the Board's consideration on July 3rd.

This request is for State grant assistance to oversee the engineering design, permitting coordination, and construction documentation preparation for the Town's next Beach Nourishment Project. Funding has been awarded and this is a prerequisite for the Town to execute a grant contract.

Number of Attachments: 1

Specific Action Requested:

Request Board review and adoption of attached resolution.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

Currently there is sufficient funding in the Beach Nourishment Capital Project Fund to cover the 50% local match of $301,000.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff's request.

Signature: Andy Garman Date: June 26, 2024

RESOLUTION AUTHORIZING THE TOWN MANAGER TO EXECUTE A CONTRACT ON BEHALF OF THE TOWN OF NAGS HEAD WITH THE STATE OF NORTH CAROLINA FOR A COASTAL STORM DAMAGE MITIGATION GRANT

WHEREAS, the Town of Nags Head is planning for the next large-scale sand nourishment project to mitigate risk of damage from coastal storm effects; and

WHEREAS, the Town is requesting grant funds encompassing planning, design and permitting for the placement of beach-quality sand along a ten-mile stretch of oceanfront; and

WHEREAS, the maintenance and restoration of Nags Head beaches is essential to the economy of Dare County and the Town of Nags Head; and

WHEREAS, the Town provides an integrated approach to implementation of beach management, maintenance, and restoration projects; and

WHEREAS, Financial assistance for the Town of Nags Head has been tentatively approved by the State for overseeing the engineering design, permitting coordination and construction document preparation for the next beach nourishment project.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF THE TOWN OF NAGS HEAD:

1. That the Board of Commissioners requests the State of North Carolina to provide financial assistance to the Town of Nags Head in the amount of $301,000 or 50% of nonstate project costs, whichever is the lesser amount.
2. The Board assumes full obligation for payment of the balance of the project cost (or non-state portion).
3. The Town will obtain all necessary state and federal environmental permits associated with the project and will assure compliance with permit conditions for safe and proper final construction in accordance with approved plans and specifications.
4. The Town will obtain appropriate easements, rights-of-way or suitable spoil disposal areas that may be necessary for the construction and operation of the project without cost or obligation to the State.
5. The Board has complied and will comply with all applicable laws governing the project and the award of contracts and the expenditure of public funds by local governments.
6. The Town of Nags Head accepts responsibility for operation and long-term maintenance of the completed project in providing for continued beach management and restoration and assures that the project is open for use by the public on an equal basis with limited restrictions.
7. The Town holds the State harmless for any damage that may result from the project.

8. The Town Manager, or in absence designee, of the Town of Nags Head is hereby authorized, individually, and collectively, to execute a contract on behalf of the Town of Nags Head with the State of North Carolina for a grant to aid in the projects described above.
9. That the Town Manager, and successors so titled, is hereby authorized and directed to furnish such information as the appropriate State agency may request in connection with such application or the project: to make the assurances as contained above; and to execute such other documents as may be required in connection with the grant contract.

Adopted this the 3rd day of July 2024.

_____

Benjamin Cahoon, Mayor
Town of Nags Head

ATTEST:

_____

Carolyn F. Morris, Town Clerk

Agenda Item Summary Sheet

Item No: **F-1**
Meeting Date: **July 3, 2024**

Item Title: Public Hearing to consider NC Public Beach and Coastal Waterfront Access grant application

Item Summary:

Staff would like to apply for a NC Public Beach and Coastal Waterfront Access grant for improvements to the June Street Public Beach Access in S Nags Head. Attached please find a grant pre-application prepared by Planning staff. A brief description of the proposed improvements are as follows:

- The Town proposes to construct a new ADA-accessible elevated dune crossover. The six-foot-wide wooden structure will be approximately 1,650 square feet long and require about three switchbacks. The new walkover will contain handrails. In conjunction with the new walkover, a sixteen-foot octagonal gazebo, new shower station and platform and new solar powered lamp post will be constructed. The existing porta-john wooden enclosure and trash wooden enclosure will be removed, and new enclosures added.

Number of Attachments: 2

Specific Action Requested:

Conduct the Public Hearing for the proposed grant application.

Submitted By: Planning and Development Date: June 25, 2024

Finance Officer Comment:

No unbudgeted fiscal impact.

Signature: Amy Miller Date: June 25, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 25, 2024

Town Manager Comment and/or Recommendation:

This project has been budgeted with grant funds in the FY 24/25 budget. This implements plans for beach access improvements for the coming year.

Signature: Andy Garman Date: June 25, 2024

North Carolina

Public Beach and Waterfront Access Grant Program

2024-25 Pre-Application

The Town of Nags Head

June Street Public Beach Access Improvements

April 4, 2024

The Town of Nags Head June Street Public Beach Access

1. Site location maps: Provide a regional location map and a detailed vicinity map (street map) showing the location of the proposed project. Include a north arrow, and legible street names.

See Attachment 1.

2. Site description: Provide a description of the site where the project will be located, including natural features and existing improvements. Also include NC Division of Water Resources Surface Water Classification(s).

The June Street Neighborhood Beach Access is currently a developed site with an improved dune crossing that provides access to the oceanfront. The site is accessible from a paved drive aisle and contains a 14-stall parking area comprised of concrete grid pavers (Turfstone). The site also contains two ADA parking spaces. The ADA parking spaces have appropriate and compliant signage and striping. Other site elements include a porta-john and enclosure, trash receptacle and enclosure, red mailbox, dedication post to Todd Krafft, shower station, lamp post, dog bag station and bike rack. The site topography slopes gently from west to east, from an elevation of 3' msl at S. Old Oregon Inlet Rd. (SR 1243), to approximately 15' msl along the crest of the improved walkway through the frontal dune system and then, with moderate slopes, transitions back towards sea level to the Atlantic Ocean. The primary dunes are heavily vegetated with native grasses along both sides of the walkway. The vegetation becomes sparser towards the crest and the oceanward side of the dune. The Atlantic Ocean is the nearest surface water with a classification designation of SB, recreational.

3. National Flood Insurance Program Floodways & Non-encroachment Areas: Indicate if the project site or improvements are located in Floodway or Non-encroachment area per 40 C.F.R. § 60.3(d)(3). If the project or improvements are located in one of these areas, additional engineering studies may be needed.

N/A

4. Project description: Site improvements projects: Provide a description of the access facilities to be built, including information on features, materials, and proximity to closest/other access sites.

The Town proposes to construct a new ADA-accessible elevated dune crossover. The six-foot-wide wooden structure will be approximately 1,650 square feet long and require about three switchbacks. The new walkover will contain handrails. In conjunction with the new walkover, a sixteen-foot octagonal gazebo, new shower station and platform and new solar powered lamp post will be constructed. The bike rack, dog bag station, custom bench, dedication to Todd Krafft and the red mailbox will remain in their existing locations. The existing porta-john wooden enclosure and trash wooden enclosure will be removed, and new enclosures will be constructed.

The site is located approximately .6 of a mile south of the extremely popular Outer Banks Fishing Pier and Fish Heads Bar and Grill in south Nags Head. There are other beach accesses both to the north, approximately .21 mile, and to the south, approximately .15 mile. The June Street beach access is located within close proximity to single-family homes, townhomes, cottage courts, and vacation rentals.

5. Project justification: Explain why the project is needed and how it will benefit your community.

The June Street public access walkover was originally constructed via a CAMA access grant awarded in 2006-2007. The original structure was comprised of an elevated dune walkover structure. However, since this original grant, the walkover has fallen into disrepair. Although advertised as an ADA accessible beach access, many of the boards have weathered and are sticking up or uneven. The disrepair of the facility makes access a challenge for those pushing strollers and for disabled individuals, despite having ADA compliant parking in good condition.

The proposed construction of an ADA accessible boardwalk is critical to providing adequate facilities for visitors and citizens in this popular segment of beach. The new boardwalk will allow people of all abilities and ages to gain access more easily and safely to the public beach through the use of a beach wheelchair, available in the Town with a reservation at the nearby fire station. Additionally, the new shower station and platform will provide a much-improved opportunity for visitors to rinse sand off themselves, their pets, and belongings. The gazebo will provide an elevated area for sitting, picnicking, and resting with picturesque views of the shoreline and protection from sun, wind and sand. There isn't another public beach access nearby with a gazebo and ADA accessibility, providing a much-needed amenity for residents and visitors looking for some refuge or alternate beach experience.

6. List the types and sources of utilities proposed; and identify associated costs on Project Budget (pg. 3). Note above ground utilities must be identified.

There is an existing rinse-off station and lamp post. Both will be renovated through this project to include a new solar powered street-light and upfitted shower station. A water tap is already available on site.

7. Project site plan: Provide a to-scale site plan showing property lines (label existing uses on adjacent lots), proposed site improvements, existing facilities, and significant natural features.

- **Include a legend, north arrow and graphic scale.**
- **Improvements shown as an overlay on aerial photos also may be submitted.**
- **Provide to-scale building elevations and floor plans as applicable.**

See Attachments 2 and 3.

8. Pre-project tasks: Identify tasks that must be completed prior to starting the project.

N/A

9. Permits: List all necessary permits and/or certifications.

- *CAMA Minor Permit*
- *Zoning Permit*
- *Floodplain Review*
- *Land Disturbance Permit*

- *Building Permit*

10. ADA Transition Plan: Is this project site identified in your community's ADA Transition Plan? If yes, provide a brief description of the improvements identified in the plan and outline how this project addresses them.

N/A

11. ADA requirements: Does this project meet ADA requirements? If yes, describe the handicapped accessible features of this project. If no, describe why a handicapped accessible facility is impracticable and outline how handicapped accessibility needs are met within the area. See Designing Facilities for ADA in the application packet.

Yes, this project will be designed to meet ADA requirements. The parking lot already has existing ADA parking spaces and will provide connecting at-grade access to the proposed wooden dune walkover, which will be 6' in width. Three switchbacks will ensure that crossover meets required ADA running slope and cross slope requirements. The walkover will also have handrails, further ensuring an ADA compliant public access site.

12. Exceeding ADA requirements: Does this project exceed ADA requirements? If yes, describe the handicapped accessible features that exceed ADA requirements. See Designing Facilities for ADA in the application packet.

In the Access Board's document, "Outdoor Developed Areas: A Summary of Accessibility Standards for Federal Outdoor Developed Areas," clear width's for walkover structures are required to be a minimum of sixty inches and sections that are not removable can be reduced to a minimum of forty-eight inches at dune crossings. The Town is proposing seventy-two inches of clear width for the entirety of the dune cross over in addition to the provision of handrails. Beach wheelchairs are also available 365 days per year by reservation at the Nags Head Fire Station 16.

13. Is this project identified as high local priority in your certified Future Land Use Plan or local Access Plan? If yes, provide a brief description of the plan and a statement of the extent to which the project implements the policies of the plan.

Yes, this project is high local priority as represented in the following:

The 2022 Town of Nags Head Comprehensive and CAMA Land Use Plan

The Town of Nags Head Comprehensive Plan was developed with community input. The vision recognizes that, "a high-quality beach experience is fundamental to protecting and promoting our small-town character." Further, "ensuring access to a well-protected natural coastal environment" is a fundamental part of our legacy and quality of life.

The 2022 Comprehensive Plan describes the South Nags Head Character Area, "All development and redevelopment should connect to both existing and planned recreational improvements such as multi use paths, beach accesses, and parks". Access to the beach is central to the character of South Nags Head.

As part of the community engagement process, residents were asked to indicate the most positive changes in the community in the last five years. Participants indicated that beach access was one of the most positive changes in the community.

In section 3.63 of the Comprehensive Plan, Subsection E: Public Access and the Beach states:

Improving handicap access is an important concern at the town's public beach accesses. In addition to handicap access, the town has beach wheelchairs that are available for public use. In addition, the plan contains the following policies that speak to the importance of access to the beach in Nags Head.

The town should work to offer greater ADA accessibility at existing facilities.

• PR-3 Expand and develop public access to ocean and estuarine shorelines that accommodate different user types, age groups, and needs.

• NR-19 Provide substantial opportunity for the public to access the beach. This includes beach accesses with adequate parking at regular intervals for the length of the town with accessible facilities.

14. Is this project reflected in other policy documents or ordinances? If yes, provide a brief description of the document or ordinance and a statement of the extent to which the project implements goals of the document or ordinance.

Yes, this project is also reflected in the following documents:

Town of Nags Head Capital Improvement Plan (CIP) *The adopted CIP for fiscal year 2024/25 identifies, prioritizes, and funds the construction of an accessible public beach access at June Street. Construction of this beach access would complete the goal of CIP. The development of the improved ADA accessible walkover will improve upon the level of service that previously existed.*

The Town of Nags Head Parks and Recreation Plan *Core Values (Live, Visit, Play, Thrive) all share a common thread of access and protection of the Town's abundant natural resources, including the beach. Public access to the beaches for residents and visitors promotes a healthier lifestyle and connects people with each other and the environment, improving the overall quality of life. Many of the residential lots in the Town do not have beach front access, and without public access points, would not have a way to access the beach.*

The goals, objectives, and actions of this plan were developed from community input gained through a series of surveys and community meetings. One of the top responses received from that citizen input effort was increased access to the beach and enhancement of existing beach accesses with restrooms, showers, and other amenities. The Town is committed to maintaining beach access for both residents and visitors.

15. Previous grants: List Access Grants previously received from DCM at this site by year. Use the DCM map of past grants awarded.

A previous access grant was received for the June Street Public Beach Access in 2006-2007. The grant included installation of a paved parking lot with approximately fourteen (14) spaces, including handicapped accessible parking spaces, installation of a water tap and shower, a bike rack, lighting, landscaping, and a sandblasted sign.

16. User fees: Is a user fee charged at this site? Do you charge user fees at any other DCM funded sites? If yes to either of these questions, provide the most recent annual accounting report as required by 15A NCAC 07M .310(d).

N/A

17. Proposed Summary Budget

	Grant Assistance Requested	***Local Cash Contribution***	***Local In-Kind Contribution***	***TOTAL***
Land Acquisition Costs:	*NA*	*NA*	*NA*	*NA*
Subtotal	*$0.00*	*$0.00*	*$0.00*	*$0.00*
Permit and Design Fees:				
Permits	*$0.00*	*$0.00*	*$800.00*	*$800.00*
Design	*$0.00*	*$0.00*	*$8,000.00*	*$8,000.00*
Survey	*$0.00*	*$2,200.00*	*$0.00*	*$2,200.00*
Subtotal	*$0.00*	*$2,200.00*	*$8,800.00*	*$11,000.00*
Demolition and Site Prep:				
Site Prep (erosion control and grading)	*$4,000.00*	*$0.00*	*$0.00*	*$4,000.00*
Demolition/removal of walkover, porta john enclosure, trash can enclosure, shower station, lamp post.	*$10,000.00*	*$0.00*	*$0.00*	*$10,000.00*
Subtotal	*$14,000.00*	*$0.00*	*$0.00*	*$14,000.00*
Site Improvement Costs: *Materials*				
1650 sf of 6' wide wood dune walkover	*$80,000.00*	*$20,000.00*	*$0.00*	*$100,000.00*
Site improvements: 16' octagonal gazebo	*$9,000.00*	*$3,000.00*	*$0.00*	*$12,000.00*

Site improvements: shower station, solar powered lamp post, porta-john enclosure, trash can enclosure	*$3,487.50*	*$1,162.50*	*$0.00*	*$4,650.00*
Subtotal	*$92,487.50*	*$24,162.50*	*$0.00*	*$116,650.00*
Site Improvement Costs: *Labor*				
6' wide wood dune walkover	*$82,000*	*$28,000.00*	*$0.00*	*$110,000.00*
Site improvements: 16' octagonal gazebo	*$11,250*	*$3,750.00*	*$0.00*	*$15,000.00*
Site improvements: shower station, solar powered lamp post, porta-john enclosure, trash can enclosure	*$3,112.50*	*$1,037.50*	*$0.00*	*$4,150.00*
Subtotal	*$96,362.50*	*$32,787.50*	*$0.00*	*$129,150.00*
Local Admin Costs:	*$0.00*	*$0.00*	*$0.00*	*$0.00*
5 % Project Contingency	*$4,818.13*	*$1,639.38*	*$0.00*	*$6,457.50*
TOTAL BUDGET	*$207,668.13*	*$60,789.38*	*$8,800.00*	*$277,257.50*

NORTH CAROLINA PUBLIC BEACH AND WATERFRONT ACCESS PROGRAM

PRE-APPLICATION 2024-2025

Local Government: The Town of Nags Head Federal ID Number: 56-6034273

Project Name: June Street Beach Access

Brief Project Description:

The Town proposes improvements to the June Street beach access in south Nags Head including an approximately 6' wide, 1,650 sf. ADA accessible wooden dune walkover, a sixteen-foot octagonal gazebo and an upgraded shower-station and lamp post. The current site contains elements that will remain including 12 permeable parking spots, two ADA-accessible parking spaces, a trash can, bike rack, custom bench, dog bag station, porta-john, lamp post and a dedication post to Todd Krafft with a red mailbox.

Local Government Project Administrator

Name: Joe Costello

Title: Deputy Planning Director

Address: 5401 S. Croatan Highway

City, State, Zip: Nags Head, NC 27959

Telephone: 252 449-4209

Email: joe.costello@nagsheadnc.gov

Project Type (choose one):

- ☐ Land Acquisition
- ☑ Site Improvement
- ☐ Site Maintenance

Costs rounded to nearest dollar:

Grant funds requested: $ 207669 .00

Local government's matching funds: $ 69590 .00

Cash Match: $ 60790 .00

In-kind Match: $ 8800 .00

Total cost of project: $ 277259 .00

Site Control (check all that apply):

- ☑ Owned by local government
- ☐ To be obtained with this land acquisition project
- ☐ Land acquired under an approved waiver. Expiration date: _____.
- ☐ Leased by applicant for 25 years or more
- ☐ Easement by applicant for 25 years or more
- ☐ Owned by other State, Federal, or government agency with a Joint Use Agreement.

LOCAL GOVERNMENT REPRESENTATIVE SIGNATURE

Joe Costello	Deputy Planning Director	Joe Costello
Print or Type Name	*Title*	*Signature*

Provide the following ATTACHMENTS and NARRATIVE:

1. **Site location maps:** Provide a regional location map and a detailed vicinity map (street map) showing the location of the proposed project. Include a north arrow, and legible street names.

2. **Site description:** Provide a description of the site where the project will be located, including natural features and existing improvements. Also include NC Division of Water Resources Surface Water Classification(s).

3. **National Flood Insurance Program Floodways & Non-encroachment Areas:** Indicate if the project site or improvements are located in Floodway or Non-encroachment area per 40 C.F.R. § 60.3(d)(3). If the project or improvements are located in one of these areas, additional engineering studies may be needed.

4. **Project description:**
    a. **Land acquisition projects:** Provide an exhibit or boundary survey indicating land area, an estimated cost of the property, and basis for the estimate. An overlay on aerial photos may be submitted. Indicate if the property would be acquired in phases.
        i. The community has five years to begin developing beach and water access facilities on an acquired site. Describe how the public will be able to use the site until improved access facilities are in place.

    b. **Site improvements projects:** Provide a description of the access facilities to be built, including information on features, materials, and proximity to closest/other access sites.

    c. **Maintenance of a previously funded site projects:** describe the repair and maintenance being proposed. Describe why repairs and maintenance are needed at this site.

5. **Project justification:** Explain why the project is needed and how it will benefit your community.

6. **List the types and sources of utilities proposed; and identify associated costs on Project Budget (pg. 3). Note above ground utilities must be identified.**

7. **Project site plan:** Provide a to-scale site plan showing property lines (label existing uses on adjacent lots), proposed site improvements, existing facilities, and significant natural features.
    - Include a legend, north arrow and graphic scale.
    - Improvements shown as an overlay on aerial photos also may be submitted.
    - Provide to-scale building elevations and floor plans as applicable.

8. **Pre-project tasks:** Identify tasks that must be completed prior to starting the project.

9. **Permits:** List all necessary permits and/or certifications.

10. **ADA Transition Plan:** Is this project site identified in your community's ADA Transition Plan? If yes, provide a brief description of the improvements identified in the plan and outline how this project addresses them.

11. **ADA requirements:** Does this project meet ADA requirements? If yes, describe the handicapped accessible features of this project. If no, describe why a handicapped accessible facility is impracticable and outline how handicapped accessibility needs are met within the area. See Designing Facilities for ADA in the application packet.

12. **Exceeding ADA requirements:** Does this project exceed ADA requirements? If yes, describe the handicapped accessible features that exceed ADA requirements. See Designing Facilities for ADA in the application packet.

13. **Is this project identified as high local priority in your certified Future Land Use Plan or local Access Plan?** If yes, provide a brief description of the plan and a statement of the extent to which the project implements the policies of the plan.

14. **Is this project reflected in other policy documents or ordinances?** If yes, provide a brief description of the document or ordinance and a statement of the extent to which the project implements goals of the document or ordinance.

15. **Previous grants:** List Access Grants previously received from DCM at this site by year. Use the DCM map of past grants awarded.

16. **User fees: Is a user fee charged at this site?** Do you charge user fees at any other DCM funded sites? If yes to either of these questions, provide the most recent annual accounting report as required by 15A NCAC 07M .310(d).

Project Budget

This form must be completed and included with your application. Round project costs to the dollar.

If available, attach a detailed breakdown of the cost assumptions upon which the Project Budget is based. Proposals that include this information increase their likelihood of funding.

Project Elements	Grant	Cash Match	In Kind	Total
Land Acquisition Costs				
N/A	$	$	$	$**0**
	$	$	$	$**0**
	$0.00	$0.00	$0.00	$**0**
Permit and Design Fees				
CAMA/Zoning/Flood/Land Disturbance/Building Permit	$0.00	$0.00	$800	$**800**
Design	$0	$0	$8000	$**8000**
Survey	$0.0	$2200	$0	$**2200**
Site Improvement Costs: Materials				
Dune Walkover	$80000	$20000	$0	$**100000**
Site Amenities	$12488	$4163	$	$**16651**
	$	$	$	$**0**
Site Improvement Costs: Labor				
Site Preparation (demolition & haul off, erosion control and grading)	$14000	$0.00	$0.00	$**14000**
Dune Walkover	$82000	$28000	$0	$**110000**
Site Amenities	$14363	$4788	$0	$**19151**
Local Administrative Costs				
5% Contingency	$4818	$1639	$0	$**6457**
	$	$	$	$**0**
	$0	$0	$0	$**0**

Totals	$**207669**	$**60790**	$**8800**	$**277259**
Match Percentages	75 **%**	22 **%**	3 **%**	100 **%**

Proposed Local Match

Local Government: The Town of Nags Head **Project Name:** June Street Beach Access

Instructions: Use the form below to show the sources of your matching funds. Indicate if these funds are currently available or are the funds yet to be approved. If funds are yet to be approved, list the date for approval. If applicable, provide additional narrative related to in-kind match and/or state/federal funds.

Applicants are encouraged to include their local contribution in their budget.

Source of Matching Funds			
Type of Matching Funds	**Amount of Funds**	**Funding Source**	**Availability (Month/Year)**
Cash	$ 60790.00	Town CIP FY 24/25	April 2024
In-kind	$ 8800	In House Design & Permitting	April 2024
	$		
	$		
	$		
Total Matching Funds:	$ 69590		

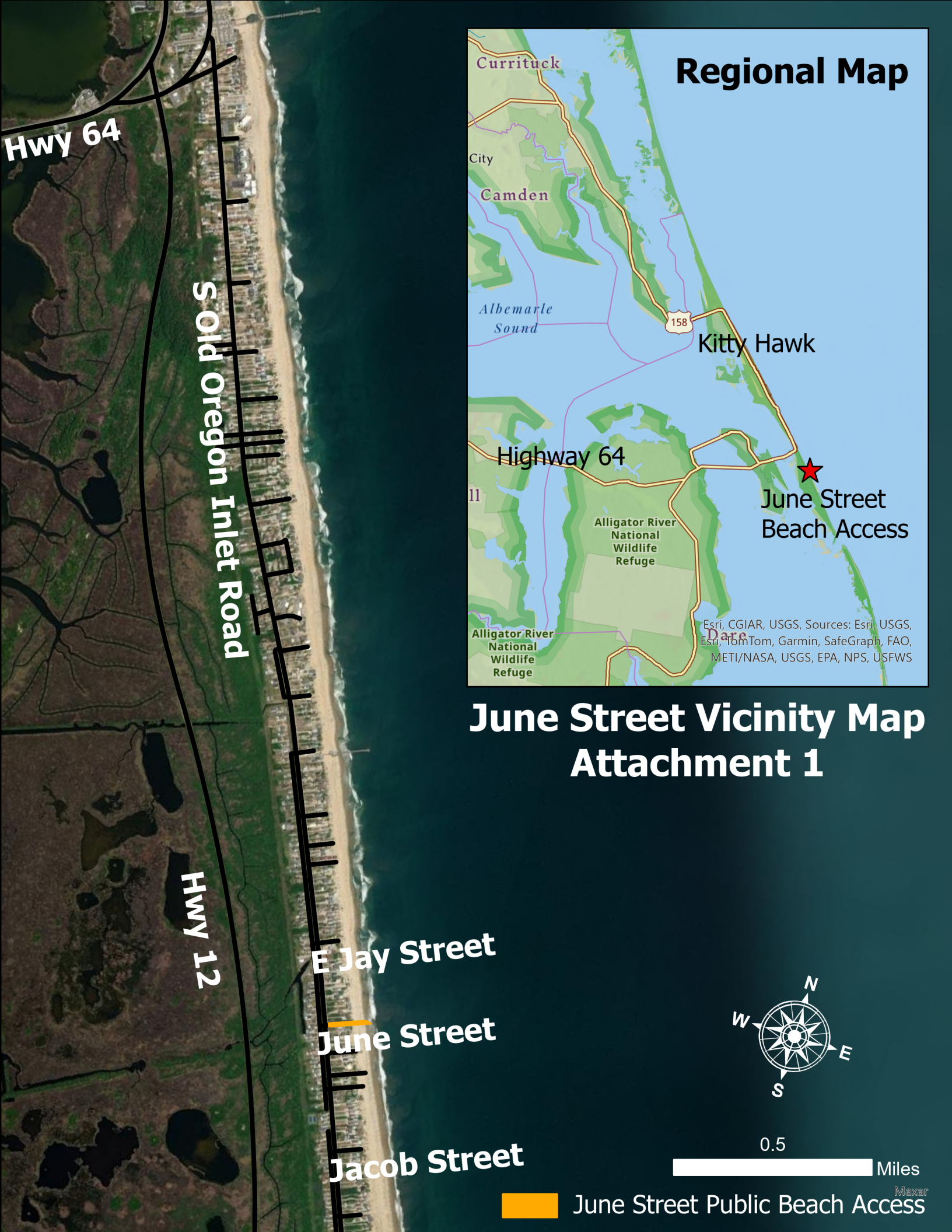
Additional Narrative:

Provide narrative explaining the relevance of proposed in-kind match to the project.

The Town of Nags Head has an Engineer on staff,and can offer the production of construction documents for the associated project. This not only saves contractual costs, but allows the town to have direct construction oversight of the installation based on the in-depth knowledge of the design documents. The town can also better control consistency of beach walkovers throughout town. The remaining in-kind match includes the fees associated with state level and town permitting required for the project.

If other state and/or federal funds are to be used as local match, indicate the specific project elements that will qualify for joint funding. How viable is the project if complementary funding from another program is not secured?

N/A

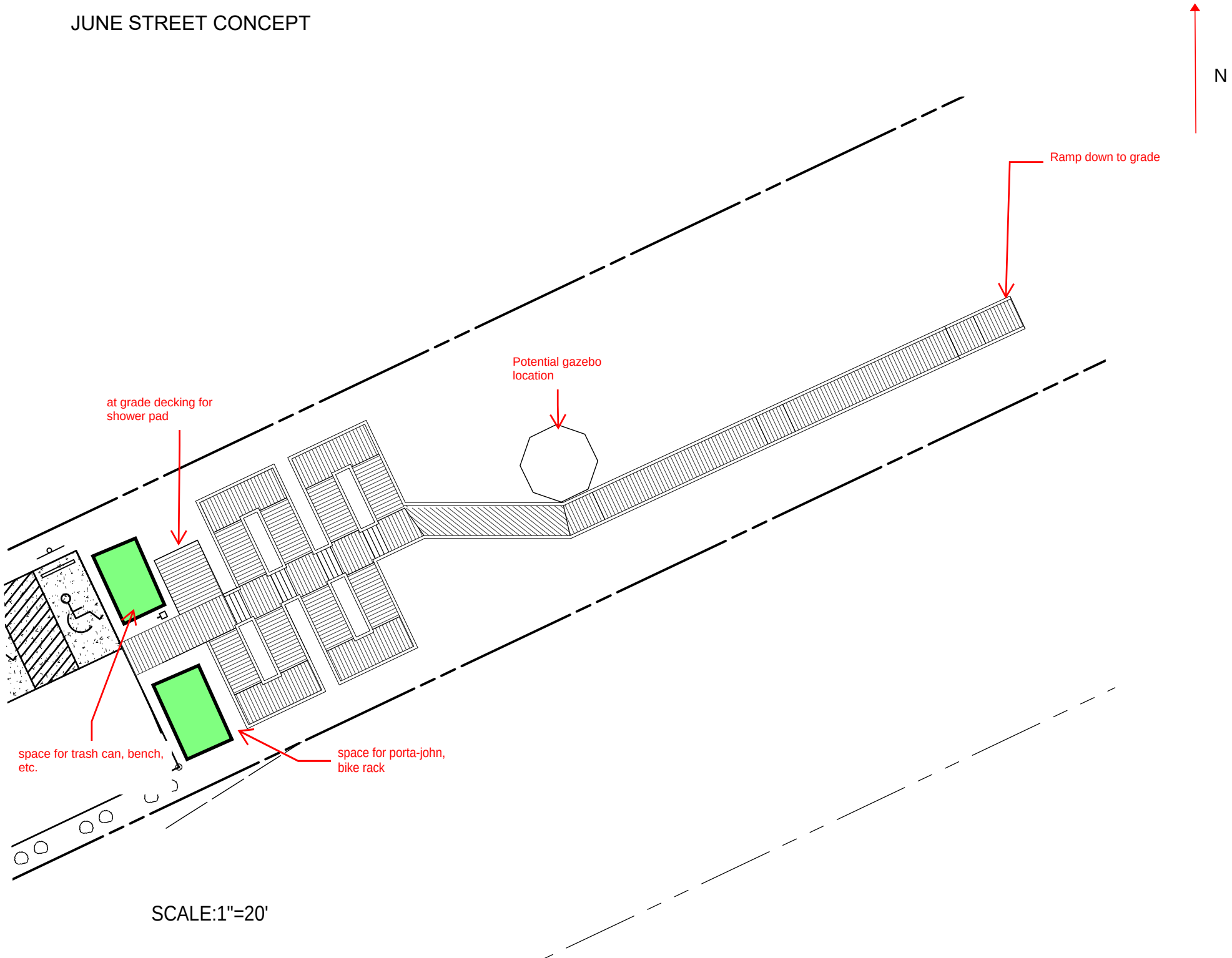


June Street Vicinity Map
Attachment 1


June Street Beach Access Existing Conditions
Attachment 2
Zoning: R2 Medium-Density Residential
Existing Use: Residential Townhouse
porta john, trash receptacle, lamp post,
dog pickup station, shower station/water tap,
custom bench, red mailbox/dedication
June St
Existing Parking to Remain
bike rack
Zoning: R2 Medium-Density Residential
Existing Use: Single Family Residential
Legend
Existing Site Elements
June Street Beach Access Property Boundary
1 Foot Contours
Parcels
N
W
E
S
0
25
50
100 Feet

ATTACHMENT 3

JUNE STREET CONCEPT



SCALE:1"=20'

Benjamin Cahoon
Mayor

Michael Siers
Mayor Pro Tem

Andy Garman
Town Manager

Town of Nags Head
Post Office Box 99
Nags Head, NC 27959
Telephone 252-441-5508
Fax 252-441-0776
www.nagsheadnc.gov

Kevin Brinkley
Commissioner

Bob Sanders
Commissioner

Megan Lambert
Commissioner

PUBLIC NOTICE

NOTICE IS HEREBY GIVEN that the Nags Head Board of Commissioners will conduct a public hearing on **Wednesday, July 3, 2024** beginning at 9:00 am in the Board Room of the Municipal Complex, 5401 S Croatan Highway, Nags Head, NC to consider and take action upon the following request:

Public Hearing to consider a North Carolina Public Beach and Coastal Waterfront Access Grant Application

A copy of the application request will be available for public inspection at the Nags Head Planning and Development Department and the Office of the Town Clerk, Town Municipal Complex, 5401 S. Croatan Hwy, Nags Head, NC 27959, telephone (252) 441-5508 during normal business hours.

As a result of this hearing, substantial changes may be made in the proposal as advertised to reflect objections, debate and discussion at the hearing. Any person desiring to be heard on the proposal as stated above should appear at the time and place specified above.

This is the 17th day of June 2024.

Kelly Wyatt
Planning Director

For publication in the Coastland Times on Wednesday, June 19th and on Wednesday, June 26th 2024.
Please use Nags Head logo and legal print.

Agenda Item Summary Sheet

Item No: **G-1**
Meeting Date: **July 3, 2024**

Item Title: Update from Planning Director

Item Summary:

Please find attached a monthly update, with attachments, from Planning Director Kelly Wyatt.

Number of Attachments: 1

Specific Action Requested:

Provided for Board information and update.

Submitted By: Planning and Development Date: June 26, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I will participate in the discussion as necessary.

Signature: Andy Garman Date: June 26, 2024

MEMORANDUM
Town of Nags Head
Planning & Development Department

To: Board of Commissioners
Planning Board

From: Kelly Wyatt, Planning Director
Joe Costello, Deputy Planning Director

Date: June 28, 2024

Subject: Planning and Development Director's Report (G-1)

This memo provides an overview of selected Planning and Development Department activities, projects, and initiatives. If requested, Staff will be prepared to discuss any of this information in detail at the Board of Commissioners meeting on July 3rd, 2024.

Monthly Activity Report

Attached for the Board's review is the *Planning and Development Monthly Report for May 2024. In* addition to permitting, inspections, code enforcement, and Todd D. Krafft Septic Health Initiative activities, Staff was involved in the following meetings or activities of note during the month of June:

- Tuesday, June 4th – Technical Review Committee Meeting (Inn at Whalebone)
- Wednesday, June 5th - Board of Commissioners Meeting
- Thursday, June 6th – CRS Users Group Meeting, Elevation Certificate Training
- Wednesday, June 12th – Committee for Art and Culture Meeting
- Wednesday, June 12th – Eastern Carolina Council Resource Roundtable
- Thursday, June 13th – Board of Adjustment Meeting (no hearings)
- Tuesday, June 18th – Planning Board Meeting
- Wednesday, June 19th – Board of Commissioners mid-month meeting
- Dowdy Park Farmers Market – Thursday, June 13th, 20th, and 27th.
- Dowdy Park Summer Concert Series – Wednesday, June 19th and June 26th

Planning Board - Pending Applications and Discussions

The Planning Board's most recent meeting was held on Tuesday, June 18, 2024. The following items were heard:

- Consideration of a Site Plan Amendment for construction of an 87-unit Hotel (Inn at Whalebone) including a request to eliminate or modify the condition of the October 4, 2023 Board of Commissioners approval that the existing Lakeside Street roadway be expanded to accommodate three lanes of traffic. The Planning Board voted 4 to 3 to recommend approval of the site plan amendments and the modification proposed by the Town Engineer as it pertains to the Lakeside Street expansion.
- Consideration of a Sketch Plan Review application for construction of a 2,279 square foot stand-alone restaurant at 7100 S. Croatan Highway (Outlets Nags Head). The Planning Board did not have any significant questions or concerns with the proposal at this time.
- Consideration of various amendments to the Unified Development Ordinance as it pertains to

the use of multi-family dwelling developments. Staff provided a brief presentation to the Planning Board and noted that they would return at their July meeting presenting the ordinance revisions in their final format for the Planning Board's formal recommendation.

- Planning staff requested that the Planning Board consider initiating a text amendment to the Unified Development Ordinance as it pertains to the dormitory use in the SED-80, Special Environmental District to facilitate the construction of lifeguard housing at 425 W. Health Center Drive, Nags Head. The Planning Board voted unanimously to initiate the necessary text amendments.

The Planning Board's next meeting is scheduled for Tuesday, July 16th, 2024. Currently, the agenda is expected to include consideration of a text amendment request from Anlauf Engineering PLLC on behalf of the Ark Church to modify the definition of "Religious Complex" to allow for a single-family residence of church staff in addition to the already allowed parsonage. Additionally, the agenda is anticipated to include consideration of various text amendments to the SED-80, Special Environmental District to permit the construction of a dormitory for housing Town of Nags Head lifeguard staff.

Board of Adjustment – Recent and Pending Applications

There were no items for the Board of Adjustments consideration in June 2024.

Additional Updates

- **DWMP/Septic Health Advisory Committee** – The Septic Health Advisory Committee is scheduled to meet on Thursday, July 25th. To advance the recommendations of the Decentralized Wastewater Management Plan four (4) additional water quality monitoring loggers have been purchased, and the department has recently received the GPS unit needed to begin mapping locations of existing septic systems within the Town.

- **Estuarine Shoreline Management Plan** – Unfortunately, the town was not invited to submit a full proposal for the National Fish and Wildlife Foundations National Coastal Resilience Fund grant. In light of this, we have revised our grant application for the NC Resilient Coastal Communities Program, Phase 3 grant, requesting a total of $500,000 with a matching contribution of $40,000.

- **Electric Vehicle Action Plan** – LoWire Technologies is in the process of installing the two (2) Level II EV Chargers at Town Hall.

- **Sand Relocation and Dune Management Cost Share Program** – The Dune Management Cost Share Application period closed the week of June 24th with the entire $400,000 being allocated to 138 participants. Planning and Finance staff are now working to process the reimbursements.

- **Public Beach and Coastal Waterfront Access Grant Program** – Staff has been informed that the pre-application to the NC Public Beach and Coastal Waterfront Access Program has been selected to submit a Final Application for improvements to the June Street Beach Access. The deadline for final application submission is August 2nd, 2024. Item F-1 on Board of Commissioners July 3rd meeting is the Public Hearing to consider the grant application for improvements to the June Street Public Beach Access in S. Nags Head.

- **Dowdy Park Events/Farmers Market/Holiday Markets/Art & Culture** – Summertime at Dowdy Park is in full swing. For the month of July, the Town will be hosting the following:
  - Yoga on the Lawn, Tuesday mornings 7:30 – 8:30am all month long.
  - Fitness Fridays, Friday mornings 7:30 – 8:15am all month long.

- Summer Concert Series, Wednesday evenings 6:30 – 8:00pm.
    - SOUL One on July 3rd
    - The Bee Keepers on July 10th
    - Troy Breslow Band on July 17th
    - Will Overman Band on July 24th
    - Rob Oliver Trio on July 31st
- Dowdy Park Farmers Markets, Thursdays 9am – 1pm: July 4th, 11th, 18th, & 25th
- Family Fun Night, Tuesday, July 2nd at 4pm – 7pm – Outer Banks Summer Tale Fest, Storytelling event with crafts, kids activities and lawn games.
- Movie at Dowdy Park, Friday, July 12th – partnership with Outer Banks Health.

Upcoming Meetings and Other Dates

- Tuesday, July 2nd – Technical Review Committee Meeting
- Wednesday, July 3rd - Board of Commissioners Meeting
- Wednesday, July 10th – Committee for Art and Culture Meeting
- Thursday, July 11th – Board of Adjustment Meeting (no hearings)
- Tuesday, July 16th – Planning Board Meeting
- Wednesday, July 17th – Board of Commissioners mid-month meeting
- Thursday, July 25th – Septic Health Advisory Committee Meeting
- Dowdy Park Farmers Market – Thursday, July 4th, 11th, 18th & 25th
- Dowdy Park Summer Concert Series – Wednesday, July 3rd, 10th, 17th, 24th, and 31st

TOWN OF NAGS HEAD PLANNING AND DEVELOPMENT
MONTHLY REPORT
MAY 2024

DATE SUBMITTED: June 7, 2024

	May-24	May-23	Apr-24	2023-2024 FISCAL YTD	2022-2023 FISCAL YTD	FISCAL YEAR INCREASE/ DECREASE
BUILDING PERMITS ISSUED - RESIDENTIAL						
New Single Family	2	1	1	16	14	2
New Single Family, 3000 sf or >	1	0	0	5	7	(2)
Duplex - New	0	0	0	1	0	1
Sub Total - New Residential	3	1	1	22	21	1
Miscellaneous (Total)	46	53	48	466	512	(46)
Accessory Structure	*2*	*6*	*7*	39	*48*	(9)
Addition	*0*	*4*	*1*	26	*27*	(1)
Demolition	*0*	*0*	*0*	5	*1*	4
Move	*1*	*0*	*0*	1	*0*	1
Remodel	*11*	*11*	*16*	119	*124*	(5)
Repair	*32*	*32*	*24*	276	*312*	(36)
Total Residential	**49**	**54**	**49**	**488**	**533**	(45)
BUILDING PERMITS ISSUED - COMMERCIAL						
Multi-Family - New	0	0	0	0	0	0
Motel/Hotel - New	0	0	0	0	0	0
Business/Govt/Other - New	0	0	0	0	2	(2)
Subtotal - New Commercial	0	0	0	0	2	(2)
Miscellaneous (Total)	2	6	18	83	79	4
Accessory Structure	*0*	*1*	*7*	31	*25*	6
Addition	*0*	*0*	*0*	0	*0*	0
Demolition	*0*	*0*	*0*	1	*1*	0
Move	*0*	*0*	*0*	0	*0*	0
Remodel	*1*	*4*	*5*	25	*26*	(1)
Repair	*1*	*1*	*6*	26	*27*	(1)
Total Commercial	**2**	**6**	**18**	**83**	**81**	2
Grand Total	**51**	**60**	**67**	**571**	**614**	(43)
SUB-CONTRACTOR PERMITS						
Electrical	90	73	80	594	555	39
Gas	3	4	3	35	34	1
Mechanical	57	43	54	375	376	(1)
Plumbing	6	6	16	122	102	20
Fire Sprinkler	0	0	1	4	3	1
VALUE						
New Single Family	$650,000	$280,000	$560,000	$8,802,995	$7,314,026	$1,488,969
New Single Family, 3000 sf or >	$2,000,000	$0	$0	$4,642,945	$7,233,733	($2,590,788)
Duplex - New	$0	$0	$0	$711,000	$0	$711,000
Misc (Total Residential)	$1,116,214	$1,900,005	$1,262,571	$16,525,941	$17,400,940	($874,999)
Sub Total Residential	**$3,766,214**	**$2,180,005**	**$1,822,571**	**$30,682,881**	**$31,948,699**	($1,265,818)
Multi-Family - New	$0	$0	$0	$0	$0	$0
Motel/Hotel - New	$0	$0	$0	$0	$0	$0
Business/Govt/Other - New	$0	$0	$0	$0	$17,988,350	($17,988,350)
Misc (Total Commercial)	$65,750	$307,911	$648,577	$4,755,890	$2,738,742	$2,017,148
Sub Total Commercial	**$65,750**	**$307,911**	**$648,577**	**$4,755,890**	**$20,727,092**	($15,971,202)
Grand Total	**$3,831,964**	**$2,487,916**	**$2,471,148**	**$35,438,771**	**$52,675,791**	**($17,237,020)**

TOWN OF NAGS HEAD PLANNING AND DEVELOPMENT
MONTHLY REPORT
MAY 2024

DATE SUBMITTED: June 7, 2024

	May-24	May-23	Apr-24	2023-2024 FISCAL YTD	2022-2023 FISCAL YTD	FISCAL YEAR INCREASE/ DECREASE
ZONING						
Zoning Permits	57	66	69	620	623	(3)
Soil & Erosion	3	N/A	0	19	N/A	N/A
Stormwater Plans	2	N/A	1	31	N/A	N/A
CAMA						
CAMA LPO Permits	3	3	3	36	34	2
CAMA LPO Exemptions	15	11	7	72	72	0
Sand Relocations			31	281	279	N/A
CODE COMPLIANCE						
Cases Investigated	38	54	19	305	713	(408)
Warnings	6	3	3	37	101	(64)
NOVs Issued	32	51	15	263	195	68
Civil Citations (#)	0	0	0	1	10	(9)
Civil Citations ($)	$0	$0	$0	$0	$23,150	($23,150)
SEPTIC HEALTH						
Tanks inspected	6	12	8	100	127	(27)
Tanks pumped	10	37	5	110	113	(3)
Water quality sites tested	26	15	2	97	217	(120)
Personnel Hours in Training/School	32	6	52	403	212	191

Kelly Wyatt

Kelly Wyatt, Planning Director

Agenda Item Summary Sheet

Item No: **G-2**
Meeting Date: **July 3, 2024**

Item Title: Discussion of potential Accessory Dwelling Unit (ADU) ordinance and existing conditions within the town.

Item Summary:

In an effort to advance the discussion of a potential Accessory Dwelling Unit (ADU) ordinance, staff will provide a presentation to the Board of Commissioners highlighting the similarities and interconnectedness between Accessory Dwelling Units, Partial-Home Short Term Rentals and Duplexes. Staff would submit that many existing partial home short-term rentals within the town are already functioning similarly to an accessory dwelling unit. Both accessory dwelling units and short-term rentals provide additional living spaces that can be rented out as separate, independent housekeeping with similar operational characteristics. In addition, many of the existing partial-home short-term rentals, and should we permit them, attached accessory dwelling units, would be comparable to duplexes in terms of structure and use.

In order to have a better understanding of how a potential ADU ordinance may affect the Town, staff believes it is important to discuss and gain understanding of the current situation within the Town, the overlap between these uses, the need for regulatory consistency, and to gain input on steps for moving forward to enhance the safety and functionality of existing and future structures within the Town.

Number of Attachments: 0

Specific Action Requested:

Discussion of potential Accessory Dwelling Unit (ADU) Ordinance and existing conditions within the Town.

Submitted By: Planning and Development Date: June 28, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 28, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 28, 2024

Town Manager Comment and/or Recommendation:

I will participate in the discussion.

Signature: Andy Garman Date: June 28, 2024

Agenda Item Summary Sheet

Item No: **G-3**
Meeting Date: **July 3, 2024**

Item Title: Consideration of a Site Plan Amendment for an 87-unit hotel, Inn at Whalebone.

Item Summary:
Consideration of a Site Plan Amendment for the construction of an 87-unit Hotel (Inn at Whalebone) and all necessary site improvements. This Site Plan was last reviewed at the Board of Commissioners October 4, 2023 meeting at which time the Board voted unanimously to recommend approval of the site plan with two conditions as noted below:

1. The existing roadway is to be expanded to accommodate three (3) lanes of traffic, and the three (3) lanes should extend to the most westward entrance of the hotel off Lakeside Street.
2. An approved subdivision plat addressing the portions of lots 24, 29, 30 and 31 and a recombination plat addressing lots 32, 33, 34, 35, 36, 22, 23, 26 and 27 be approved and filed at the Dare County Register of Deeds prior to the issuance of any development permits for the proposed hotel project.

The applicant is requesting that consideration be given to various Site Plan Amendments as well as a request to eliminate in whole, or modify, the requirements imposed by condition #1 as it relates to W. Lakeside Street.

Staff Recommendation/Planning Board Recommendation
Based on the staff's review and analysis of the proposed site plan amendments, we find that the modifications comply with the Unified Development Ordinance (UDO) and recommend approval as presented.

Regarding the applicant's request to remove or modify the condition to widen Lakeside Street, this condition was included in the October 4, 2023, Board of Commissioners approval to address traffic concerns raised by citizens and Board members. While fully meeting this condition could impact runoff onto adjacent properties and conflict with above-ground utilities, there is an opportunity to widen a portion of the roadway. This approach would fulfill the intent of the Board of Commissioners' conditioned approval without encroaching on adjoining properties. Staff recommends that the Board of Commissioners consider modifying the approval to reflect the alternative roadway design proposed by the Town Engineer.

At their June 18, 2024 meeting, the Planning Board voted 4 to 3 to recommend approval of the Site Plan Amendments and modification of the condition related to the widening of Lakeside Street.

Number of Attachments: 1

Specific Action Requested:
Consider the Site Plan Amendment request.

Submitted By: Planning and Development Date: June 28, 2024

Finance Officer Comment:
Insufficient information to determine fiscal impact.

Signature: Amy Miller Date: June 28, 2024

Town Attorney Comment:
Attorney Leidy will participate in the discussion as necessary.

Signature: John Leidy Date: June 28, 2024

Town Manager Comment and/or Recommendation:
I will participate in the discussion as necessary.

Signature: Andy Garman Date: June 28, 2024

STAFF REPORT
Town of Nags Head
Planning & Development Department

To: Board of Commissioners

From: Kelly Wyatt, Planning Director
Joe Costello, Deputy Planning Director

Date: June 28, 2024

Subject: Site Plan Amendment for Inn at Whalebone, 87-unit Hotel located at 6632 W. Pheasant Avenue (W. Lakeside Street).

BACKGROUND INFORMATION

At their October 4, 2023, meeting, the Nags Head Board of Commissioners reviewed the Site Plan Application request to construct a 90-unit hotel, Inn at Whalebone at 6632 W. Pheasant Avenue (W. Lakeside Street). The Board of Commissioners voted unanimously to approve the site plan with the two conditions noted below:

1. The existing roadway is to be expanded to accommodate three (3) lanes of traffic, and the three (3) lanes should extend to the most westward entrance of the hotel off Lakeside Street.

2. An approved subdivision plat addressing the portions of lots 24, 29, 30 and 31 and a recombination plat addressing lots 32, 33, 34, 35, 36, 22, 23, 26 and 27 be approved and filed at the Dare County Register of Deeds prior to the issuance of any development permits for the proposed hotel project.

Shortly after the site plan approval, the applicant worked with Bissell Professional Group to prepare the necessary subdivision plat and have it recorded with the Dare County Register of Deeds. Condition # 2 has been satisfied.

At this time, the applicant is requesting that consideration be given to various Site Plan amendments as well as a request to eliminate in whole, or modify, the requirements imposed by Condition #1 as it relates to the widening of Lakeside Street.

Site Plan Amendment Review

Section 4.4 of the Unified Development Ordinance sets forth the criteria for what types of development may be reviewed and approved administratively by staff. In addition to listing what constitutes minor versus major site plan modifications, it states that the UDO Administrator has the authority to determine when projects shall require a Major Site Plan due to other project activities or unique circumstances. As the UDO Administrator, Planning Director Kelly Wyatt made the determination that the proposed modifications were major in nature as the project had notable concerns with traffic

circulation, access, and stormwater management from its original review in October of 2022.

The applicant has outlined the modifications from the most recent Board of Commissioners approval on October 4, 2023, in their attached Site Plan Amendment Project Narrative. It notes that many of the modifications were in response to achieving state stormwater and wastewater approvals. These modifications include:

- This project was originally approved as a 90-unit hotel; however, the revised plan seeks approval for an 87-unit hotel.
- The overall area of the proposed building has increased by 729 square feet.
- With the proposed reduction in hotel units, 87 parking spaces are now required. The revised parking is compliant with 90 proposed spaces.
- Building lot coverage has increased from 12.94% to 13.4%. With 35% allowed, this lot coverage remains compliant.
- Parking lot coverage has increased from 36.18% to 38.6%. With 45% allowed, lot coverage remains compliant.
- The minimum required landscaped area of 20% remains at 28%.
- Numerous modifications have been made to the stormwater management design.

Town Engineer David Ryan has reviewed the revised plans and notes that the stormwater narrative on Sheet C-103 indicates a Seasonal High Water Table Elevation of 3.50' MSL. The typical infiltration basin detail indicates a SHWL of 4.8'. This discrepancy should be clarified. The stormwater management design information submitted appears to be in substantial compliance with the Town of Nags Head Unified Development Ordinance.

Staff reports from this project original review and approval on October 5, 2022, and subsequent review and approval on October 4, 2023, are attached for the Planning Board's consideration.

Based upon the staff's analysis, the proposed modifications remain compliant with the requirements of the Unified Development Ordinance.

<u>Lakeside Street Widening Condition of Approval Review</u>

The applicant has submitted a request that the Planning Board and Board of Commissioners consider amending or removing the condition placed upon their October 4, 2023 Site Plan Approval that Lakeside Street roadway be expanded to accommodate three (3) lanes of traffic, and the three (3) lanes should extend to the most westward entrance of the hotel off Lakeside Street.

MacConnell & Associates, P.C. has provided a Technical Memorandum outlining the impacts and challenges associated with this request. MacConnell & Associates, P.C. provided a Turn Lane Exhibit for town staff and Board consideration, it is attached for the Planning Board's review. Town Engineer, David Ryan has conducted a review of this proposed exhibit and has provided the following comments:

***"Lakeside Street Turn Lane Exhibit**- A condition was placed on the previous site plan approval to widen the Lakeside St roadway extending from S. Croatan Hwy. to the westernmost boundary of the subject property. With the existing Lakeside St. right-of-way width at 40' there are some impacts associated with a roadway widening of this length. These impacts include runoff onto adjoining properties and potential conflicts with above ground utilities. However, there is still an opportunity to provide roadway widening to meet the intent of the previous Board of Commissioners conditioned approval.*

The applicant has submitted an exhibit which shows a reduced widening plan from the eastern property boundary. This concept indicates an encroachment onto the adjoining undeveloped property to the south. Attached is an exhibit mark-up which describes a potential alternative roadway widening approach which may not result in improvements extending onto private property. The recommendation is for the applicant to modify the traffic improvements for Lakeside St. to reflect the approach as identified in the attached plan mark-up. This approval would be conditioned on the applicant acquiring detailed survey information for the development of a roadway widening and construction plan in accordance with Chapter 36-4 of the Town Code of Ordinances. It should be noted that a temporary construction easement may be required from the owner of the undeveloped property to the south for the purposes of construction in addition to a right-of-way encroachment through NCDOT."

STAFF RECOMMENDATION

Following review and analysis of the proposed site plan amendments, staff has determined that the modifications comply with the Unified Development Ordinance (UDO) and recommend approval as presented. However, the discrepancy in the seasonal high water table elevation noted by the Town Engineer on Sheet C-103 must be clarified before any permits can be issued.

Regarding the applicant's request to remove or modify the condition to widen Lakeside Street, this condition was included in the October 4, 2023, Board of Commissioners (BOC) approval to address traffic concerns raised by citizens and Board members. While fully meeting this condition could impact runoff onto adjacent properties and conflict with above-ground utilities, there is an opportunity to widen a portion of the roadway. This approach would fulfill the intent of the Board of Commissioners' conditioned approval without encroaching on adjoining properties. Staff recommends that the Board of Commissioners consider modifying the approval to reflect the alternative roadway design proposed by the Town Engineer.

PLANNING BOARD RECOMMENDATION

At their June 18, 2024 meeting, the Planning Board voted 4 to 3 to recommend approval of the Site Plan Amendments and modification of the condition related to the widening of Lakeside Street.

TOTAL PROPOSED SQUARE FOOTAGE ___ x .50 = $_____+

(Optional) VESTED RIGHT ☐ (no fee)

= TOTAL FEE DUE _____

TOWN OF NAGS HEAD

DATE RECEIVED _____

SITE PLAN REVIEW APPLICATION & CHECKLIST

1. **LOCATION AND ZONING INFORMATION**
   - A. PROJECT TITLE The Inn At Whalebone
   - B. STREET ADDRESS 6632 West Pheasant Ave.
   - C. SUBDIVISION Roanoke Shores
     LOT(S) 32-36 BLOCK _____ SECTION _____
   - D. PRESENT ZONING Village Hotel Overlay/SPD-C
   - E. PRESENT USE Vacant Lots
   - F. EXISTING NONCONFORMITIES _____
   - G. ABUTTING PROPERTY ZONING SPDC-COS/R3/C2
   - H. ABUTTING PROPERTY USE Golf Course / Gas Station / Residential

2. **CERTIFICATION AND STANDING**
   - A. As applicant of standing of the above-named project, I certify that the information on this checklist and the site plan is complete and accurate.

     _____
     OWNER ☐ AGENT ☐ CONTRACT ☑
     PURCHASER ☐
   - B. APPLICANT/DEVELOPER: NAME MacConnell and Associates, P.C.
     ADDRESS 501 Cascade Pointe Lane, Suite 103, Cary, NC 27513
     TELEPHONE (919) 467-1239
   - C. CONTACTPERSON: NAME David Barcal, PE
     ADDRESS 501 Cascade Pointe Lane, Suite 103, Cary, NC 27513
     TELEPHONE (919) 467-1239

3. **ADJACENT OWNERSHIP INFORMATION (TO BE SHOWN ON SITE PLAN)**
   NAME/ADDRESS (N) SEE ATTACHED
   NAME/ADDRESS (S) _____
   NAME/ADDRESS (E) _____
   NAME/ADDRESS (W) _____
   (If additional space is needed, please attach separate sheets.)

4. SITE PLAN AND SITE PLAN ATTACHMENT DATA

A. Site plan preparer MacConnell and Associates, P.C. Phone# (919) 467-1239

NC Registered ☑ Engineer ☐ Architect ☐ Surveyor. License# C-1039

B. The design for the attached Stormwater Management Plan includes:

☐ 1.5", 2-hour rainfall: retained on-site.

☑ 4.3", 2-hour rainfall: no important access or health-related impacts.

☐ 5.0", 2-hour rainfall: no unapproved impacts.

Drainage calculations have been prepared ☑ YES ☐ NO ATTACHED ☑ YES ☐ NO

Note: Stormwater Management Plan MUST be approved by the Town Engineer prior to Planning Board review for all listed permitted uses in the zoning ordinance.

C. Sewage disposal approval is being submitted in the form of:

☐ Attached tentative approval letter dated _____

☑ Attached final permit dated July 25, 2023

☐ State ☑ County

D. Project involves condominium ownership.

☑ NO ☐ YES, Three copies of condominium documents attached.

E. Amount of land-disturbing activity proposed 99,233 square feet.

A Soil Erosion and Sedimentation Control Plan has been prepared.

☑ NO ☑ YES; (1) Copy attached,
(2) Copy submitted to Dare County Soil Conservation Service, Manteo NC 27954.

F. Coastal Area Management Act (CAMA) permit. ☐ YES ☑ NO

5. INFORMATION TO BE SHOWN ON SITE PLAN

Twelve (12) copies for Planning Board review

A. **Property and ownership**	YES	COMMENTS
1. Present recorded owner and map book/cabinet reference of the site property.	✓	
2. Current PIN Number.	✓	
3. Site Address.	✓	
4. Owners' names, lot numbers or map book and page reference of all adjacent property owners.	✓	
5. Boundary of the entire parcel by course and distance.	✓	
6. Widths of the existing rights-of-way that abut the site.	✓	
7. Nature or purpose, location and size of existing easements.	N/A	
8. At all lot comers, points of tangents and any angle point along a given course of the site, iron pins minimum 3/8-inch diameter or 4x4-inch concrete monuments.	✓	
9. Plan to at least 1"=50' scale, showing north arrow and whether true or magnetic.	✓	
10. Signature and seal of preparer.	✓	
B. Existing features		
1. Streets, curbs, and sidewalks with type and width of pavement.	✓	
2. Topographic features of site and existing grades for any streets, storm drainage system including existing grades at four comers of all structures.	✓	

	YES	COMMENT
3. Flood zone(s) as determined by latest FEMA Flood Insurance Rate Map, with notation, "flood zone subject to change by FEMA."	✓	
4. All underground utilities and facilities including gasoline tanks and existing septic facilities (including tanks and fields).	N/A	
5. If the lot is within an ocean hazard Area of Environmental Concern, the location of the first line of stable natural vegetation, the CAMA setback line, and contour lines at 2-foot intervals depicting any dunes located within an oceanfront AEC that are to be disturbed by construction.	N/A	
6. The location of any marsh areas or estuarine waters or US Army Corps of Engineers 404 wetlands within or abutting the lot.	N/A	
7. If the lot is within the small surface water supply watershed AEC (within 1,200 feet from the Fresh Water Pond), the distance between the pond and proposed septic or sewage treatment system.	N/A	
8. Percentage of site to be included in calculation for undisturbed vegetation preservation compliance in Article 10, Part I of the Unified Development Ordinance.	N/A	
C. **Site improvements** in accordance with regulations of state of North Carolina, Dare County, and Town of Nags Head		
1. Proposed building type (e.g., concrete or frame), number of floors and dimensions.	✓	Frame
2. Proposed building elevations of all sides of building labeled in accordance with proposed architectural design criteria of Article 10, Part VI of the UDO.	✓	
3. Total height and number of stories of proposed structure(s). If increased height is being proposed in conjunction with increased setbacks, show increase allowed in tabular form on plan. Note definition of height in Appendix A of the Unified Development Ordinance.	✓	
4. Existing and proposed ground elevations at the corners of proposed structure(s).	✓	
5. Sanitary sewer facilities with connection to sewer system or septic tank.	✓	
6. Approximate locations of proposed underground utilities and any necessary easements.	✓	
7. Screened dumpster pad(s) accessible to left-side loaders and sized in accordance with the Town Code of Ordinances.	✓	
8. Proposed fire hydrants and extensions of water distribution lines.	✓	
9. Location and height of proposed free-standing signs. See requirements of Article 10, Part III of the Unified Development Ordinance.	✓	
10. Location of all sidewalks, curbs, drives, and parking within the site and proposed finished elevations.	✓	
11. Handicapped parking spaces, walks, ramps, and entrances in accordance with the NC State Building Code. Handicapped parking spaces to be 13 feet wide, marked with a free-standing handicapped sign.	✓	
12. The Vegetative Buffer Yard areas have been identified and the proper buffer yard provision(s) have been identified as outlined in the Unified Development Ordinance.	✓	
13. Layout of numbered stalls/loading zones in accordance with Article 10, Part II of the Unified Development Ordinance.	✓	

Commercial ☐ Residential ☐	Parking Spaces Required	Parking Spaces Shown	Loading Spaces
4 STORIES BUILDING SQUARE FOOTAGE: PRINCIPAL 13,405 ACCESSORY TOTAL 13,405	89	90	1
# EMPLOYEES 6			
#DWELLING/LODGING UNITS 87			

D. **EXPLANATORY NOTES**

1. Vicinity map. ✓
2. Total square feet of land area to undergo land-disturbing activity. ✓
3. The total required parking spaces versus the total parking spaces provided. Parking spaces to be numbered. ✓
4. Cross-section details of all streets, roads, ditches, and parking lot improvements. ✓
5. The number of dwelling/commercial units. If more than one use is proposed (e.g., large hotel with shops, etc.), show breakdown of units or square footage by building. ✓
6. If additional height above 35 feet is being proposed, the additional height and increased setbacks shall be laid out in tabular form. ✓
7. Total site coverage calculations. (Refer to UDO to calculate lot coverage for lots abutting ocean or sound). ✓
8. Components of the lighting plan (pole location, pole height, type of fixture, wattage, source of illumination, etc.). See Article 10, Part IV of the Unified Development Ordinance. ✓
9. A completed architectural points worksheet for commercial structures subject to residential design criteria. ✓

6. **PLAN AND ATTACHMENT PREPARER CERTIFICATION**

A. I certify that all information for which I am responsible is complete and accurate.

4/14/24
DATE

SIGNATURE OF ENGINEER ☑ ARCHITECT ☐ SURVEYOR ☐

B. The following individuals have contributed information or attachments to the plan:

Name	Phone#	Information Provided
Nitin Kulkarni	1-804-200-4085	Architectural

Site Specific Development Plan Option - Vested Right for Site Plans

Please be advised that as the owner, or agent for the owner, you have the opportunity to apply for and receive a Site-Specific Development Plan that will establish a Vested Right for this project for a period of time not to exceed two (2) years from the date the Board of Commissioners approves the plan. You must secure a building permit for this project within two (2) years of the approval date, or your Site-Specific Development Plan will expire. If you elect not to apply for a Site-Specific Development Plan, you must secure a building permit within six (6) months or else your site plan will expire.

If you choose the Site-Specific Development Plan option, please keep in mind the following concerns:

1. Although your project may be classified as a permitted use, by requesting a Site-Specific Development Plan your project will be processed as a Special Use for which a public hearing will be held, and an additional fee of $200.00 will be charged to process your application.
2. Once your Site-Specific Development Plan has been approved with vested rights status no modifications can be made to the plan.

If you wish to take advantage of the Vested Right process, please check off the Vested Right box on page one. If you do not, then leave the box blank.

P.O. Box 129
Morrisville, NC 27560

(919) 467-1239

MacCONNELL & Associates, P.C.
"Engineering Today For Tomorrow's Future"

501 Cascade Pointe Lane
Suite 103
Cary, NC 27513

www.macconnellandassoc.com

Technical Memorandum

To: Board of Commissioners
Client: Inn at Whalebone, LLC
Subject: The Inn at Whalebone
Project No.:C06001.00

Date: May 17, 2024
From: Gary S. MacConnell, P.E.
and Cricket Corwin, E.I.

Introduction

This is a request to amend/remove the road widening aspect of the original submittal due to the challenges of this task. This technical memorandum will also discuss two different road widening options and their impacts.

Option 1 – Complete Road Widening Impacts

- Road widening to the North
  - Significant impacts to the entrance and driveway of the service station that would result in the turn radius' not being met to the service station.
  - The customer staging area for gas pumps would be reduced at the service station.
  - Road widening would interfere with existing power poles.
  - Existing drainage ways would be covered up.
  - This would also eliminate the existing vegetative buffer.

- Road widening to the South
  - Completely cover up existing water line and service connections which would impact the accessibility of the water line making it difficult to maintain the line adequately. During construction, there could potentially be impacts to the operation of the water distribution system depending on the depth and material of the water line. This will impact future maintenance because the road would have to be shut down entirely, and pavement would have to be removed and replaced.
  - Would impact the frontage of the lots encroaching on existing driveways, power poles, mailboxes, fire hydrants, etc.
  - There would also be significant impact to the stormwater drainage and collection of the dwellings along the road by not only increasing the amount of impervious area but also covering up the existing drainage ditches with the proposed road.
  - Existing lot frontage would be reduced.

- Please also note that the North Carolina Department of Transportation does not have jurisdiction over this road.

- Because there is no existing stormwater infrastructure besides ditches, there would be no other way to convey stormwater from this road.
- With the road widening, where would be no shoulder on either side of the road.
- As shown in the attachment, 10' lanes are the minimum dimensions required to accommodate a single ingress lane and egress lane with a dedicated left turn lane and through with right turn lane. These dimensions severely impact the entirety of the road as described above.
- See attached street view images (3) of existing conditions looking toward S. Old Road near proposed Inn at Whalebone.

Option 2 – Road Widening only Lakeside Street/S Croatan Highway (Turn Lane) Impacts

- Additional land would need to be acquired near the S Croatan Highway in order add the turn lane.
- There would be a need to modify existing water lines and existing electrical and other utilities in the area.
- The curb return on the south side would need to be modified.
- See attached street view images (1 & 2) of existing conditions looking toward S. Croatan Highway from Lakeside Street.



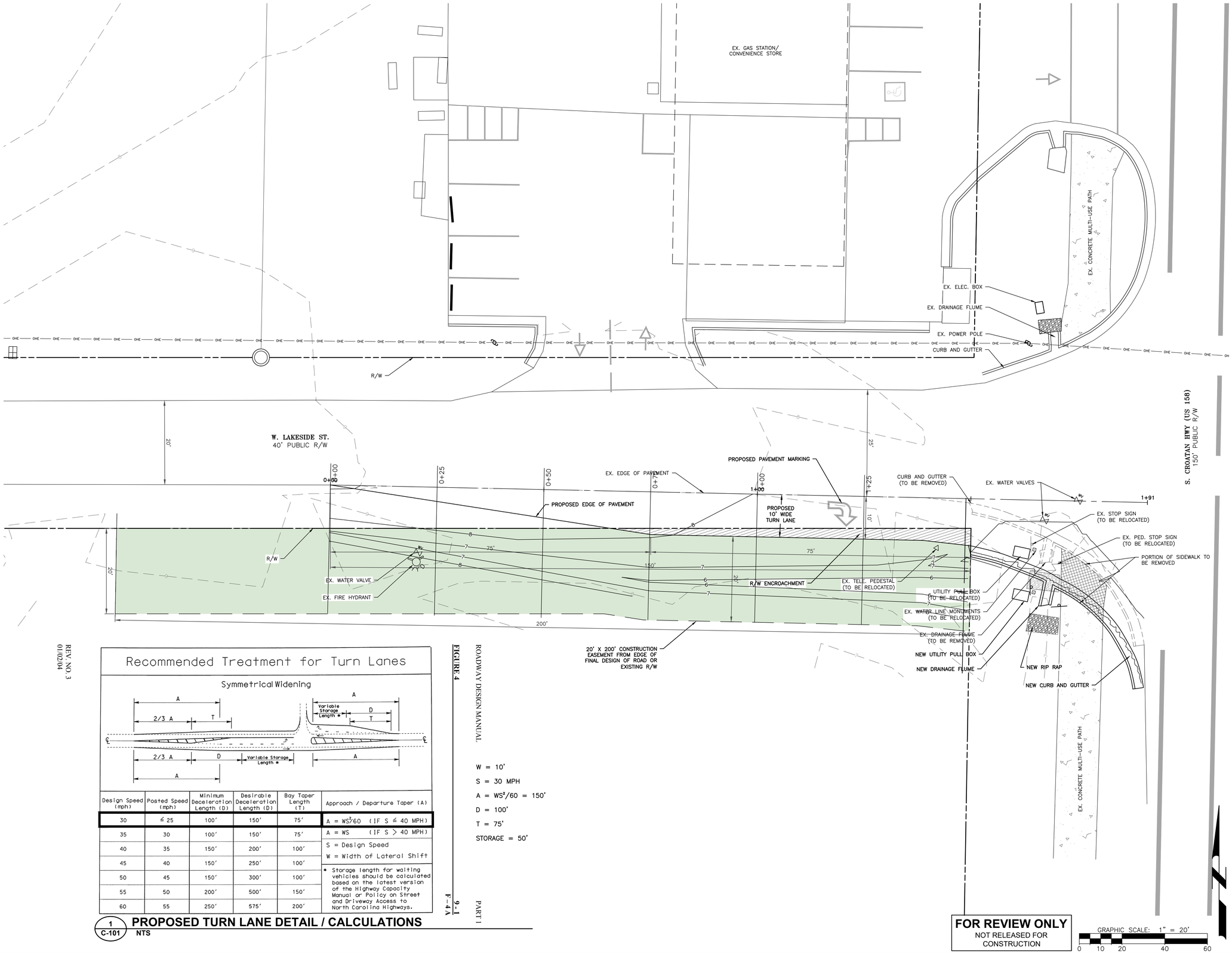
Image 1



Image 2



Image 3



REV. NO. 3
01/02/04

Recommended Treatment for Turn Lanes

Symmetrical Widening

Design Speed (mph)	Posted Speed (mph)	Minimum Deceleration Length (D)	Desirable Deceleration Length (D)	Bay Taper Length (T)	Approach / Departure Taper (A)
30	≤ 25	100'	150'	75'	$A = WS^2/60$ (IF $S \leq 40$ MPH)
35	30	100'	150'	75'	$A = WS$ (IF $S > 40$ MPH)
40	35	150'	200'	100'	S = Design Speed
45	40	150'	250'	100'	W = Width of Lateral Shift
50	45	150'	300'	100'	* Storage length for waiting vehicles should be calculated based on the latest version of the Highway Capacity Manual or Policy on Street and Driveway Access to North Carolina Highways.
55	50	200'	500'	150'	
60	55	250'	575'	200'	

FIGURE 4 ROADWAY DESIGN MANUAL PART 1 9-1-4A

W = 10'
S = 30 MPH
$A = WS^2/60 = 150'$
D = 100'
T = 75'
STORAGE = 50'

1 C-101 **PROPOSED TURN LANE DETAIL / CALCULATIONS**
NTS

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

NOTES

1. SEE C-101 FOR ALL GENERAL NOTES.

LEGEND

- 110 — INDEX CONTOUR
- 108 — INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- x — FENCE
- RIGHT-OF-WAY
- CREEK
- ss — EX. SANITARY SEWER
- w — EX. WATER LINE
- ss — NEW SANITARY SEWER
- NEW WATER LINE

REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	DCB
DRAWN BY:	CHECKED BY:
JDH	GSM

DATE: JUNE 6, 2024

PRELIMINARY
NOT RELEASED FOR CONSTRUCTION
FOR REVIEW ONLY
NORTH CAROLINA
PROFESSIONAL ENGINEER
DAVID C. MACCONNELL
6/11/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
LICENSE No. C-1039
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

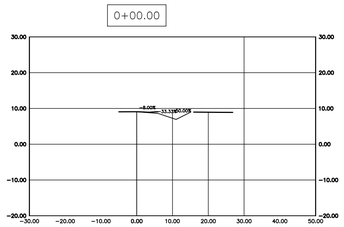
TRAFFIC IMPROVEMENTS FOR W. LAKESIDE ST.

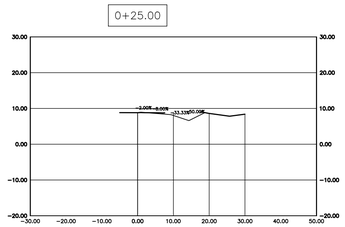
DARE COUNTY, NC

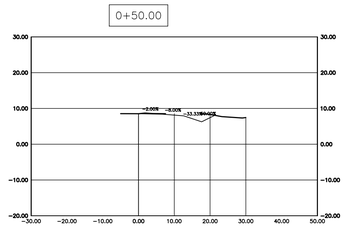
TURN LANE EXHIBIT

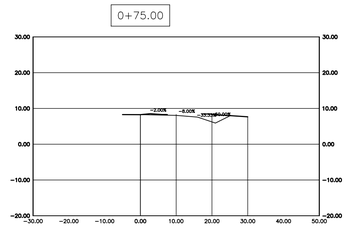
PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-101

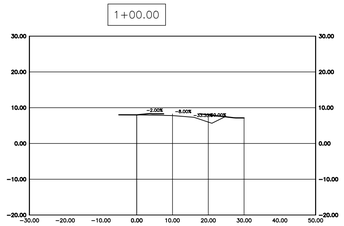
COPYRIGHT © 2024

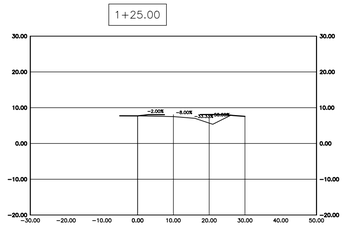












NOTES

1. SEE C-101 FOR ALL GENERAL NOTES.

LEGEND

- 110 — INDEX CONTOUR
- 108 — INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- x — FENCE
- RIGHT-OF-WAY
- CREEK
- ss — EX. SANITARY SEWER
- w — EX. WATER LINE
- ss — NEW SANITARY SEWER
- NEW WATER LINE

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REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER: GSM	PROJECT ENGINEER: DCB
DRAWN BY: JDH	CHECKED BY: GSM

DATE: JUNE 6, 2024

PRELIMINARY
NOT RELEASED FOR CONSTRUCTION
FOR REVIEW ONLY
NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 042161 DAVID C. MACCONNELL
6/11/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

TRAFFIC IMPROVEMENTS FOR W. LAKESIDE ST.

DARE COUNTY, NC

CROSS SECTIONS

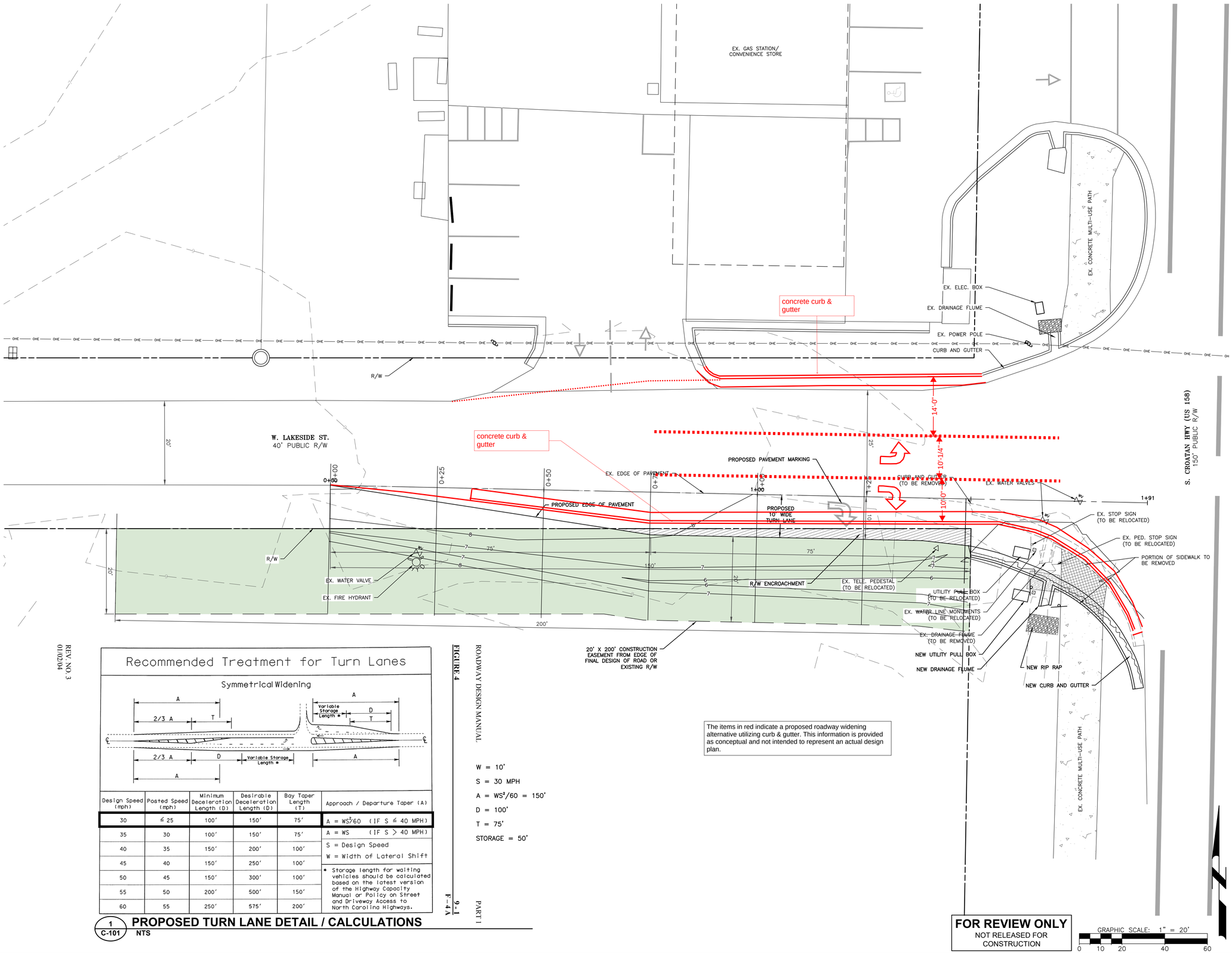
PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-102

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

N

TOWN ENGINEER MARK-UP, STAFF RECOMMENDED LAYOUT



Recommended Treatment for Turn Lanes

Symmetrical Widening

Design Speed (mph)	Posted Speed (mph)	Minimum Deceleration Length (D)	Desirable Deceleration Length (D)	Bay Taper Length (T)	Approach / Departure Taper (A)
30	≤ 25	100′	150′	75′	$A = WS^2/60$ (IF S ≤ 40 MPH)
35	30	100′	150′	75′	$A = WS$ (IF S > 40 MPH)
40	35	150′	200′	100′	S = Design Speed
45	40	150′	250′	100′	W = Width of Lateral Shift
50	45	150′	300′	100′	* Storage length for waiting vehicles should be calculated based on the latest version of the Highway Capacity Manual or Policy on Street and Driveway Access to North Carolina Highways.
55	50	200′	500′	150′	
60	55	250′	575′	200′	

REV. NO. 3
01/02/04

FIGURE 4 — ROADWAY DESIGN MANUAL — PART 1 — 9-1 — F-4-A

W = 10′
S = 30 MPH
A = $WS^2/60$ = 150′
D = 100′
T = 75′
STORAGE = 50′

1 / C-101 **PROPOSED TURN LANE DETAIL / CALCULATIONS**
NTS

The items in red indicate a proposed roadway widening alternative utilizing curb & gutter. This information is provided as conceptual and not intended to represent an actual design plan.

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GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

NOTES

1. SEE C-101 FOR ALL GENERAL NOTES.

LEGEND

- 110 — INDEX CONTOUR
- 108 — INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- x — FENCE
- RIGHT-OF-WAY
- CREEK
- ss — EX. SANITARY SEWER
- w — EX. WATER LINE
- ss — NEW SANITARY SEWER
- NEW WATER LINE

REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	DCB
DRAWN BY:	CHECKED BY:
JDH	GSM

DATE: JUNE 6, 2024

PRELIMINARY — NOT RELEASED FOR CONSTRUCTION — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047162 — FOR REVIEW ONLY — RELEASED FOR CONSTRUCTION — MacCONNELL — 6/11/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510
LICENSE No. C-1039

THE INN AT WHALEBONE, LLC

TRAFFIC IMPROVEMENTS FOR W. LAKESIDE ST.

DARE COUNTY, NC

TURN LANE EXHIBIT

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-101

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P.O. Box 129
Morrisville, NC 27560

(919) 467-1239

MacCONNELL & Associates, P.C.
"Engineering Today For Tomorrow's Future"

501 Cascade Pointe Lane
Suite 103
Cary, NC 27513

www.macconnellandassoc.com

Site Plan Amendment Project Narrative

To: Board of Commissioners
Client: Inn at Whalebone, LLC
Subject: The Inn at Whalebone
Project No.:C06001.00

Date: May 16, 2024
From: Gary S. MacConnell, P.E.
and Cricket Corwin, E.I.

Introduction

The modifications that were made to the original site plan were necessary to achieve site approval for the stormwater permits and to accommodate for the wastewater design. Additionally, these adjustments were made to meet specific requirements outlined by Marriott, particularly regarding the downsizing of rooms to accommodate their preference for 12% suite rooms, as well as additional space for common areas such as the gym and breakfast lobby. Please see below for a list of other changes that were considered in the site plan revision.

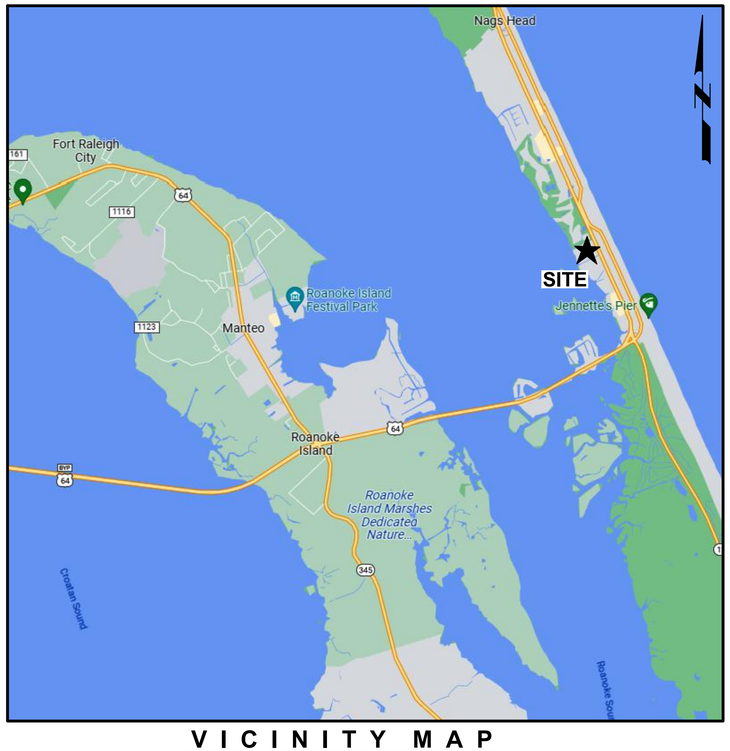
- The hotel was previously proposed and approved as a 90-unit establishment, but the revised plan seeks approval for an 87-unit hotel. Please see specifications below:
  - Previous Building Area: 11,214 square feet
  - New Building Area: 11,943 square feet
  - Building Area Difference: 729 square feet, 6.5% increase.
- There were originally 93 parking spots proposed and approved. However, due to the reduction in units, only 87 parking spots were required. 90 parking spots were proposed as part of the site plan revision. Some parking spaces were eliminated to facilitate the creation of a walkway near the pool area and to also help with additional stormwater handling.
- Lot coverage has increased due to the added walkways and change in pool size.
  - Previous Lot Coverage: 56,428 square feet
  - New Lot Coverage: 55,531 square feet
  - Lot Coverage Difference: 897 square feet, 1.6% decrease.
- Revisions were made to stormwater management measures to accommodate the relocation of the pool, meet required stormwater storage capacities, adhere to setbacks from the onsite and offsite septic systems, and address feedback from the North Carolina Department of Environmental Quality (NCDEQ). These revisions also helped with detention time and treatment.
- Underground storage structures were integrated into the design to fulfill stormwater storage requirements while also maintaining necessary setbacks from the proposed onsite and offsite septic systems and to accommodate for the vegetative buffers.
- Some of the stormwater basins along the perimeter of the property were removed to adhere to setbacks from the adjacent property septic system and the onsite septic system.

INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC
PROJECT No. C06001.00

6632 W. PHEASANT AVE.
NAGS HEAD, NC 27959



VICINITY MAP



LOCATION MAP

SCHEDULE OF DRAWINGS:

COVER SHEET

C-101	EXISTING CONDITIONS
C-102	SITE AND UTILITY PLAN
C-103	GRADING AND DRAINAGE PLAN
C-104	LANDSCAPE PLAN
C-105	LIGHTING PLAN
D-101	R TANK DETAILS - 1 & 2
D-102	R TANK DETAILS - 3 & 4
D-103	R TANK DETAILS - 5
D-104	EROSION CONTROL DETAILS 1
D-105	EROSION CONTROL DETAILS 2

NORTH CAROLINA PROFESSIONAL SEAL 042668 ENGINEER Thomas A. Pergue
3/15/2024

PROJECT MANAGEMENT

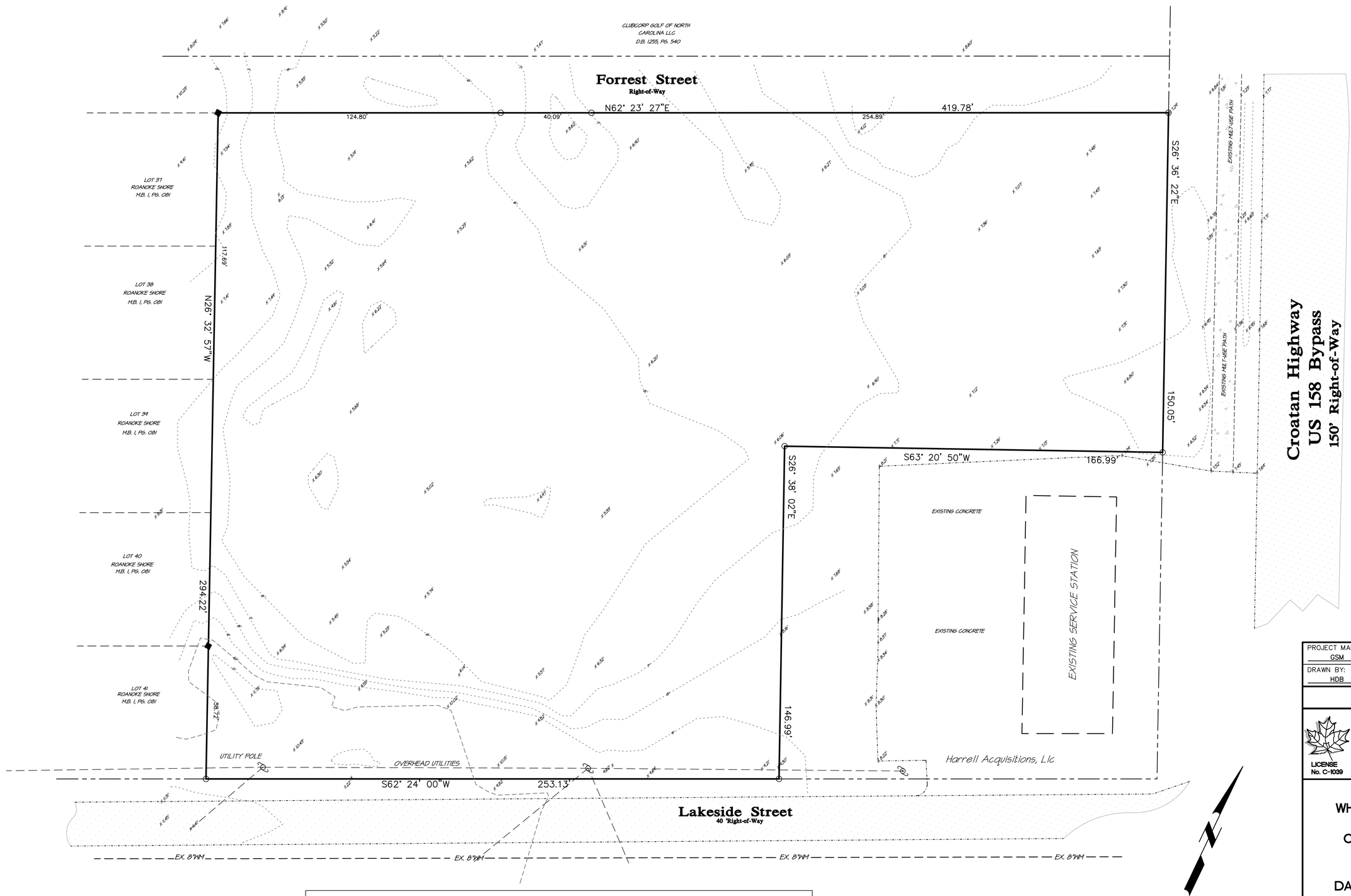
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501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P. O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039 TEL: (919) 467-1239 FAX: (919) 319-6510

MARCH 15, 2024

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NOT RELEASED FOR CONSTRUCTION

REVISIONS			
NO.	DATE	DESCRIPTION	SHEET



BOUNDARY AND TOPOGRAPHIC INFORMATION PREPARED BY
BISSELL PROFESSIONAL GROUP
MAP ENTITLED: BOUNDARY AND TOPOGRAPHIC SURVEY DATED: 04-07-22

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

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NOT RELEASED FOR CONSTRUCTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE:
March 15, 2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

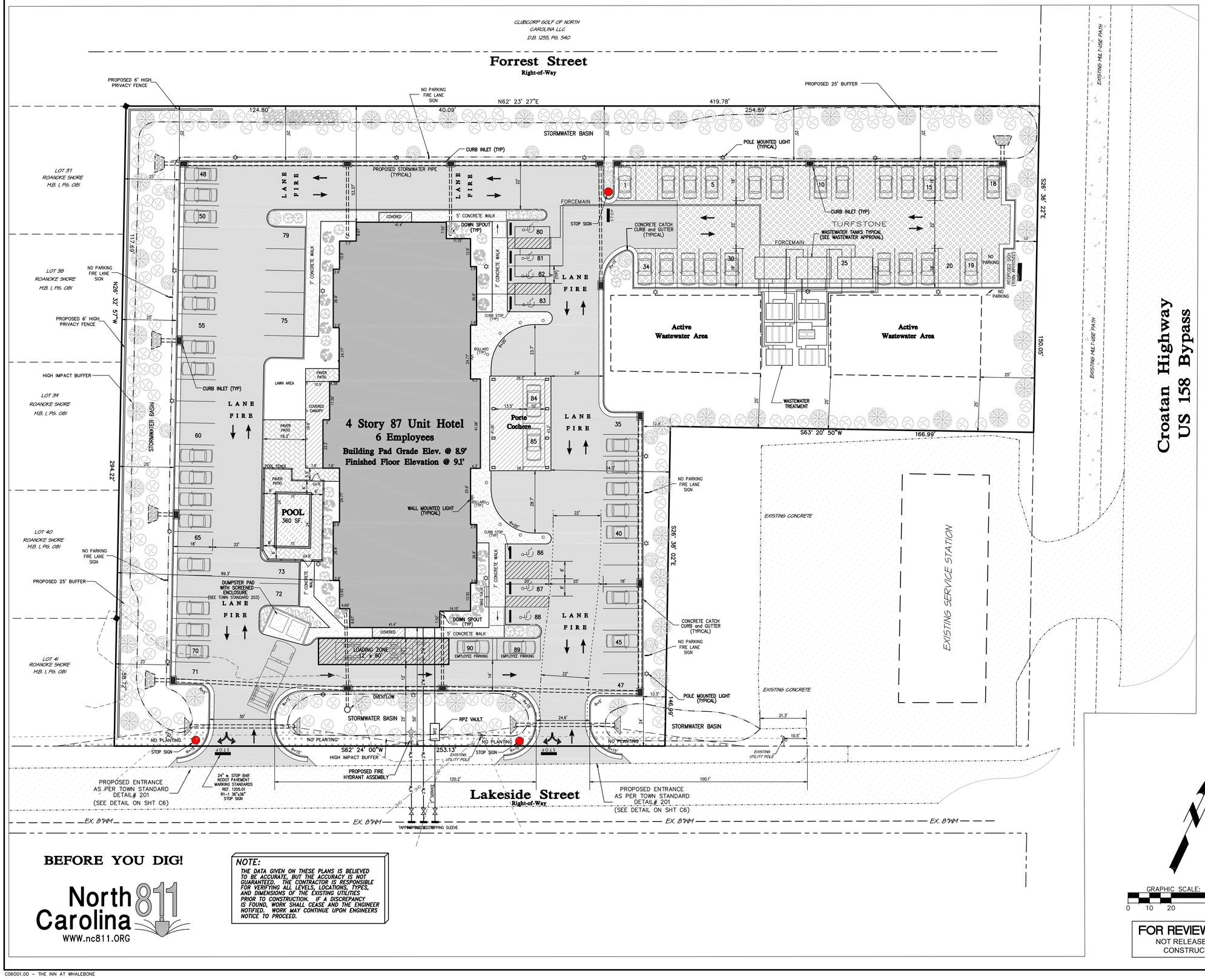
DARE COUNTY, NC

Existing Conditions

Location:
6632 West Pheasant Avenue
Parcel in Nags Head
Nags Head Dare County North Carolina

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-101

C06001.00 – THE INN AT WHALEBONE



GENERAL NOTES:

- * SUBJECT PROPERTY: Lot: 32–36 & Pheasant Ave, Nags Head, NC 27959
- * STREET ADDRESS: 6632 W Pheasant Ave, Nags Head, NC 27959
- * PARCEL ID NUMBER: 006891000
- * GLOBAL PIN: 080006472501
- * RECORDED REFERENCE: DB. 1515 PG. 0048
- * TOTAL PARCEL AREA: 99,233 S.F. (2.28 AC.)
- * BOUNDARY INFORMATION TAKEN FROM BISSELL PROFESSIONAL GROUP
- * LOT COVERAGE:
  - BUILDING and COVERED DECKS – 13,405 SQ. FT.
  - CONCRETE VEHICULAR – 28,794 SQ. FT.
  - CONCRETE WALK/CURB – 6,224 SQ. FT.
  - POOL SURFACE AREA – 360 SQ. FT.
  - TURFSTONE GRID PAVERS – 8,823 S.F. x 0.67 = 5,911 SQ. FT.
  - POOL PAVERS – 1,250 S.F. x 0.67 = 837 SQ. FT.
  - TOTAL IMPERVIOUS COVERAGE = 55,531 SQ. FT.
  - PERCENT LOT COVERAGE = 55.96%
  - BUILDING @ 13.40%
  - PARKING @ 38.66%
  - LANDSCAPED @ 28.2%
  - TOTAL PARKING AREA = 38,360 x 20% = 7,632 SQ. FT. (IMPERVIOUS)
  - TOTAL IMPERVIOUS PROVIDED = 8,823 SQ. FT.
- * PARKING DATA
  - 87 UNITS @ 1 SPACE PER UNIT = 87 SPACES
  - 6 EMPLOYEES @ 1 SPACE PER 3 EMPLOYEES = 2 SPACES
  - TOTAL SPACES REQUIRED = 89 SPACES
  - TOTAL SPACES PROVIDED = 90 SPACES

LEGEND:

- PROPOSED VEHICLE CIRCULATION AREA
- PROPOSED TURFSTONE
- PROPOSED BUILDING AREA
- PROPOSED DECKS
- PROPOSED CONCRETE SURFACE
- PROPOSED PAVERS
- PROPOSED VEHICLE PARKING AREA
- PROPOSED CURB INLET / CATCH BASIN
- PROPOSED STORMWATER PIPE

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NOTE:
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GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

PROJECT MANAGER: GSM	PROJECT ENGINEER: HDB
DRAWN BY: HDB	CHECKED BY: TAP

DATE: March 15, 2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

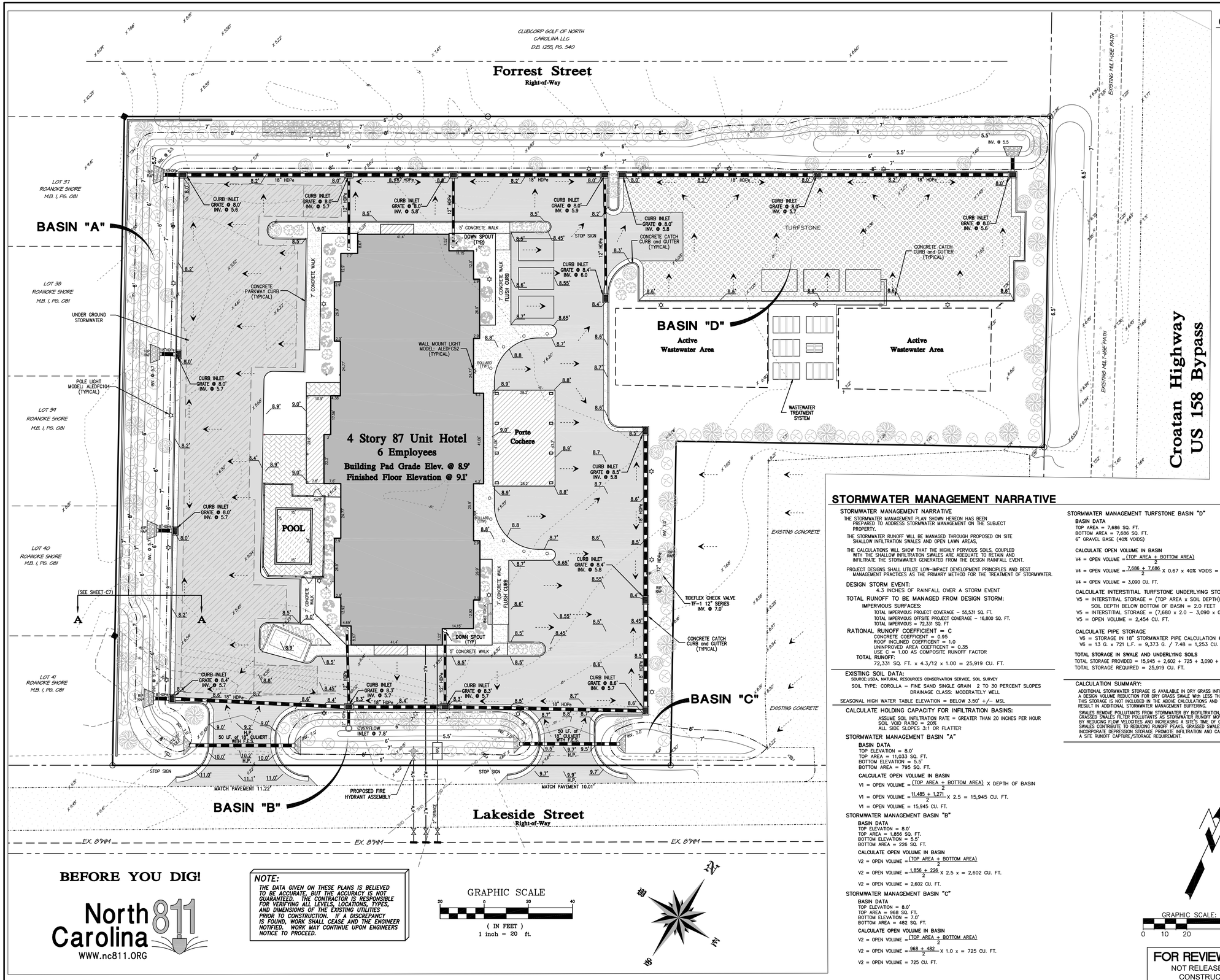
DARE COUNTY, NC

Site and Utility Plan

Location:
6632 West Pheasant Avenue
Parcel in Nags Head
Nags Head Dare County North Carolina

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-102

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GENERAL NOTES:

* SUBJECT PROPERTY:	Lot: 32-36 & Pheasant Ave Nags Head, NC 27959
* STREET ADDRESS:	6632 W Pheasant Ave Nags Head, NC 27959
* PARCEL ID NUMBER:	006891000
* GLOBAL PIN:	080006472501
* RECORDED REFERENCE:	DB. 1515 PG. 0048
* TOTAL PARCEL AREA:	99,233 S.F. (2.28 AC.)
* LOT COVERAGE:	BUILDING and COVERED DECKS – 13,405 SQ. FT. CONCRETE VEHICULAR – 28,794 SQ. FT. CONCRETE WALK/CURB – 6,204 SQ. FT. POOL SURFACE AREA – 450 SQ. FT. TURFSTONE GRID PAVERS – 8,823 S.F. x 0.67 = 5,911 SQ. FT. POOL PAVERS – 1,140 S.F. x 0.67 = 764 SQ. FT. TOTAL IMPERVIOUS COVERAGE = 55,528 SQ. FT. PERCENT LOT COVERAGE = 55.95%

LEGEND:

- PROPOSED VEHICLE CIRCULATION AREA
- PROPOSED TURFSTONE
- PROPOSED BUILDING AREA
- PROPOSED DECKS
- PROPOSED CONCRETE SURFACE
- PROPOSED VEHICLE PARKING AREA
- PROPOSED CURB INLET / CATCH BASIN
- PROPOSED STORMWATER PIPE — 18" HDPe
- PROPOSED RUNOFF DIRECTIONAL ARROW
- PROPOSED FINISHED GRADE CONTOUR — 8"
- PROPOSED FINISHED SPOT GRADE — 8.0'
- EXISTING GRADE CONTOUR — 6"
- EXISTING SPOT GRADE — x 6.2'

STORMWATER MANAGEMENT NARRATIVE

STORMWATER MANAGEMENT NARRATIVE

THE STORMWATER MANAGEMENT PLAN SHOWN HEREON HAS BEEN PREPARED TO ADDRESS STORMWATER MANAGEMENT ON THE SUBJECT PROPERTY.

THE STORMWATER RUNOFF WILL BE MANAGED THROUGH PROPOSED ON SITE SHALLOW INFILTRATION SWALES AND OPEN LAWN AREAS,

THE CALCULATIONS WILL SHOW THAT THE HIGHLY PERVIOUS SOILS, COUPLED WITH THE SHALLOW INFILTRATION SWALES ARE ADEQUATE TO RETAIN AND INFILTRATE THE STORMWATER GENERATED FROM THE DESIGN RAINFALL EVENT.

PROJECT DESIGNS SHALL UTILIZE LOW-IMPACT DEVELOPMENT PRINCIPLES AND BEST MANAGEMENT PRACTICES AS THE PRIMARY METHOD FOR THE TREATMENT OF STORMWATER.

DESIGN STORM EVENT:
4.3 INCHES OF RAINFALL OVER A STORM EVENT

TOTAL RUNOFF TO BE MANAGED FROM DESIGN STORM:
IMPERVIOUS SURFACES:
TOTAL IMPERVIOUS PROJECT COVERAGE – 55,531 SQ. FT.
TOTAL IMPERVIOUS OFFSITE PROJECT COVERAGE – 16,800 SQ. FT.
TOTAL IMPERVIOUS = 72,331 SQ. FT

RATIONAL RUNOFF COEFFICIENT = C
CONCRETE COEFFICIENT = 0.95
ROOF INCLINED COEFFICIENT = 1.0
UNIMPROVED AREA COEFFICIENT = 0.35
USE C = 1.00 AS COMPOSITE RUNOFF FACTOR

TOTAL RUNOFF:
72,331 SQ. FT. x 4.3/12 x 1.00 = 25,919 CU. FT.

EXISTING SOIL DATA:
SOURCE:USDA, NATURAL RESOURCES CONSERVATION SERVICE, SOIL SURVEY
SOIL TYPE: COROLLA – FINE SAND SINGLE GRAIN 2 TO 30 PERCENT SLOPES
DRAINAGE CLASS: MODERATELY WELL

SEASONAL HIGH WATER TABLE ELEVATION = BELOW 3.50' +/– MSL

CALCULATE HOLDING CAPACITY FOR INFILTRATION BASINS:
ASSUME SOIL INFILTRATION RATE = GREATER THAN 20 INCHES PER HOUR
SOIL VOID RATIO = 20%
ALL SIDE SLOPES 3:1 OR FLATTER

STORMWATER MANAGEMENT BASIN "A"

BASIN DATA
TOP ELEVATION = 8.0'
TOP AREA = 11,033 SQ. FT.
BOTTOM ELEVATION = 5.5'
BOTTOM AREA = 795 SQ. FT.

CALCULATE OPEN VOLUME IN BASIN

$V1 = \text{OPEN VOLUME} = \frac{(\text{TOP AREA} + \text{BOTTOM AREA})}{2} \times \text{DEPTH OF BASIN}$

$V1 = \text{OPEN VOLUME} = \frac{11,485 + 1,271}{2} \times 2.5 = 15,945 \text{ CU. FT.}$

V1 = OPEN VOLUME = 15,945 CU. FT.

STORMWATER MANAGEMENT BASIN "B"

BASIN DATA
TOP ELEVATION = 8.0'
TOP AREA = 1,856 SQ. FT.
BOTTOM ELEVATION = 5.5'
BOTTOM AREA = 226 SQ. FT.

CALCULATE OPEN VOLUME IN BASIN

$V2 = \text{OPEN VOLUME} = \frac{(\text{TOP AREA} + \text{BOTTOM AREA})}{2}$

$V2 = \text{OPEN VOLUME} = \frac{1,856 + 226}{2} \times 2.5 \times = 2,602 \text{ CU. FT.}$

V2 = OPEN VOLUME = 2,602 CU. FT.

STORMWATER MANAGEMENT BASIN "C"

BASIN DATA
TOP ELEVATION = 8.0'
TOP AREA = 968 SQ. FT.
BOTTOM ELEVATION = 7.0'
BOTTOM AREA = 482 SQ. FT.

CALCULATE OPEN VOLUME IN BASIN

$V2 = \text{OPEN VOLUME} = \frac{(\text{TOP AREA} + \text{BOTTOM AREA})}{2}$

$V2 = \text{OPEN VOLUME} = \frac{968 + 482}{2} \times 1.0 \times = 725 \text{ CU. FT.}$

V2 = OPEN VOLUME = 725 CU. FT.

STORMWATER MANAGEMENT TURFSTONE BASIN "D"

BASIN DATA
TOP AREA = 7,686 SQ. FT.
BOTTOM AREA = 7,686 SQ. FT.
6" GRAVEL BASE (40% VOIDS)

CALCULATE OPEN VOLUME IN BASIN

$V4 = \text{OPEN VOLUME} = \frac{(\text{TOP AREA} + \text{BOTTOM AREA})}{2}$

$V4 = \text{OPEN VOLUME} = \frac{7,686 + 7,686}{2} \times 0.67 \times 40\% \text{ VOIDS} = 3,090 \text{ CU. FT.}$

V4 = OPEN VOLUME = 3,090 CU. FT.

CALCULATE INTERSTITIAL TURFSTONE UNDERLYING STORAGE
V5 = INTERSTITIAL STORAGE = (TOP AREA x SOIL DEPTH) – V1) x 0.2
SOIL DEPTH BELOW BOTTOM OF BASIN = 2.0 FEET
V5 = INTERSTITIAL STORAGE = (7,680 x 2.0 – 3,090 x 0.2 = 2,454 CU. FT.
V5 = OPEN VOLUME = 2,454 CU. FT.

CALCULATE PIPE STORAGE
V6 = STORAGE IN 18" STORMWATER PIPE CALCULATION @ 13 G PER FOOT
V6 = 13 G. x 721 L.F. = 9,373 G. / 7.48 = 1,253 CU. FT.

TOTAL STORAGE IN SWALE AND UNDERLYING SOILS
TOTAL STORAGE PROVIDED = 15,945 + 2,602 + 725 + 3,090 + 2,454 + 1,253 = 26,069 CU. FT.
TOTAL STORAGE REQUIRED = 25,919 CU. FT.

CALCULATION SUMMARY:
ADDITIONAL STORMWATER STORAGE IS AVAILABLE IN DRY GRASS INFILTRATION SWALES.
A DESIGN VOLUME REDUCTION FOR DRY GRASS SWALE With LESS THAN 1.5% SLOPE
THIS STORAGE IS NOT INCLUDED IN THE ABOVE CALCULATIONS AND WILL RESULT IN ADDITIONAL STORMWATER MANAGEMENT BUFFERING.

SWALES REMOVE POLLUTANTS FROM STORMWATER BY BIOFILTRATION, SETTLING, AND INFILTRATION. GRASSED SWALES FILTER POLLUTANTS AS STORMWATER RUNOFF MOVES THROUGH THE GRASS. BY REDUCING FLOW VELOCITIES AND INCREASING A SITE'S TIME OF CONCENTRATION, GRASSED SWALES CONTRIBUTE TO REDUCING RUNOFF PEAKS. GRASSED SWALES THAT ARE DESIGNED WITH INCORPORATE DEPRESSION STORAGE PROMOTE INFILTRATION AND CAN HELP CONTRIBUTE TO SATISFYING A SITE RUNOFF CAPTURE/STORAGE REQUIREMENT.

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GRAPHIC SCALE
20 0 20 40
(IN FEET)
1 inch = 20 ft.

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE:
March 15, 2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510
LICENSE No. C-1039

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

Grading and Drainage
Location:
6632 West Pheasant Avenue
Parcel in Nags Head
Nags Head Dare County North Carolina

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-103

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C06001.00 – THE INN AT WHALEBONE

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GENERAL NOTES:

* SUBJECT PROPERTY: Lot: 32–36 & Pheasant Ave Nags Head, NC 27959
* STREET ADDRESS: 6632 W Pheasant Ave Nags Head, NC 27959
* PARCEL ID NUMBER: 006891000
* GLOBAL PIN: 080006472501

LEGEND:

- PROPOSED VEHICLE CIRCULATION AREA
- PROPOSED TURFSTONE
- PROPOSED BUILDING AREA
- PROPOSED DECKS
- PROPOSED CONCRETE SURFACE
- PROPOSED VEHICLE PARKING AREA
- PROPOSED CURB INLET / CATCH BASIN
- PROPOSED STORMWATER PIPE

CLUBCORP GOLF OF NORTH CAROLINA LLC
D.B. 1255, Pg. 540

Forrest Street
Right-of-Way

PROPOSED 6' HIGH PRIVACY FENCE
(EXISTING) PERIMETER LANDSCAPE PRESERVATION AREA 1,823 SQ. FT. (1.84%)
NO PARKING FIRE LANE SIGN
N62° 23' 27"E 419.78'
124.80'
40.09'
254.89'
PROPOSED 25' BUFFER
(NEW) PERIMETER LANDSCAPE PRESERVATION AREA
STORMWATER BASIN
CURB INLET (TYP)
POLE MOUNTED LIGHT (TYPICAL)
EXISTING MULT-USE PATH

LOT 37 ROANOKE SHORE M.B. I, Pg. 081
LOT 38 ROANOKE SHORE M.B. I, Pg. 081
LOT 39 ROANOKE SHORE M.B. I, Pg. 081
LOT 40 ROANOKE SHORE M.B. I, Pg. 081
LOT 41 ROANOKE SHORE M.B. I, Pg. 081

INTERIOR PARKING LANDSCAPE AREA
INTERIOR PARKING LANDSCAPE TREE (TYPICAL)
5' CONCRETE WALK
DOWN SPOUT (TYP)
STOP SIGN
CONCRETE CATCH CURB and GUTTER (TYPICAL)
WASTEWATER TANKS TYPICAL (SEE WASTEWATER APPROVAL)
NO PARKING
S26° 36' 22"E 150.05'

Active Wastewater Area
Active Wastewater Area
WASTEWATER TREATMENT

4 Story 87 Unit Hotel
6 Employees
Building Pad Grade Elev. @ 8.9'
Finished Floor Elevation @ 9.1'
Porte Cochere
S63° 20' 50"W 166.99'
(NEW) PERIMETER LANDSCAPE PRESERVATION AREA
NO PARKING FIRE LANE SIGN
EXISTING CONCRETE
EXISTING SERVICE STATION

POOL 360 SF.
POOL FENCE
GATE
PAVER PATIO
LAWN AREA
COVERED CANOPY
WALL MOUNTED LIGHT (TYPICAL)
BOLLARD (TYP)
CURB STOP (TYP)
7' CONCRETE WALK
S26° 38' 02"E
(NEW) PERIMETER LANDSCAPE PRESERVATION AREA

DUMPSTER PAD WITH SCREENED ENCLOSURE (SEE TOWN STANDARD 203)
PROPOSED 6' HIGH PRIVACY FENCE
HIGH IMPACT BUFFER
CURB INLET (TYP)
INTERIOR PARKING LANDSCAPE TREE (TYPICAL)
STORMWATER BASIN
294.22'
(NEW) PERIMETER LANDSCAPE PRESERVATION AREA
N26° 32' 57"W 117.69'
NO PARKING FIRE LANE SIGN
PROPOSED 25' BUFFER
(NEW) PERIMETER LANDSCAPE PRESERVATION AREA
S62° 24' 00"W 253.13'
HIGH IMPACT BUFFER
STOP SIGN
24" x STOP BAR NCDOT PAVEMENT MARKING STANDARDS REF. 1205.01 R1-1 36"x36" STOP SIGN
PROPOSED FIRE HYDRANT ASSEMBLY
EXISTING UTILITY POLE
LOADING ZONE 12' x 60'
EMPLOYEE PARKING
INTERIOR PARKING LANDSCAPE AREA
OVERFLOW
STORMWATER BASIN
RPZ VAULT
NO PLANTING
CONCRETE CATCH CURB and GUTTER (TYPICAL)
NO PARKING FIRE LANE SIGN
POLE MOUNTED LIGHT (TYPICAL)
EXISTING CONCRETE
EXISTING UTILITY POLE
21.3'
10.5'
146.95'
STORMWATER BASIN
EXISTING MULT-USE PATH

Lakeside Street
Right-of-Way
EX. 8"WM
EX. 8"WM
EX. 8"WM
TAPPING SLEEVE
TAPPING SLEEVE

Croatan Highway
US 158 Bypass

BEFORE YOU DIG!
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* PARKING LOT INTERIOR LANDSCAPE:
PARKING SPACE AREA = 16,340 SQ FT. x 10% = 1,634 SQ. FT. (1,937 SQ. FT. PROVIDED)
* LANDSCAPE AREA TOWARD PRESERVATION:
EXISTING PRESERVED TREES AND SHRUBS AREA 1,823 SQ. FT.
TREES: 45 + 21 = 66 (T) x 100 (S.F.) 6,600 SQ. FT.
SHRUBS: 202 + 23 + 17 = 242 (S) x 50 (S.F.) 12,100 SQ. FT.
TOTAL LANDSCAPING = 18,700 SQ. FT. / 99,233 SQ. FT. = 18.84%

LANDSCAPE LEGEND:

COMMON NAME Botanical Name	HEIGHT	SPREAD	SCIENTIFIC NAME	QUANTITY	SYMBOL
FLOWERING DOGWOODS	10' – 25'	20' – 30'	Cornus florida	21	
CRAPE MYRTLE	10' – 30'	6' – 15'	Lagerstroemia Indica	45	
JAPANESE PRIVET	6' – 12'	3' – 8	Ligustrum japonicum	202	
BUTTERFLY WEED	1' – 3'	2' – 4'	Asclepias tuberosa	23	
Dustymiller	1' – 4'	1' – 2'	Artemisia stelleriana	17	

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE: March 15, 2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039 TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

Landscape Plan

Location:
6632 West Pheasant Avenue
Parcel in Nags Head
Nags Head Dare County North Carolina

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-104

C06001.00 – THE INN AT WHALEBONE

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CLUBCORP GOLF OF NORTH CAROLINA LLC
D.B. 1255, PG. 540

Forrest Street
Right-of-Way

N62° 23' 27"E 419.78'
124.80' 40.09' 254.89'

LOT 37
ROANOKE SHORE
M.B. I, PG. 081

LOT 38
ROANOKE SHORE
M.B. I, PG. 081

LOT 39
ROANOKE SHORE
M.B. I, PG. 081

LOT 40
ROANOKE SHORE
M.B. I, PG. 081

LOT 41
ROANOKE SHORE
M.B. I, PG. 080

N26° 57' 57"W 187.69'

S28° 36' 22"E 526.96'

S33° 20' 30"W 166.99'

S28° 36' 22"E 150.05'

S62° 24' 00"W 253.13'

N26° 57' 57"W 224.32'

S58° 32' 49"E 149.69'

4 Story 87 Unit Hotel
6 Employees
Building Pad Grade Elev. @ 8.9'
Finished Floor Elevation @ 9.1'

POOL

Porte Cochere

Active Wastewater Area

Active Wastewater Area

EXISTING CONCRETE

EXISTING CONCRETE

EXISTING SERVICE STATION

EXISTING MULTI-USE PATH

EXISTING MULTI-USE PATH

Croatan Highway
US 158 Bypass

POLE LIGHT

PROPOSED POLE LIGHT

WALL PACK LIGHT

WALL PACK LIGHT

DOWN SPOUT (TYP)

DOWN SPOUT (TYP)

5' CONCRETE WALK

7' CONCRETE WALK

CURB STOP (TYP)

TURFSTONE

TURFSTONE

GATE

Lakeside Street
Right-of-Way

EX. 8"WM

EX. 8"WM

EX. 8"WM

EX. 8"WM

GENERAL NOTES:

* SUBJECT PROPERTY: Lot: 32-36 & Pheasant Ave, Nags Head, NC 27959
* STREET ADDRESS: 6632 W Pheasant Ave, Nags Head, NC 27959
* PARCEL ID NUMBER: 006891000
* GLOBAL PIN: 080006472501
* RECORDED REFERENCE: DB. 1515 PG. 0048
* TOTAL PARCEL AREA: 99,233 S.F. (2.28 AC.)
* BOUNDARY INFORMATION TAKEN FROM BISSELL PROFESSIONAL GROUP

LIGHTING LEGEND

PROPOSED POLE LIGHT
RAB LIGHTING (MODEL: ALEDFC104)
RAB STEEL POLE (MODEL: PS4-07-25D2)
(OR APPROVED EQUAL)
MOUNTING HEIGHT @ 21'

PROPOSED WALL PACK LIGHT
RAB LIGHTING (MODEL: ALEDFC52)
(OR APPROVED EQUAL)
MOUNTING HEIGHT @ 21'

PHOTOMETRIC ILLUMINATION SPOT NUMBER 3.8

PHOTOMETRIC ILLUMINATION CONTOURS
APPROVED BY TOWN OF NAGS HEAD 3 / 3.5

APPROVED EQUAL: WALL MOUNTED AND POLE MOUNTED LIGHTS TO BE PROVIDED BY DOMINION ENERGY'S OUTDOOR SERVICES

LEGEND:

- PROPOSED VEHICLE CIRCULATION AREA
- PROPOSED TURFSTONE
- PROPOSED BUILDING AREA
- PROPOSED DECKS
- PROPOSED CONCRETE SURFACE
- PROPOSED VEHICLE PARKING AREA
- PROPOSED CURB INLET / CATCH BASIN
- PROPOSED STORMWATER PIPE

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North Carolina 811
WWW.nc811.ORG

NOTE:
THE DATA GIVEN ON THESE PLANS IS BELIEVED TO BE ACCURATE, BUT THE ACCURACY IS NOT GUARANTEED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL LEVELS, LOCATIONS, TYPES, AND DIMENSIONS OF THE EXISTING UTILITIES PRIOR TO CONSTRUCTION. IF A DISCREPANCY IS FOUND, WORK SHALL CEASE AND THE ENGINEER NOTIFIED. WORK MAY CONTINUE UPON ENGINEERS NOTICE TO PROCEED.

GRAPHIC SCALE: 1" = 20'
0 10 20 40 60

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PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE: March 15, 2024

MacCONNELL & Associates, P. C.
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P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039 TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

Lighting Plan

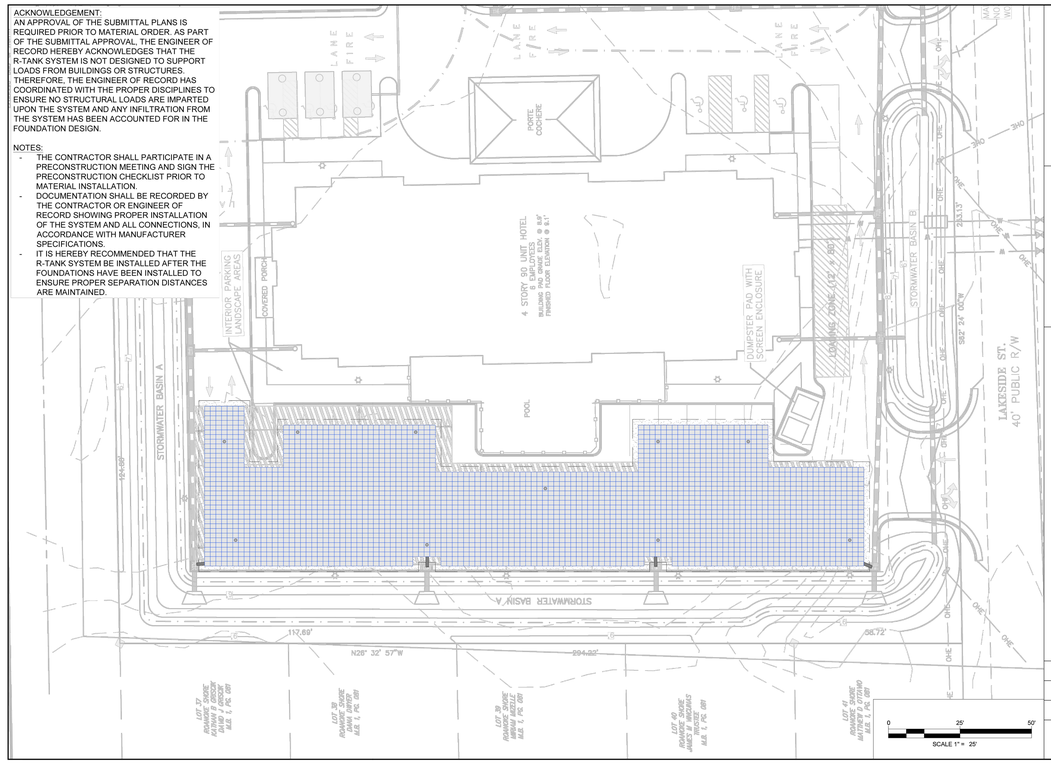
Location:
6632 West Pheasant Avenue
Parcel in Nags Head
Nags Head Dare County North Carolina

PROJECT NUMBER	DRAWING NUMBER
C06001.00	C-105

C06001.00 – THE INN AT WHALEBONE

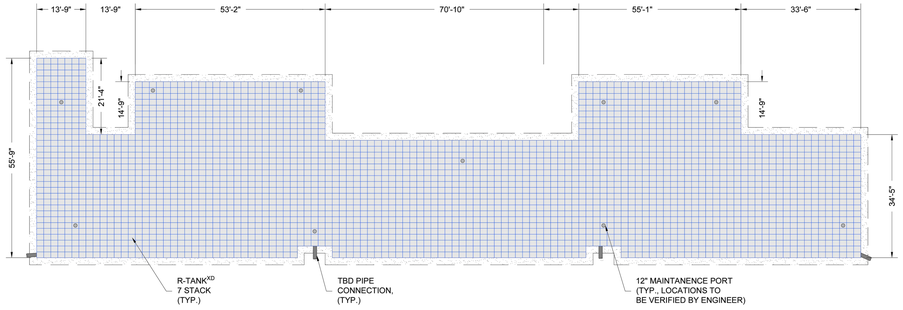
ACKNOWLEDGEMENT:
AN APPROVAL OF THE SUBMITTAL PLANS IS REQUIRED PRIOR TO MATERIAL ORDER. AS PART OF THE SUBMITTAL APPROVAL, THE ENGINEER OF RECORD HEREBY ACKNOWLEDGES THAT THE R-TANK SYSTEM IS NOT DESIGNED TO SUPPORT LOADS FROM BUILDINGS OR STRUCTURES. THEREFORE, THE ENGINEER OF RECORD HAS COORDINATED WITH THE PROPER DISCIPLINES TO ENSURE NO STRUCTURAL LOADS ARE IMPARTED UPON THE SYSTEM AND ANY INFILTRATION FROM THE SYSTEM HAS BEEN ACCOUNTED FOR IN THE FOUNDATION DESIGN.

NOTES:
- THE CONTRACTOR SHALL PARTICIPATE IN A PRECONSTRUCTION MEETING AND SIGN THE PRECONSTRUCTION CHECKLIST PRIOR TO MATERIAL INSTALLATION.
- DOCUMENTATION SHALL BE RECORDED BY THE CONTRACTOR OR ENGINEER OF RECORD SHOWING PROPER INSTALLATION OF THE SYSTEM AND ALL CONNECTIONS, IN ACCORDANCE WITH MANUFACTURER SPECIFICATIONS.
- IT IS HEREBY RECOMMENDED THAT THE R-TANK SYSTEM BE INSTALLED AFTER THE FOUNDATIONS HAVE BEEN INSTALLED TO ENSURE PROPER SEPARATION DISTANCES ARE MAINTAINED.



R-TANK[XD] SYSTEM OVERLAY
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE 1" = 25'
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 1 of 6



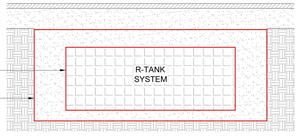
R-TANK QUANTITIES	
R-TANK[XD] PANEL STACK HEIGHT	7 PANELS HIGH
TRAFFIC LOAD	HS-25
# OF 7 STACK R-TANK[XD] MODULES	2942
TOTAL # OF R-TANK[XD] PANELS	20594
TOTAL SYSTEM STORAGE	14,020 CF
R-TANK STORAGE VOLUME	9,815 CF
STONE STORAGE VOLUME (40% VOID RATIO)	4,205 CF
STONE BED FOOTPRINT	10,808 SF
STONE QUANTITY	389 CY
N080 NON-WOVEN GEOTEXTILE TANK WRAP	2,522 SY
N080 NON-WOVEN GEOTEXTILE EXCAVATION WRAP	2,930 SY
12" MAINTENANCE PORTS	10
PIPE BOOTS (8" | 12" | 15" | 18" | 24")	TBD
STORMRING CPS (8" | 8" | 12" | 15" | 18" | 24")	TBD
NOTE: STONE QUANTITY INCLUDES 7" OF COVER AND 3" OF BASE.	
NOTE: GEOTEXTILE / LINER QUANTITIES INCLUDE A 15% WASTE FACTOR.	
SEE SHEETS 3 - 6 FOR DETAILS AND ADDITIONAL INFORMATION	

GRAPHIC SCALE

0 20' 40'
SCALE 1" = 20'

R-TANK ELEVATIONS

DESCRIPTION	ELEVATION
BASE INV.	5.55
TANK INV.	5.80
TOP OF TANK	6.95
GEOGRID	7.53
MIN. ALLOW. FINAL GRADE	7.45
MAX. ALLOW. FINAL GRADE	22.95



R-TANK[XD] TANK WRAP & EXCAVATION ENVELOPE DETAIL

R-TANK[XD] SYSTEM LAYOUT
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE 1" = 20'
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 2 of 6

FERGUSON WATERWORKS
FOR ADDITIONAL INFORMATION PLEASE CONTACT: FERGUSON WATERWORKS, 1-800-448-3836, www.ferguson.com

R-TANK[XD] ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.

NOTES

LEGEND

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- FENCE
- RIGHT-OF-WAY
- EX. EDGE OF PAVEMENT
- CREEK
- EX. SANITARY SEWER
- NEW SANITARY SEWER
- EX. WATER LINE
- NEW WATER LINE
- NEW FORCE MAIN
- CATCH BASIN
- NEW STORM PIPE
- POLE-MOUNTED LIGHT

REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE: MARCH 15, 2024

3/15/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

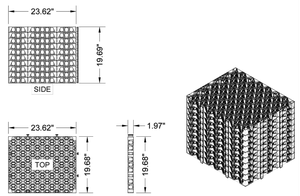
R-TANK DETAILS 1 & 2

PROJECT NUMBER C06001.00
DRAWING NUMBER D-101

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MODULE DATA

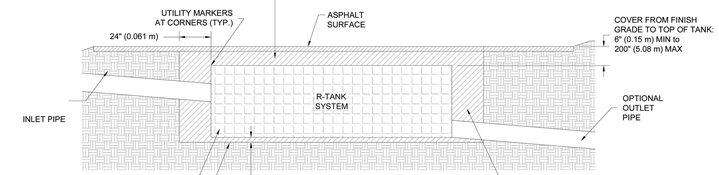
GEOMETRY:
LENGTH = 23.62 IN. (600 MM)
WIDTH = 19.68 IN. (500 MM)
HEIGHT = 13.78 IN. (350 MM)
TANK VOLUME = 3.71 CF
STORAGE VOLUME = 3.34 CF
VOID INTERNAL VOLUME: 90%
VOID SURFACE AREA: 90%

LOAD RATING:
240.2 PSI, (MODULE ONLY)
HS20-25, (WITH ACF COVER SYSTEM)
MATERIAL:
100% RECYCLED POLYPROPYLENE

R-TANK^{XD} - MODULE DETAIL

TOTAL COVER: 6" MINIMUM AND 200" MAXIMUM. INITIAL COVER UP TO 12" MUST BE FREE DRAINING BACKFILL (SPEC SECTION 2.03B): STONE <1.5" OR SOIL (USCS CLASS GW, GP, SW OR SP). ADDITIONAL FILL MAY BE STRUCTURAL FILL (SPEC SECTION 2.03C): STONE OR SOIL (USCS CLASS SM, SP, SW, GM, GP OR GW) WITH MAX CLAY CONTENT<10%, MAX 25% PASSING NO. 200 SIEVE, AND MAX PLASTICITY INDEX OF 4. CONTACT ACF ENVIRONMENTAL IF MORE THAN 200" OR LESS THAN 6" OF TOP BACKFILL IS REQUIRED (FROM TOP OF TANK TO TOP OF PAVEMENT).

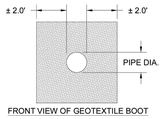
NOTES:
1. FOR COMPLETE MODULE DATA, SEE APPROPRIATE R-TANK^{XD} MODULE SHEET.
2. INSTALLATIONS PER THIS DETAIL MEET GUIDELINES OF HL-93 LOADING PER THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, CUSTOMARY U.S. UNITS, 7TH EDITION, 2014 WITH 2015 AND 2016 INTERIM REVISIONS.
3. PRE-TREATMENT STRUCTURES NOT SHOWN.
4. FOR INFILTRATION APPLICATIONS, GEOTEXTILE ENVELOPING R-TANK SHALL BE ACF M200 (PER SPEC SECTION 2.02A) AND BASE SHALL BE 4" MIN. UNCOMPACTED FREE DRAINING BACKFILL (SPEC SECTION 2.03A) TO PROVIDE A LEVEL BASE. SURFACE MUST BE SMOOTH, FREE OF LUMPS OR DEBRIS, AND EXTEND 2' BEYOND R-TANK^{XD} FOOTPRINT.



R-TANK^{XD} HS20-25 LOADS - SECTION VIEW

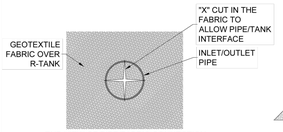
NOTE:
- PIPE BOOTS ARE AVAILABLE IN THE FOLLOWING STANDARD SIZES: 8" | 12" | 15" | 18" | 24".
- LARGER SPECIAL ORDER, CUSTOM SIZES ARE AVAILABLE.

CUT AN "X" IN THE FABRIC ENVELOPE THAT IS SLIGHTLY LARGER THAN THE PIPE. PULL THE FABRIC FLAPS AROUND THE PIPE, AND SEAL WITH A STAINLESS STEEL BAND.

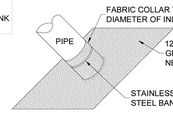


FRONT VIEW OF GEOTEXTILE BOOT

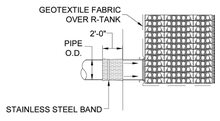
AFTER TANK WRAP IS SECURED TO PIPE, SLIDE BOOT AGAINST R-TANK AND SECURE WITH SECOND STAINLESS STEEL BAND, THEN ATTACH BOOT FLAP TO TANK ENVELOPE FABRIC WITH DUCT TAPE OR OTHER ADHESIVE.



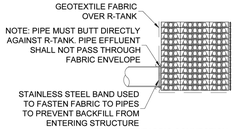
END VIEW OF PIPE/FABRIC CONNECTION



GEOTEXTILE BOOT



SIDE VIEW OF GEOTEXTILE BOOT



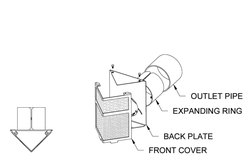
SIDE VIEW OF PIPE/FABRIC CONNECTION

R-TANK^{XD} TYPICAL TANK INLET/OUTLET W/ GEOTEXTILE PIPE BOOT DETAIL

FERGUSON WATERWORKS
FOR ADDITIONAL INFORMATION PLEASE CONTACT: FERGUSON WATERWORKS, 1-800-445-3636, www.fergusonwaterworks.com

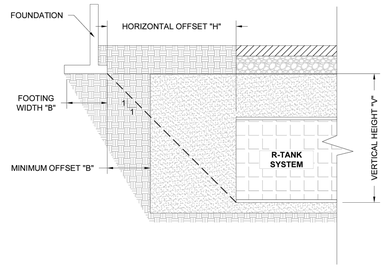
R-TANK^{XD} SYSTEM DETAILS
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE NTS
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 3 of 6



PIPE DIA. (A)	STUB LENGTH (B)	CPS DEPTH (C)	CPS HEIGHT (D)	CPS WIDTH (E)
6"	4.00"	8.50"	10.00"	10.00"
8"	6.00"	11.00"	12.25"	11.50"
10"	8.00"	16.00"	13.50"	13.50"
12"	8.00"	16.00"	15.50"	15.50"
15"	8.00"	16.00"	21.50"	18.50"
18"	8.00"	16.00"	28.00"	21.50"
24"	10.00"	18.00"	40.00"	28.00"

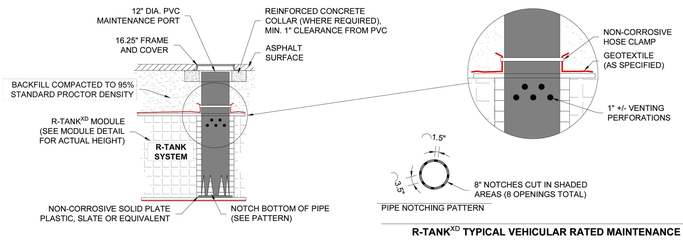
STORMRING CPS PRETREATMENT DETAIL



R-TANK IS NOT DESIGNED TO SUPPORT STRUCTURAL LOADS ASSOCIATED WITH BUILDINGS, RETAINING WALLS OR OTHER STRUCTURES.
- FOUNDATIONS OF WIDTH "B" SHALL BE OFFSET A MINIMUM "B" FEET FROM THE STONE BACKFILL.
- THE CIVIL ENGINEER AND STRUCTURAL ENGINEER SHALL REVIEW ALL DOCUMENTATION AND DESIGNS TO ENSURE NO STRUCTURAL LOADS ARE APPLIED BY THE STRUCTURE ON THE R-TANK UNITS. IT IS RECOMMENDED THAT ALL R-TANK UNITS BE INSTALLED ABOVE THE ELEVATION OF ANY SUBSURFACE STRUCTURAL ELEMENTS SUCH AS FOOTERS. IF THIS CANNOT BE ACHIEVED, IT RECOMMENDED THAT A MINIMUM 1:1 ZONE OF INFLUENCE, SITE SPECIFIC SOILS MAY REQUIRE GREATER SEPARATION DISTANCE, BE MAINTAINED BETWEEN THE STRUCTURAL ELEMENT AND THE UNITS.
- THE STRUCTURAL ENGINEER AND GEOTECHNICAL ENGINEER SHALL REVIEW ALL DOCUMENTATION AND DESIGNS TO ENSURE PROPER STABILITY OF STRUCTURAL ELEMENTS DURING SATURATED SOIL CONDITIONS POTENTIALLY CAUSED BY THE PROXIMITY OF INFILTRATION FACILITIES TO THE STRUCTURAL ELEMENTS.

R-TANK - MINIMUM OFFSET DETAIL

NOTES
1. THIS PORT IS USED TO PUMP WATER INTO THE SYSTEM AND RE-SUSPEND ACCUMULATED SEDIMENT SO THAT IT MAY BE PUMPED OUT.
2. MINIMUM REQUIRED MAINTENANCE INCLUDES A QUARTERLY INSPECTION DURING THE FIRST YEAR OF OPERATION AND A YEARLY INSPECTION THEREAFTER. FLUSH AS NEEDED.
3. R-TANK^{HD}, R-TANK^{XD}, R-TANK^{XD} AND R-TANK^{XD} MAY BE USED IN TRAFFIC APPLICATIONS.
4. SEE TRAFFIC LOADING DETAIL FOR MINIMUM & MAXIMUM COVER REQUIREMENTS.
5. IF MAINTENANCE PORT IS LOCATED IN A NON-TRAFFIC AREA, A PLASTIC CAP CAN BE USED IN LIEU OF A FRAME AND COVER WITH CONCRETE COLLAR.



R-TANK^{XD} TYPICAL VEHICULAR RATED MAINTENANCE PORT

FERGUSON WATERWORKS
FOR ADDITIONAL INFORMATION PLEASE CONTACT: FERGUSON WATERWORKS, 1-800-445-3636, www.fergusonwaterworks.com

R-TANK^{XD} SYSTEM DETAILS
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE NTS
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 4 of 6

NOTES

LEGEND

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- FENCE
- RIGHT–OF–WAY
- EX. EDGE OF PAVEMENT
- CREEK
- EX. SANITARY SEWER
- NEW SANITARY SEWER
- EX. WATER LINE
- NEW WATER LINE
- NEW FORCE MAIN
- CATCH BASIN
- NEW STORM PIPE
- POLE–MOUNTED LIGHT

REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE: MARCH 15, 2024

3/15/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

R-TANK DETAILS 3 & 4

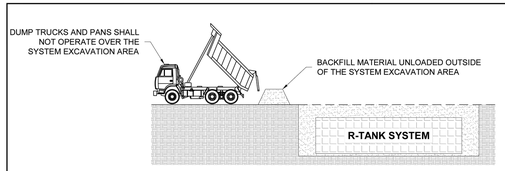
PROJECT NUMBER C06001.00

DRAWING NUMBER D-102

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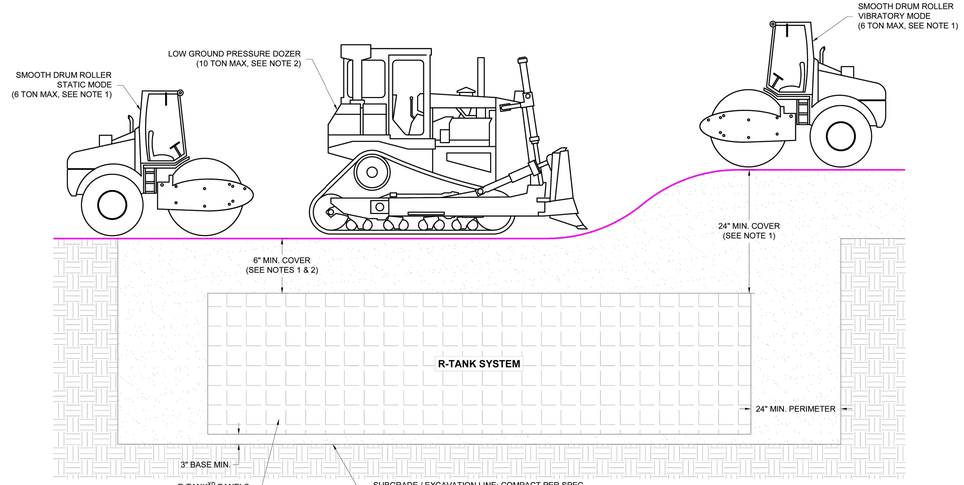
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DUMP TRUCK DETAIL (SEE NOTE 3)

NOTES:
1. FOLLOWING PLACEMENT OF SIDE BACKFILL, A UNIFORM 12" (OR AS SHOWN ON PLANS) LIFT OF THE FREELY DRAINING MATERIAL (SPEC SECTION 2.03.B2) SHALL BE PLACED OVER THE R-TANK AND LIGHTLY COMPACTED USING A WALK-BEHIND TRENCH ROLLER. ALTERNATELY, A ROLLER (MAXIMUM GROSS VEHICLE WEIGHT OF 6 TONS) MAY BE USED. ROLLER MUST REMAIN IN STATIC MODE UNTIL A MINIMUM OF 24" OF COVER HAS BEEN PLACED OVER THE MODULES. SHEEP FOOT ROLLERS SHOULD NOT BE USED. **SPEC SECTION 3.05 A5**
2. ONLY LOW PRESSURE TIRE OR TRACK VEHICLES (LESS THAN 7 PSI AND OPERATING WEIGHT OF LESS THAN 20,000 LBS) SHALL BE OPERATED OVER THE R-TANK SYSTEM DURING CONSTRUCTION. **SPEC SECTION 3.05 B**
3. DUMP TRUCKS AND PANS SHALL NOT BE OPERATED WITHIN THE R-TANK SYSTEM AT ANY TIME. WHERE NECESSARY, THE HEAVY EQUIPMENT SHOULD UNLOAD IN AN AREA ADJACENT TO THE R-TANK SYSTEM AND THE MATERIAL SHOULD BE MOVED OVER THE SYSTEM WITH TRACKED EQUIPMENT. **SPEC SECTION 3.05 B**
4. ENSURE THAT ALL UNRELATED CONSTRUCTION TRAFFIC IS KEPT AWAY FROM THE LIMITS OF EXCAVATION UNTIL THE PROJECT IS COMPLETE AND FINAL SURFACE MATERIALS ARE IN PLACE. NO NON-INSTALLATION RELATED LOADING SHOULD BE ALLOWED OVER THE R-TANK SYSTEM UNTIL THE FINAL DESIGN SECTION HAS BEEN CONSTRUCTED (INCLUDING PAVEMENT). **SPEC SECTION 3.05 C**
5. SEE R-TANK INSTALLATION GUIDE OR CONTACT YOUR LOCAL FERGUSON REPRESENTATIVE FOR ADDITIONAL INFORMATION.



CONSTRUCTION EQUIPMENT COVER DETAIL - VEHICULAR TRAFFIC

FERGUSON WATERWORKS
FOR ADDITIONAL INFORMATION PLEASE CONTACT: ALL ROADS WATERWORKS 1-800-448-3636, www.ferguson.com

ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.

R-TANK^XD CONSTRUCTION EQUIPMENT COVER DETAIL
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE NTS
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 5 of 6

R-TANK^XD SPECIFICATION

PART 1 - GENERAL

1.01 Related Documents
A. Drawings, technical specification and general provisions of the Contract as modified herein apply to this section.

1.02 Description of Work Included
A. Provide excavation and base preparation per geotechnical engineer's recommendations and/or as shown on the design drawings, to provide adequate support for project design loads and safety from excavation sidewall collapse. Excavations shall be in accordance with the owner's and OSHA requirements.
B. Provide and install R-Tank^XD system (hereafter called R-Tank) and all related products including fill materials, geotextiles, geogrids, inlet and outlet pipe with connections per the manufacturer's installation guidelines provided in this section.
C. Provide and construct the cover of the R-Tank system including; stone backfill, structural fill cover, and pavement section as specified.
D. Protect R-Tank system from construction traffic after installation until completion of all construction activity in the installation area.

1.03 Quality Control
A. All materials shall be manufactured in ISO certified facilities.
B. Installation Contractor shall demonstrate the following experience:
   1. A minimum of three R-Tank or equivalent projects completed within 2 years; and,
   2. A minimum of 25,000 cubic feet of storage volume completed within 2 years.
   3. Contractor experience requirement may be waived if the manufacturer's representative provides on-site training and review during construction.
C. Installation Personnel: Performed only by skilled workers with satisfactory record of performance on bulk earthworks, pipe, chamber, or pond/landfill construction projects of comparable size and quality.
D. Contractor must have manufacturer's representative available for site review if requested by Owner.

1.04 Submittals
A. Submit proposed R-Tank layout drawings. Drawings shall include typical section details as well as the required base elevation of stone and tanks, minimum cover requirements and tank configuration.
B. Submit manufacturer's product data, including compressive strength and unit weight.
C. Submit manufacturer's installation instructions.
D. Submit R-Tank sample for review. Reviewed and accepted samples will be returned to the Contractor.
E. Submit material certificates for geotextile, geogrid, base course and backfill materials.
F. Submit required experience and personnel requirements as specified in Section 1.03.
G. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening. Review package should include third party reviewed performance data that meets or exceeds criteria in Table 2.01 B.

1.05 Delivery, Storage, and Handling
A. Protect R-Tank and other materials from damage during delivery, and store UV sensitive materials under tarp to protect from sunlight when time from delivery to installation exceeds two weeks. Storage of materials should be on smooth surfaces, free from dirt, mud and debris.
B. Handling is to be performed with equipment appropriate to the materials and site conditions, and may include hand, handcart, forklifts, extension lifts, etc.
C. Cold weather:
   1. Care must be taken when handling plastics when air temperature is 40 degrees or below as plastic becomes brittle.
   2. Do not use frozen materials or materials mixed or coated with ice or frost.
   3. Do not build on frozen ground or wet, saturated or muddy subgrade.

1.06 Preinstallation Conference.
A. Prior to the start of the installation, a preinstallation conference shall occur with the representatives from the design team, the general contractor, the excavation contractor, the R-Tank installation contractor, and the manufacturer's representative.

1.07 Project Conditions
A. Coordinate installation for the R-Tank system with other on-site activities to eliminate all non-installation related construction traffic over the completed R-Tank system. No loads heavier than the design loads shall be allowed over the system, and in no case shall loads higher than a standard AASHTO HS20 (or HS25, depending on design criteria) load be allowed on the system at any time.
B. Protect adjacent work from damage during R-Tank system installation.
C. All pre-treatment systems to remove debris and heavy sediments must be in place and functional prior to operation of the R-Tank system. Additional pretreatment measures may be needed if unit is operational during construction due to increased sediment loads.
D. Contractor is responsible for any damage to the system during construction.

PART 2 - PRODUCTS

2.01 R-Tank Units
A. R-Tank^XD – Injection molded plastic cells stacked to form a 90% void modular structure of predesigned height (custom for each project).
B. R-Tank^XD units shall meet the following Physical Characteristics:

PROPERTY	DESCRIPTION	R-Tank^XD VALUE
Void Area	Volume available for water storage	90%
Surface Void Area	Percentage of exterior available for infiltration	90%
Compressive Strength	ASTM D 2412 / ASTM F 2418	240.2 psi
HS-20 Minimum Cover	Cover required to support HS-20 loads	6"
HS-25 Minimum Cover	Cover required to support HS-25 loads	6"
Maximum Cover	Maximum allowable cover depth	< 10.7 feet
Unit Weight	Weight of panels per cubic foot of tank	7.02 lbs / cf
Service Temperature	Safe temperature range for use	-14 – 120° F

C. Supplier: Ferguson Waterworks 2831 Cardwell Road Richmond, VA 23234 (T): 800-448-3636; (F): 804-743-7779 www.ferguson.com

2.02 Geosynthetics
A. Geotextile. A geotextile envelope is required to prevent backfill material from entering the R-Tank modules.
   1. **Standard Application**: The standard geotextile shall be a minimum 8 oz per square yard nonwoven geotextile (ACF N080 or equivalent).
   2. **Infiltration Applications**: When water must infiltrate/exfiltrate through the geotextile as a function of the system design, a woven monofilament (ACF M200 or equivalent) shall be used.
B. Geogrid: When required by project plans, install geogrid (ACF BX12 or equivalent) to reinforce backfill above the R-Tank system.

2.03 Backfill & Cover Materials
A. Bedding Materials: Stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System) shall be used below the R-Tank system (3" minimum). Material must be free from lumps, debris, and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation. For infiltration applications bedding material shall be free draining.
B. Side and Top Backfill
   1. **Deep Applications (> 12" total cover)**: Free draining stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System) shall be used adjacent to (12" minimum) and above (for the first 12") the R-Tank system. Material must be free from lumps, debris and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.
   2. **Shallow Applications (< 12" total cover)**: Materials listed in section 2.03 B1 above may be used adjacent to the modules. Top backfill must be well graded aggregate (angular and smaller than 0.75" in diameter) or soil (GW or SW as classified by the Unified Soil Classification System). Material must be free from lumps, debris and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.
C. Additional Cover Materials: Structural Fill shall consist of granular materials meeting the gradational requirements of SM, SP, SW, GM, GP or GW as classified by the Unified Soil Classification System. Structural fill shall have a maximum of 25 percent passing the No. 200 sieve, shall have a maximum clay content of 10 percent and a maximum Plasticity Index of 4. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.

2.04 Other Materials
Utility Marker: Install metallic tape at corners of R-Tank system to mark the area for future utility detection.

PART 3 - EXECUTION

3.01 Assembly of R-Tank Units
A. R-Tank^XD modules do not require on-site assembly prior to installation. See Section 3.04 below for details on installation.

3.02 Layout and Excavation
A. Installer shall stake out, excavate, and prepare the subgrade area to the required plan grades and dimensions, ensuring that the excavation is at least 2 feet greater than R-Tank dimensions in each direction allowing for installation of geotextile filter fabric, R-Tank modules, and free draining backfill materials.
B. All excavations must be prepared with OSHA approved excavated sides and sufficient working space.
C. Protect partially completed installation against damage from other construction traffic by establishing a perimeter with high visibility construction tape, fencing, barricades, or other means until construction is complete.
D. Base of the excavation shall be uniform, level, and free of lumps or debris and soft or yielding subgrade areas. A minimum 2,000 pounds per square foot bearing capacity is required.
   1. **Standard Applications**: Compact subgrade to a minimum of 95% of Standard Proctor (ASTM D698) density or as required by the Owner's engineer.
   2. **Infiltration Applications**: Subgrade shall be prepared in accordance with the contract documents. Compaction of subgrade should not be performed in infiltration applications.
E. Unsuitable Soils or Conditions: All questions about the base of the excavation shall be directed to the owner's engineer, who will approve the subgrade conditions prior to placement of stone. The owner's engineer shall determine the required bearing capacity of the R-Tank subgrade; however in no case shall a bearing capacity of less than 2,000 pounds per square foot be provided.
   1. If unsuitable soils are encountered at the subgrade, or if the subgrade is pumping or excessively soft, repair the area in accordance with contract documents and/or as directed by the owner's engineer.
   2. If indications of the water table are observed during excavation, the engineer shall be contacted to provide recommendations.
   3. Do not start installation of the R-Tank system until unsatisfactory subgrade conditions are corrected and the subgrade conditions are accepted by the owner's engineer.

3.03 Preparation of Base
A. Place a thin layer (3" unless otherwise specified) of bedding material (Section 2.03 A), over the subgrade to establish a level working platform for the R-Tank modules. Level to within ½" (+/- ½") or as shown on the plans. Native subgrade soils or other materials may be used if determined to meet the requirements of 2.03 A and are accepted by the owner's engineer.
   1. **Standard Applications**: Static roll or otherwise compact bedding materials until they are firm and unyielding.
   2. **Infiltration Applications**: Bedding materials shall be prepared in accordance with the contract documents.
B. Outline the footprint of the R-Tank system on the excavation floor using spray paint or chalk line to ensure a 12" perimeter is available around the R-Tank system for proper installation and compaction of backfill.

3.04 Installation of the R-Tank^XD
A. Where a geotextile wrap is specified on the stone base, cut strips to length and install in excavation, removing wrinkles so material lays flat. Overlap geotextile a minimum 12" or as recommended by manufacturer.
B. Where an impervious liner (for containment) is specified, install the liner per manufacturer's recommendations and the contract documents. The R-Tank units shall be separated from impervious liner by a non-woven geotextile fabric installed accordance with Section 3.04A.
C. Install R-Tank^XD Units in layers in accordance with the design drawings. R-Tank^XD places on each layer should be connected to all other places on that layer. Layers should stack on top of each preceding layer evenly. No vertical connection between layers is required. It is advisable to use a string line to form square corners and straight edges along the perimeter of the R-Tank system. The panels are to be oriented as per the design drawing (19.68' x 23.62') with required depth as shown on plans.
D. Wrap the R-Tank top and sides in specified geotextile. Cut strips of geotextile so that it will cover the sides and top, encapsulating the entire system to prevent backfill entry into the system. Overlap geotextile 12" or as recommended by manufacturer. Take great care to avoid damage to geotextile (and, if specified, impervious liner) during placement.
E. Identify locations of inlet, outlet and any other penetrations of the geotextile (and optional liner). These connections should be installed flush (butted up to the R-Tank) and the geotextile fabric shall be cut to enable hydraulic continuity between the connections and the R-Tank units. These connections shall be secured using pipe boots with stainless steel pipe clamps. Support pipe in trenches during backfill operations to prevent pipe from settling and damaging the geotextile, impervious liner (if specified) or pipe. Connecting pipes at 90 degree angles facilitates construction, unless otherwise specified. Ensure end of pipe is installed snug against R-Tank system.
F. Install Inspection and Maintenance Ports in locations noted on plans. At a minimum one maintenance port shall be installed within 10' of each inlet & outlet connection, and with a maximum spacing of one maintenance port for every 2,500 square feet. Install all ports as noted in the R-Tank Installation Guide.
G. If required, install ventilation pipes and vents as specified on drawings to provide ventilation for proper hydraulic performance. The number of pipes and vents will depend on the size of the system. Vents are often installed using a 90 degree elbow with PVC pipe into a landscaped area with 1/2" bend or venting bollard to inhibit the ingress of debris. A ground level concrete or steel cover can be used.

3.05 Backfilling of the R-Tank Units
A. Backfill and fill with recommended materials as follows:
   1. Place freely draining backfill materials (Section 2.03 B) around the perimeter in lifts with a maximum thickness of 12". Each lift shall be placed around the entire perimeter such that each lift is no more than 24" higher than the side backfill along any other location on the perimeter of the R-Tank system. No fill shall be placed over top of tanks until the side backfill has been completed.
   2. Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density or until no further densification is observed (for self-compacting stone materials). The side lifts must be compacted with walk behind compaction equipment. Even when "self-compacting" backfill materials are selected, a walk behind vibratory compactor must be used.
   3. Take care to ensure that the compaction process does not allow the machinery to come into contact with the modules due to the potential for damage to the geotextile and R-Tank units.
   4. No compaction equipment is permissible to operate directly on the R-Tank modules.
   5. Top Backfill:
      a **Deep Applications (> 12" total cover)**: Install a 12" (or as shown on plans) lift of freely draining material (Section 2.03 B1) over the R-Tank^XD Units, maintaining 12" between equipment tracks and R-Tank System. Lightly compact using a walk-behind trench roller. Alternately, a roller (maximum gross vehicle weight of 6 tons) may be used. Roller must remain in static mode until a minimum of 24" of cover has been placed over the modules. Sheep foot rollers should not be used.
      b **Shallow Applications (< 12" total cover)**: Install top backfill (Section 2.03 B2) in accordance with plans using an LGP skid steer or dozer (rubber tracks preferred). Lightly compact using a walk-behind trench roller. Alternately, a roller (maximum gross vehicle weight of 6 tons) may be used in static mode only
   6. If required, install a geogrid as shown on plans. Geogrid shall extend a minimum of 2 feet beyond the limits of the excavation wall.
   7. Following placement and compaction of the initial cover, subsequent lifts of structural fill (Section 2.03 C) shall be placed at the specified moisture content and compacted to a minimum of 95% of the Standard Proctor Density and shall cover the entire footprint of the R-Tank system. During placement of fill above the system, unless otherwise specified, a uniform elevation of fill shall be maintained to within 12" across the footprint of the R-Tank system. Do not exceed maximum cover depths listed in Table 2.01 B.
   8. Place additional layers of geotextile and/or geogrid at elevations as specified in the design details. Each layer of geosynthetic reinforcement placed above the R-Tank system shall extend a minimum of 3 feet beyond the limits of the excavation wall.
B. Only low pressure tire or track vehicles shall be operated over the R-Tank system during construction. No machinery should drive on top of the tank until a minimum of 18" of backfill and compaction is achieved. Dump Trucks and Pans shall not be operated within the R-Tank system footprint at any time. Where necessary the heavy equipment should unload in an area adjacent to the R-Tank system and the material should be moved over the system with tracked equipment.
C. Ensure that all unrelated construction traffic is kept away from the limits of excavation until the project is complete and final surface materials are in place. No non-installation related loading should be allowed over the R-Tank system until the final design section has been constructed (including pavement).
D. Place surfacing materials, such as groundcovers (no large trees), or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.
E. Backfill depth over R-Tank system must be within the limitations shown in the table in Section 2.01 B. If the total backfill depth does not comply with this table, contact engineer or manufacturer's representative for assistance.

PART 4 - USING THE SYSTEM

4.01 Maintenance Requirements
A. A routine maintenance effort is required to ensure proper performance of the R-Tank system. The Maintenance program should be focused on pretreatment systems. Ensuring these structures are clean and functioning properly will reduce the risk of contamination of the R-Tank system and stormwater released from the site. Pre-treatment systems shall be inspected yearly, or as directed by the regulatory agency and by the manufacturer (for proprietary systems). Maintain as needed using acceptable practices or following manufacturer's guidelines (for proprietary systems).
B. Inspection and/or Maintenance Ports in the R-Tank system will need to be inspected for accumulation of sediments at least quarterly through the first year of operation and at least yearly thereafter. This is done by removing the cap of the port and using a measuring device long enough to reach the bottom of the R-Tank system and stiff enough to push through the loose sediments, allowing a depth measurement.
C. If sediment has accumulated to the level noted in the R-Tank Maintenance Guide or beyond a level acceptable to the Owner's engineer, the R-Tank system should be flushed.
D. A flushing event consists of pumping water into the Maintenance Port and/or adjacent structure, allowing the turbulent flows through the R-Tank system to re-suspend the fine sediments. If multiple Maintenance Ports have been installed, water should be pumped into each port to maximize flushing efficiency. Sediment-laden water can be filtered through a Dirtbag or approved equivalent if permitted by the locality.

R-TANK^XD SPECIFICATION
THE INN AT WHALEBONE, LLC
DARE COUNTY, NC

SCALE NTS
DRAWN BY JEC
DATE 08/24/2023
SHEET NO. 6 of 6

NOTES

LEGEND

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- FENCE
- RIGHT–OF–WAY
- EX. EDGE OF PAVEMENT
- CREEK
- EX. SANITARY SEWER
- NEW SANITARY SEWER
- EX. WATER LINE
- NEW WATER LINE
- NEW FORCE MAIN
- CATCH BASIN
- NEW STORM PIPE
- POLE–MOUNTED LIGHT

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT MANAGER: GSM
PROJECT ENGINEER: HDB
DRAWN BY: HDB
CHECKED BY: TAP

DATE: MARCH 15, 2024

3/15/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
LICENSE No. C-1039
TEL: (919) 467-1239 FAX: (919) 319-6510

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

R-TANK DETAILS 5 & 6

PROJECT NUMBER C06001.00
DRAWING NUMBER D-103

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

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SEEDING SPECIFICATIONS

1. PERMANENT SEEDING: PERMANENT SEEDING IS REQUIRED FOR ALL AREAS DISTURBED BY CONSTRUCTION EXCEPT FOR AREAS COVERED BY STRUCTURES, PAVEMENTS, ETC.

2. TEMPORARY SEEDING: TEMPORARY SEEDING IS REQUIRED FOR THOSE AREAS DISTURBED BY CONSTRUCTION AND LEFT EXPOSED FOR PERIODS OF 7–14 DAYS (SEE NCG01 GROUND STABILIZATION TABLE) OR MORE BEFORE BEING BROUGHT TO FINAL GRADE AND PERMANENTLY SEEDED. THE FORCE MAIN SHALL BE SEEDED AT THE END OF EACH WORKING DAY TO MINIMIZE CONSTRUCTION DISTURBANCE ACTIVITIES.

*PRODUCTS:

MATERIALS:

1. FERTILIZER:

   A. TEMPORARY SEEDING: PROVIDE 10–10–10 COMMERCIAL FERTILIZER CONFORMING TO STATUTORY REQUIREMENTS AND ALL RULES AND REGULATIONS ADOPTED BY THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE.

   B. PERMANENT SEEDING: PROVIDE 870 POUNDS OF 10–20–20 OR 1,740 POUNDS OF 5–10–10 PER ACRE COMMERCIAL FERTILIZER CONFORMING TO STATUTORY REQUIREMENTS AND ALL RULES AND REGULATIONS ADOPTED BY THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE. IN SANDY SOILS, TYPICAL TO COASTAL PLAIN AND SANDHILLS, FERTILIZER RATES SHOULD BE INCREASED BY 20 PERCENT.

2. LIMESTONE: PROVIDE LIMESTONE CONFORMING TO ALL STATUTORY REQUIREMENTS AND ALL RULES AND REGULATIONS ADOPTED BY THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE.

3. SEEDING: PROVIDE SEED CONFORMING TO ALL STATUTORY REQUIREMENTS AND ALL RULES AND REGULATIONS ADOPTED BY THE NORTH CAROLINA DEPARTMENT OF AGRICULTURE. PROVIDE SEED MIXTURES AS TABULATED BELOW. DELIVER SEED TO THE SITE IN ORIGINAL CONTAINERS BEARING THE APPROPRIATE GUARANTEED MIXTURES. SEED SHALL SHOW A PURITY OF NOT LESS THAN 90 PERCENT AND GERMINATION QUALITY OF NOT LESS THAN 85 PERCENT.

3A. TEMPORARY MIXTURE:

   A. LATE WINTER AND EARLY SPRING (COASTAL PLAIN: DECEMBER 1 – APRIL 15; PIEDMONT: JANUARY 1 – MAY 1; MOUNTAINS >2,500 FEET: FEBRUARY 15 – MAY 15; MOUNTAINS <2,500 FEET: FEBRUARY 1 – MAY 1): THE TEMPORARY SEED MIXTURE FOR GENERAL AREAS SHALL CONSIST OF 120 POUNDS PER ACRE OF RYE (GRAIN) AND 50 POUNDS PER ACRE OF ANNUAL LESPEDEZA (KOBE IN PIEDMONT AND COASTAL PLAIN, KOREAN IN MOUNTAINS).

   B. SUMMER (COASTAL PLAIN: APRIL 15 – AUGUST 15; PIEDMONT: MAY 1 – AUGUST 15; MOUNTAINS: MAY 15 – AUGUST 15): THE TEMPORARY SEED MIXTURE FOR GENERAL AREAS SHALL CONSIST OF 40 POUNDS PER ACRE OF GERMAN MILLET. IN THE PIEDMONT AND MOUNTAINS A SMALL–STEMMED SUDANGRASS MAY BE SUBSTITUTED AT A RATE OF 50 POUNDS PER ACRE.

   C. FALL (COASTAL PLAIN AND PIEDMONT: AUGUST 15 – DECEMBER 30; MOUNTAINS: AUGUST 15 – DECEMBER 15): THE TEMPORARY SEED MIXTURE FOR GENERAL AREAS SHALL CONSIST OF 120 POUNDS PER ACRE OF RYE (GRAIN).

3B. PERMANENT MIXTURE:

   A. THE PERMANENT SEED MIXTURE FOR GENERAL AREAS SHALL CONSIST OF MINIMUM RATE OF 50 lbs./ac. PENSACOLA BAHIAGRASS, 30 lbs./ac. SERICEA LESPEDEZA, 10 lbs./ac. COMMON BERMUDA GRASS, AND 10 lbs./ac. GERMAN MILLET. THE BEST SEEDING DATES FOR THIS MIXTURE ARE FROM APRIL 1st TO JULY 15th.

   B. OTHER MIXTURES: OTHER MIXTURES, AS APPROVED OR RECOMMENDED BY THE SOIL CONSERVATION SERVICE OR THE NORTH CAROLINA AGRICULTURAL EXTENSION OFFICE MAY BE USED.

4. MULCH: MULCH ALL SEEDED AREAS, EXCEPT WHERE JUTE MESH IS REQUIRED AND DURING PERMANENT SEEDING. USE UNDAMAGED, AIR–DRIED, THRESHED SMALL GRAIN STRAW FREE OF UNDESIRABLE WEED SEED. ANCHOR STRAW BY TACKING WITH ASPHALT, NETTING, BY ROVING, OR THROUGH USE OF A MULCH ANCHORING TOOL

*EXECUTION

1. FOLLOW PROCEDURES SET FORTH IN THE PUBLICATION "GUIDE FOR SEDIMENT CONTROL ON CONSTRUCTION SITES IN NORTH CAROLINA" BY THE SOIL CONSERVATION SERVICE OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, AND AS SPECIFIED HEREIN.

2. SPREAD A MINIMUM OF FOUR (4) INCHES OF TOP SOIL OVER ALL DISTURBED AREAS TO THE FINISHED GRADE.

3. REMOVE ALL GRASS AND WEEDS AND SHAPE THE OVERALL AREA TO EVEN OUT HIGH AND LOW SPOTS.

4. SCARIFY SOIL TO A DEPTH OF THREE (3) INCHES AND WORK INTO A SATISFACTORY SEED BED BY DISKING OR THROUGH THE USE OF CULTIPACKERS, HARROWS, DRAGS, OR OTHER APPROVED MEANS.

5. THE PREPARATION OUTLINED ABOVE SHALL NOT BE DONE WHEN THE SOIL IS FROZEN, WET, OR OTHERWISE IN AN UNFAVORABLE CONDITION.

6. BEGIN AND COMPLETE SEEDING OPERATIONS, AS OUTLINED BELOW, AS SOON AS POSSIBLE AFTER FINAL OR INTERMEDIATE GRADING IS COMPLETED.

7. DISTRIBUTE LIME AND FERTILIZER, AS REQUIRED, UNIFORMLY OVER THE SEED BED. HARROW RAKE OR OTHERWISE WORK THESE ADDITIONS INTO THE SEED BED.

8. DISTRIBUTE SEED UNIFORMLY OVER THE ESTABLISHED SEED BED. LIGHTLY RAKE THE SURFACE OF THE SEED BED IN ORDER TO COVER SEED TO A MAXIMUM DEPTH OF 0.25 INCH.

9. COMPACT THE SEED BED WITH AN APPROVED ROLL OR DRAG AFTER COVERING THE SEED.

10. NO LIME, FERTILIZER, OR SEED SHALL BE APPLIED DURING A STRONG WIND, WHEN THE SOIL IS WET, OR WHEN THE SOIL IS OTHERWISE UNWORKABLE. SHOULD RAIN FOLLOW SEEDING BEFORE ROLLING IS INITIATED, THE SEED BED SHALL NOT BE ROLLED.

11. NO RIP–RAP IS TO BE PLACED ALONG THE BANKS OF NEW FILL. MAINTAIN THE AREA AND REPAIR ANY EROSION DAMAGE UNTIL A PERMANENT GROUND COVER IS ESTABLISHED. USE MULCH OR MESH AS REQUIRED.

*APPLICATION

TEMPORARY SEEDING: LATE WINTER – SUMMER:

1. APPLY LIME ACCORDING TO THE SOIL TESTS OR AT A RATE OF 2000 lbs./ac. BEFORE SEEDING.

2. APPLY FERTILIZER ACCORDING TO THE SOIL TESTS OR AT A RATE OF 750 lbs./ac.

3. SEED THE SEED BED WITH THE SPECIFIED SEED MIXTURE AT THE SPECIFIED RATE FOR THE RECOMMENDED PLANTING SEASON.

4. APPLY GRAIN STRAW AT A RATE OF 4000 lbs./ac. OR PROVIDE EQUIVALENT COVER OF ANOTHER SUITABLE COVER. MULCH SHALL BE ANCHORED IN A SUITABLE WAY. WHERE JUTE MESH IS REQUIRED, APPLY THE PRODUCT ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND ANCHOR WITH STEEL HAIRPIN–SHAPED WIRE STAPLES.

5. REFERTILIZE SEED BED IF GROWTH IS NOT FULLY ADEQUATE, AS DETERMINED BY THE ENGINEER. RE–SEED, FERTILIZE, AND MULCH ALL DAMAGED, BARE, AND ERODED AREAS IMMEDIATELY AND UNTIL A SUITABLE COVER IS ESTABLISHED.

TEMPORARY SEEDING: FALL:

1. APPLY LIME ACCORDING TO THE SOIL TESTS OR AT A RATE OF 2000 lbs./ac. BEFORE SEEDING.

2. APPLY FERTILIZER ACCORDING TO THE SOIL TESTS OR AT A RATE OF 1000 lbs./ac.

3. SEED THE SEED BED WITH THE SPECIFIED SEED MIXTURE AT THE SPECIFIED RATE FOR THE RECOMMENDED PLANTING SEASON.

4. APPLY GRAIN STRAW AT A RATE OF 4000 lbs./ac. OR PROVIDE EQUIVALENT COVER OF ANOTHER SUITABLE COVER. MULCH SHALL BE SUITABLY ANCHORED. WHERE JUTE MESH IS REQUIRED, APPLY THE PRODUCT ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND ANCHOR WITH STEEL HAIRPIN–SHAPED WIRE STAPLES.

5. REFERTILIZE SEED BED IF GROWTH IS NOT FULLY ADEQUATE, AS DETERMINED BY THE ENGINEER. RE–SEED, FERTILIZE, AND MULCH ALL DAMAGED, BARE, AND ERODED AREAS IMMEDIATELY AND UNTIL A SUITABLE COVER IS ESTABLISHED.

PERMANENT SEEDING: APPLICATION OF LIME, FERTILIZER, SEED, AND MULCH:

1. WHERE A NEAT APPEARANCE IS DESIRED, OMIT SERICEA.

2. USE COMMON BERMUDAGRASS ONLY ON ISOLATED SITES WHERE IT CANNOT BECOME A PEST. BERMUDAGRASS MAY BE REPLACED WITH 5 LBS./AC. CENTIPEDEGRASS.

3. SOIL AMENDMENTS: APPLY LIME AND FERTILIZER ACCORDING TO SOIL TESTS, OR APPLY 3200 LBS./AC. GROUND AGRICULTURAL LIMESTONE AND 870 POUNDS OF 10–20–20 OR 1,740 POUNDS OF 5–10–10 PER ACRE. FOR SANDY SOILS, TYPICAL TO COASTAL PLAIN AND SANDHILLS OF NORTH CAROLINA, FERTILIZER RATES SHOULD BE INCREASED BY 20 PERCENT.

4. SEED THE SEED BED WITH THE SPECIFIED SEED MIXTURE AT THE SPECIFIED RATE DURING RECOMMENDED PLANTING SEASONS. IF GRADING IS COMPLETED AT TIMES OTHER THAN THE RECOMMENDED SEASON, PROVIDE TEMPORARY SEEDING OR OTHER EROSION AND SEDIMENTATION PROTECTION APPROVED BY THE ENGINEER UNTIL THE APPROPRIATE PLANTING SEASON BEGINS.

5. MULCH: APPLY 4000 LBS./AC. GRAIN STRAW OR EQUIVALENT COVER OF ANOTHER SUITABLE MULCH. ANCHOR BY TACKING ASPHALT, ROVING, OR NETTING OR BY CRIMPING WITH A MULCH ANCHORING TOOL. A DISC WITH BLADES SET NEARLY STRAIGHT MAY BE USED AS A MULCH ANCHORING TOOL.

6. 6. MAINTENANCE: REFERTILIZE THE FOLLOWING APRIL WITH 50 LBS./AC. NITROGEN. REPEAT AS GROWTH REQUIRES. MOW ONLY ONCE PER YEAR. WHERE A NEAT APPEARANCE IS DESIRED, OMIT SERICEA AND MOW

CONSTRUCTION SCHEDULE

THE CONTRACTOR MUST COMPLY WITH THE REQUIREMENTS HEREIN:

1. CONDUCT A PRECONSTRUCTION MEETING BEFORE ANY LAND DISTURBING ACTIVITY STARTS. THOSE REQUIRED FOR ATTENDANCE SHALL: BE THE GENERAL CONTRACTOR, ORANGE COUNTY EROSION CONTROL ADMINISTRATOR, GRADING AND EROSION CONTROL SUB–CONTRACTORS (IF ANY), AND A REPRESENTATIVE OF THE FINANCIALLY RESPONSIBLE PARTY.

2. INSTALL EROSION CONTROL MEASURES AS REQUIRED, SUCH AS THE CONSTRUCTION ENTRANCE, SILT FENCE, AND SILT FENCE OUTLETS. ONLY DISTURB AREAS REQUIRED TO INSTALL THESE DEVICES. DISTURBANCE FOR PERIMETER SILT FENCE MUST BE LIMITED TO A MAXIMUM 12" MACHINE WIDTH. AFTER INSTALLATION OF SILT FENCE AND OUTLETS, CONTACT ORANGE COUNTY EROSION CONTROL OFFICER CHASE ELLIS, 919–245–2587, TO SCHEDULE A SILT FENCE INSPECTION. NO ADDITIONAL WORK CAN BE COMPLETED UNTIL THE SILT FENCE INSPECTION HAVE BEEN CONDUCTED AND PASSED.

3. CLEAR AREA FOR SKIMMER SEDIMENT BASIN FOOTPRINT. ONCE BASIN HAS BEEN INSTALLED, CONTACT ORANGE COUNTY EROSION CONTROL OFFICER CHASE ELLIS, 919–245–2587, TO SCHEDULE A BASIN INSPECTION.

4. CLEAR AREAS FOR FOOTPRINT OF DIVERSION DITCH INSTALLATION. ONCE INSTALLED, CONTACT ORANGE COUNTY EROSION CONTROL OFFICER CHASE ELLIS, 919–245–2587, TO SCHEDULE A DIVERSION DITCH INSPECTION.

5. CLEAR AND GRUB ANY WOODED AREAS TO BE DEVELOPED WITHIN LIMITS OF DISTURBANCE. STOCKPILE TOPSOIL AND SUITABLE FILL MATERIAL IN AREAS DESIGNATED AS STOCKPILES.

6. BEGIN GRADING ACTIVITIES AFTER ALL REQUIRED EROSION CONTROL MEASURES HAVE BEEN INSTALLED AND CONSTRUCTED. SALVAGE ANY TOPSOIL THAT MAY BE USED AFTER CONSTRUCTION.

7. NO LAND DISTURBANCE BEYOND THE LIMITS OF DISTURBANCE IS ALLOWED.

8. INSTALL DRIVEWAY CULVERT. PLACE INLET AND OUTLET PROTECTION IMMEDIATELY AFTER PIPE INSTALLATION.

9. SEED TEMPORARY AREAS THAT HAVE BEEN LEFT DORMANT IN ACCORDANCE WITH THE NCG01 STABILIZATION CHART. THE MAXIMUM ALLOWED TIME TO STABILIZE IS 14 DAYS.

10. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSPECTED WEEKLY AND AFTER EACH HEAVY RUNOFF PRODUCING RAINFALL. NEEDED REPAIRS SHALL BE MADE IMMEDIATELY.

11. PERIMETER MEASURES MUST BE LEFT IN PLACE UNTIL ALL UPLAND AREAS ARE PERMANENTLY STABILIZED AND PERMISSION HAS BEEN GRANTED FROM THE ORANGE COUNTY EROSION CONTROL DEPARTMENT. AFTER SITE IS PERMANENTLY STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AND PROVIDE PERMANENT SEEDING WHERE TEMPORARY MEASURES HAVE BEEN REMOVED AND GROUND COVER IS NOT ADEQUATE.

12. AFTER CONSTRUCTION REMOVE ALL TEMPORARY STRUCTURES AND ENSURE ALL SEEDING IS COMPLETED FOR AREAS DISTURBED.

13. WHEN THE PROJECT IS COMPLETE, THE PERMITTEE SHALL CONTACT ORANGE COUNTY TO CLOSE OUT THE EROSION CONTROL PLAN.

GENERAL MAINTENANCE PLAN

1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED WEEKLY AND AFTER EACH HEAVY STORMWATER–PRODUCING RAINFALL. ALL NEEDED REPAIRS SHALL BE MADE IMMEDIATELY TO PREVENT FURTHER DAMAGE AND EROSION. STRUCTURES THAT WILL BE MAINTAINED WILL INCLUDE:

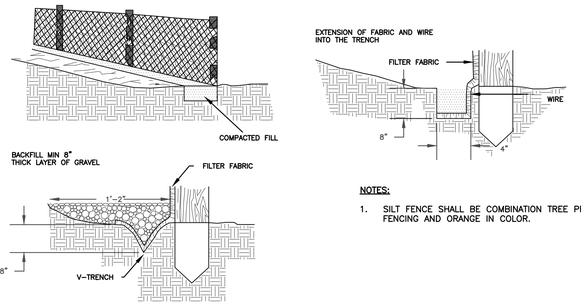
   CONSTRUCTION ENTRANCE/EXIT: INSPECT CONSTRUCTION ROAD SURFACE REGULARLY, MAINTAIN IN A CONDITION TO PREVENT SEDIMENT FROM LEAVING THE SITE, AND TOP–DRESS WHEN NEEDED. SEDIMENT TRANSPORTED TO PUBLIC ROADS SHALL BE REMOVED DAILY.

   SEEDING, FERTILIZING, AND MULCHING: SEEDED AREAS SHALL BE INSPECTED FOR FAILURE AND NECESSARY REPAIRS SHALL BE MADE WITHIN THE SAME SEASON, IF POSSIBLE.

   SILT FENCE/SILT FENCE OUTLETS: REMOVE SEDIMENT AFTER 6 INCHES OF ACCUMULATION AT FENCE.

2. THE ANGLE FOR GRADED SLOPES AND FILLS SHALL BE NO GREATER THAN THE ANGLE THAT CAN BE RETAINED BY VEGETATIVE COVER OR OTHER ADEQUATE EROSION CONTROL DEVICES OR STRUCTURES. IN ANY EVENT, SLOPES LEFT EXPOSED WILL, WITHIN 21 CALENDAR DAYS OF COMPLETION OF ANY PHASE OF GRADING, BE PLANTED OR OTHERWISE PROVIDED WITH TEMPORARY GROUND COVER, DEVICES OR STRUCTURES SUFFICIENT TO RESTRAIN EROSION. PERMANENT GROUND COVER SHALL BE PROVIDED FOR ALL DISTURBED AREAS WITHIN 15 WORKING DAYS OR NO MORE THAN 90 CALENDAR DAYS.

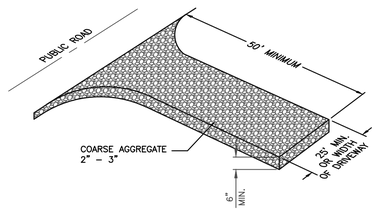
TOTAL DISTURBED AREA: ±2.33 AC.



NOTES:

1. SILT FENCE SHALL BE COMBINATION TREE PROTECTION FENCING AND ORANGE IN COLOR.

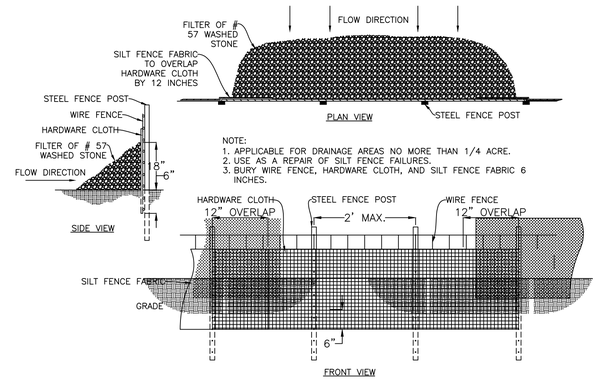
1 / D-104 SILT FENCE DETAIL
NTS



NOTES:

1. GRAVEL PAD TO BE 25'–0" x 50'–0" AND 6" THICK MINIMUM
2. TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS IS TO BE PROVIDED.
3. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR MAXIMUM UTILITY BY ALL CONSTRUCTION VEHICLES.
4. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE SHALL BE NECESSARY.
5. ANY MATERIAL DEPOSITED ONTO THE ROAD MUST BE CLEANED UP IMMEDIATELY.
6. APPLICABLE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS AND TIMELY MAINTENANCE OF THIS DEVICE MUST BE PROVIDED.
7. MAINTENANCE: CONSTRUCTION ENTRANCE/EXIT: INSPECT CONSTRUCTION ROAD SURFACE REGULARLY, MAINTAIN IN A CONDITION TO PREVENT SEDIMENT FROM LEAVING THE SITE, AND TOP–DRESS WHEN NEEDED. SEDIMENT TRANSPORTED TO PUBLIC ROADS SHALL BE REMOVED IMMEDIATELY.

2 / D-104 TEMPORARY CONSTRUCTION ENTRANCE
NTS



NOTE:
1. APPLICABLE FOR DRAINAGE AREAS NO MORE THAN 1/4 ACRE.
2. USE AS A REPAIR OF SILT FENCE FAILURES.
3. BURY WIRE FENCE, HARDWARE CLOTH, AND SILT FENCE FABRIC 6 INCHES.

3 / D-104 TEMPORARY SILT FENCE OUTLET
NTS

FOR REVIEW ONLY
NOT RELEASED FOR CONSTRUCTION

NOTES

LEGEND

- 110 — INDEX CONTOUR
- 108 — INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- x — FENCE
- RIGHT–OF–WAY
- EX. EDGE OF PAVEMENT
- CREEK
- ss — EX. SANITARY SEWER
- NEW SANITARY SEWER
- w — EX. WATER LINE
- NEW WATER LINE
- fm — NEW FORCE MAIN
- CATCH BASIN
- NEW STORM PIPE
- POLE–MOUNTED LIGHT

REVISIONS

NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE: MARCH 15, 2024

3/15/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510
LICENSE No. C-1039

THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

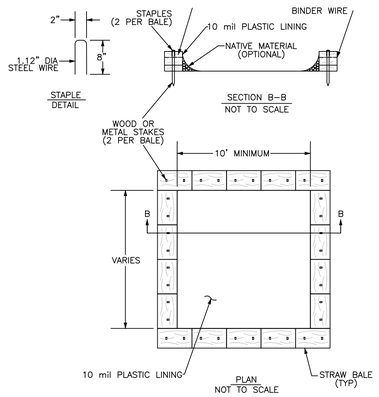
EROSION CONTROL DETAILS 1

PROJECT NUMBER	DRAWING NUMBER
C06001.00	D-104

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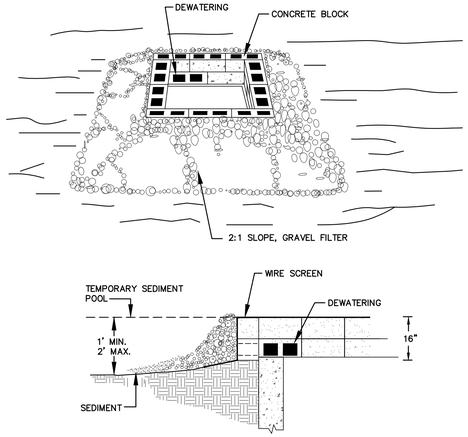
C06001.00 – HOUSE ENGINEERING, P.C. – THE INN AT WHALEBONE



NOTES:

1. ACTUAL LAYOUT TO BE DETERMINED IN THE FIELD.
2. A CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30' OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE REMOVED FROM THE SITE OF THE WORK AND DISPOSED OF OR RECYCLED.
4. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCE CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE BACKFILLED, REPAIRED, AND STABILIZED TO PREVENT EROSION.
5. MUST BE LOCATED >50 FEET AWAY FROM INLETS/WATERWAYS UNLESS THERE IS NO OTHER PRACTICAL ALTERNATIVE.

1 D-105 CONCRETE WASHOUT
NTS



NOTES:

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE IN THE BOTTOM ROW TO ALLOW POOL DRAINAGE. THE FOUNDATION SHOULD BE EXCAVATED AT LEAST 2 INCHES BELOW THE CREST OF THE STORM DRAIN. PLACE THE BOTTOM ROW OF BLOCKS AGAINST THE EDGE OF THE STORM DRAIN FOR LATERAL SUPPORT AND TO AVOID WASHOUTS WHEN OVERFLOW OCCURS. IF NEEDED, GIVE LATERAL SUPPORT TO SUBSEQUENT ROWS BY PLACING 2 X 4 WOOD STUDS THROUGH BLOCK OPENINGS.
2. CAREFULLY FIT HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2–INCH OPENINGS OVER ALL BLOCK OPENINGS TO HOLD GRAVEL IN PLACE.
3. USE CLEAN GRAVEL, 3/4– TO 1/2–INCH IN DIAMETER, PLACED 2 INCHES BELOW THE TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER AND SMOOTH IT TO AN EVEN GRADE. DOT #57 WASHED STONE IS RECOMMENDED.

2 D-105 BLOCK AND GRAVEL DROP INLET EROSION CONTROL
NTS

NOTES:

1. ALL PLANTS DESIGNATED TO BE SAVED SHALL BE PROTECTED BY FENCING, AS ILLUSTRATED.
2. INSTALL TREE PROTECTION FENCE AT TREE DRIP LINE OR AT EDGE OF DISTURBED AREA, AS SHOWN ON PLANS, PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. SPACE TREE PROTECTION ZONE SIGNS A MINIMUM OF ONE EVERY 300 FEET. THE SIZE OF EACH SIGN MUST BE A MINIMUM OF 2' x 2' AND BE VISIBLE FROM BOTH SIDES OF THE FENCE. THE SIGN MUST CONTAIN THE FOLLOWING LANGUAGE IN BOTH ENGLISH & SPANISH: "TREE PROTECTION ZONE, KEEP OUT".
4. THERE SHALL BE NO STORAGE OF MATERIAL WITHIN THE BOUNDARIES OF THE TREE PROTECTION FENCING.
5. TREE PROTECTION FENCING SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.

3 D-105 TREE PROTECTION FENCE
NTS

NOTES

LEGEND

- 110 — INDEX CONTOUR
- 105 — INTERMEDIATE CONTOUR
- PROPERTY LINE
- ADJOINING PROPERTIES
- x — FENCE
- RIGHT–OF–WAY
- EX. EDGE OF PAVEMENT
- CREEK
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- NEW SANITARY SEWER
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REVISIONS		
NO.	DATE	DESCRIPTION

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	HDB
DRAWN BY:	CHECKED BY:
HDB	TAP

DATE:
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3/15/2024

MacCONNELL & Associates, P. C.
501 CASCADE POINTE LANE, SUITE 103
CARY, NORTH CAROLINA 27513
P.O. BOX 129
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TEL: (919) 467-1239 FAX: (919) 319-6510
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THE INN AT WHALEBONE, LLC

CONSTRUCTION DRAWINGS

DARE COUNTY, NC

EROSION CONTROL DETAILS 2

PROJECT NUMBER	DRAWING NUMBER
C06001.00	D-105

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FRONT VIEW FROM NORTH-EAST CORNER

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield
BY MARRIOTT

6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

REVISIONS

NO.	DATE	COMMENTS
1	OCT 03, 2023	PRELIMINARY FLOOR PLANS
2	OCT 31, 2023	FRANCHISE 15% APPROVAL SET
3	APR 04, 2024	75% ARCH TO DESIGN TEAM

Sheet A-100A

BUILDING EXTERIOR

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FRONT VIEW FROM SOUTH-EAST CORNER

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

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VIEW FROM NORTH-WEST CORNER

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield
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VIEW OF POOL AND REAR PATIO

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield
BY MARRIOTT

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1 A401 FIRST FLOOR PLAN

SCALE: 1/8"=1'-0"

ROOM TYPE

NAME	ROOM TYPE	1ST FLOOR	2ND FLOOR	3RD FLOOR	4TH FLOOR	TOTAL	
TYPE-A	KING ROOM	1	5	5	5	16	TOTAL KING 18 (20.5%)
TYPE-A1	ADA KING ROOM (ROLL-IN)	1	1	-	-	2	
TYPE-C	Q/Q ROOM	5	7	7	7	26	TOTAL Q/Q 58 (67%)
TYPE-C1	Q/Q ROOM LONG	-	3	3	3	09	
TYPE-C2	Q/Q ROOM LONG	4	5	6	6	21	
TYPE-C3	ADA Q/Q ROOM (TUB)	-	-	1	1	02	
TYPE-B	KING SUITE	-	1	1	1	03	TOTAL SUITES 11 (12.5%)
TYPE-B1	KING SUITE	1	2	2	2	07	
TYPE-B2	ADA KING SUITE (ROLL-IN)		1	-	-	01	
TOTAL ROOMS PER FLOOR		12	25	25	25	87 TOTAL ROOMS	
TOTAL AREA		11,659.0	11,591.0	11,591.0	11,591.0	46,432.00 SQ.FT.	

PORTE COCHERE : 1,047.00 SQ.FT.
REAR+SIDE PORCH : 522.00 SQ.FT.
ADA UNITS REQUIRED = 4+1 (ROLL-IN) = 5, PROVIDED 2+3 (ROLL-IN) = 5
HEARING IMPARED UNITS REQUIRED = 9, PROVIDED = 1 H/C +8 = 9

HEARING IMPAIRED ROOMS STATEMENT

NAME	ROOM TYPE	1ST FLOOR	2ND FLOOR	3RD FLOOR	TOTAL	
ADA+ HEARING IMPAIRED ROOM			219		1	TOTAL 9 ROOMS
HEARING IMPAIRED ROOMS		107, 123, 124,	216, 218,	316, 319, 320	8	

ARCHITECT
NITIN KULKARNI
AIA NCARB
GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT

6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

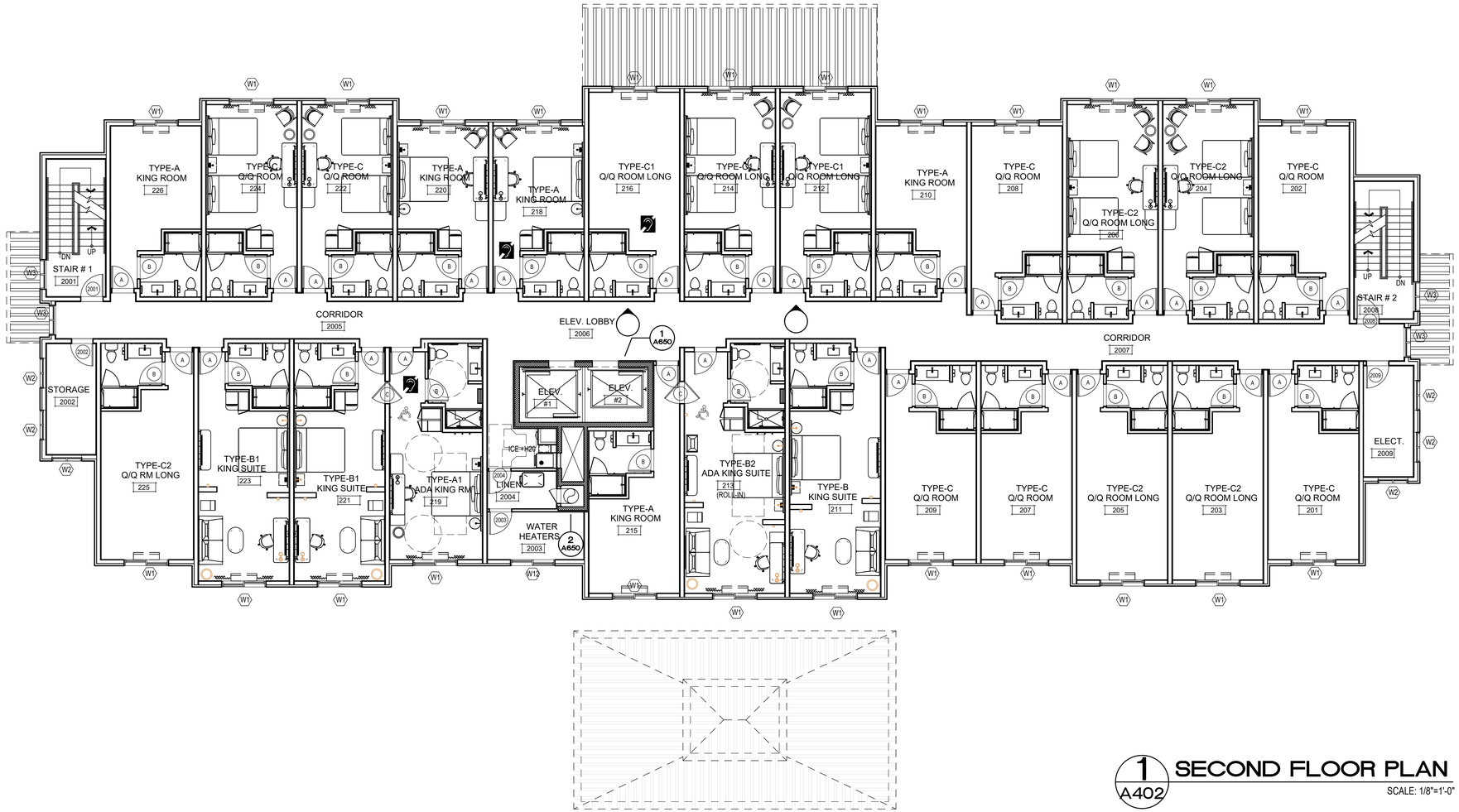
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Sheet A-401

FIRST FLOOR PLAN

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1 A402 SECOND FLOOR PLAN

SCALE: 1/8"=1'-0"

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT

6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

REVISIONS

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Sheet A-402

SECOND FLOOR PLAN

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1 A403 THIRD FLOOR PLAN

SCALE: 1/8"=1'-0"

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT

6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

REVISIONS

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Sheet A-403

THIRD FLOOR PLAN

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1 FOURTH FLOOR PLAN

SCALE: 1/8"=1'-0"

ARCHITECT

NITIN KULKARNI
AIA NCARB

GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT

6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

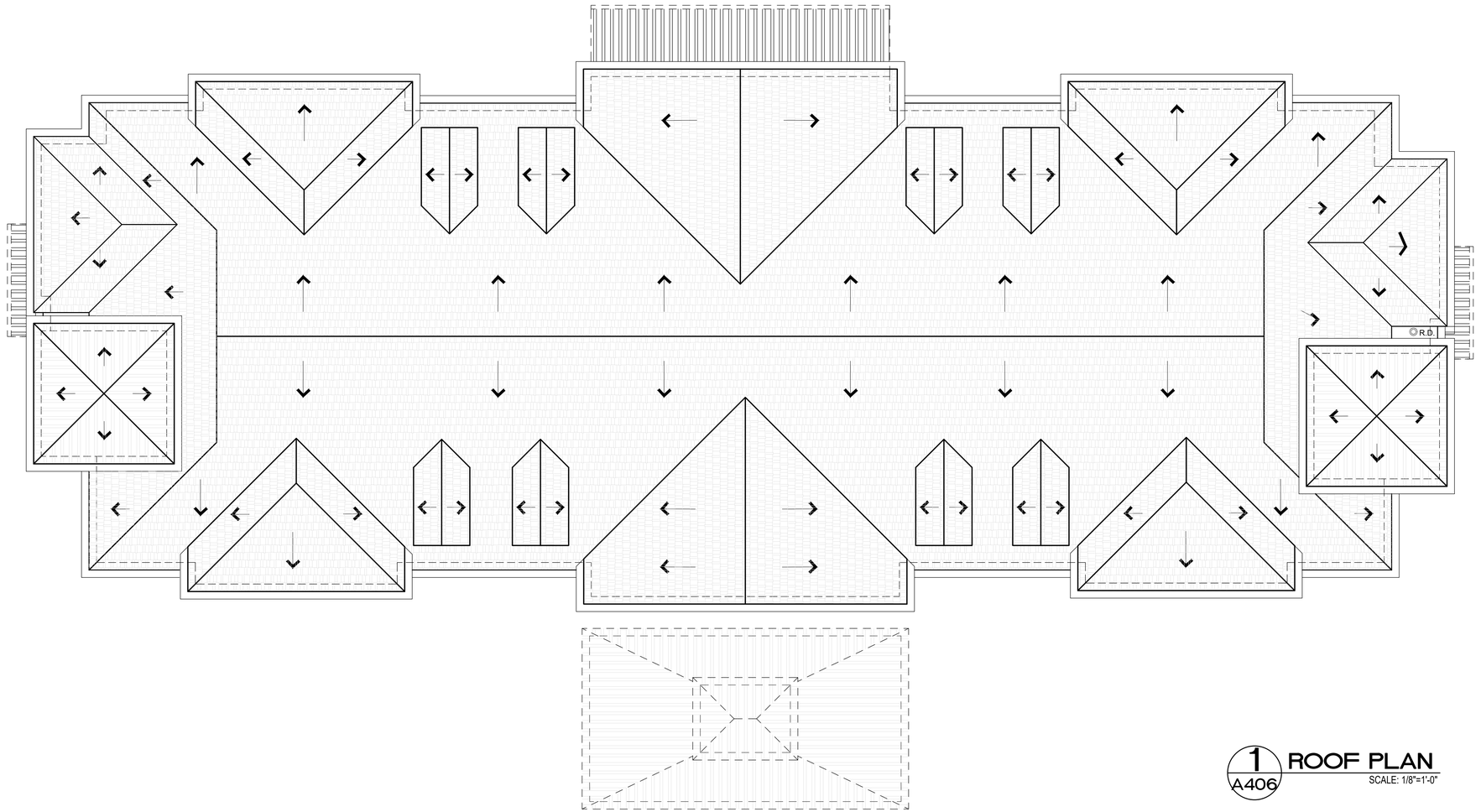
REVISIONS

NO.	DATE	COMMENTS
1	OCT 03, 2023	PRELIMINARY FLOOR PLANS
2	OCT 31, 2023	FRANCHISE 15% APPROVAL SET
3	APR 04, 2024	75% ARCH TO DESIGN TEAM

Sheet A-404

FOURTH FLOOR PLAN

THIS DRAWING IS THE PROPERTY OF NITIN KULKARNI AIA. ANY USE, REUSE, REPRODUCTION, DISPLAY OR SALE OF THIS DRAWING WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT AND ITS CONSULTANTS IS STRICTLY PROHIBITED



1 A406 ROOF PLAN
SCALE: 1/8"=1'-0"

ARCHITECT
NITIN KULKARNI
AIA NCARB
GLEN ALLEN, VA 23059
☏(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT
6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: APRIL 04, 2024

REVISIONS

NO.	DATE	COMMENTS
1	OCT 03, 2023	PRELIMINARY FLOOR PLANS
2	OCT 31, 2023	FRANCHISE 15% APPROVAL SET
3	APR 04, 2024	75% ARCH TO DESIGN TEAM

Sheet A-405

ROOF PLAN

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2 A501 RIGHT SIDE ELEVATION
SCALE: 1/8"=1'-0"



1 A501 FRONT ELEVATION
SCALE: 1/8"=1'-0"

ARCHITECT
NITIN KULKARNI
AIA NCARB
GLEN ALLEN, VA 23059
☎(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT
6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: MAY 14, 2024

REVISIONS

NO.	DATE	COMMENTS
1	OCT 03, 2023	PRELIMINARY FLOOR PLANS
2	OCT 31, 2023	FRANCHISE 15% APPROVAL SET
3	APR 04, 2024	75% ARCH TO DESIGN TEAM
4	MAY 14, 2024	90% COORDINATION SET

Sheet
A-501

BUILDING ELEVATIONS

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2 A502 LEFT SIDE ELEVATION
SCALE: 1/8"=1'-0"



1 A502 REAR ELEVATION
SCALE: 1/8"=1'-0"

ARCHITECT
NITIN KULKARNI
AIA NCARB
GLEN ALLEN, VA 23059
☎(804) 200-4085

A DEVELOPMENT BY

INN AT WHALEBONE

Fairfield BY MARRIOTT
6632 WEST PHEASANT AVE.
NAGS HEAD NC

MARRIOTT PROJECT NUMBER: 65890

Date: MAY 14, 2024

REVISIONS

NO.	DATE	COMMENTS
1	OCT 03, 2023	PRELIMINARY FLOOR PLANS
2	OCT 31, 2023	FRANCHISE 15% APPROVAL SET
3	APR 04, 2024	75% ARCH TO DESIGN TEAM
4	MAY 14, 2024	90% COORDINATION SET

Sheet
A-502

BUILDING ELEVATIONS

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Unofficial Document

ROANOKE SHORE

NAGS HEAD. N.C.

JAN 9, 1951
SCALE 1" = 200'
CARLYLE C. WEBB C.E.

81

R.T.L. ANTIC OCEAN

HIGH WATER

N.C. HWY. NO. 158

N71°-29'E 424.6

S12°-45'E 311.5'

N12°-45'W 311.5'

11.5' DRIVE

S 71°-29' W 424.6

TO MANTEO

CONC. POST

FLORENCE EPSTIEN

20' RWY. SOUND TO OCEAN

N 71°-29' E 1950'±

Alur. Hwy.

1ST. ST. | 2ND. ST. | 3RD. ST. | 4TH ST. | 5TH. ST.

LAKESIDE AVE.

OLD RD.

OWENS LANE

N 12°-45' W 481.5'

POST

IRON STK.

S 71°-29' W 1950'±

CHAR. R. EVANS

IRON STK.

IRON STK.

Alur. Hwy.

ROANOKE SOUND

Unofficial Document

BK 383 PG 0432

PREPARED BY W. W. PRITCHETT, JR., POST OFFICE BOX 9, WINDSOR, NC 27983

FILED

'84 OCT 18 PM 3 38

DORRIS A. FRY
REGISTER OF DEEDS
DARE COUNTY, N.C.

WWP/jwb

STATE OF NORTH CAROLINA

COUNTY OF DARE

THIS NEGATIVE EASEMENT, made this the _____ day of October, 1984, by and between Spruill Oil Company, Inc., a corporation organized under the laws of the State of North Carolina, with one of its offices in Windsor, North Carolina, party of the first part, and Town of Nags Head, a municipal corporation organized under the laws of the State of North Carolina, party of the second part:

WITNESSETH: That for and in consideration of the approval of a site plan for the construction of a gas and convenience store on Lots 25, 26 and portions of Lots 24, 29, 30 and 31 of Roanoke Shores by the party of the second part, the said party of the first part agrees and by these presents does agree to grant and convey unto the said party of the second part and its successors and assigns, a negative easement prohibiting the construction of new buildings or accessory buildings on Lots 22, 23, 27, 28 and parts of Lots 24 and 29 until such time as the drainage from the gas and convenience store as shown in the party of the first part site plan is diverted into either a ditch constructed by the North Carolina Department of Transportation along the right of way for U. S. Highway 158 Bypass, or a ditch constructed by the party of the first part to an existing drainage ditch that is approximately 400 feet North of the Northeastern corner of Lot Number 22 of Roanoke Shores as shown in Map Book 1, page 81 of the Dare County Registry, or with the permission of the party of the second part.

The lots described shall be subject to the proceeding Declaration of Covenants, Conditions, Limitations, Restrictions and Easements, which said declarations shall constitute covenants to run with Lots 22, 23, 27, 28 and the parts of Lots 24 and 29 not used for the construction of the gas and convenience store and shall be binding upon the party of the first part herein and all other persons and parties claiming through the party of the first part herein and for the benefit of and limitation upon all future owners of said land and premises, this declaration of negative easement being designed for the purposes of assuring the availability of adequate drainage for the gas and convenient store being constructed by the party of the first part as described in its site plan prepared August 1, 1984.

PRITCHETT, COOKE & BURCH
ATTORNEYS AT LAW
WINDSOR, N. C.

IN WITNESS WHEREOF, the said party of the first part has caused these presents to be executed in its name by its president, attested by its secretary and its corporate seal hereto affixed, all by due authority of its Board of Directors heretofore duly given, this the day and year first above written.

SPRUILL OIL COMPANY, INC.

By: C. T. Spruill
President

Attest:

Doris Hughes
Secretary

STATE OF NORTH CAROLINA

COUNTY OF BERTIE

I, Frances Cobb, Notary Public, for said county and state, certify that ~~Hunter W. Spruill~~ DORIS HUGHES personally came before me and acknowledged She is secretary of Spruill Oil Company, Inc., a corporation, and that by authority duly given and as the act of the corporation, the foregoing instrument was signed in its name by its president, sealed with its corporate seal, and attested by himself as its secretary.

Witness my hand and official seal, this the 15th day of October, 1984.

Frances Cobb
Notary Public

My Com. Expires: June 14, 1989.

(SEAL)

NORTH CAROLINA DARE COUNTY

The foregoing Certificate(s) of Francis Cobb a Notary Public of Bertie Co N.C.

is/are certified to be correct. This instrument and this certificate are duly registered at the date and time and in the Book and Page shown on the first page hereof.

Doris A Fry Register of Deeds For Dare County

By Barbara M. Gray ~~Deputy~~/Assistant-Register of Deeds RECORDED: OCT 22 1984

PRITCHETT, COOKE & BURCH
ATTORNEYS AT LAW
WINDSOR, N. C.

Ardmar Gas Co.
PO Box 159
Manteo, NC

Recorded OCT. 22 1984

Doris A. Fry
Register of Deeds, Dare County, N. C.

By VM

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
WILLIAM E. TOBY VINSON, JR
Interim Director

NORTH CAROLINA
Environmental Quality

September 14, 2023

Inn at Whalebone, LLC
Attn: Vikram Virk – Member Agent
3631 Union St.
Elizabeth City, NC 27909

Subject: **State Stormwater Management Permit No. SW7230901**
The Inn at Whalebone
High Density Project
Dare County

Dear Vikram Virk:

The Washington Regional Office received a complete State Stormwater Management Permit Application for the subject project on September 11, 2023. Staff review of the plans and specifications has determined that the project, as proposed, complies with the Stormwater Regulations set forth in Title 15A NCAC 02H.1000 amended on January 1, 2017 (2017 Rules). We are hereby forwarding Permit No. SW7230901 dated September 14, 2023, for the construction of the built-upon areas (BUA) and stormwater control measures (SCMs) associated with the subject project.

This permit shall be effective from the date of issuance until September 13, 2031 and the project shall be subject to the conditions and limitations as specified therein and does not supersede any other agency permit that may be required. Failure to comply with these requirements will result in future compliance problems. Please note that this permit is not transferable except after notice to and approval by the Division.

This cover letter, attachments, and all documents on file with DEMLR shall be considered part of this permit and is herein incorporated by reference.

If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing by filing a written petition with the Office of Administrative Hearings (OAH). The written petition must conform to Chapter 150B of the North Carolina General Statutes and must be filed with the OAH within thirty (30) days of receipt of this permit. You should contact the OAH with all questions regarding the filing fee (if a filing fee is required) and/or the details of the filing process at 6714 Mail Service Center, Raleigh, NC 27699-6714, or via telephone at 919-431-3000, or visit their website at www.NCOAH.com. Unless such demands are made this permit shall be final and binding.

If you have any questions concerning this permit, please contact Carl Dunn in the Washington Regional Office, at 2552-948-3959 or carl.dunn@ncdenr.gov.

Sincerely,

William Carl Dunn, PE
Division of Energy, Mineral and Land Resources

Enclosures: Attachment A – Designer's Certification Form
Application Documents

cc: Thomas Perdue, PE – MacConnell & Associates (Thomas.perdue@macconnellandassoc.com)
Nags Head Permitting – Kim Thompson (kim.thompson@nagsheadnc.gov)
Washington Regional Office Stormwater File

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF ENERGY, MINERAL AND LAND RESOURCES

STATE STORMWATER MANAGEMENT PERMIT

HIGH DENSITY DEVELOPMENT

In compliance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations promulgated and adopted by the North Carolina Environmental Management Commission, including 15A NCAC 02H. amended on January 1, 2017 (2017 Rules) (the "stormwater rules"),

PERMISSION IS HEREBY GRANTED TO

Inn at Whalebone, LLC

The Inn at Whalebone

6632 W. Pheasant Ave, Nags Head, Dare County

FOR THE

construction, management, operation and maintenance of built-upon area (BUA) draining to three connected (3) infiltration basins and one (1) underground storage tank system draining to SA;HQW waters as outlined in the application, approved stormwater management plans, supplement, calculations, operation and maintenance agreement, recorded documents, specifications, and other supporting data (the "approved plans and specifications") as attached and/or on file with and approved by the Division of Energy, Mineral and Land Resources (the "Division" or "DEMLR"). The project shall be constructed, operated and maintained in accordance with these approved plans and specifications. The approved plans and specifications are incorporated by reference and are an enforceable part of this permit.

This permit shall be effective from the date of issuance until September 13, 2031 and shall be subject to the following specified conditions and limitations. The permit issued shall continue in force and effect until the permittee files a request with the Division for a permit modification, transfer, renewal, or rescission; however, these actions do not stay any condition. The issuance of this permit does not prohibit the Director from reopening and modifying the permit, revoking and reissuing the permit, or terminating the permit for cause as allowed by the laws, rules, and regulations contained in Title 15A NCAC 2H.1000 and NCGS 143-215.1 et.al.

1. BUA REQUIREMENTS. The maximum amount of BUA allowed for the entire project is 71,519 square feet. The runoff from all BUA within the permitted drainage areas of this project must be directed into the permitted SCMs. The BUA requirements and allocations for this project are as follows:

   a. SCM BUA LIMITS. The SCM labeled DA1 has been designed to handle the runoff from 71,519 square feet of BUA of which 55,316 square feet is on site and 16,203 square feet is off site. This permit does not include an allotment of BUA for future development.

2. PERVIOUS AREA IMPROVEMENTS. At this time, none of the pervious area improvements listed in G.S. 143-214.7(b2) or the Stormwater Design Manual have been proposed for this project. Pervious area improvements will be allowed in this project if documentation is provided demonstrating those improvements meet the requirements of the stormwater rule.

3. SCM REQUIREMENTS. The SCM requirements for this project are as follows:

   a. SCM DESIGN. The SCM's are permitted based on the design criteria presented in the sealed, signed and dated supplements and as shown in the approved plans and specifications. These SCM's must be provided and maintained at the design condition.

   b. SCM DESIGN FOR SA WATER.. The SCM's provide runoff treatment without discharging in excess of the pre-development conditions during the one-year, 24-hour storm event. The excess runoff is released at a non-erosive velocity at the edge of the vegetated setback or to an existing stormwater drainage system.

   c. PLANTING PLAN. The SCM landscape planting plan shown in the approved plans shall be followed in its entirety during construction. After the plants are established, the operation and maintenance agreement must be followed.

4. STORMWATER OUTLETS. This project has demonstrated that the on-site stormwater system will not discharge from the 10-year storm event and therefore will not have the opportunity to cause erosion during the 10-year storm event.

5. VEGETATED SETBACKS. A 50-foot wide vegetative setback must be provided and maintained in grass or other vegetation adjacent to all surface waters as shown on the approved plans. The setback is measured horizontally from the normal pool elevation of impounded structures, from the top of bank of each side of streams or rivers, and from the mean high waterline of tidal waters, perpendicular to the shoreline.

6. RECORDED DOCUMENT REQUIREMENTS. The stormwater rules require the following documents to be recorded with the Office of the Register of Deeds:

   a. ACCESS AND/OR EASEMENTS. The entire stormwater conveyance system, including any SCMs, and maintenance accesses must be located in public rights-of-way, dedicated common areas that extend to the nearest public right-of-way, and/or permanent recorded easements that extend to the nearest public right-of-way for the purpose of inspection, operation, maintenance, and repair.

   b. OPERATION AND MAINTENANCE AGREEMENT. The operation and maintenance agreement must be recorded with the Office of the Register of Deeds.

   c. FINAL PLATS. The final recorded plats must reference the operation and maintenance agreement and must also show all public rights-of-way, dedicated common areas, and/or permanent drainage easements, in accordance with the approved plans.

d. DEEDS. The permittee shall record deed restrictions and protective covenants prior to the issuance of a certificate of occupancy to ensure the permit conditions and the approved plans and specifications are maintained in perpetuity.

7. CONSTRUCTION. During construction, erosion shall be kept to a minimum and any eroded areas of the on-site stormwater system will be repaired immediately.

   a. PROJECT CONSTRUCTION, OPERATION AND MAINTENANCE. During construction, all operation and maintenance for the project shall follow the Erosion Control Plan requirements until the Sediment-Erosion Control devices are converted to SCMs or no longer needed. Once the device is converted to a SCM, the permittee shall provide and perform the operation and maintenance as outlined in the applicable section below.

   b. SCM RESTORATION. If one or more of the SCMs are used as an Erosion Control device and/or removed or destroyed during construction, it must be restored to the approved state stormwater design condition prior to close-out of the erosion control plan and/or project completion and/or transfer of the state stormwater permit. Upon restoration, a new or updated certification will be required for the SCM(s) and a copy must be submitted to the appropriate DEQ regional office.

8. MODIFICATIONS. No person or entity, including the permittee, shall alter any component shown in the approved plans and specifications. Prior to the construction of any modification to the approved plans, the permittee shall submit to the Director, and shall have received approval for modified plans, specifications, and calculations including, but not limited to, those listed below. For changes to the project or SCM that impact the certifications, a new or updated certification(s), as applicable, will be required and a copy must be submitted to the appropriate DEQ regional office upon completion of the modification.

   a. Any modification to the approved plans and specifications, regardless of size including the SCM(s), BUA, details, etc.

   b. Redesign or addition to the approved amount of BUA or to the drainage area.

   c. Further development, subdivision, acquisition, lease or sale of any, all or part of the project and/or property area as reported in the approved plans and specifications.

   d. Altering, modifying, removing, relocating, redirecting, regrading, or resizing of any component of the approved SCM(s), stormwater collection system and/or vegetative conveyance shown on the approved plan.

   e. The construction of any allocated future BUA.

   f. The construction of any permeable pavement, #57 stone area, public trails, or landscaping material to be considered a permeable surface that were not included in the approved plans and specifications.

   g. Other modifications as determined by the Director.

9. DESIGNER'S CERTIFICATION. Upon completion of the project, the permittee shall determine if the project is in compliance with the approved plans and take the necessary following actions:

a. If the permittee determines that the project is in compliance with the approved plans, then within 45 days of completion, the permittee shall submit to the Division one hard copy and one electronic copy of the following:

   i. The completed and signed Designer's Certification provided in Attachment A noting any deviations from the approved plans and specifications. Deviations may require approval from the Division;
   ii. A copy of the recorded operation and maintenance agreement;
   iii. Unless already provided, a copy of the recorded deed restrictions and protective covenants; and
   iv. A copy of the recorded plat delineating the public rights-of-way, dedicated common areas and/or permanent recorded easements, when applicable.

b. If the permittee determines that the project is not in compliance with the approved plans, the permittee shall submit an application to modify the permit within 30 days of completion of the project or provide a plan of action, with a timeline, to bring the site into compliance.

10. OPERATION AND MAINTENANCE. The permittee shall provide and perform the operation and maintenance necessary, as listed in the signed operation and maintenance agreement, to assure that all components of the permitted on-site stormwater system are maintained at the approved design condition. The approved operation and maintenance agreement must be followed in its entirety and maintenance must occur at the scheduled intervals.

    a. CORRECTIVE ACTIONS REQUIRED. If the facilities fail to perform satisfactorily, the permittee shall take immediate corrective actions. This includes actions required by the Division and the stormwater rules such as the construction of additional or replacement on-site stormwater systems. These additional or replacement measures shall receive a permit from the Division prior to construction.

    b. MAINTENANCE RECORDS. Records of maintenance activities must be kept and made available upon request to authorized personnel of the Division. The records will indicate the date, activity, name of person performing the work and what actions were taken.

11. PERMIT RENEWAL. A permit renewal request must be submitted at least 180 days prior to the expiration date of this permit. The renewal request must include the appropriate application, documentation and the processing fee as outlined in 15A NCAC 02H.1045(3).

12. CURRENT PERMITTEE NAME OR ADDRESS CHANGES. The permittee shall submit a completed Permit Information Update Application Form to the Division within 30 days to making any one or more of the following changes:

    a. A name change of the current permittee;

    b. A name change of the project;

    c. A mailing address change of the permittee.

13. TRANSFER. This permit is not transferable to any person or entity except after notice to and approval by the Director. Neither the sale of the project and/or property, in whole or in part, nor the conveyance of common area to a third party constitutes an approved transfer of the permit.

    a. TRANSFER REQUEST. The transfer request must include the appropriate application, documentation and the processing fee as outlined in 15A NCAC 02H.1045(2) and must be submitted upon occurrence of any one or more of the following events:

        i. A natural person who is deceased;
        ii. A partnership, limited liability corporation, corporation, or any other business association that has been dissolved;
        iii. A person or entity who has been lawfully and finally divested of title to the property on which the permitted activity is occurring or will occur through foreclosure, bankruptcy, or other legal proceeding;
        iv. A person or entity who has sold the property, in whole or in part, on which the permitted activity is occurring or will occur;
        v. The assignment of declarant rights to another individual or entity;
        vi. The sale or conveyance of the common areas to a Homeowner's or Property Owner's Association, subject to the requirements of NCGS 143-214.7(c2).

    b. TRANSFER INSPECTION. Prior to transfer of the permit, a file review and site inspection will be conducted by Division personnel to ensure the permit conditions have been met and that the project and the on-site stormwater system complies with the permit conditions. Records of maintenance activities performed to date may be requested. Projects not in compliance with the permit will not be transferred until all permit and/or general statute conditions are met.

14. COMPLIANCE. The permittee is responsible for complying with the terms and conditions of this permit and the approved plans and specifications until the Division approves the transfer request.

    a. REVIEWING AND MONITORING FOR COMPLIANCE. The permittee is responsible for verifying that the proposed BUA within each drainage area and for the entire project does not exceed the maximum amount allowed by this permit. The permittee shall review and routinely monitor the project to ensure continued compliance with the conditions of the permit, the approved plans and specifications.

    b. APPROVED PLANS AND SPECIFICATIONS. A copy of this permit, approved plans, application, supplement, operation and maintenance agreement, all applicable recorded documents, and specifications shall be maintained on file by the permittee at all times.

    c. MAINTENANCE ACCESS. SCMs, stormwater collection systems, and vegetated conveyances must be accessible for inspection, operation, maintenance and repair as shown on the approved plans.

    d. DIVISION ACCESS. The permittee grants Division Staff permission to enter the property during normal business hours to inspect all components of the permitted project.

    e. ENFORCEMENT. Any individual or entity found to be in noncompliance with the provisions of a stormwater management permit or the requirements of the stormwater rules is subject to enforcement procedures as set forth in NCGS 143 Article 21.

f. ANNUAL CERTIFICATION. The permittee shall electronically submit to the Division an annual certification completed by either the permittee or their designee confirming the projects conformance with permit conditions.

g. OBTAINING COMPLIANCE. The Director may notify the permittee when the permitted site does not meet one or more of the minimum requirements of the permit. Within the time frame specified in the notice, the permittee shall submit a written time schedule to the Director for modifying the site to meet minimum requirements. The permittee shall provide copies of modified plans and certification in writing to the Director that the changes have been made.

h. OTHER PERMITS. The issuance of this permit does not preclude the permittee from obtaining and complying with any and all other permits or approvals that are required for this development to take place, as required by any statutes, rules, regulations, or ordinances, which are imposed by any other Local, State or Federal government agency having jurisdiction. Any activities undertaken at this site that cause a water quality violation or undertaken prior to receipt of the necessary permits or approvals to do so are considered violations of NCGS 143-215.1, and subject to enforcement procedures pursuant to NCGS 143-215.6.

Permit issued this the 14th day of September 2023.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

For Toby Vinson, Interim Director
Division of Energy, Mineral and Land Resources
By Authority of the Environmental Management Commission

Permit Number SW7230901

Attachment A

Certification Forms

The following blank Designer Certification forms are included and specific for this project:

- As-Built Permittee Certification
- As-Built Designer's Certification General MDC
- As-Built Designer's Certification for Infiltration Project

A separate certification is required for each SCM. These blank certification forms may be copied and used, as needed, for each SCM and/or as a partial certification to address a section or phase of the project.

AS-BUILT PERMITTEE CERTIFICATION

I hereby state that I am the current permittee for the project named above, and I certify by my signature below, that the project meets the below listed Final Submittal Requirements found in NCAC 02H.1042(4) and the terms, conditions and provisions listed in the permit documents, plans and specifications on file with or provided to the Division.

☐ Check here if this is a partial certification. Section/phase/SCM #?_____

☐ Check here if this is part of a Fast Track As-built Package Submittal.

Printed Name_____Signature_____

I, _____, a Notary Public in the State of _____

County of _____, do hereby certify that _____

personally appeared before me this _____ day of _____, 20_____

and acknowledge the due execution of this as-built certification. (SEAL)

Witness my hand and official seal

_____

My commission expires _____

Permittee's Certification NCAC .1042(4)	Completed / Provided	N/A
A. DEED RESTRICTIONS / BUA RECORDS		
1. The deed restrictions and protective covenants have been recorded and contain the necessary language to ensure that the project is maintained consistent with the stormwater regulations and with the permit conditions.	Y or N	
2. A copy of the recorded deed restrictions and protective covenants has been provided to the Division.	Y or N	
3. Records which track the BUA on each lot are being kept. (See Note 1)	Y or N	
B. MAINTENANCE ACCESS		
1. The SCMs are accessible for inspection, maintenance and repair.	Y or N	
2. The access is a minimum of 10 feet wide.	Y or N	
3. The access extends to the nearest public right-of-way.	Y or N	
C. EASEMENTS		
1. The SCMs and the components of the runoff collection / conveyance system are located in recorded drainage easements.	Y or N	
2. A copy of the recorded plat(s) is provided.	Y or N	
D. SINGLE FAMILY RESIDENTIAL LOTS - Plats for residential lots that have an SCM include the following:	Y or N	
1. The specific location of the SCM on the lot.	Y or N	
2. A typical detail for the SCM.	Y or N	

3. A note that the SCM is required to meet stormwater regulations and that the lot owner is subject to enforcement action as set forth in NCGS 143 Article 21 if the SCM is removed, relocated or altered without prior approval.	Y or N	
E. OPERATION AND MAINTENANCE AGREEMENT	Y or N	
1. The O&M Agreement is referenced on the final recorded plat.	Y or N	
2. The O&M Agreement is recorded with the Register of Deeds and appears in the chain of title.	Y or N	
F. OPERATION AND MAINTENANCE PLAN – maintenance records are being kept in a known set location for each SCM and are available for review.	Y or N	
G. DESIGNER'S CERTIFICATION FORM – has been provided to the Division.	Y or N	

Note 1- Acceptable records include ARC approvals, as-built surveys, and county tax records.

Provide an explanation for every requirement that was not met, and for every "N/A" below. Attach additional sheets as needed.

AS-BUILT DESIGNER'S CERTIFICATION FOR INFILTRATION PROJECT

I hereby state that I am a licensed professional and I certify by my signature and seal below, that I have observed the construction of the project named above to the best of my abilities with all due care and diligence, and that the project meets all of the MDC found in NCAC 02H.1051 in accordance with the permit documents, plans and specifications on file with or provided to the Division, except as noted on the "AS-BUILT" drawings, such that the intent of the stormwater rules and the general statutes has been preserved.

☐ Check here if this is a partial certification. Section/phase/SCM #?_____

☐ Check here if this is a part of a Fast-Track As-Built Package Submittal per .1044(4).

☐ Check here if the Designer did not observe the construction, but is certifying the project.

☐ Check here if pictures of the SCM are provided.

Printed Name_____Signature_____

NC Registration Number_____Date_____

SEAL:

Consultant's Mailing Address:

_____

City/State/ZIP _____

Phone Number _____

Consultant's Email address:

_____

① Circle N if the as-built value differs from the Plan. If N is circled, provide an explanation on Page 2.

②N/E = not evaluated (provide explanation on page 2) ③N/A = not applicable to this project or SCM

This Certification must be completed in conjunction with the General MDC certification under NCAC 02H.1050

Consultant's Certification (MDC .1051)	①As-built	②N/E	③N/A
A. Inlets / Pretreatment / Design Depths / Elevations			
1. Inlets are located per the approved plans.	Y or N		
2. Pretreatment measures are provided? (Rooftop runoff does not require pre-treatment.)	Y or N		
3. BASIN only – the area and depth of the basin is consistent with the approved plans			
4. TRENCH only- the provided width, length and height of the trench are consistent with the approved plan.			
5. TRENCH only- the provided length and size of the perforated pipe is consistent with the approved plan.			
6. The bottom elevation of the basin / trench is consistent with the approved plans.			
7. The bypass elevation is consistent with the approved plan.			

8. The overflow elevation is consistent with the approved plan.			
B. Soils / SHWT / Subgrade			
1. The hydraulic properties of the insitu soils are in accordance with the soils report.	Y or N		
2. The lowest point of the infiltration system is a minimum of 2 feet above the SHWT.	Y or N		
3. If separation to the SHWT is less than 1 foot, the water table draws down to its pre-storm level within 72 hours.	Y or N		
4. The slope of the soil subgrade is <= 2%.	Y or N		
C. Drawdown Time			
1. The system dewaters within 72 hours?	Y or N		
2. The Insitu soils were removed and replaced with suitable infiltration media to achieve the 72 hour drawdown.	Y or N		
	①As-built	②N/E	③N/A
D. Observation Port – for underground systems, a minimum of one inspection port has been provided.	Y or N		

Provide an explanation for every MDC that was not met, and for every item marked "N/A" or "N/E", below. Attach additional pages as needed:

AS-BUILT DESIGNER'S CERTIFICATION GENERAL MDC

I hereby state that I am a licensed professional and I certify by my signature and seal below, that I have observed the construction of the project named above to the best of my abilities with all due care and diligence, and that the project meets the below listed General MDC found in NCAC 02H.1050 in accordance with the permit documents, plans and specifications on file with or provided to the Division, except as noted on the "AS-BUILT" drawings, such that the intent of the stormwater rules and statutes has been preserved.

☐ Check here if this is a partial certification. Section/phase/SCM #?_____

☐ Check here if this is a part of a Fast-Track As-Built Package Submittal per .1044(3).
☐ Check here if the designer did not observe the construction, but is certifying the project.
☐ Check here if pictures of the SCM are provided.

Printed Name_____Signature_____

NC Registration Number_____Date_____

SEAL:

Consultant's Mailing Address:

_____

City/State/ZIP _____

Phone Number _____

Consultant's Email address:

_____

① Circle N if the as-built value differs from the Plan. If N is circled, provide an explanation on Page 2.
②N/E = not evaluated (provide explanation on page 2) ③N/A = not applicable to this SCM or project.

Consultant's Certification NCAC .1003((3) & General MDC .1050	①As-built	②N/E	③N/A
A. TREATMENT REQUIREMENTS			
1. The SCM achieves runoff treatment.	Y or N		
2. The SCM achieves runoff volume match.	Y or N		
3. Runoff from offsite areas and/or existing BUA is bypassed.	Y or N		
4. Runoff from offsite areas and/or existing BUA is directed into the permitted SCM and is accounted for at the full build-out potential.	Y or N		
5. The project controls runoff through an offsite permitted SCM that meets the requirements of the MDC.	Y or N		
6. The net area of new BUA increase for an existing project has been accounted for at the appropriate design storm level.	Y or N		
7. The SCM(s) meets all the specific minimum design criteria.	Y or N		

B. VEGETATED SETBACKS / BUA			
1. The width of the vegetated setback has been measured from the normal pool of impounded waters, the MHW line of tidal waters, or the top of bank of each side of rivers or streams.	Y or N		
2. The vegetated setback is maintained in grass or other vegetation.	Y or N		
3. BUA that meets the requirements of NCGS 143-214.7 (b2)(2) is located in the setback.	Y or N		
4. BUA that does not meet the requirements of NCGS 143-214.7 (b2)(2) is located within the setback and is limited to: a. Publicly funded linear projects (road, greenway sidewalk) b. Water-dependent structures c. Minimal footprint uses (utility poles, signs, security lighting and appurtenances)	Y or N		
5. Stormwater that is not treated in an SCM is released at the edge of the setback and allowed to flow through the setback as dispersed flow.	Y or N		
	①As-built	②N/E	③N/A
C. STORMWATER OUTLETS – the outlet handles the peak flow from the 10 year storm with no downslope erosion.	Y or N		
D. VARIATIONS			
1. A variation (alternative) from the stormwater rule provisions has been implemented.	Y or N		
2. The variation provides equal or better stormwater control and equal or better protection of surface waters.	Y or N		
E. COMPLIANCE WITH OTHER REGULATORY PROGRAMS has been met.	Y or N		
F. SIZING -the volume of the SCM takes the runoff from all surfaces into account and is sufficient to handle the required storm depth.	Y or N		
G. CONTAMINATED SOILS – infiltrating SCM's are not located in or on areas with contaminated soils.	Y or N		
H. SIDE SLOPES			
1. Vegetated side slopes are no steeper than 3H:1V.	Y or N		
2. Side slopes include retaining walls, gabion walls, or other surfaces that are steeper than 3H:1V.	Y or N		
3. Vegetated side slopes are steeper than 3H:1V (provide supporting documents for soils and vegetation).	Y or N		
I. EROSION PROTECTION			
1. The inlets do not cause erosion in the SCM.	Y or N		
2. The outlet does not cause erosion downslope of the discharge point during the peak flow from the 10 year storm.	Y or N		
J. EXCESS FLOWS – An overflow / bypass has been provided.	Y or N		
K. DEWATERING – A method to drawdown standing water has been provided to facilitate maintenance and inspection.	Y or N		

L. CLEANOUT AFTER CONSTRUCTION – the SCM has been cleaned out and converted to its approved design state.	Y or N		
M. MAINTENANCE ACCESS			
1. The SCM is accessible for maintenance and repair.	Y or N		
2. The access does not include lateral or incline slopes >3:1.	Y or N		
N. DESIGNER QUALIFICATIONS (FAST-TRACK PERMIT) – The designer is licensed under Chapters 89A, 89C, 89E, or 89F of the General Statutes.	Y or N		

Provide an explanation for every MDC that was not met, and for every item marked "N/A" or "N/E", below. Attach additional pages as needed:

STAFF REPORT
Town of Nags Head
Planning & Development Department

To: Board of Commissioners

From: Kelly Wyatt, Planning Director

Date: September 22, 2023

Subject: Site Plan Review for Inn at Whalebone, 90-unit Hotel located at 6632 W. Pheasant Avenue (W. Lakeside Street).

BACKGROUND INFORMATION

The Site Plan for Inn at Whalebone was reviewed and approved by the Nags Head Board of Commissioners on October 5th, 2022. This was a Site Plan approval (and not a Vested Right approval), as such the site plan approval expires one (1) year from the date of approval, meaning the site plan approval for Inn at Whalebone will expire on October 5th, 2023. Planning staff were recently contacted by the applicant to discuss the upcoming expiration and what steps could be taken to extend the approval. It was at that time that staff notified the applicant of the requirements of Section 4.15, Time Limits for Site Plan, Zoning Permits, & Building Permits, of the Unified Development Ordinance, included below.

> ***Section 4.15 - Time Limitations for Site Plans, Zoning Permits, & Building Permits.***
> *The following provisions pertaining to time limitations to obtain building permits, and to commence, continue and complete construction, shall apply in all cases in which a site plan approval or development permit is required unless otherwise provided for in Section 3.6, Establishment of Vested Rights.*
>
> ***4.15.1. Time Limitation to Obtain Building Permit.*** *Final approval of a site plan by the Board of Commissioners or approval of a zoning permit by the UDO Administrator shall be valid for twelve (12) months from date of approval. The Building Inspector may issue a building permit within twelve (12) months from the date of such approval, provided that all other requirements are met. If a building permit is not issued within twelve (12) months from the date of final approval of the site plan or zoning permit, the site plan or zoning permit shall expire and the applicant must submit a new site plan conforming to the then current provisions of this Ordinance for review by the Planning Board and Board of Commissioners or a new zoning permit application for review by the UDO Administrator and pay the applicable fees. Upon the issuance of a building permit, the approval of the underlying site plan or zoning permit shall remain valid as long as the corresponding building permit remains valid as provided for in this section.*

Note that following site plan approval by the Board of Commissioners a **building permit** must be issued within twelve (12) months from the date of approval, or the site plan approval expires, and the applicant must then submit a new site plan review conforming with the current provisions of the Unified Development Ordinance. In speaking with the applicant, they are unable to submit a complete development permit application in anticipation of having the building permit issued in advance of October 5th, 2023. As such, they have resubmitted their previously reviewed and approved Site Plan Review application for the Planning Board and Board of Commissioners consideration. The staff report from the Board of Commissioners October 5th, 2022, meeting has been provided below.

The Planning, Fire, Police, and Public Services Department have all reviewed the new submittal and find it to be consistent with the previously approved October 5th, 2022, submittal. Town Engineer has reviewed the stormwater design, which has been slightly modified. They have removed the underground storage chamber system from the eastern parking lot and placed it along the western portion of the parking area with an underground storage chamber system. The change in location results in a greater subsurface storage area and an overall greater volume of stormwater storage for the site. This additional storage is concentrated on the western side of the site, which will mitigate any potential for stormwater impacts on the adjoining properties to the west. From an overall stormwater management volume requirement, 20,220 cubic feet is required, 25,932 cubic feet of storage has been provided. Mark up of revised stormwater plan has been included in the packet.

Note that the finalized Traffic Impact Analysis was received and reviewed by NCDOT in advance of the October 5th, 2022, Board of Commissioners meeting with no comments provided. Town Engineer David Ryan reached out to Jason Davidson, Division Traffic Engineer with NCDOT upon the new submittal to see if anything over the past year would result in them providing comments or necessitating additional review. Mr. Davidson confirmed that they did not have anything new or additional affecting this site moving forward.

Staff Recommendation

Staff recommends approval of the Site Plan Review application as presented with the following condition carrying over from the previous review:

1. An approved subdivision plat addressing the portions of lots 24, 29, 30 and 31 and a recombination plat addressing lots 32, 33, 34, 35, 36, 22, 23, 26 and 27 be approved and filed at the Dare County Register of Deeds prior to the issuance of any development permits for the proposed hotel project.

Planning Board Recommendation

At their September 19, 2023, meeting the Planning Board voted 4-1 to recommend approval of the Site Plan as proposed to include the previous condition as it pertains to the necessary subdivision and recombination plats as well as a new condition that a traffic impact analysis be conducted after one full year of operation to determine if any additional measures are warranted. This study should occur during the peak summer season.

STAFF REPORT FROM OCTOBER 5TH, 2022 BOARD OF COMMISSIONERS MTG

GENERAL INFORMATION

Applicant: House Engineering, P.C.

Application Type: Site Plan Review.

Purpose/Request: Construction of a four-story, 90-unit Hotel along with all necessary site improvements.

Property Location: 6632 W. Pheasant Avenue, Nags Head.

Existing Land Use: Vacant.

Zoning Classification of Property: SPD-C, Village at Nags Head Hotel District, and the Hotel Overlay District.

Zoning Classification of Surrounding Properties: Property to the north is zoned SPD-C, Village Recreation (Golf Course). Property to directly to the south and across Lakeside Street is zoned C-2, General Commercial and developed commercially (Duck Thru Gas Station) and residentially. Property to the west is zoned R-3, High Density Residential and is developed residentially (Roanoke Shores Subdivision). Property to the east and across US Highway 158 is zoned C-2, General Commercial and developed commercially (gas station and Forbes Retail).

Flood Hazard Zone of Property: Property is located in an X Flood Zone, per the Town of Nags Head local ordinance, the property is subject to an RFPE/LES of 9 ft. The proposed first floor elevation of the hotel is proposed to be at an elevation of 9.1' and is therefore compliant.

Land Use Plan Map/Policies: The 2017 Comprehensive Plan Future Land Use Map classifies this property as General Commercial. This proposal is consistent with this land use classification and stated Land Use Policies.

SPECIFIC INFORMATION

Applicable Zoning Regulations:

- Use Regulations: Section 9.36, Table of Uses and Activities for the SPD-C District lists "Hotel" as a Permitted Use within the Village Hotel District, with supplemental regulations set forth in Section 9.37.1. This section requires that Hotels be permitted in accordance with Section 9.36 provided that hotel suites comprise no more than thirty-three (33) percent of the total units in the building.

  Section 9.24.5, Development Standards within the Hotel District states that in cases where the standards of this section conflict with standards contained in Article 10, Part VI, Commercial Design Standards, the more restrictive standard shall apply.

- Lot Coverage: Section 9.24.5.1 of the UDO, Coverage for Hotels states that for buildings with a height between 49 – 60 feet, the maximum building coverage shall not exceed 35%, maximum parking coverage shall not exceed 45% and must have a minimum landscaped area of 20%. Proposed building coverage is 12.94%, proposed parking coverage is 36.18% and there is a proposed landscaped area of 28.2%. Proposed coverage is compliant.

- Height: Section 9.24.5.5 of the UDO states that the maximum height for hotel developments is 60 feet. The proposed hotel has a height of 59.10 feet therefore height is compliant. If constructed, a height certification will be required prior to any final zoning inspections.

- Architecture Design Standards: Section 10.82 of the UDO, Applicability, states that Commercial Design Standards shall apply to all building construction or remodeling projects requiring a conditional use permit or site plan review. This project must adhere to the Commercial Design Standards set forth within Part VI of the UDO, Division II – Building Design. Staff has reviewed the submittal and finds the proposal to be compliant with the standards required in Building Design, Building Size/Dimensions, Building Height, Architectural Design/Elements, Site Design and Building Footprint Orientation. The following are a few examples lending to the compliance of the proposed structure: incorporation of dormers and other roof articulations, covered porch area, screened typical rooftop installations such as mechanical equipment, exhaust vents, residential style double-hung windows, use of gable brackets, workable shutters, and column trim.

- Parking: Pursuant to Article 10, Table 10-2, Required Parking by Use, Hotels shall provide parking at one parking space for each hotel unit without kitchen facilities. There are additional parking standards if hotel units have kitchens or there or conference, assembly, restaurant, or retail uses associated with the hotel. The proposed hotel units will not have kitchen facilities and there are no other uses proposed. With 90 hotel units proposed, 90 parking spaces are required. A total of 93 parking spaces have been proposed therefore parking is compliant.

  In addition, Section 10.92.14.4 of the UDO, Surface Materials, requires that a minimum of twenty (20) percent of the surface area of the parking area and drive aisles shall be constructed of permeable surface materials. Approximately 22.9% has been proposed in permeable surface materials therefore the proposal is compliant.

- Buffering/Landscaping: Several sections of the Unified Development Ordinance speak to Buffering and Landscaping as it applies throughout this proposed site:

  - Section 10.92.6.2 of the UDO, Parking and Drive Aisle Setbacks, requires that where off-street parking is provided between the building and the street right-of-way line, a parking lot buffer of at least ten (10) feet in width shall be provided between the parking lot and the street

right-of-way. A compliant buffer has been proposed along Forrest Street, Lakeside Street and US 158 rights-of-way.

- Section 10.93.3.2 of the UDO, Commercial Transitional Protective Yards, requires increased landscaping to be provided and maintained when non-residential land uses are adjacent to a residential use or residential zoning district. Specifically, Section 10.93.3.2.2 states that where a high impact use abuts a residential district, a buffer strip of at least twenty-five (25) feet in width along the entire length of the lot shall be provided. The buffer yard shall consist of three rows of plant material. Hotel is a listed High Impact Use. The western property boundary abuts residential subdivision, Roanoke Shores and a compliant 25-foot-wide commercial transitional protective yard has been proposed along the entirety of the western property boundary.

- Section 9.24.5.3.2.3 of the UDO, Building Setback Requirements for Hotels over three stories in height states that for hotels west of NC 12, a minimum 25-foot natural or landscaped buffer shall be provided along the northern and southern boundaries. This is a Village Hotel standard that is more stringent than the Hotel Overlay standard. As noted in Section 9.24.5, the more stringent standard applies. The applicant has shown a compliant 25-foot-wide landscape buffer along both the northern and southern property boundaries and therefore the proposal is compliant.

- Section 10.93.3.7 of the UDO, Interior Parking Lot Landscaping, requires parking lot landscaping be provided at a minimum rate equal to ten percent of the total area of the parking spaces. The minimum area necessary for compliance is 1,643 square feet of vegetation. The applicant has proposed 1,937 square feet of vegetation (approx. 12%) therefore interior parking lot landscaping is compliant.

- Section 10.93.3.8 of the UDO, Vegetation Preservation/Planting Requirements, requires that new development projects either preserve a minimum of ten (10) percent of the lot's total area with existing natural vegetation and/or dune elevations or plant new vegetation in lieu of preservation. When existing vegetation cannot be preserved, the planting of a minimum of fifteen (15) percent of the lot's total area shall be required. The applicant has provided the required calculations and notation on the landscape plan demonstrating that the vegetation planting requirements will be met. While the applicant is proposing to preserve a small percentage of existing, mature vegetation in the northwest corner of the site, they have also proposed to provide approximately 18.8% of the site area in newly planted trees, shrubs and herbaceous plants and ornamental grasses therefore, this requirement has been met.

- Lighting: A lighting plan compliant with the requirements of Article 10, Part IV of the Unified Development Ordinance will be required prior to the issuance of any

development permits. In addition, a light audit will be required prior to issuance of occupancy permits.

- Signage: No additional signage is being proposed at this time.

Water and Sewage Disposal: The applicants' proposal includes the management of on-site wastewater through an advanced treatment system in combination with four (4) separate low-pressure disposal fields. The average daily design flow of 11,000 gallons per day will require approval through the NC Department of Health and Human Services, Environmental Health Section, On-Site Water Protection Branch. We request that copies of the permit approvals be submitted to the Town. Note, no development permits will be issued prior to receipt of the state permit approvals.

Traffic Circulation: Traffic circulation has been reviewed by the Town Engineer with the following comments:

- Two points of ingress and egress are depicted along Lakeside Street. Section 10.92.2.2.7.4 of the UDO indicates curb cuts in excess of one, on streets other than US 158, NC12/US64/264 or SR1243, are allowed if the Board of Commissioners determines that more than one curb cut is necessary or desirable to facilitate traffic flow. Staff feels two separate access points from Lakeside St. is appropriate to facilitate traffic flow in conjunction with emergency vehicle access and sanitation truck access.

- A loading zone has been provided in compliance with UDO Section 10.17.2.

- A draft copy of a Traffic Impact Analysis as prepared by VHB, a traffic consultant for the applicant, has been submitted for staff review and NCDOT review. Existing traffic data was collected in early September 2022 to review existing intersection turning movements along East & West Lakeside St from both S. Croatan Hwy. and S. Virginia Dare Trail. The collected data was analyzed based on the current roadway geometrics and traffic counts with no proposed improvements recommended at full project buildout. The traffic consultant will be available to present the findings of the report at the Board of Commissioners meeting. Comments of the NCDOT review have not been received at this time.

Stormwater Management: Stormwater management has been reviewed and approved by the Town Engineer with the following comments:

- This proposal is being reviewed under Section 11.4 General Standards for Commercial, Mixed Use, and All Non-Single Family or Non-Duplex Residential Development, Including Multi-Family Development which requires development of a property to provide stormwater control measures to retain runoff from a 4.3-inch design storm.

- Questions have arisen as to how this application should be reviewed regarding stormwater management and whether this proposal would be considered as part of the Village at Nags Head stormwater master plan approval. NC Department of Environmental Quality, Division of Energy, Mineral and Land Resources staff was contacted to discuss the matter. First and foremost, this application would NOT

be viewed as a common plan of development. A common plan of development means a site where multiple and distinct development activities may be taking place at different times on different schedules but governed by a single development plan. Since this Village at Nags Head stormwater plan did not account for the subject property, it should not be considered as part of the system, and it is appropriate to review under the current state and local stormwater regulations.

- During the review process a negative easement was discovered to be applied to the subject property. The negative easement was applied in conjunction with the 1984 approval of the gas station immediately to the east of the subject property. The verbiage of the negative easement is designed for the purpose of assuring the availability of adequate drainage for the gas station property. The proposed stormwater management design for the hotel proposal accounts for rainfall runoff from the proposed improvements in addition to the gas station property. In total, stormwater management improvements for both on-site runoff and off-site runoff are designed to manage runoff volume for an approximate 5 -inch rainfall event, which is in excess of the Town design storm event of 4.3 inches.

- Review of published data, to include the National Wetland Inventory Map and on-site soil investigation do not indicate the presence of hydric soils or wetlands.

- A NCDEQ High-Density stormwater permit shall be acquired, and copies shall be submitted to the Town in advance of the issuance of a building permit. Copies of the executed operation and maintenance agreement of the stormwater control measures shall be submitted in conjunction with the approved state permit.

- An engineer's certification shall be submitted to the Town in association with construction record drawings prior to the issuance of a certificate of occupancy.

Erosion & Sediment Control: Proposed Erosion and Sediment Control has been reviewed and approved by the Town Engineer with the following comments:

- The building permit submission for land disturbing activities shall include the ground stabilization and material handling and inspection, recordkeeping and reporting detail sheets as required by the NCG01 NPDES Construction Program.

- The applicant shall apply for a Certificate of Coverage through the NPDES Construction Program and prior to land disturbing activities occurring.

- A pre-construction conference shall be coordinated by the applicant to include the design engineer, contractor, and Town representatives prior to land disturbing activities.

Fire: The project will be required to comply with all applicable NC Fire Prevention Code requirements as part of building permit application review and issuance.

Public Works: The Public Works Director has reviewed and approved the proposed site plan as presented.

ANALYSIS

Staff finds that the proposal is consistent with the applicable use and development standards as well as relevant land use policies. In addition, staff finds that the proposed stormwater management plan satisfies the requirements of the negative easement via an approved alternative drainage plan which accommodates the 4.3-inch storm event for both the proposed hotel development as well as the existing improvements on the gas station property.

Article 4 Section 4 of the Unified Development Ordinance sets forth the procedures for subdivision approvals. Records reflect that the current property owner for this hotel site owns lots 32, 33, 34, 35, 36, 22, 23, 26, and 27 in their entirety and a portion of lots 24, 29, 30, and 31. The remaining portions of lots 24, 29, 30 and 31 are owned by Harrell Acquisitions, LLC. Until 1999 all these parcels were in common ownership. To date, although boundaries are referenced in transferring deeds, there has not been a formal subdivision approved pursuant to the Unified Development Ordinance for these parcels. As such, an approved subdivision or recombination plat addressing lots 24, 29, 30 and 31 must be approved and recorded prior to the issuance of any development permits for this project.

STAFF RECOMMENDATION

With the following condition, Staff recommends approval of the Site Plan Review application as presented:

2. An approved subdivision plat addressing the portions of lots 24, 29, 30 and 31 and a recombination plat addressing lots 32, 33, 34, 35, 36, 22, 23, 26 and 27 be approved and filed at the Dare County Register of Deeds prior to the issuance of any development permits for the proposed hotel project.

PLANNING BOARD RECOMMENDATION – AUGUST 16, 2022

At their August 16, 2022 meeting the Planning Board voted 4 – 2 to recommend approval of the Site Plan as proposed. Following the August 16th meeting of the Planning Board, the applicant has revised their stormwater management plan to manage additional runoff and has had consultant, VHB Engineering NC, P.C. conduct a Traffic Impact Analysis.

Attachments: *Site Plan Application & Checklist, Civil Drawings, Architectural Elevations & Renderings, Grading and Drainage, Supplemental data.*

Agenda Item Summary Sheet

Item No: **H-1**
Meeting Date: **July 3, 2024**

Item Title: From May 1st Board meeting - Discussion/Review of multi-use path pavement markings

Item Summary:

At the May 1, 2024 Board of Commissioners meeting, it was Board consensus to authorize staff to install pavement markings (speed limit/user guidance) in a high traffic area of the beach road multi-use path to determine if this was something we want to adopt as a standard for the remainder of the path. As mentioned in previous discussions, bicycle speeds and operator behavior has created user conflicts and safety concerns.

At the July 3rd Board of Commissioners meeting, Police Chief Perry Hale will discuss with the Board what has been done so far and gather input on proceeding further with additional pavement markings.

Number of Attachments: 0

Specific Action Requested:

Provided for Board discussion.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

If approved, minimal fiscal impact related to the cost of signage.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I will participate in the discussion.

Signature: Andy Garman Date: June 26, 2024

Agenda Item Summary Sheet

Item No: **H-2**
Meeting Date: **July 3, 2024**

Item Title: Multi-Decadal Beach Nourishment Master Plan

Item Summary:
Over the past several years, the consulting firm of Moffatt & Nichol has been assisting the Town with the development of a Multi-Decadal Beach Nourishment Master Plan to establish a long-term strategy to permit, schedule and finance ongoing beach nourishment efforts. The framework allows for proactive planning and sustainable beach management over a 50-year planning horizon. The key aspects of this plan include the evaluation of long-term sediment sources, Levels of Protection (LoP), nourishment triggers, regulatory pathways, project timelines and estimated future years project costs. A draft copy of report was provided to the Board of Commissioners at their August 2, 2023 meeting.

Within the report and presentations, several recommendations were provided which evaluated the frequency of the placement of sand. Nourishment intervals of 4, 5, 6 and 8 years were investigated in conjunction with phased approaches which would consider the placement of sand within the southern reaches every five years and a town-wide project every ten years.

A planned 6-year beach nourishment interval (non-phased) allows for responsiveness to changing conditions and provides a lower total cost than the evaluated 4-year and 5-year intervals. Additionally, if the volumetric triggers are not reached within 24 months of the 6-year planned interval, the plan provides the flexibility to extend an additional year or more beyond the 6-year mark. The recommendation is for a 6-year nourishment interval.

Town staff will provide a brief overview summarizing the findings of the report and will be available for questions. A copy of the final report will be provided to Board members at the meeting.

Staff Recommendation
Staff recommends the Board of Commissioners adopt the Beach Nourishment Master Plan final document.

Number of Attachments: 0

Specific Action Requested:
Consider adoption of the Beach Nourishment Master Plan final document.

Submitted By: Town Engineer David Ryan Date: June 26, 2024

Finance Officer Comment:

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:
Attorney Leidy will participate in the discussion as necessary.

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:
I appreciate the work of the Town Engineer, David Ryan, and our consulting team for the work on this important project. I would recommend adoption of the final master plan.

Signature: Andy Garman Date: June 26, 2024

FINAL REPORT
Produced for the Town of Nags Head, NC
June 2024

moffatt & nichol

MULTI-DECADAL BEACH NOURISHMENT MASTER PLAN

Town of Nags Head, NC



10979/11

MULTI-DECADAL BEACH NOURISHMENT MASTER PLAN

Prepared for:

TOWN OF NAGS HEAD

Rev No	A	B	C	D	E	F
Issue Purpose	Draft	Revised Draft	Revised Draft	Revised Draft	Revised Draft	Final Report
Date	July 2023	August 2023	January 2024	April 2024	June 2024	June 2024
By	AK/TH/YC /ES	AK/TH/YC /ES	AK/TH/YC /ES	AK/TH/YC /ES/NV	AK/TH/YC /ES/NV	AK/TH/YC /ES/NV
Checked	NV/MB/PS	NV/PS	NV/PS	BPJ	BPJ	BPJ
Approved	BPJ	BPJ	BPJ	BPJ	BPJ	BPJ

Prepared by:

moffatt & nichol



MULTI-DECADAL BEACH NOURISHMENT MASTER PLAN

moffatt & nichol

EXECUTIVE SUMMARY

The Town of Nags Head has demonstrated its commitment to maintaining a healthy beach environment for storm protection, habitat preservation, and recreational use. Ongoing beach monitoring has informed the Town of the state of the beach, and beach nourishment projects have been completed as needed to enhance and protect the shoreline. This Multi-Decadal Beach Nourishment Master Plan has been completed to assist the Town in establishing a long-term strategy to permit, schedule, and finance ongoing beach nourishment efforts. The framework developed here allows for proactive planning and execution of sustainable beach management over the 50-year planning horizon.

The key aspects of this plan include statistical analysis of historical data to establish rates of volumetric sand loss due to long-term erosion as well as storm impacts, numerical modeling of storm impacts to determine equivalent Levels of Protection (LoP) for each area of the town's shoreline, and evaluation of alternatives to meet the town's beach management needs. In addition, a complete analysis of the offshore borrow area to be used as a long-term sediment source has been completed. Regulatory pathways and project timelines for both ongoing beach maintenance projects and post-storm emergency restoration projects have been completed to assist the Town in implementing the master plan. Figure ES-1 shows the Nags Head vicinity along with the reach designations that have been developed to facilitate the long-term monitoring and beach nourishment design process.

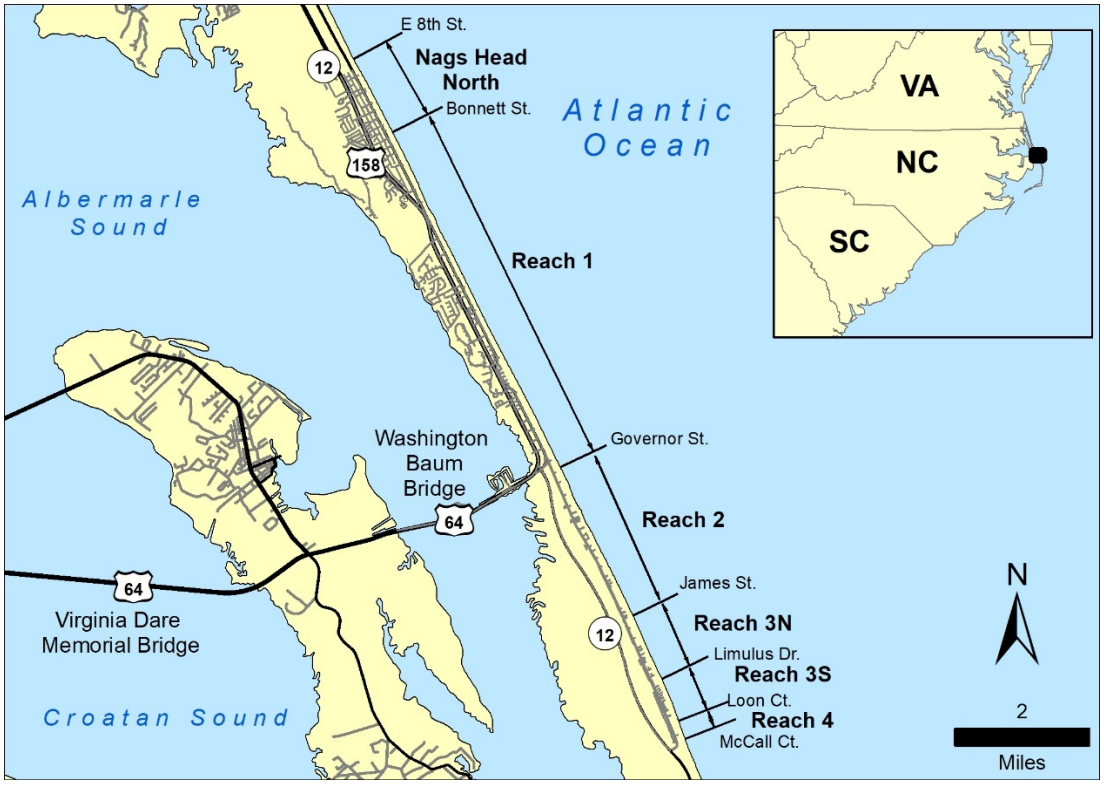


Figure ES-1: Nags Head Vicinity Map with Reaches

All of the long-term monitoring beach profile data was used to perform a statistical analysis of the sediment volume needs for each reach. Volume changes measured since 2011 were used along with the Crystal Ball software package to perform a Monte Carlo simulation and determine volume needs for long-term annual background erosion, as well as additional potential storm impacts, as presented in Table ES-1. Results showed an overall background volume loss along the Nags Head shoreline of approximately 450,000 cy/year at the 50% non-exceedance probability (i.e., there is a 50% likelihood that this volume will be exceeded). In order to estimate sediment need over the 50-year planning timeframe, potential impacts of additional storms were considered at the 75% non-exceedance probability (i.e., there is a 25% likelihood that this volume will be exceeded, as a conservative approach). An annualized total need of approximately 430,000 cy/year was estimated, considering 16 storms impacting the Town over the 50 years. These annual needs were summed and multiplied by 50 to estimate the 50-year need presented in Table ES-1.

Table ES-1: Nags Head Long-Term Nourishment Need from Background Erosion and Additional Storms

Category	Volume Above -19 ft, NAVD88 (cy)
Annual Background Volume Change (50% non-exceedance probability)	-451,218
Annualized* Storm Volume Change (75% non-exceedance probability)	-431,893
Annual Total Volume Change	-833,111
50-yr Material Need	44,155,550

**16 storms in 50-years*

Numerical modeling was performed to develop a preferred beach and dune profile design to achieve adequate LoP for habitable structures and infrastructure, along with appropriate trigger conditions for renourishment actions. Representative profiles were established along the Nags Head shoreline, based on the May 2018 profile survey data. These profiles are considered to demonstrate a quasi-natural state of the beach, being surveyed immediately prior to the 2019 beach nourishment project. The 25-year storm was selected as the most appropriate target for adequate LoP. Simulations were performed with the CSHORE 1D profile evolution model using the representative profiles and the 25-year storm conditions to evaluate the quasi-natural LoP of the beach state. Figure ES-1 shows the results of this analysis. In summary, the May 2018 pre-nourishment existing conditions of the beach and dune system are considered to provide a sufficient LoP along the northern and middle portions of Nags Head for up to a 25-year return period design storm event. Before the nourishment event, the representative profiles at Reaches 3 South and 4 do not have sufficient material available to protect the structures.

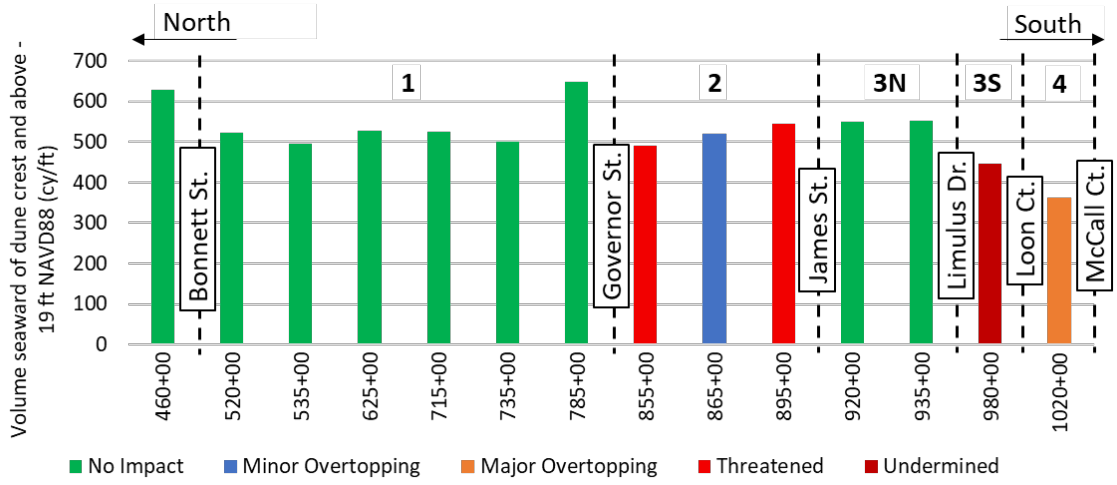


Figure ES-1: Pre-Nourishment Condition CSHORE Pre-Storm Profile Volumes Coded for 25-year Return Period LoP

The CSHORE model was then used along with the representative profiles to adjust the beach profile design to achieve an acceptable LoP along the Town's oceanfront in the design storm event. For cases where the profiles already provided adequate LoP, (e.g., Nags Head North, Reach 1, Reach 3N) dune and berm volume was removed to determine the threshold volume to meet the minimum LoP. The profiles at Reaches 2, 3 South, and 4 indicated severe impacts, so those were modified by adding dune and berm volumes to provide adequate protection. The volumes required to provide a 25-year LoP at each representative profile and within each reach are presented in Table ES-2. The May 2018 condition at each representative profile is also presented. It is noted that due to the condition of the profiles in Reaches 2, 3 South, and 4 at the time of the May 2018 survey, an estimated 0.6 Mcy would be required to be added to provide the minimum LoP. These triggers provide a basis for comparison with the annual beach monitoring profile surveys. When conditions arise such that the profile volumes are nearing the LoP triggers, the Town can begin planning the next maintenance project.

Table ES-2: Trigger Volumes Above -19 ft NAVD88 for 25-yr Event

Reach	Length (ft)	Rep. Profile	25-yr Trigger Volume (cy/ ft)	Reach Trigger for 25-yr event (cy/ft) (Weighted)	May 2018 Volume Above -19 ft (cy/ ft)
North	6,250	460+00	355	355	578
Reach 1	4,500	520+00	503	470	509
	5,500	535+00	451		472
	7,000	625+00	478		506
	5,500	715+00	479		501
	6,000	735+00	443		490
	2,500	785+00	604		610
Reach 2	5,500	855+00	491	502	446
	2,500	865+00	471		499
	2,500	895+00	526		485
	2,500	920+00	463		504
Reach 3 - North	4,500	935+00	464	446	464
Reach 3 - South	2,000	980+00	461		407
Reach 4	2,750	1020+00	401		373
TOTAL	59,500			464	

The implications of relative sea level change should also be considered when determining future beach nourishment needs. The dune crest and berm elevations would need to rise by approximately the same amount as relative sea level to maintain an equivalent LoP. An evaluation of the amount of sand volume that would be required to accommodate this required increase in dune crest and berm height and maintain the shoreline position has been performed using the Bruun Rule. Three sea level rise scenarios developed by NOAA for the Duck, NC tide gauge location were used to obtain a range of volume estimates, from 2.6 Mcy to 4.7 Mcy, to meet these needs.

The sea level rise volume need estimates were combined with the background erosion rate need, the additional storm erosion need, and the initial Level of Protection placement need analysis to develop a long-term sediment volume need, presented in Table ES-3. A relatively high estimate of potential volumetric losses during dredging was also computed. This volume estimate is considered to be conservative and can be compared with sand volumes available from identified borrow sources to provide assurance that the beach nourishment master plan can be executed successfully.

Table ES-3: Long-Term (50-Year) Sediment Volume Need

Crystal Ball	**Background Erosion 50 years (50%)**	22.5 Mcy		
	Additional Storms (16 storms) (75%)	21.5 Mcy		
LoP (25 year) Design		0.6 Mcy		
Relative Sea Level Rise (NOAA, 2022)		**Intermediate Low**	**Intermediate**	**Intermediate High**
		2.6 Mcy	3.4 Mcy	4.7 Mcy
TOTAL		**46.7 Mcy**	**47.5 Mcy**	**48.8 Mcy**
Assumed 20% losses during dredging		*56.0 Mcy*	*57.0 Mcy*	*58.6 Mcy*

A shoreline change model (GenCade) was calibrated and validated using historical data to enable assessment of longshore transport and long-term shoreline evolution along the Nags Head shoreline. The model shows that there is a reversal of sediment transport within the town where the net sediment transport is to the north along the northern reaches of the town, but the overall net sediment transport is towards the south. The exact location of the reversal varies according to the wave climate but is generally within Reach 1 or Reach 2. This reversal may be one of the reasons for the relative stability of Nags Head – North and Reach 1.

A series of engineering alternatives were evaluated to provide options for the Town to meet their goals to maintain a healthy beach over the next 50 years. These alternatives included discontinuing beach nourishment, varying cycles of beach nourishment, phased beach nourishment, and beach nourishment with structures.

To evaluate implications of discontinuing beach nourishment, a shoreline position forecast was made with the GenCade model, considering past wave conditions repeated consecutively to reach the 50-year timeframe. The resulting modeled shoreline was compared with structure footprints and parcels in a GIS framework. Structures, and their associated parcels, were considered impacted if the modeled 50-year shoreline came within 20 ft of the main structure footprint. Based on this analysis, approximately 1330 parcels were impacted, containing a total value of $805 million (2023 dollars). In addition to the potential property losses, potential losses to annual property tax could reach $3.9 million (2023 dollars). There are also significant potential economic implications for tourism if the beach is not maintained.

Varying cycles of beach nourishment along Reaches 1 to 4 were evaluated using estimated volume requirements and costs. An 8-year nourishment cycle had the lowest costs over the 50-year timeframe, because it minimized the number of projects and therefore lower mobilization and demobilization costs and lower costs per cubic yard for sand placement. However, a 6-year planning cycle allows for less expensive individual projects and more frequent ability to adapt to changes in the volumetric erosion rate. The nourishment interval is also flexible in that if volumetric triggers are not reached, the time period between projects can be extended, or the spatial limits of the project can be customized. Some general advantages of nourishing all of the reaches in each project are that this practice

reduces the number of projects required over the 50-year planning horizon, minimizing mobilization/demobilization costs as well as the number of times the permitting process is required. Additionally, it may be perceived as equitable by residents and property owners as all of the reaches are nourished each time. However, in this case all of the reaches are affected by the disruptions and potential environmental impacts associated with the nourishment project every time.

A phased approach was also considered where the interval between placement events would differ between Reach 1 and Reaches 2 to 4. Because the volumetric erosion rate in Reach 1 is less than that of the other reaches, direct placement of sand in Reach 1 can have a longer nourishment interval than Reaches 2 to 4. The phased approach provides nourishment volumes that would allow for Reach 1 to be nourished every other time that Reaches 2 to 4 are nourished. For example, the nourishment interval for Reaches 2 to 4 could be 4 years, while Reach 1 can be nourished every 8 years (a 4/8 year cycle). Intervals of 4/8 year cycles and 5/10 year cycles were evaluated. The 5/10 year cycles are the less expensive option over the 50-year master plan timeframe. The phased approach results in lower costs per cubic yard for Reach 1, because there is higher fill density for each project. In addition, the Reach 1 portion of the Town's shoreline is not subject to the disturbances and environmental impacts associated with project construction as often. Phasing also alternates between a lower-cost and a higher-cost project, which may have financing advantages for the Town. However, because there are more frequent projects in the phased approach than in the 6-year cycle or 8-year cycle where all of the reaches are nourished, overall mobilization and demobilization costs for the 50-year master plan timeframe are higher. Additionally, more frequent projects increase the number of times the environmental permitting process is required.

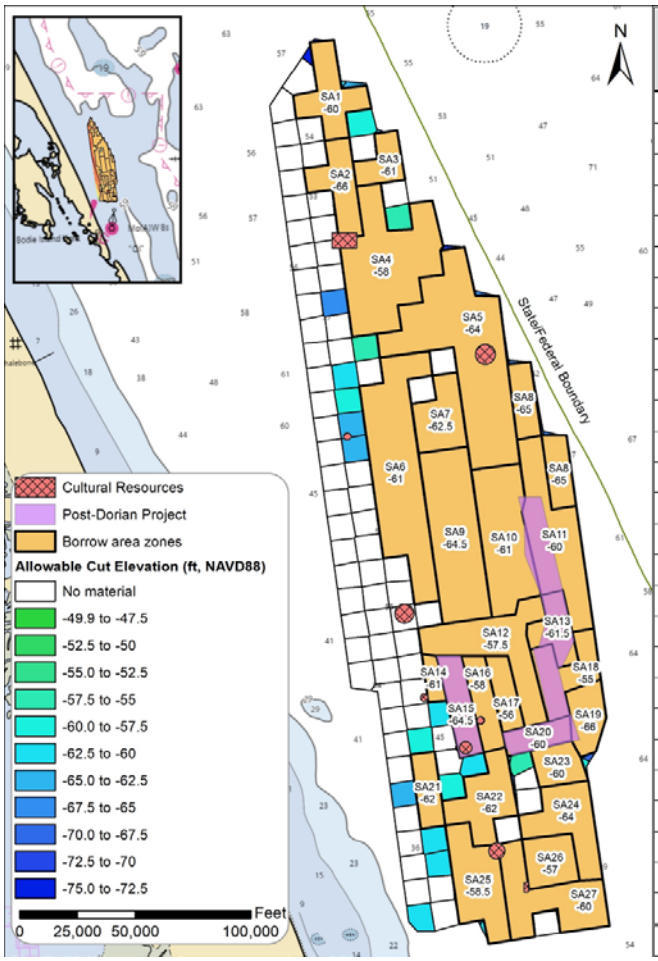
Structural alternatives to reduce erosion rates in South Nags Head (Reach 3S and Reach 4) were also considered in the alternatives analysis. Nearshore breakwaters added significant costs because the reduction in erosion provided by the breakwaters is not enough to substantially reduce the nourishment requirements. A groin alternative is shown to significantly reduce the erosion rates in Reaches 3S and 4, however, adverse downdrift effects are modeled within the Cape Hatteras National Seashore. These downdrift effects would likely add costs for required mitigation/downdrift sand placement. It is noted that oceanfront erosion control structures are currently not allowed under North Carolina G.S. § 113A-115.1, with the exception of terminal groins constructed at the terminus of an island or on the side of an inlet. Because the town is not immediately adjacent to Oregon Inlet, the groin approach would not fall within this exception.

Additional considerations for beach nourishment project design were reviewed, including project funding sources, feasibility of construction, and tourism and recreation. These factors can influence design and construction and can be evaluated on a project-by-project basis. Funding considerations may constrain a beach nourishment project in terms of the volume that is able to be placed with the available funds, as well as the timing of projects if funding sources take time to secure or favorable bids are not received from contractors. For beach nourishment project construction, there is generally a minimum fill volume density that is economically feasible for a contractor to construct. This volume density may vary depending upon the borrow source characteristics, dredging and placement

methodology, and desired template. The engineering design and permitting of each nourishment event should include analysis to determine whether higher volumes with lower unit costs or lower volumes with higher unit costs will be more advantageous for the Town in terms of overall project cost. Finally, in addition to beach nourishment providing protection for the Town's infrastructure, there are also recreational benefits to consider. The Town may choose to increase the volume of a planned beach nourishment to provide additional recreational beach width.

Maintenance of established dunes through best management practices is an important part of preserving and growing a healthy dune system. Dune planting along with installation of sand fencing is a proven method of stabilizing dunes and capturing sand, contributing towards dune growth. In order to create a robust vegetation system, it is recommended to participate in seasonal inspections and planting so as to allow for planting of multiple species of dune vegetation throughout the year.

A comprehensive evaluation of the previously identified borrow area S1 located offshore of Nags Head was performed, including collection of detailed geophysical and geological data to characterize and quantify the beach-compatible sand available. Sub-zones were delineated as shown in Figure ES-2, with allowable dredge cut elevation and available beach-compatible sand also presented. Based on this analysis of borrow area S1, approximately 67.9 Mcy of beach compatible material is made available. This quantity is considered sufficient to accommodate the estimated placement requirement of approximately 49 Mcy for the town's beach management efforts over the next 50 years.



Zone	Allowable Cut Elevation (ft, NAVD88)	Available Sand to Cut Elevation (cy)
SA1	-60	236,947
SA2	-66	1,476,340
SA3	-61	423,663
SA4	-58	2,306,244
SA5	-64	10,013,758
SA6	-61	5,949,522
SA7	-62.5	2,308,713
SA8	-65	2,902,471
SA9	-64.5	8,501,582
SA10	-61	5,796,575
SA11	-60	3,917,228
SA12	-57.5	4,195,481
SA13	-61.5	420,665
SA14	-61	329,510
SA15	-64.5	111,967
SA16	-58	692,023
SA17	-56	473,870
SA18	-55	1,272,303
SA19	-66	1,320,016
SA20	-60	USED
SA21	-62	626,489
SA22	-62	2,474,583
SA23	-60	1,374,315
SA24	-64	3,308,557
SA25	-58.5	2,160,860
SA26	-57	1,867,713
SA27	-60	3,424,295
SUM		67,885,691

Figure ES-2: Borrow Area Sub-Zones and Corresponding Maximum Dredge Cut Elevations

The master plan approach is designed to make the regulatory process more streamlined and efficient by developing volumetric requirements and evaluating borrow sources in advance of an imminent project. The required permitting process for a beach nourishment project includes both CAMA and USACE permits and coordination with multiple state and federal agencies. Construction moratoriums and avoidance measures are required to minimize environmental impacts of each project. Because of the coordination required as well as the time needed for project engineering design, bidding, and financing the project, it generally takes on the order of two years to complete a project from initiation to construction start. The annual beach monitoring surveys along with the volumetric LoP triggers provide the tools for the Town to initiate this process well in advance of a needed maintenance project. If an emergency post-storm project is required, an application for FEMA post-disaster assistance is initiated along with the other project tasks. FEMA review can take on the order of six months, and depending on the storm occurrence timeline, it may be up to three years before a post-storm recovery project is constructed to replace the losses incurred during the storm event.

TABLE OF CONTENTS

1.0 INTRODUCTION 13

1.1 Study Area 13

2.0 PROJECT PURPOSE AND NEED 16

2.1 Project Purpose 16
2.2 Project Need 16
2.3 Scope of Study 16

3.0 REVIEW OF AVAILABLE DATA 19

3.1 Wave Climate 19
3.1.1 UNC Coastal Studies Institute Oregon Inlet Station, NDBC 44095 20
3.1.2 USACE Station JPRN7 – Jennette's Pier 21
3.1.3 USACE Field Research Facility (FRF) Station 44056 22
3.2 Water Levels 23
3.2.1 NOAA Tide Station #8651370 Duck Station 24
3.2.2 NOAA Tide Station #8652587, Oregon Inlet Marina Station 24
3.2.3 Storm Surge 25
3.2.4 Sea Level Change 26
3.3 Beach Topography and Nearshore Bathymetry 28
3.3.1 Beach Monitoring Profiles 29
3.3.2 Bathymetric Data 31
3.3.3 LiDAR Data 31
3.4 Aerial Photography 32
3.5 Shoreline Positions 34
3.6 Sediment Resource Data 35
3.6.1 Recipient Beach Sediment Grain Size Data 35
3.6.2 Borrow Area Sediment Data 36
3.7 Summary of Previous Beach and Dune Nourishments 38
3.8 Previous Dune Stabilization and Preservation Efforts 40

4.0 EVALUATION OF HISTORICAL BEACH PROFILE CHANGES 41

4.1 Purpose and Definitions 41
4.2 Analytical/Empirical Assessments 41
4.2.1 Raw Historical Analysis 41
4.2.2 Statistical Analysis of Sediment Volume Needs 44

5.0 BEACH NOURISHMENT LEVEL OF PROTECTION ANALYSIS AND NOURISHMENT TRIGGER ASSESSMENT 48

5.1 Introduction 48
5.1.1 Representative Profiles and Reaches 48
5.2 LoP Definitions 51
5.3 Numerical Modeling: CSHORE Storm Profile Response 53
5.3.1 CSHORE Model Description 53

5.3.2 CSHORE calibration *54*
5.3.3 Profile Data *55*
5.3.4 Water Levels and Wave Conditions *55*
5.3.5 Sediment Transport Parameters *57*
5.3.6 Historical Storm Model Simulation Results *57*
5.4 LoP with Pre-Nourished Conditions (May 2018) Profiles 62
5.5 Beach Nourishment Design Scenarios and LoP Determinations 70
5.5.1 Approach *71*
5.5.2 Beach Nourishment LoP Design *73*
5.5.3 LoP Summary *80*
5.5.4 Consideration of Sea Level Rise *97*
5.6 Nourishment Trigger Determination 98
5.7 Long-Term Sediment Volume Need 98

6.0 EVALUATION OF HISTORICAL SHORELINE EVOLUTION 100

6.1 Purpose and Definitions 100
6.2 Analytical/Empirical Analysis 100
6.3 Numerical Modeling: GenCade 100
6.3.1 Modeling Scope *102*
6.3.2 Calibration Model *102*
6.3.3 Model Validation *107*

7.0 ENGINEERING ALTERNATIVES CONSIDERED 111

7.1 No Action: No Further Beach Nourishment 111
7.2 Beach Nourishment Alternatives 113
7.2.1 North Reach Considerations *113*
7.2.2 Initial Volume to Attain Equivalent Level of Protection (LoP) *113*
7.2.3 Nourishment Interval Comparisons *113*
7.2.4 Discussion *116*
7.3 Phased Beach Nourishment Alternatives 116
7.3.1 Phased Interval Comparison *117*
7.3.2 Discussion *119*
7.4 Beach Nourishment with Structures Alternatives 119
7.4.1 Nearshore Breakwaters with Beach Nourishment *120*
7.4.2 Shoreline Modeling: Nearshore Breakwaters *121*
7.4.3 Nearshore Breakwaters Comparisons *122*
7.4.4 Terminal Groin with Beach Nourishment *124*
7.4.5 Shoreline Modeling: Terminal Groin *125*
7.4.6 Terminal Groin Comparison *125*
7.4.7 Discussion *127*
7.5 Additional Beach Nourishment Considerations 127
7.5.1 Project Funding *127*
7.5.2 Constructability *128*
7.5.3 Tourism and Recreation *129*
7.5.4 Future Project Costs and Cost Variability *132*
7.6 Dune Stabilization and Preservation 134

7.7 Summary of Alternatives....135
8.0 BORROW SOURCE ANALYSIS....138
8.1 Borrow Area Bathymetry....139
8.2 Geotechnical Investigations....139
8.3 Potential Borrow Area Delineation....140
8.4 Potential Impacts of Borrow Site Dredging on the Nearshore Wave Climate....143
9.0 REGULATORY PATHWAYS AND PROJECT TIMELINES....145
9.1 Maintenance Projects....145
9.2 Post-Storm Restoration Projects....145
10.0 CONCLUSIONS AND RECOMMENDATIONS....148
11.0 REFERENCES....151

APPENDICES

Appendix A – Wave Transformation & Borrow Area Modeling

Appendix B – Beach Profile Volume Crystal Ball Analysis

Appendix C – CSHORE Analysis & Results

Appendix D – No Further Beach Nourishment Alternative Maps

Appendix E – Alternative Cost Estimates

Appendix F – Dune Stabilization Guidelines

Appendix G – Borrow Area Geophysical and Geotechnical Data

LIST OF FIGURES

Figure 1-1: Study Area of Nags Head, Dare County, NC 14

Figure 2-1: Workflow for development of Beach Nourishment Master Plan 18

Figure 3-1: Wave and Water Level Data Locations 20

Figure 3-2: Station 44095 Offshore Significant Wave Height Rose from April 2012 – March 2021 21

Figure 3-3: Station JPRN Offshore Significant Wave Height Rose from May 2013 – March 2014 22

Figure 3-4: Station 44056 Offshore Significant Wave Height Rose from January 1997 – March 2021 23

Figure 3-5: Tidal Datum Chart for Duck, NC Station 8651370 24

Figure 3-6: Tidal Datum Chart for Oregon Inlet Marina, NC Station 8652587 25

Figure 3-7: Relative Sea Level Trend - Duck, NC (Sta. 8651370) based on monthly mean sea level data from 1978 to 2022 27

Figure 3-8: Relative Sea Level Change at Duck, NC Based on Sweet et al. (2022). The annual mean sea level for the year 2005 serves as the 'zero' for the figure with the elevation of NAVD88 also provided. 28

Figure 3-9: Nags Head Survey Transects 30

Figure 3-10: 2016 Recipient Beach Sediment Sample Transects (CSE) 35

Figure 3-11: Borrow Area Locations 37

Figure 3-12: Borrow Area Vibracore Data Locations 38

Figure 4-1: Volumetric Calculation Lenses for Historical Analysis 42

Figure 4-2: Annualized Background Unit Volume Change Above -19 ft NAVD88 43

Figure 5-1: Location of Representative Transects 50

Figure 5-2: LoP Categories: (a) No Impact, (b) Minor Overtopping, (c) Major Overtopping, (d) Threatened, (e) Undermined 52

Figure 5-3: CSHORE Input Waves and Water Level, Hurricane Sandy (2012) 56

Figure 5-4: CSHORE Input Waves and Water Level, Hurricane Matthew (2016).....57

Figure 5-5: CSHORE Calibration: Hurricane Sandy at 520+00 (Bainbridge Street).....59

Figure 5-6: CSHORE Calibration: Hurricane Sandy at 735+00 (E. Flicker Street).....59

Figure 5-7: CSHORE Calibration: Hurricane Sandy at 1020+00 (E. McCall Court) 60

Figure 5-8: CSHORE Validation: Hurricane Matthew at 520+00 (Bainbridge Street).....61

Figure 5-9: CSHORE Validation: Hurricane Matthew at 735+00 (E. Flicker Street).....61

Figure 5-10: CSHORE Validation: Hurricane Matthew at 1020+00 (E. McCall Court) ..62

Figure 5-11: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 520+00 (Bainbridge Street).....64

Figure 5-12: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 520+00 (Bainbridge Street).....65

Figure 5-13: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 520+00 (Bainbridge Street).....65

Figure 5-14: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 865+00 (E Ida Street) 66

Figure 5-15: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 865+00 (E Ida Street) 66

Figure 5-16: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 865+00 (E Ida Street).....67

Figure 5-17: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 980+00 (E Altoona Street) 67

Figure 5-18: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 980+00 (E Altoona Street) 68

Figure 5-19: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 980+00 (E Altoona Street) 68

Figure 5-20: Pre-Nourishment Condition CSHORE Pre-Storm Profile Volumes Coded for 25-year Return Period LoP.....69

Figure 5-21: Pre-Nourishment CSHORE Pre-Storm Profile Volumes Coded for 50-year Return Period LoP.....69

Figure 5-22: Pre-Nourishment CSHORE Pre-Storm Profile Volumes Coded for 100-year Return Period LoP....70

Figure 5-23: LOP Beach Nourishment Design Process....72

Figure 5-24: CSHORE Results, Design Scenario #2, 25-year RP, Station 520+00 (Bainbridge Street)....74

Figure 5-25: CSHORE Results, Design Scenario #2, 25-year RP, Station 865+00 (E Ida Street)....74

Figure 5-26: CSHORE Results, Design Scenario #2, 25-year RP, Station 980+00 (E Altoona Street)....75

Figure 5-27: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 520+00 (Bainbridge Street)....77

Figure 5-28: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 865+00 (E Ida Street)....77

Figure 5-29: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 980+00 (E Altoona Street)....78

Figure 5-30: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 520+00 (Bainbridge Street)....78

Figure 5-31: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 865+00 (E Ida Street)....79

Figure 5-32: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 980+00 (E Altoona Street)....79

Figure 5-33: 50-yr Event Trigger vs. 25-yr Event Trigger vs. 2018 Volume (-19 ft NAVD88)....82

Figure 5-34: Profile Volume Above -19 ft NAVD88 – Representative Profile 460+00 (430+00 – 490+00)....83

Figure 5-35: Profile Volume Above -19 ft NAVD88 – Representative Profiles 520+00 and 535+00 (495+00 – 535+00)....84

Figure 5-36: Profile Volume Above -19 ft NAVD88 – Representative Profile 520+00 and 535+00 (540+00 – 590+00)....85

Figure 5-37: Profile Volume Above -19 ft NAVD88 – Representative Profile 625+00 (595+00 – 660+00)....86

Figure 5-38: Profile Volume Above -19 ft NAVD88 – Representative Profile 715+00 (665+00 – 715+00) 87

Figure 5-39: Profile Volume Above -19 ft NAVD88 – Representative Profile 735+00 (720+00 –775+00) 88

Figure 5-40: Profile Volume Above -19 ft NAVD88 – Representative Profile 785+00 (780+00 – 800+00) 89

Figure 5-41: Profile Volume Above -19 ft NAVD88 – Representative Profile 855+00 (805+00 – 855+00) 90

Figure 5-42: Profile Volume Above -19 ft NAVD88 – Representative Profile 865+00 (860+00 – 880+00) 91

Figure 5-43: Profile Volume Above -19 ft NAVD88 – Representative Profile 895+00 (885+00 – 905+00) 92

Figure 5-44: Profile Volume Above -19 ft NAVD88 – Representative Profile 920+00 (910+00 – 930+00) 93

Figure 5-45: Profile Volume Above -19 ft NAVD88 – Representative Profile 935+00 (935+00 – 975+00) 94

Figure 5-46: Profile Volume Above -19 ft NAVD88 – Representative Transect 980+00 (980+00 – 995+00) 95

Figure 5-47: Profile Volume Above -19 ft NAVD88 – Representative Transect 460+00 (1020+00 – 1025+00) 96

Figure 6-1: NCDCM 2020 Long-Term Erosion Rates 100

Figure 6-2: GenCade Calibration – Comparison of Model Simulated and Measured Shoreline Changes (Model Calibration, Jun. 2015 to Apr. 2019) 106

Figure 6-3: GenCade calibration – Calculated Net Longshore Sediment Transport Rates (Jun. 2015 to Apr. 2019) 107

Figure 6-4: GenCade validation - Comparison of Model Simulated and Measured Shoreline Changes (Model Validation, Jun. 2012 to Jun. 2016) 109

Figure 6-5: GenCade validation - Calculated Net Longshore Sediment Transport Rates (Jun. 2012 to Jun. 2016).....110

Figure 7-1: Beach Nourishment Alternatives 114

Figure 7-2: Phased Beach Nourishment Alternatives.....117

Figure 7-3: Breakwater Alternatives 1 (top panel) and 1A (bottom panel). Alternative 1 includes ten (10) breakwaters and Alternative 1A includes only the southernmost five (5) breakwaters. 120

Figure 7-4: Breakwater Alternatives 2 (top panel) and 2A (bottom panel). Alternative 2 includes nine (9) breakwaters and Alternative 2A includes only the southernmost five (5) breakwaters. 121

Figure 7-5: GenCade Shoreline Modeling Results for Nearshore Breakwaters Alternatives. Top panel shows Alternatives 1/1A, bottom panel shows Alternatives 2/2A. Dashed breakwaters are removed for the 1A and 2A alternatives. 122

Figure 7-6: Terminal Groin Alternative 124

Figure 7-7: GenCade Shoreline Modeling Results for Terminal Groin Alternative. 125

Figure 7-8: Example Design Fill for Achieving Recreational Beach Width 131

Figure 8-1: Borrow Area S1 138

Figure 8-2: Vibracore Locations 140

Figure 8-3: Bottom of Allowable Cut Elevation 141

Figure 8-4: Borrow Area Sub-zones and Corresponding Maximum Dredge Cut Elevations 142

Figure 8-5: Updated model bathymetry around S1 borrow area without (left) and with (right) dredging 143

Figure 9-1: Maintenance Project Timeline 146

Figure 9-2: Post-Storm Project Timeline 147

LIST OF TABLES

Table 1-1: Reach Start and End Points 15

Table 3-1: Ten Highest Water Levels at Duck NOAA Tide Gauge 26

Table 3-2: Nags Head Beach Profile Surveys.....29

Table 3-3: Nags Head Bathymetric Data 31

Table 3-4: Nags Head Elevation Data 32

Table 3-5: Nags Head Aerial Photography 33

Table 3-6: Nags Head Shorelines 34

Table 3-7: Historical Recipient Beach Data 35

Table 3-8: Recipient Beach Characteristics and NCAC Rule Parameters.....36

Table 3-9: Recipient Beach Sediment Statistics 36

Table 3-10: Available Borrow Area Sediment Data from Previous Studies 37

Table 4-1: Average Annual Volume Change by Reach, 2012-2022 (cy/year).....44

Table 4-2: Crystal Ball Analysis Results for Annual Background Volume Change.....45

Table 4-3: Crystal Ball Results for Storm Induced Volumetric Change 46

Table 4-4: Nags Head Long-Term Nourishment Need from Background Erosion and Additional Storms 47

Table 5-1: Reach Description and Representative Profiles 49

Table 5-2: Boundary Wave Height, Wave Period, and Total Water Level Conditions for CSHORE at Peak of Design Storm Simulations.....53

Table 5-3: CSHORE Calibration Parameters 58

Table 5-4: LoP for Pre-Nourished Conditions CSHORE Profiles.....63

Table 5-5: Additional Dune and Berm Volume Required to Achieve 25-year Storm LoP 76

Table 5-6: Additional Dune and Berm Volume Required to Achieve 50-year Storm LoP 80

Table 5-7: Placement required for 25-yr and 50-yr LoP at May 2018 shoreline conditions 81

Table 5-8: Additional Volumes Needed to Adapt to RSLC Scenarios 97

Table 5-9: Trigger Volumes Above -19 ft NAVD88 for 25-yr Event 98

Table 5-10: Long-Term (50-Year) Sediment Volume Need 99

Table 6-1: Calibrated GenCade Model Setup Parameters 105

Table 7-1: Value of Impacted Parcels 111

Table 7-2: Property Tax Values 112

Table 7-3: Beach Recreation Values (BIMP, 2016) 112

Table 7-4: Placement Volumes for Varying Nourishment Cycles 115

Table 7-5: Project Costs for Varying Nourishment Cycles (2023 dollars) 116

Table 7-6: Placement Volumes for Phased Nourishment Cycles 118

Table 7-7: Project Costs for Phased Nourishment Cycles (2023 dollars) 119

Table 7-8: Placement Volumes for Nearshore Breakwater Alternatives1 and 1A 123

Table 7-9: Placement Volumes for Nearshore Breakwater Alternatives 2 and 2A 123

Table 7-10: Cost Estimates for Nearshore Breakwater Alternatives with Beach Nourishment on a 6-Year Cycle (1 initial nourishment project and 7 repeat nourishment projects, 2023 dollars). 124

Table 7-11: Placement Volume for Terminal Groin Alternative (Permeability 0.1) 126

Table 7-12: Cost Estimates for Terminal Groin Alternative with Beach Nourishment. Costs consider initial nourishment cost plus either 7 (6-year cycle) or 5 (8-year cycle) repeat nourishment projects (2023 dollars). 127

Table 7-13: Representative Beach Widths in Summer and Fall 2023 130

Table 7-14: Additional Berm Volume Required by the LOP Profiles to Achieve Recreational Beach Width 132

Table 7-15: Historical Project Costs 133

Table 7-16: 2018 versus 2019 Project Construction Bid Costs 133

Table 7-17: Estimated Project Costs for 2027 134

Table 7-18. Sand Fence and Dune Vegetation Costs.....135

Table 8-1: Average Shoreline Changes after 6 Years.....144

LIST OF ACRONYMS

CSDM	Coastal Storm Damage Mitigation
CO-OPS	[NOAA] Center for Operational Oceanographic Products and Services
cy	Cubic yards
cy/lf	Cubic yards per linear foot
DEM	Digital Elevation Model
NC CGIA	North Carolina Center for Geographic Information and Analysis
NC CRC	State of North Carolina Coastal Resources Commission
NC DCM	North Carolina Division of Coastal Management
NC DEQ	North Carolina Department of Environmental Quality
NCDIT	North Carolina Department of Information
NCDOT	North Carolina Department of Transportation
NCEI	[NOAA] National Centers for Environmental Information
CSE	Coastal Science & Engineering, Inc.
FEMA	Federal Emergency Management Agency
FRF	Field Research Facility
H_s	Significant wave height
H_{m0}	Spectral significant wave height
IPCC	Intergovernmental Panel on Climate Change
LiDAR	Light Detection and Ranging
T_p	Peak wave period
Mcy	Million cubic yards
MHW	Mean High Water
MHHW	Mean Higher High Water
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MSD	Municipal Service District
MSL	Mean Sea Level
MMS	US Minerals Management Service
NAIP	[USDA] National Agriculture Imagery Program
NASA	National Aeronautics and Space Administration
NAVD88	North American Vertical Datum of 1988
NGS	National Geodetic Survey
NOAA	National Oceanographic and Atmospheric Administration
NRC	National Research Council
RSLC	Relative Sea Level Change
SLR	Sea Level Rise
SWEL	Still Water Elevation
UNC CSI	University of North Carolina Coastal Studies Institute
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USGS	US Geological Survey

1.0 INTRODUCTION

The Town of Nags Head was the first community in Dare County to conduct a locally-funded beach nourishment project, with an initial project constructed in 2011 (Kana and Kaczkowski, 2012). This project has successfully provided storm protection and has increased the available beach and dune habitat within the town, including enabling dune growth of an average of 3 cubic yards per linear foot (cy/ft) for the first five years after project construction as documented by Kaczkowski *et al.* (2018). The town demonstrated its commitment to regular maintenance of its beach, as valuable infrastructure, by completing its first planned town-wide beach renourishment in the summer of 2019. The beach was then significantly eroded by Hurricane Dorian in September 2019, and in partnership with the Federal Emergency Management Agency (FEMA), the Town completed a post-Hurricane Dorian beach renourishment project in August 2022 to replace sand lost as a result of that storm.

Construction of these beach nourishment projects has been funded primarily by the Town through a combination of town-wide property taxes and revenues from its own Municipal Service Districts (MSDs). The Town has also received funding support from Dare County via the County's Beach Nourishment Fund. In addition, FEMA post-disaster Public Assistance funding and a The Federal Emergency Management Agency (FEMA) and a North Carolina Department of Environmental Quality (NC DEQ), Division of Water Resources Coastal Storm Damage Mitigation (CSDM) grant provided the funds for the post-Hurricane Dorian restoration project in 2022 (Town of Nags Head, 2022).

The town is committed to maintaining a healthy beach and dune system to provide protection for upland properties, maintain habitat for many species of wildlife, and serve as a valuable recreational asset. In keeping with that commitment, the Town decided to pursue a more comprehensive, forward looking multi-decadal beach nourishment master plan. This report documents the initial version of that master plan. The report describes the history of beach nourishment, shoreline and volume changes observed from historical data, coastal engineering and modeling studies, and investigations and analysis of potential beach quality sand borrow areas available for present and future beach nourishments within the plan's timeframe. This multi-decadal beach nourishment master plan provides the Town of Nags Head with a framework to plan and conduct beach maintenance and storm response projects over a 50-year time frame. With this framework in place, the town will be able to efficiently plan the permitting, financing, and construction of those future projects.

1.1 Study Area

The study area for the master plan is the Town of Nags Head's approximately 11-mile Atlantic Ocean shoreline (Figure 1-1). Additional areas considered include the downdrift shoreline to the south within the Cape Hatteras National Seashore as well as the updrift communities within Dare County. Unless otherwise noted, all units in this report are in the US Customary system, and all elevations are referenced to the North American Vertical

Datum of 1988 (NAVD88). All horizontal coordinates are referenced to State Plane US Survey Feet, NAD 83 horizontal datum.

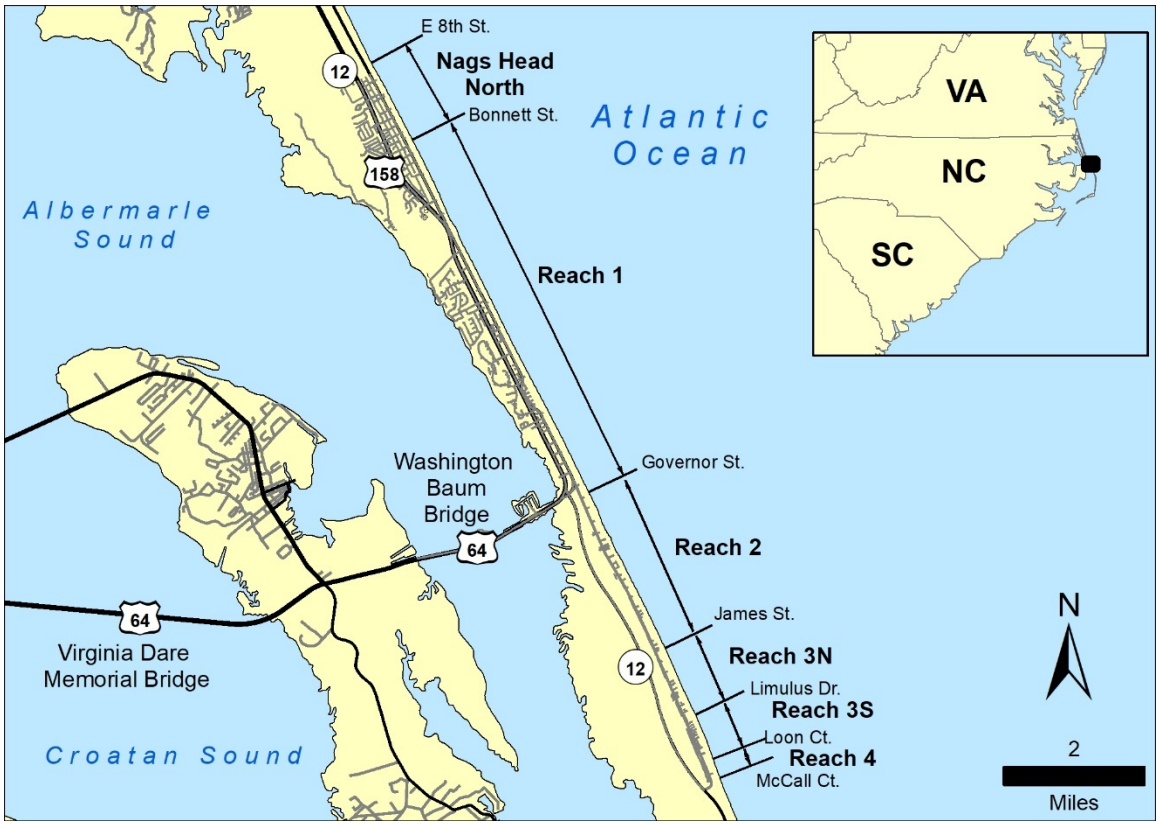


Figure 1-1: Study Area of Nags Head, Dare County, NC

Within the study area, a series of transects and reaches were developed when the Town initiated beach nourishment and monitoring in 2011 (Town of Nags Head, 2011). The reaches were later modified to divide Reach 3 into two sub-reaches (Reach 3 – North and Reach 3 – South). Table 1-1 presents the reach start and end points, corresponding transect stations, and reach lengths.

Table 1-1: Reach Start and End Points

Reach	Stations	Length (ft)	Start Point	End Point
Nags Head - North	430+00-495+00	6,750	E 8th Street	Bonnett Street
Reach 1	495+00-790+00	29,000	Bonnett Street	Governor Street
Reach 2	790+00-920+00	13,000	Governor Street	James Street
Reach 3 - North	920+00-975+00	5,500	James Street	Limulus Drive
Reach 3 - South	975+00-1010+00	3,500	Limulus Drive	Loon Court
Reach 4	1010+00-1025+00	2,000	Loon Court	McCall Court

2.0 PROJECT PURPOSE AND NEED

2.1 Project Purpose

The Nags Head Multi-Decadal Beach Nourishment Master Plan's purpose is to:

1) establish a programmatic plan to facilitate authorization and implementation of beach nourishment events (maintenance and storm response), including borrow source identification and analysis;

2) provide a project plan for the long-term maintenance of the dune, beach, and foreshore within the Town of Nags Head to:

- establish an equivalent level of storm protection to upland property and infrastructure within the town, protecting Nags Head residents' properties as well as protecting the associated local, state, and federal tax bases;
- ensure the viability of the Nags Head tourism industry;
- maintain natural resources and associated recreational uses while avoiding and minimizing adverse environmental impacts to the extent feasible;

3) provide an efficient framework to financially and logistically manage the Town of Nags Head's beaches in coordination with Dare County and surrounding communities.

2.2 Project Need

The Town of Nags Head has completed three beach nourishment projects over the past 12 years. Two of those projects were focused on beach maintenance and one on post-storm recovery. The town is dedicated to maintaining a healthy beach for storm protection and recreational use. A master plan approach will enable the town to establish a long-term strategy to permit, schedule, and finance ongoing beach nourishment efforts.

Having estimates of the long-term ongoing volumes needed for beach maintenance and storm response will enable the town to work with Dare County as well as state and federal sources to allocate adequate funding. These estimates, in conjunction with a comprehensive analysis of the identified offshore borrow area, provide assurance that enough beach-compatible sand is available to supply the estimated need for the 50-year plan time horizon. In addition, establishing project timelines based on volume triggers and storm occurrence allows for proactive planning of regulatory considerations and permitting requirements.

2.3 Scope of Study

This comprehensive report reviews present-day beach conditions, past beach nourishment projects, and ongoing monitoring data to develop a nourishment plan based on volumetric thresholds for the town. In addition, the regulatory requirements are reviewed and permitting timelines established to facilitate timely project implementation. The planning

horizon is 50 years to provide long-term stability to the town's beach nourishment program. The master plan examines alternatives including beach nourishment across all nourished reaches, beach nourishment with variable timing according to need, and beach nourishment in conjunction with structures (nearshore breakwaters or terminal groin).

The final master plan is intended to 1) establish the parameters (such as volumetric thresholds) for future beach nourishment and management, 2) provide a basis for the town to continue to qualify for FEMA reimbursement for replacement of sand lost during a federally-declared disaster, and 3) provide Town with proactive planning and execution of sustainable beach management for a 50-year planning horizon; including regulatory timelines, financial needs, and the tools to assess the Town's level of protection based on annual monitoring surveys.

The workflow for development of the master plan is shown in Figure 2-1. Initially, the technical work plan, including numerical modeling needs was developed. Next, existing data sets describing historical and existing conditions were assembled, including wave climate, water levels, beach topography and nearshore bathymetry, shoreline changes, and sediment resources. These data sets were used to perform analytical assessment of beach profile changes, localized hot spots, and sand sources. These were then employed to develop the beach nourishment volume needs and triggers. In parallel, a calibrated and validated numerical model of shoreline change was developed using historical data. The results of the analytical assessment were used to estimate beach nourishment needs over the 50-year planning timeframe.

With input from the town, alternative scenarios were developed for evaluation. The analytical and numerical modeling tools developed using historical beach behavior were used to evaluate the performance of each alternative. These results in conjunction with preliminary cost estimates and project timelines comprise the master plan.

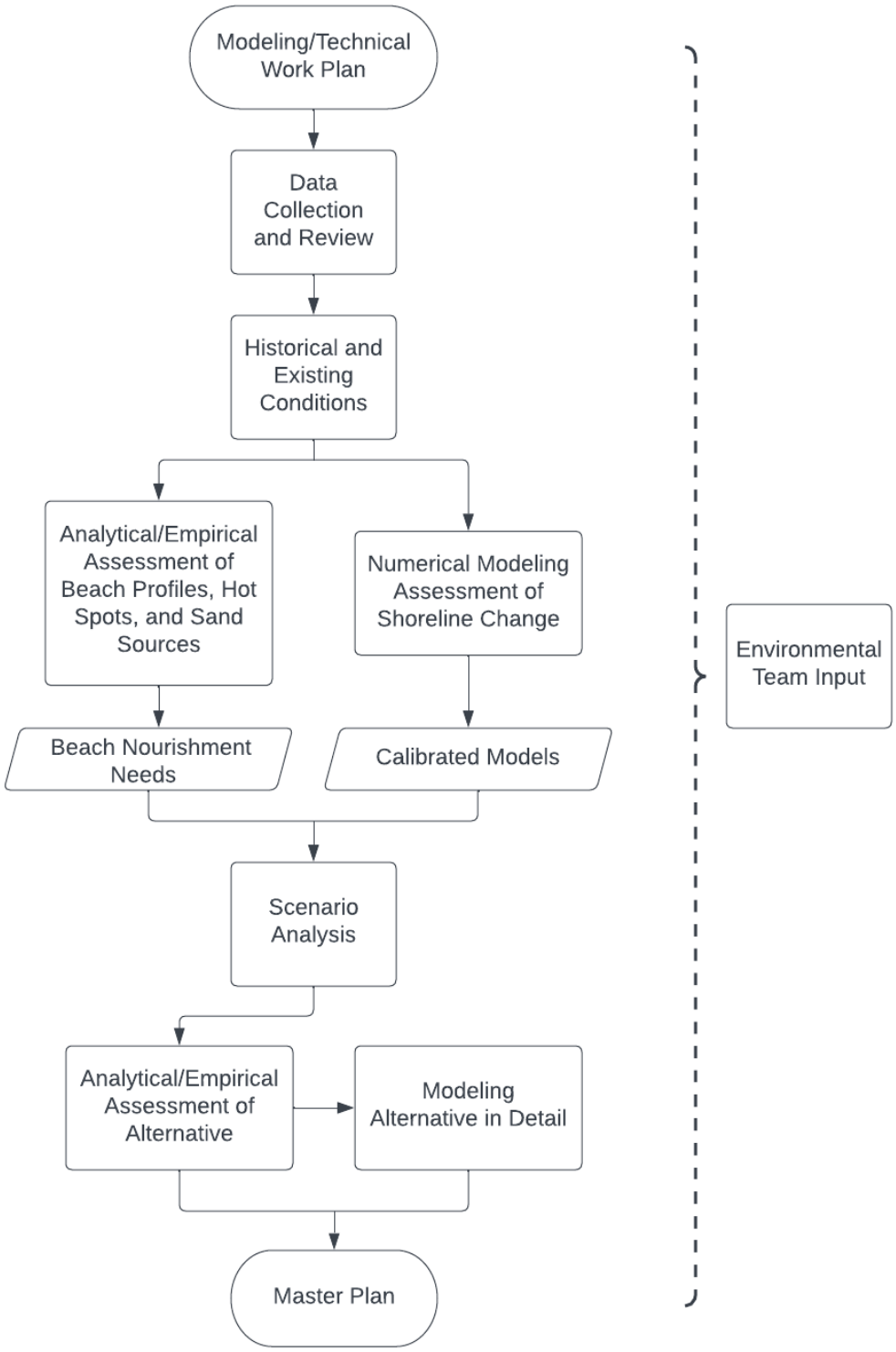


Figure 2-1: Workflow for development of Beach Nourishment Master Plan

3.0 REVIEW OF AVAILABLE DATA

Data from various sources including public (federal, state, and local entities) and private sources, such as previous studies by others, were compiled during the course of this study. The primary types of data include historical measured water levels; historical measured and hindcast wave conditions; historical shoreline positions, beach profiles and nearshore bathymetry; aerial photography; sediment characteristics both on the Nags Head beaches and within potential borrow areas; logs and records of historical coastal engineering works along Nags Head; and a collection of previous studies by others relative to coastal processes in the project area. This chapter documents the most significant data utilized for the coastal engineering analysis of this study.

3.1 Wave Climate

The primary mechanism of sediment movement along an open ocean coast is the action of waves and the associated currents. In order to understand the magnitude and direction of sediment movement, it is necessary to properly characterize the wave climate. The shape of the nearshore bathymetry and the angle at which waves approach the coastline influence the shoreline changes. Wave characteristics have short-term (seasonal) and long-term impacts on cross-shore and along-shore sediment transport. Drastic changes in beach width and elevation can occur during large storm events (hurricanes) with elevated wave conditions, but it is the more frequent storms and wave events that generally drive the overall shoreline position. The wave climate is a driver for the modeling of sediment movement and shoreline evolution pre- and post-nourishment projects.

Relevant wave data in the study area consist of three directional wave buoys that have been operated at various times by the UNC Coastal Studies Institute and the U.S. Army Corps of Engineers (USACE). The wave measurements at these stations include wave height, period, and direction in varying intervals and over varying time periods, as described below. The publicly available historical water level and wave data sources considered in this study are shown in Figure 3-1.

This section of the report provides a brief summary of the offshore wave data sources relevant to determining the wave climate at Nags Head. Appendix A provides a more detailed presentation and discussion of the offshore wave data sources and wave transformation model simulations to generate nearshore wave climates for various components of this master plan.

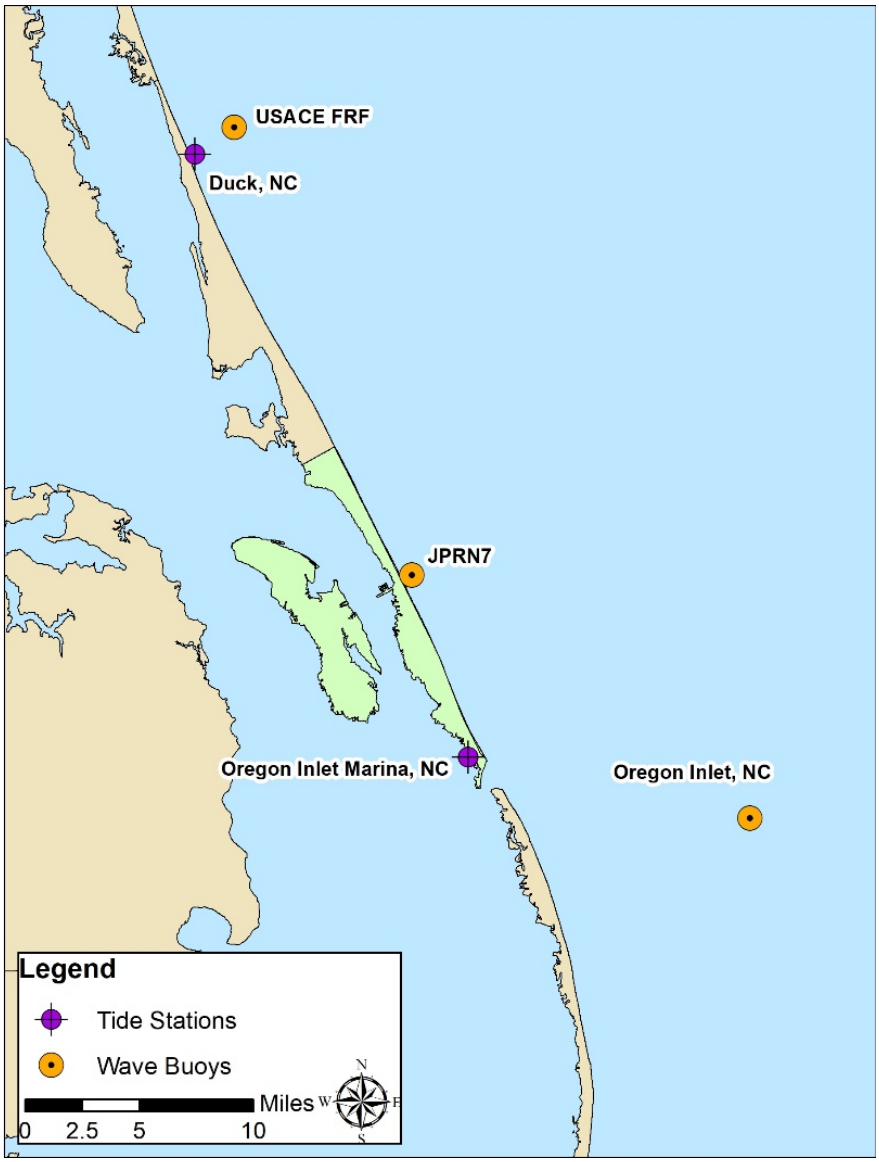


Figure 3-1: Wave and Water Level Data Locations

3.1.1 UNC Coastal Studies Institute Oregon Inlet Station, NDBC 44095

UNC buoy #44095 (Oregon Inlet) is located approximately 18.3 miles southeast of Nags Head and in a water depth of approximately 69 ft. The data record spans April 2012 – May 2021, with significant gaps in coverage, including May 13 to July 16, 2013; February 2 to April 24, 2015; December 5, 2016 to April 23, 2017; and February 3 to June 8, 2020. Figure 3-4 shows a rose plot of wave heights by direction at this location. The rose indicates that, offshore of Oregon Inlet, waves are predominantly from the east-northeast through the east-southeast sectors, with measured significant wave heights predominantly between 1.5 ft and 7.5 ft. Measured significant wave heights exceed 9.4 ft approximately 5.0% of the time, and they exceed 14.0 ft approximately 1.0% of the time.

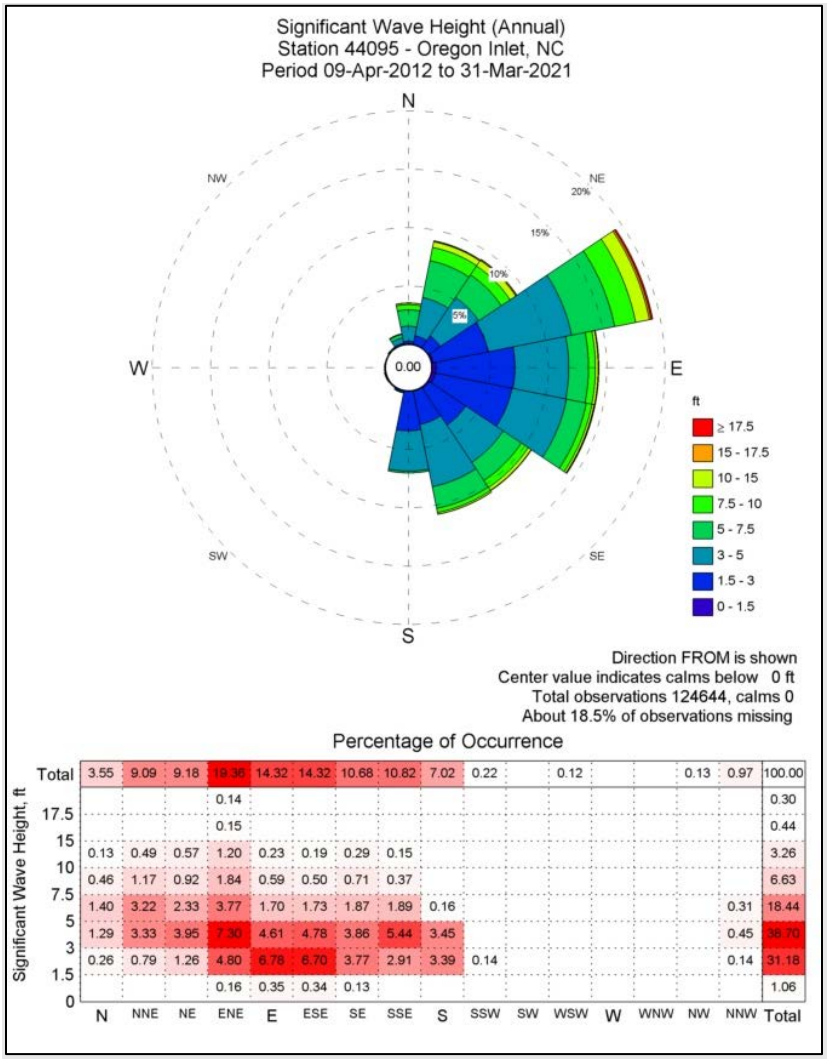


Figure 3-2: Station 44095 Offshore Significant Wave Height Rose from April 2012 – March 2021

3.1.2 USACE Station JPRN7 – Jennette's Pier

A nearshore station data source USACE buoy JPRN7 (Jennette's Pier) was used in wave model calibration efforts to validate the MIKE 21 Spectral Waves model described in Appendix A. The data record at this gauge spans May 2013 – March 2014. JPRN7 was a bottom mounted acoustic Doppler current profiler (ADCP) located approximately 0.35 miles offshore of the Jennette's Pier in a water depth of approximately 37.1 ft. At the station, waves are predominantly from the northeast through the east-southeast (Figure 3-3).

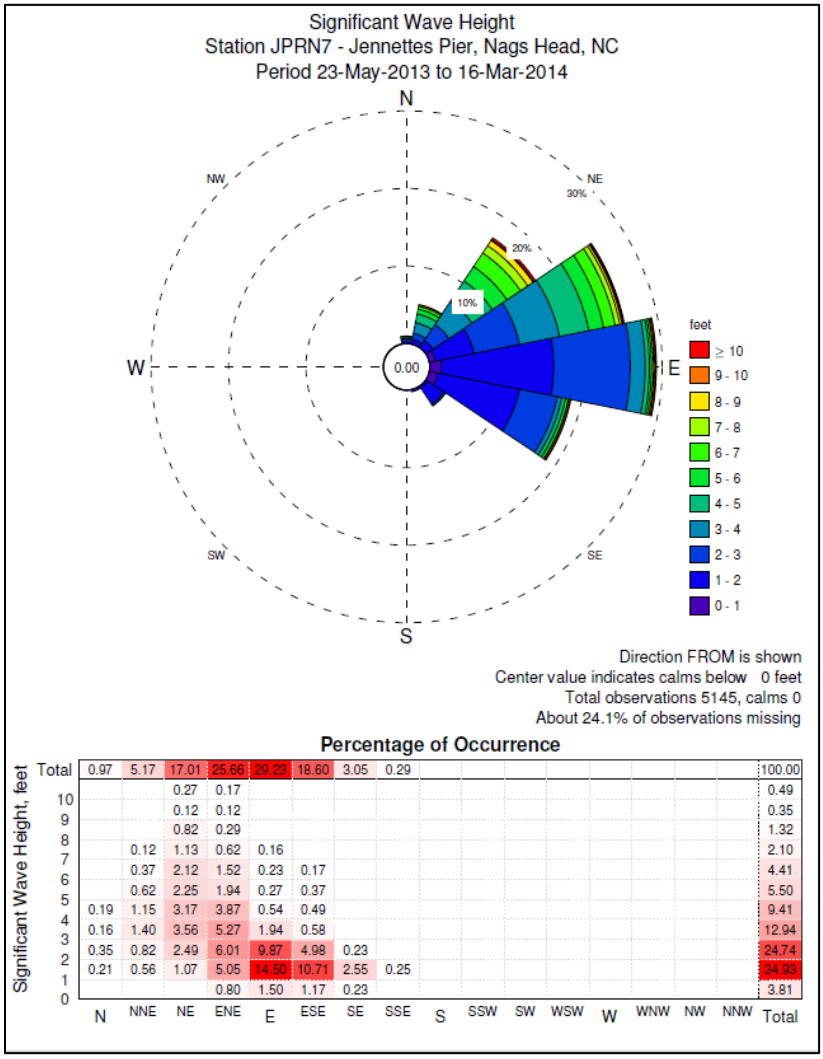


Figure 3-3: Station JPRN Offshore Significant Wave Height Rose from May 2013 – March 2014

3.1.3 USACE Field Research Facility (FRF) Station 44056

The USACE FRF buoy data was used to establish the overall wave climate offshore of Nags Head. The FRF buoy is located approximately 15 miles north of the Town in a water depth of approximately 58 ft. The data record at this gauge spans January 1997 – March 2021. The longer-term wave time series available from the FRF buoy was used to establish extreme wave heights for use in developing synthetic design storm data sets for cross-shore modeling described in Section 5.3. Figure 3-4 shows a rose plot of wave heights by direction at this location. At the FRF buoy the recorded waves are predominantly from the east direction. Waves from east-northeast and east-southeast are also observed frequently. Wave heights are predominantly between 1.0 and 5.0 ft. Measured significant wave heights exceed 7.5 ft approximately 4.1% of the time, and they exceed 10.0 ft approximately 1.0% of the time.

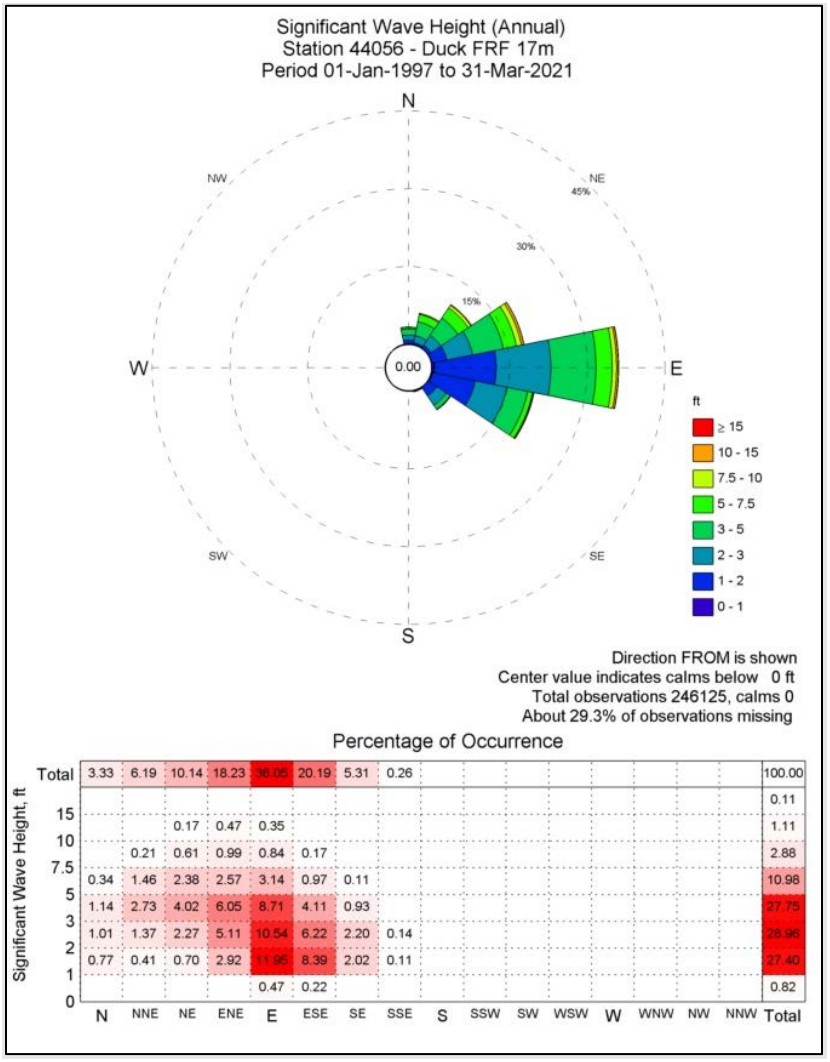


Figure 3-4: Station 44056 Offshore Significant Wave Height Rose from January 1997 – March 2021

3.2 Water Levels

Changes in water level are tidally influenced and driven by changes with climate, sea level rise, and subsidence. Along the open ocean coast this rise and fall dictates the typical range of water levels along the shore. Elevated water levels will increase the exposure of the coast to storm-driven surge and high waves, magnifying their impact on the coast. The most severe coastal impacts tend to occur when a storm surge coincides with high tides and/or during periods of anomalously high sea level.

The National Oceanic and Atmospheric Administration (NOAA) tides and currents website contains two active tide stations in the vicinity of Nags Head: Duck and Oregon Inlet Marina, NC. These tide stations' locations are shown in Figure 3-1**.**

3.2.1 NOAA Tide Station #8651370 Duck Station

The only open-coast NOAA tide gauge listed by NOAA's CO-OPS program in the immediate study area is located in the Town of Duck at the USACE FRF Pier (see Figure 3-1). Verified hourly and 6-minute water level measurements are readily available from NOAA's CO-OPS program website since June 1978 and October 1995, respectively.

The data recorded at this gauge were used in calibration and verification of the CSHORE model as described in Section 5.3.2 and for the extreme analysis to calculate the design storm peak water levels, which is explained further in Section 5.5.1. NOAA's published tidal datum sheet for the Duck station indicates a range of 3.69 ft between MHHW and MLLW, with a range of 3.23 ft between MHW and MLW. Figure 3-5 shows the relationships of tidal datums MHHW, MLLW, and MSL in feet relative to NAVD88 at the Duck tide station based on NOAA's 1983-2001 tidal epoch.

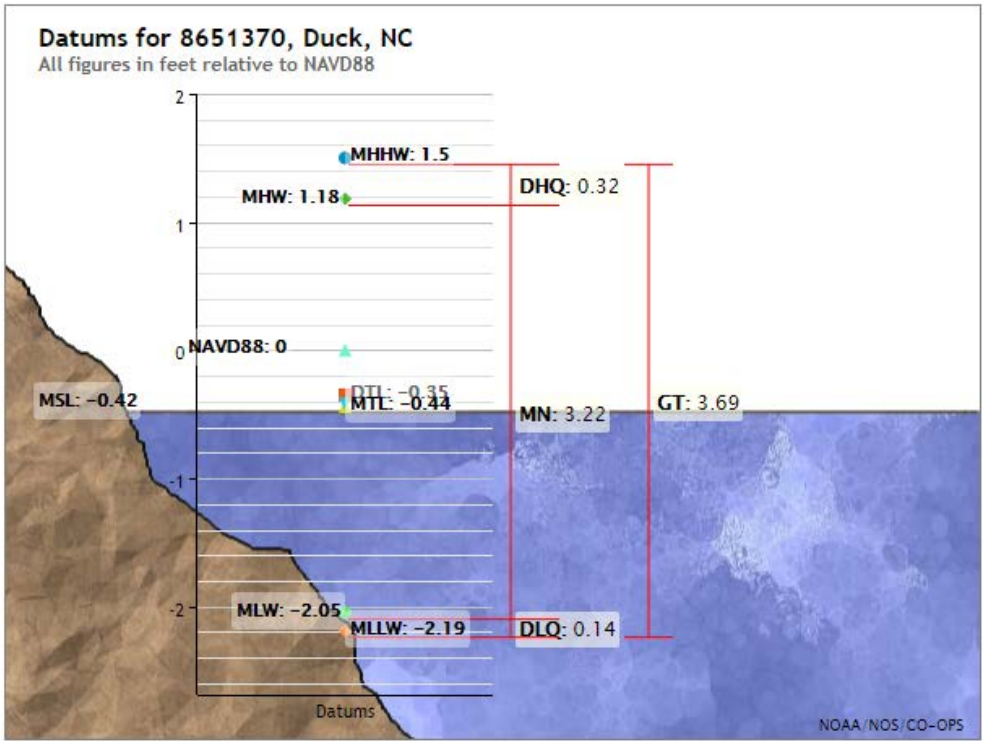


Figure 3-5: Tidal Datum Chart for Duck, NC Station 8651370

3.2.2 NOAA Tide Station #8652587, Oregon Inlet Marina Station

The Oregon Inlet Marina, NC tide station is another nearby operating gauge. This gauge was installed on August 14, 1974, and provides verified hourly water level measurements from 1974 to present. The gauge has also recorded 6-minute water level intervals since January 1996. The Oregon Inlet tide station is located within the Oregon Inlet Marina (Figure 3-1**)**, and as such does not accurately represent tidal water levels along the open Atlantic coast. However, the tide gauge data provides an applicable data set for inferring

the effects of coastal storms (e.g., surge over predicted astronomical tides) and sea level rise trends.

NOAA's published tidal datum sheet indicates a range of 1.18 ft between MHHW and MLLW, with a range of 0.9 ft between MHW and MLW. Figure 3-6 shows the relationships of tidal datums MHHW, MLLW, and MSL in feet relative to NAVD88 at the Duck tide station based on NOAA's 1983-2001 tidal epoch.

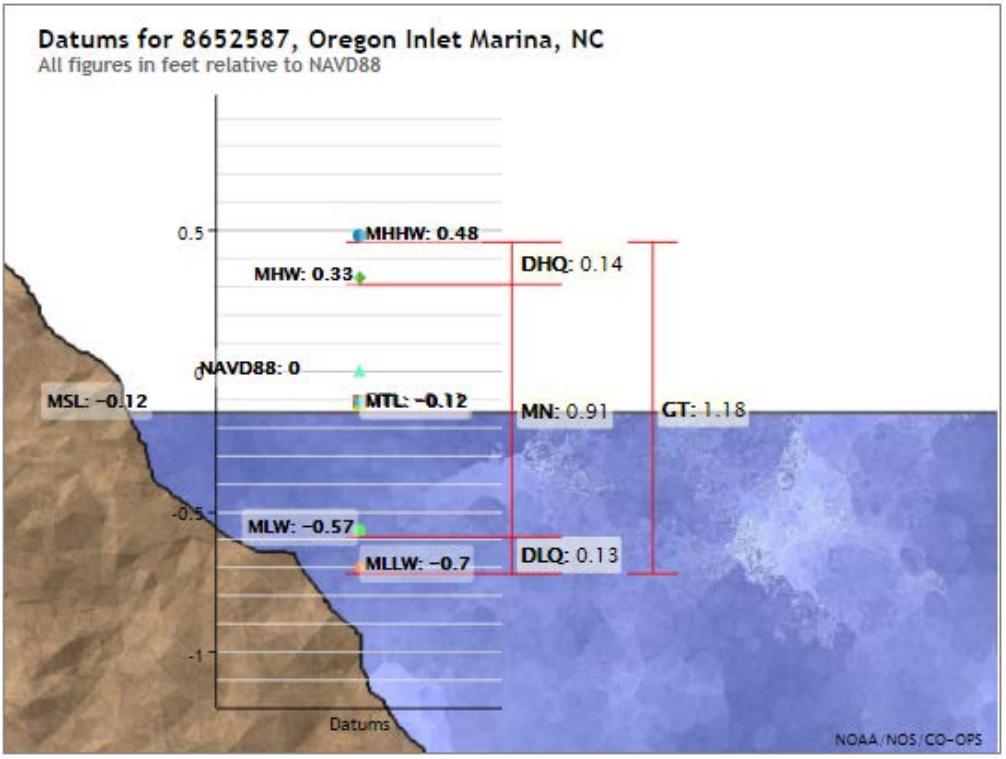


Figure 3-6: Tidal Datum Chart for Oregon Inlet Marina, NC Station 8652587

3.2.3 Storm Surge

Another short-term water level fluctuation is storm surge, which is the rise in water levels generated by a storm above the typical astronomical tide. This water level rise can have a significant impact on sand movement since it allows waves to travel further landward. Storm surges and fluctuating water levels allow waves to erode various elevations of the beach from the dunes to the berm, and beach foreshore.

Storm surge is included in the historical water level measurements at the Duck NOAA tide gauge. The top ten highest water level events at the Duck tide gauge from January 1980 to May 2023, and the respective surge components, are summarized in Table 3-1.

Table 3-1: Ten Highest Water Levels at Duck NOAA Tide Gauge

Date	Total Water Level (ft, NAVD88)	Predicted Tide Level (ft, NAVD88)	Storm Surge (ft)
2003-09-18	5.63	0.93	4.70
2006-11-22	5.36	1.80	3.56
2019-09-06	4.97	1.63	3.34
2022-01-03	4.96	2.08	2.88
1999-08-30	4.79	1.88	2.91
2021-11-07	4.68	2.54	2.14
2015-10-02	4.65	2.21	2.44
2009-11-13	4.49	1.80	2.69
2012-10-28	4.49	1.65	2.84
2000-05-29	4.43	1.34	3.09

3.2.4 Sea Level Change

Due to the multi-decadal nature of the overall beach nourishment master planning process, the impact of sea level rise on long-term beach behavior and project performance is a significant factor. It is recognized that the actual rate of relative sea level change experienced by Nags Head, including any potential acceleration of this rate, is not known with certainty. The resiliency and/or adaptability of the forward-looking plans and design generated by this study is improved by considering the impacts of sea level rise. The most recent federal guidance on sea level change is provided by NOAA's Global and Regional Sea Level Rise Scenarios for the United States (Sweet et al. 2022). This (2022) prediction was chosen as the most current and reliable estimate for sea level rise after a thorough review of available data.

NOAA (2022) Relative Sea Level Change at Duck

Relative mean sea level at the Duck NOAA tide gauge (Sta. 8651370) has been rising at a long-term average rate of approximately 4.74 mm/year (0.016 ft/year), as computed by NOAA from monthly mean sea level data between 1978 and 2022 (**Figure 3-7**). Over a 50-year future planning period, the continuance of this trend would result in a relative mean sea level increase of approximately 0.78 feet.

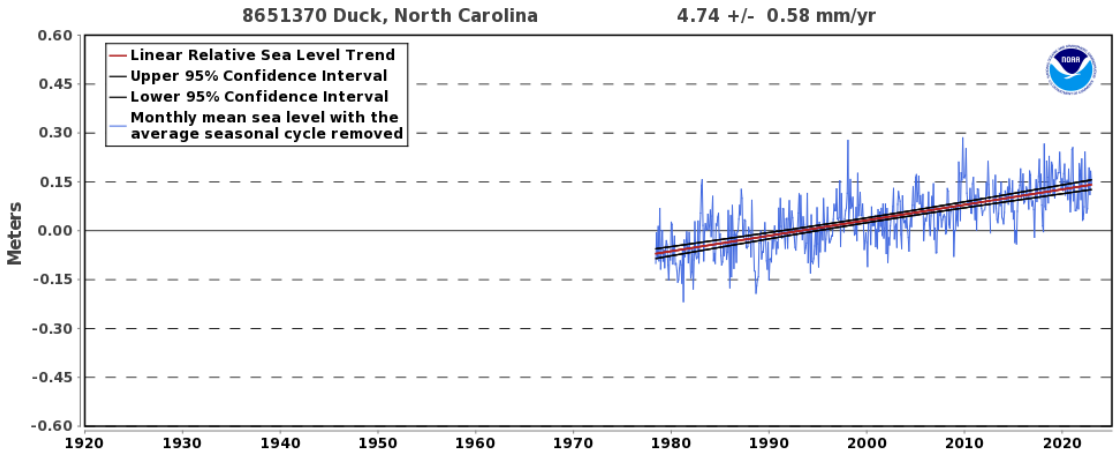


Figure 3-7: Relative Sea Level Trend - Duck, NC (Sta. 8651370) based on monthly mean sea level data from 1978 to 2022

In 2017, the U.S. Interagency Sea Level Rise Taskforce conducted a review of the research on global sea level rise projections and updated the scenarios of global mean sea level rise. In their report, the researchers defined six global sea level rise scenarios (Low, Intermediate Low, Intermediate, Intermediate High, High, and Extreme) decade by decade for this century based on the latest published and peer reviewed science. Regionally appropriate scenarios were then generated by NOAA (Sweet et al. 2017), integrating the refined global scenarios with regional factors contributing to sea level change for the entire U.S coastline. The researchers scaled these scenarios down to a one-degree gridded resolution, or roughly 70 miles. This effort was updated in 2022 (Sweet et al. 2022) to include additional observations and improved understanding of the drivers of sea level change. In addition, the Extreme scenario is no longer included.

Figure 3-8 presents the results of the updated study at Duck, NC. Based on the 2022 scenarios, local sea level at Duck, NC is very likely to rise at least 1 ft above 2022 levels by 2072 on a low-global-warming pathway. On future pathways with the highest global warming levels, sea level rise could reach approximately 3 ft above 2022 levels by 2070.

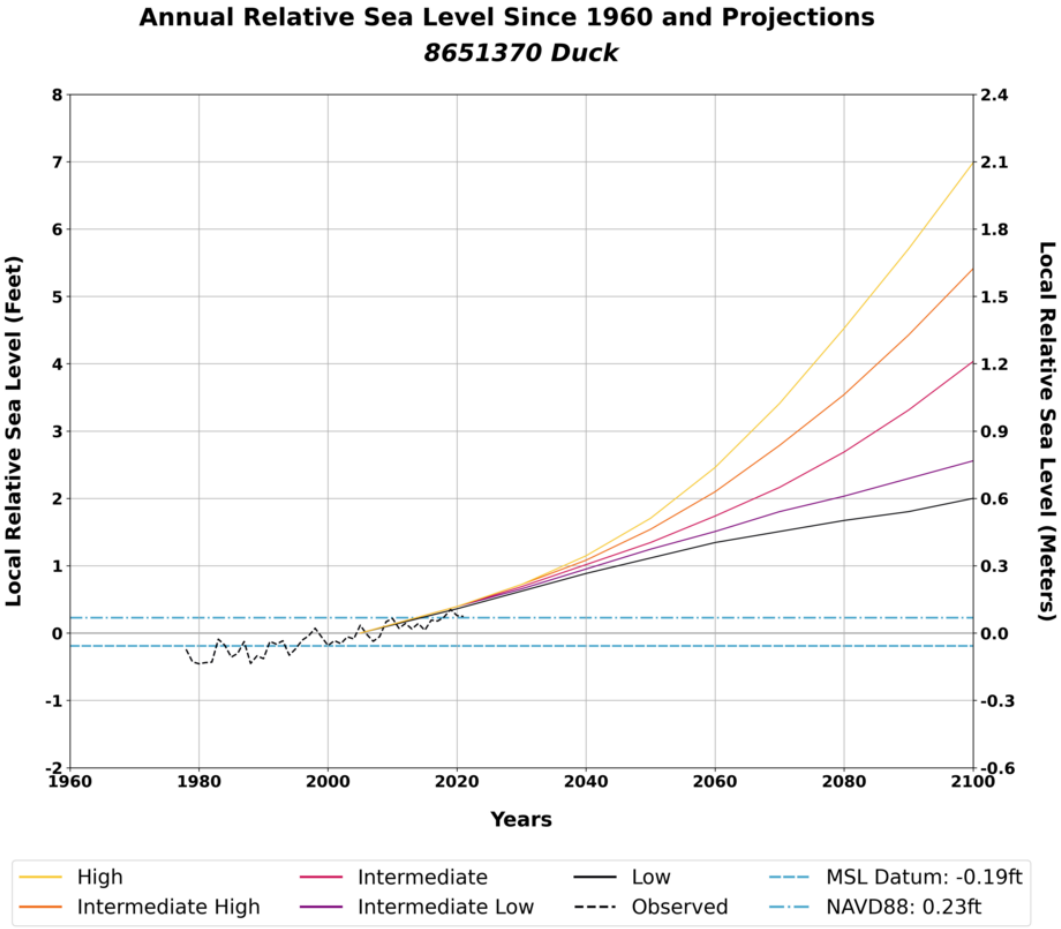


Figure 3-8: Relative Sea Level Change at Duck, NC Based on Sweet et al. (2022). The annual mean sea level for the year 2005 serves as the 'zero' for the figure with the elevation of NAVD88 also provided.

Realistic scenario estimates of sea level rise will be utilized for the project. Consideration of the specific impacts of sea level rise on the performance of project alternatives is discussed in Section 5.5.4.

3.3 Beach Topography and Nearshore Bathymetry

Beach topography and nearshore bathymetry are used to understand the physical characteristics of the coastal zone. By mapping the shape and elevation of beaches, as well as the depth and shape of the nearshore area, the susceptibility of the shore to erosion and sediment transport along the shore can be determined. This information is then used to assess the risk of erosion and storms and develop strategies to mitigate the risk and reduce the impact of these hazards.

3.3.1 Beach Monitoring Profiles

Beach profile data for the project study area is readily available as part of the ongoing monitoring program along Nags Head's ocean shoreline. Town of Nags Head began to consistently monitor the shoreline after the 2011 beach nourishment project. Table 3-2 shows the available survey data for Nags Head. Figure 3-9 shows the beach monitoring survey transect locations.

Table 3-2: Nags Head Beach Profile Surveys

Date	Source	Description	Transect Stations Included
November 2004	CSE	Hurricane Isabel Dune Recovery Project BD	430+00-1020+00
May 2005	CSE	Hurricane Isabel Dune Recovery Project AD	522+00-1020+00
December 2006	CSE		430+00 – 1020+00
March 2009	CSE		430+00 – 1020+00
November 2010	CSE		430+00 – 1080+00
June 2011	CSE	2011 Nourishment BD Survey	430+00 – 1025+00
November 2011	CSE	2011 Nourishment AD Survey	430+00 – 1025+00
June 2012	CSE	Annual Monitoring	430+00 – 1080+00
November 2012	CSE	Annual Monitoring	430+00 – 1080+00
June 2013	CSE	Annual Monitoring	430+00 – 1080+00
June 2014	CSE	Annual Monitoring	430+00 – 1080+00
June 2015	CSE	Annual Monitoring	430+00 – 1080+00
June 2016	CSE	Annual Monitoring	430+00 – 1080+00
July 2017	CSE	Annual Monitoring	430+00 – 1080+00
May 2018	CSE	Annual Monitoring	430+00 – 1080+00
April 2019	CSE	2019 Nourishment BD Survey	430+00 – 1080+00
August 2019	CSE	2019 Nourishment AD Survey	430+00 – 1080+00
November 2019	CSE	Post-Dorian Survey	495+00 – 1025+00
June 2020	McKim & Creed	Annual Monitoring	430+00 – 1300+00
July 2021	McKim & Creed	Annual Monitoring	430+00 – 1300+00
July 2022	McKim & Creed	Annual Monitoring	430+00 – 1300+00

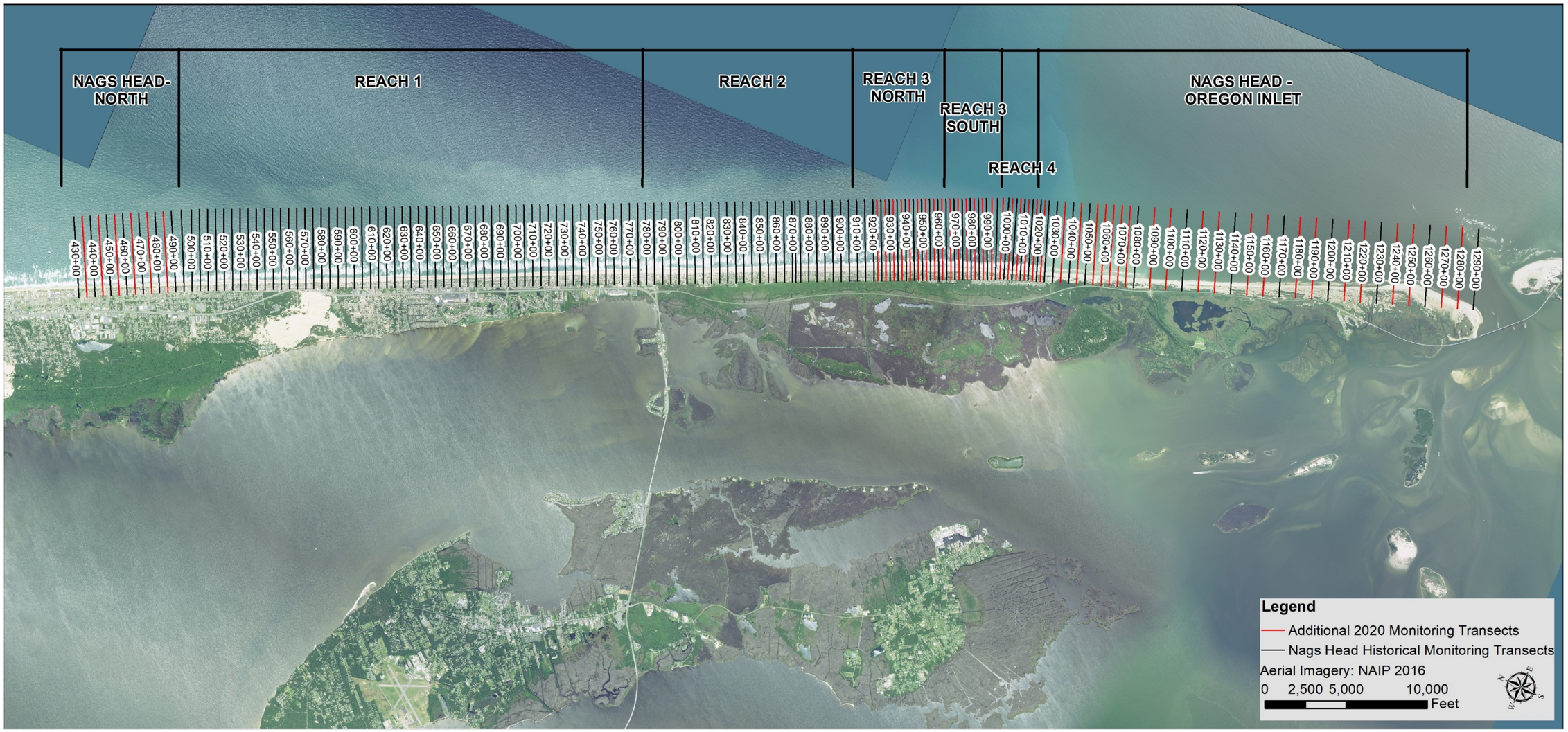


Figure 3-9: Nags Head Survey Transects

3.3.2 Bathymetric Data

NOAA Chart 12204, dated 06/2018, covers the entire project area and provides general bathymetry data based on a collection of data ranging from 1900 to the present. A majority of the data offshore of Nags Head in Chart 12204 is from 1970 - 1989**.**

In addition to NOAA Navigation Charts, NOAA's National Centers for Environmental Information (NCEI) and NC Emergency Management have developed a coarse Digital Elevation Model (DEM) which covers the Nags Head oceanfront by combining historical elevation data from a variety of sources, including (but not limited to) the NOAA Office of Coast Survey, NOAA National Geodetic Survey, NOAA Office for Coastal Management, USGS, and USACE. A continuously updated digital elevation model (CUDEM) is also available from NOAA's Digital Coast. A summary of the historical bathymetry data offshore of the Nags Head study area is presented in Table 3-3**.**

Table 3-3: Nags Head Bathymetric Data

Date	Source	Description	Resolution	Coverage
up to 1998	NOAA NCEI	Coastal Relief Model	3 Arc-Second	South East Atlantic
up to 2005	NC Emergency Management	Integrated data from various sources from various years to support inundation modeling	1 Arc-Second	North Carolina
up to 2023	NOAA NCEI	CUDEM	1/9 Arc-Second	USA

3.3.3 LiDAR Data

Light Detection and Ranging (LiDAR) is a method that uses light in the form of a pulsed laser to measure distances to the Earth. Agencies and local governments often acquire high-resolution LiDAR (Light Detection and Ranging) data for the purpose of creating elevation datasets. The data includes hydrographic and topographic data depicting the elevations above and below the immediate coastal waters. LiDAR data for Nags Head is available from various sources including USGS, USACE, NOAA and NASA. Table 3-4 shows the available LiDAR for the area.

Table 3-4: Nags Head Elevation Data

Date	Source	Resolution	Coverage	Description
Mar-2022	USGS CoNED	1 m	NC and SC Coast	Topobathy DEM
Jun-2019	USACE NCMP	1 m	NC	
Oct-2019	USACE NCMP	1 m	NC	Dunex
Oct-2018	USACE NCMP	1 ft	Southeast Coast	Post-Florence
Aug-2018	USACE NCMP	0.5 m	East Coast	
Jul-2017	USACE NCMP	1 m	East Coast	
Oct-2016	USACE NCMP	0.4 m	Southeast Coast	Post-Matthew
Mar-2014	NOAA OCM	1 ft	NC	Post-Sandy
Sep-2013	USACE NCMP	1 ft	NC	Post-Sandy
Nov-2012	USGS	1 m	Northeast Coast	Post-Sandy
Aug-2011	NOAA NGS	1 m	NC	Post-Irene
Nov-2009	USGS	2 m	NC	Post-Nor'easter Ida
Aug-2009	USACE NCMP	2 ft	NC	
Mar-2008	NOAA NGS	2 m	NC	
Oct-2005	USACE NCMP	2 m	East Coast	
Jul-2004	USACE NCMP	3 m	NC	
Feb-2001	NOAA OCM	4 m	NC	
Mar-2000	NOAA/USGS/NASA	2 m	NC	
Oct-1999	NOAA/USGS/NASA	3 m	NC	
Sep-1999	NOAA/USGS/NASA	3 m	NC	Post-Dennis
Sep-1999	NOAA/USGS/NASA	3 m	NC	Post-Floyd
Sep-1998	NOAA/USGS/NASA	3 m	NC	
Sep-1997	NOAA/USGS/NASA	3 m	NC	
Oct-1996	NOAA/USGS/NASA	3 m	NC	

3.4 Aerial Photography

Photography is available from various sources including USGS, NAIP, NOAA and NC CGIA. Starting from 1952, aerials of the Nags Head oceanfront shoreline were taken by USGS through various programs. The NAIP has obtained aerial photography for a variety of dates from 2004 to 2020. Additionally, NC CGIA also has a database of aerial imagery between 1996 -2020. In addition, Landsat Copernicus imagery exists from 1985- 2022 and has been compiled by Google Earth. Table 3-5 shows the available photography for the area.

Table 3-5: Nags Head Aerial Photography

Date	Source	Format	Color	Resolution	Coverage
NC CGIA (1996 - 2020)					
1996	NC CGIA	Tiff	B&W	0.5 ft	Nags Head
2002	NC CGIA	Tiff	Color	0.25 ft	Nags Head
2007	NC CGIA	Tiff	Color	0.25 ft	Nags Head
2012	NC CGIA	Tiff	Color	0.5 ft	Nags Head
2016	NC CGIA	Tiff	Color	0.25 ft	Nags Head
2020	NC CGIA	Tiff	4-band	0.5 ft	Nags Head
NAIP (2004 - 2020)					
2004	USDA (NAIP)	Tiff	Color	2 m	Nags Head
2005	USDA (NAIP)	Tiff	Color	2 m	Nags Head
2006	USDA (NAIP)	Tiff	Color	1 m	Nags Head
2009	USDA (NAIP)	Tiff	4-band	1 m	Nags Head
2010	USDA (NAIP)	Tiff	4-band	1 m	Nags Head
2012	USDA (NAIP)	Tiff	4-band	1 m	Nags Head
2014	USDA (NAIP)	Tiff	4-band	1 m	Nags Head
2016	USDA (NAIP)	Tiff	4-band	1 m	Nags Head
2018	USDA (NAIP)	Tiff	4-band	2 ft	Nags Head
2020	USDA (NAIP)	Tiff	4-band	2 ft	Nags Head
USGS Photography (1952 - 1999)					
1952, 1956, 1961, 1964, 1974, 1975, 1977, 1999	USGS	Photography	B&W		Nags Head
1970, 1972, 1973, 1976, 1982 (2), 1989, 1990 (2), 1992, 1993, 1999,	USGS	Photography	Color		Nags Head
1982, 1983	USGS (NHAP)	Photography	B&W		Nags Head
1993, 1998, 1999	USGS (NAPP)	Photography	Color		Nags Head
1993	USGS	DOQ	B&W		Nags Head
1998	USGS	DOQ	Color		Nags Head
USGS					
2009	USGS	Tiff	4-band	1 ft	Nags Head
NOAA (2008 - 2022)					
2008	NOAA/NCDEQ	Tiff	4-band	0.5 m	Nags Head
2014	NOAA NGS	Tiff	4-band	1 ft	Nags Head
2017	NOAA NGS	Tiff	4-band	1 ft	Nags Head
2018	NOAA NGS	Tiff	Color	1 ft	Nags Head
2019	NOAA NGS	Tiff	Color	1 ft	Nags Head
2020	NOAA NGS	Tiff	Color	1 ft	Nags Head
2022	NOAA NGS	Tiff	Color	1 ft	Nags Head
USACE (2017, 2018)					
2017	USACE	Tiff	4-band	0.04 m	Nags Head
2018	USACE	Tiff	Color	0.05 m	Nags Head
ESA (1985 - 2020)					
1985 - 2022 (Annually)	ESA(Copernicus)	Photography	Color	varied	Nags Head
Dare County					
2007	Dare County	Tiff	Color	0.25 ft	Nags Head
NCDIT					
2010	NCDIT (NC 911)	Tiff	Color	0.5 ft	Nags Head

3.5 Shoreline Positions

Shoreline data for the project study area is available through agencies such as NC DCM, USACE, USGS, USDA, and NCDOT for which in a majority of cases, the shoreline was interpreted as the wet/dry line digitized from aerial photography. The primary source of historical data is via interpretation of a multi-temporal collection of geo-referenced shoreline maps or "T-Sheets", provided by the NOAA Coastal Services Center. DCM has also collaborated with the USGS and USACE to document the shorelines based on delineation of wet-dry line as interpreted from orthophotography, as well as deriving the MHW based on LiDAR survey data. The available shoreline data and extents vary depending on the historical photographs. In addition, MHW data has been pulled from the various beach surveys that were mentioned in Section 3.3.1. Table 3-6 presents a summary of the available shoreline data and the extents covered.

Table 3-6: Nags Head Shorelines

Date	Reference	Description	Source	Location
Jan-1849, Dec-1949	Wet-Dry	NOS T-Sheets	NOAA	Outer Banks
Jan-1980	MHW	CERC Map	USGS	Outer Banks
Jan-1997	MHW	LIDAR	USGS	Outer Banks
Jul-1998	Wet-Dry	Interpreted from Imagery	Dare County	Dare County
Feb-2002	Wet-Dry	Interpreted from Imagery		Outer Banks
Aug-2004	MHW	USGS Swash	USGS	Outer Banks
Mar-2007	Wet-Dry	Interpreted from Imagery	NC CGIA	Nags Head
Jul-2009	Wet-Dry	Interpreted from Imagery	USDA NAIP	Nags Head
Apr-2010	Wet-Dry	Interpreted from Imagery	NC 911	Outer Banks
Feb-2012	Wet-Dry	Interpreted from Imagery	NC CGIA	Outer Banks
Jan-2016	Wet-Dry	Interpreted from Imagery	NC CGIA	Outer Banks
Jan-2020	Wet-Dry	Interpreted from Imagery	NC DCM	Outer Banks
Nov-2004, May-2005, Dec-2006, Mar-2009, Nov-2010, Jun-2011, Nov-2011, Jun-2012, Nov-2012, Jun-2013, Jun-2014, Jun-2015, Jun-2016, Jul-2017, May-2018, Apr-2019, Aug-2019, Nov-2019	MHW	Beach Profile Surveys	CSE	Nags Head
Jun-2020, Jul-2021, Jul-2022	MHW	Beach Profile Surveys	McKim & Creed	Nags Head

3.6 Sediment Resource Data

3.6.1 Recipient Beach Sediment Grain Size Data

Recipient beach data were initially collected by USACE as well as CSE in the early 2000s. These data indicate a recipient beach grain size ranging from 0.2 mm to 0.4 mm. Table 3-7 summarizes the available grain size data from these investigations.

Table 3-7: Historical Recipient Beach Data

Date	Source	Mean Grain Size (mm)	Median Grain Size (mm)	Coverage
2001	USACE	0.25	0.26	420+00 – 1000+00
May 2005 & November 2008	CSE	0.36	0.33	430+00 – 1050+00

The most recent comprehensive sediment data set was collected by CSE in 2016. The sediment distribution for the Town was defined based on the percent gravel, granular, sand, fine-grained, and calcium carbonate present in samples taken from 13 positions (e.g. dune toe, MHW, etc.) along transects spanning the length of the Town spaced no more than 5,000 ft apart as specified in North Carolina Administrative Code (NCAC) "Technical Standards for Beach Fill Projects" 15A NCAC 07H.0312 (1). These 13 cross-shore samples were then averaged to obtain a composite average across the profile for each transect. The composite average for each of the 14 transects (Figure 3-10) were then averaged to obtain a global (or overall project area) mean for all transects on the recipient beach.

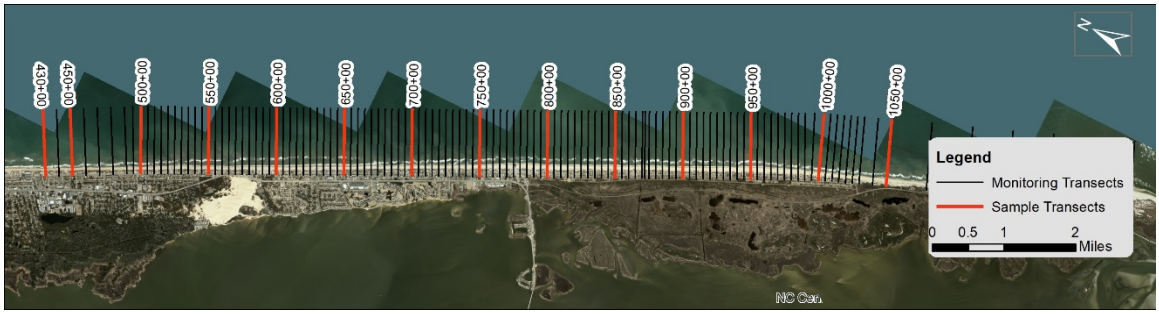


Figure 3-10: 2016 Recipient Beach Sediment Sample Transects (CSE)

The native beach characteristics and parameters identified by 15A NCAC 07H.0312 are presented in Table 3-8**.** Any borrow areas ultimately used for any beach nourishment activities must fall within these guidelines. A summary of the sediment grain size distribution and statistics is provided in Table 3-9.

Table 3-8: Recipient Beach Characteristics and NCAC Rule Parameters

Characteristic	2016 Global Mean (Overall Project Area)	NCAC Requirements	NCAC Maximum
Gravel (>#4)	Reported combined at 0.8%, Assumed 0.4% each	native + 5%	≤ 5.4%
Granular (>#10 & <#4)		native + 10%	≤ 10.4%
Sand (>#230 & <#10)	Reported: 96.96%	-	-
Fines (<#230)	Reported: 1.88%	native +5%	≤ 7%
Calcium Carbonate	Reported: 1.7%	native + 15%	≤ 17%

Table 3-9: Recipient Beach Sediment Statistics

Sediment Compatibility	2016 Global Mean (Overall Project Area)
Median (mm)	0.30
Median (φ)	1.73
Mean (mm)	0.32
Mean (φ)	1.64
Standard Deviation (σφ)	0.63

For Master Plan analysis and reporting purposes, a median grain size **of 0.3 mm** is selected as the best single-value representation of the recipient beach based updated samples analyzed by CSE in 2016.

3.6.2 Borrow Area Sediment Data

Sediment data has also been collected to locate potential suitable sand sources and identify borrow areas for previous nourishment projects. Initial data collection occurred during USACE (2000) and US Minerals Management Service (MMS) (2001) efforts to locate suitable sources of sand for Dare County beaches. Figure 3-11 presents the potential borrow area S1 identified by USACE (2000). Additional sediment cores were obtained by CSE to identify the offshore borrow areas (BA2, BA3, BA3A & BA4), shown in Figure 3-11, that were used for the 2011 and 2019 beach nourishment projects. Table 3-10 gives a summary of these investigations. Figure 3-12 shows the location of the vibracores.

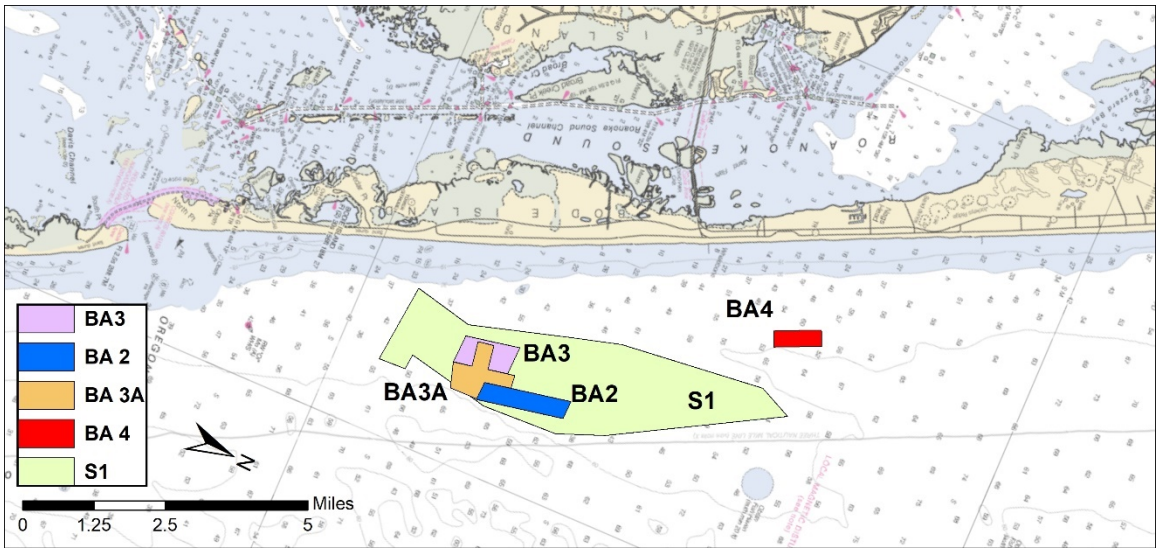


Figure 3-11: Borrow Area Locations

Table 3-10: Available Borrow Area Sediment Data from Previous Studies

Borrow Area	Year	# Cores	Source
Dare County Beaches	1996	30	USACE
	1996	56	US MMS
	1998	42	USACE
S1	2005	61	CSE
	2006	41	CSE
Borrow Area 3A	2017	23	CSE
Borrow Area 4	2017	15	CSE

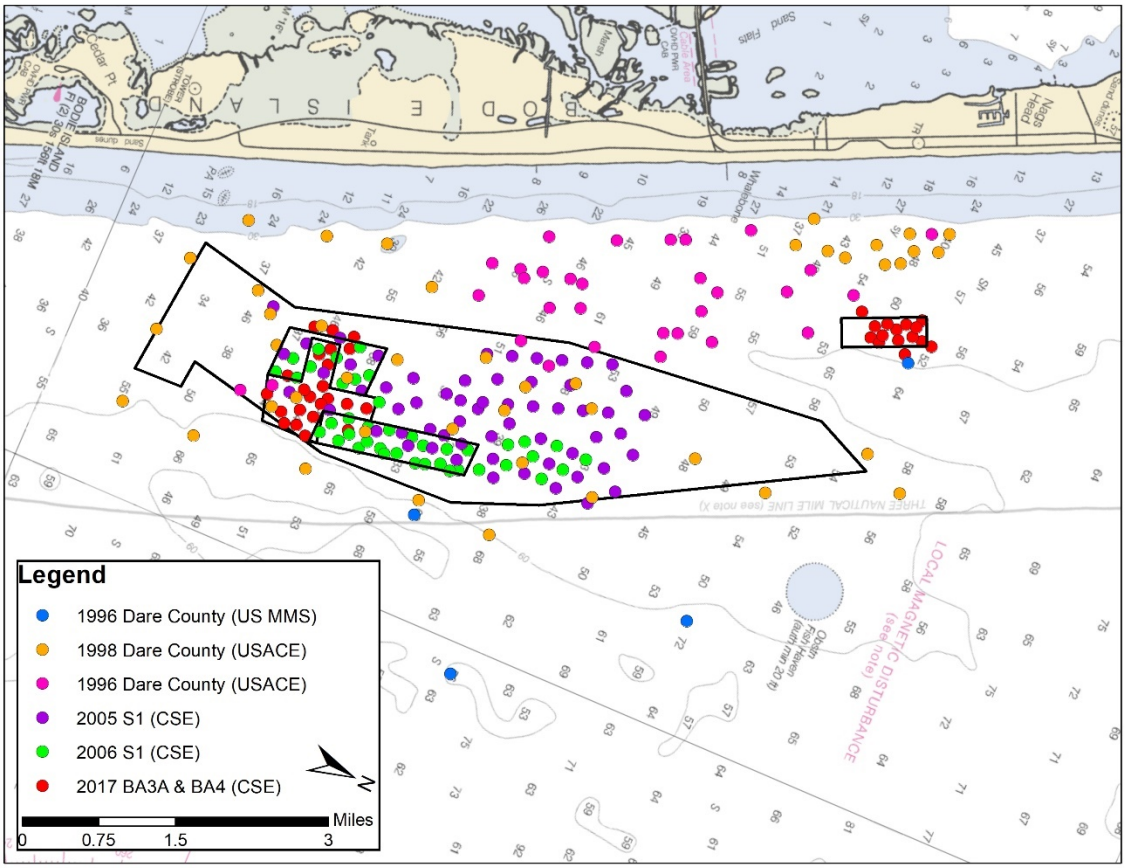


Figure 3-12: Borrow Area Vibracore Data Locations

3.7 Summary of Previous Beach and Dune Nourishments

The Town has conducted four beach and dune nourishment projects along the Nags Head oceanfront since 2004, including:

- 2004-2005 Post Hurricane Isabel Emergency Dune Restoration Project
- 2011 Town of Nags Head Beach Nourishment Project
- 2019 Town of Nags Head Beach Nourishment Project
- 2022 Post Hurricane Dorian Beach Restoration Project

Since 2004 approximately 9.5 Mcy of sand have been placed on Nags Head.

2004-2005 Post Isabel Emergency Dune Restoration Project

In 2003, Hurricane Isabel impacted Nags Head causing significant dune loss across the oceanfront. Through the Robert T. Stafford Relief and Emergency Assistance Act, the Federal Emergency Management Agency (FEMA) authorized funds for a dune restoration project. The dune restoration project consisted of hauling and placement of approximately 320,066 cy along 8 miles of shoreline from an upland borrow source at the Robbie Parker Construction Co. mines in Currituck County. On average, the dune template consisted of a

10-ft wide dune crest with 5H:1V slopes. The dune crest elevation varied between +16 and +17 ft NAVD88. Construction for the dune restoration initiated in spring 2004 with the placement of approximately 56,666 cy along 1.4 miles of the beach. At the end of April construction was stopped due to the environmental moratorium window. The construction reconvened in December 2004 and 210,300 cy of material was placed along various shoreline reaches. The project was completed on April 30, 2005.

2011 Beach Nourishment Project

The Town of Nags Head carried out a publicly funded beach nourishment project in 2011 along the Town's shoreline. The 2011 project encompassed approximately 10 miles of shoreline. Four reaches were delineated based on historical erosion rates. Two borrow areas 2 and 3 located in the USACE designated borrow area S1 were used in this project.

The purpose of the 2011 beach nourishment project was to restore a protective beach for a minimum of 10 years and expand the recreational beach for the community. The design template for the beach nourishment extended the berm 50-125 ft at elevation +6 ft NAVD88 and placed approximately 50-140 cy/ft of material.

The project placed approximately 4.6 Mcy of beach compatible material along the five reaches of Nags Head (Reaches 1, 2, 3N, 3S, and 4) between May 24 and October 27, 2011.

2019 Beach Nourishment Project

Construction of the 2019 Nags Head Beach Nourishment Project began on May 1, 2019, and was completed on August 18, 2019. The project was funded by Town of Nags Head. During the project, a total of 4 million cy of material was placed along approximately 10 miles of shoreline.

Two borrow sources were used for the project: borrow area 3A located in the USACE designated borrow area S1 and borrow area 4 located approximately 1.5 miles offshore from the north central portion of Nags Head beach (Figure 3-11). The entire project took just under 16 weeks, and 4,004,634 cy of material was placed along the five reaches of Nags Head.

2022 Post Hurricane Dorian Beach Restoration Project

In response to Hurricane Dorian in September 2019, Town of Nags Head applied for and received both federal and state funding through the FEMA Public Assistance Program and the N.C. Division of Emergency Management CSDM grants. This funding, which required some local matches, was the basis for the size of the targeted project.

Borrow areas 2 and 3 (Figure 3-11) within USACE designated borrow area S1 were used to complete the project. The project template consisted of a berm of variable width at +6 ft NAVD88 and a foreshore slope of 1:15 out to the existing ground, landward of the prominent offshore bar. The entire project took approximately 6 weeks to complete, and

614,106 cy of material was placed along four reaches of Nags Head (Reaches 2, 3N, 3S, and 4).

3.8 Previous Dune Stabilization and Preservation Efforts

The Town has historically supported both dune fencing and planting of vegetation to stabilize protective dunes. The Town currently supports annual winter American Beachgrass planting through a partnership with a local non-profit. Additionally, the Town uses approximately $25,000 from the beach nourishment fund each year to conduct dune preservation activities. The activities alternate every other year between planting and replacement or supplementation of sand fencing. Furthermore, approximately every two years, the Town initiates a large scale planting and/or sand fencing effort, depending on what is determined to be needed based on visual inspections by Town staff. Typically this is funded through a grant such as the CSDM grant administered by the NC DEQ. The most recent large-scale planting effort composed of 1.3 million sprigs of American beachgrass at various locations along the Town's shoreline was completed in early 2024.

In addition to these efforts, the Town operates a dune management cost share grant program to assist oceanfront property owners in maintaining their protective dunes. Eligible applicants include oceanfront single family homeowners, oceanfront residential condominiums, oceanfront cottage courts, and oceanfront motels and hotels. Up to $1,000 per lot is available to assist owners who would like to plant approved native vegetation on their properties. Applicants may apply for the cost share grants on a rolling basis annually. All plants must be planted according to the specifications detailed in the Town of Nags Head Dune Vegetation Recommended Planting Guidelines. These Guidelines detail recommendations for planting American beachgrass (cultivars Hatteras and Bogue), sea oats, and bitter panicum. Guidelines from NC Division of Coastal Management (DCM) and US Fish and Wildlife Service must also be followed during any planting or sand fencing operations.

The Town has also historically promoted dune stabilization and preservation efforts in conjunction with beach nourishment efforts. As part of the 2019 and 2022 beach nourishment projects, the Town contracted placement of sand fencing and planting of dune grasses. In 2019, sea oats and bitter panicum were planted across the entire 10-mile project area. In 2022, American beachgrass was planted after the beach nourishment was placed.

4.0 EVALUATION OF HISTORICAL BEACH PROFILE CHANGES

4.1 Purpose and Definitions

One of the most reliable ways to analyze beach behavior and develop estimates for potential future beach nourishment needs is to examine past beach evolution with recognition of prior nourishment projects. Historical shoreline positions and beach profile morphology (including the associated volume changes) provide a basis for understanding the physics and sediment processes that caused the beach evolution. This assessment is also necessary to calibrate and validate shoreline and profile change models of the region that are used to assess alternatives.

Historical surveyed beach profiles and volume changes have been documented consistently in Nags Head beach profile monitoring reports annually since 2011. In addition to these dates, additional complete surveys along Nags Head were completed in 2004, 2005, 2006, 2009 and 2010, as summarized in Table 3-2. These annual surveys (since 2011), including 114 profiles along the Nags Head shoreline, have been performed as part of the Town's Beach Monitoring Program. All the profiles cover both onshore (dune to wading depth) and offshore (wading depth to -30 feet NAVD) at the profiles shown in Figure 3-9. Each of the annual surveys since 2011 were evaluated and findings documented in annual monitoring reports. Those findings have been utilized to inform the beach nourishment master planning process.

The analytical/empirical and numerical modeling portions of the present study considered historical and present shoreline/volumetric change rates, pre-nourishment and post nourishment sand volumes, and forward-looking sand volumes required to achieve an equivalent level of protection (LoP) for property and infrastructure along developed reaches of the Town's shoreline.

4.2 Analytical/Empirical Assessments

4.2.1 Raw Historical Analysis

The first stage of the analytical/empirical analysis of historical data was to assess volumetric change over the 10 year period of 2012 to 2022. Beach profile volumes and changes were calculated based on the survey time periods and then annualized. The measured rates of change were then used along with a statistical model to estimate both anticipated background erosion and storm-induced erosion in the study area as described in Section 4.2.2.

A key aspect of the historical profile evolution assessment is to determine volumetric changes in the beach profile. Volumetric changes were assessed above the following elevations (NAVD88) (see Figure 4-1):

- +6 ft contour (represents the dune)
- +1.18 ft contour equivalent to MHW (dune and subaerial beach)

- -6 ft contour (dune, subaerial beach, and recreational beach)
- -14 ft contour (includes the offshore bar)
- -19 ft contour (apparent depth of closure)
- -30 ft contour (full extents of the possible active beach profile)

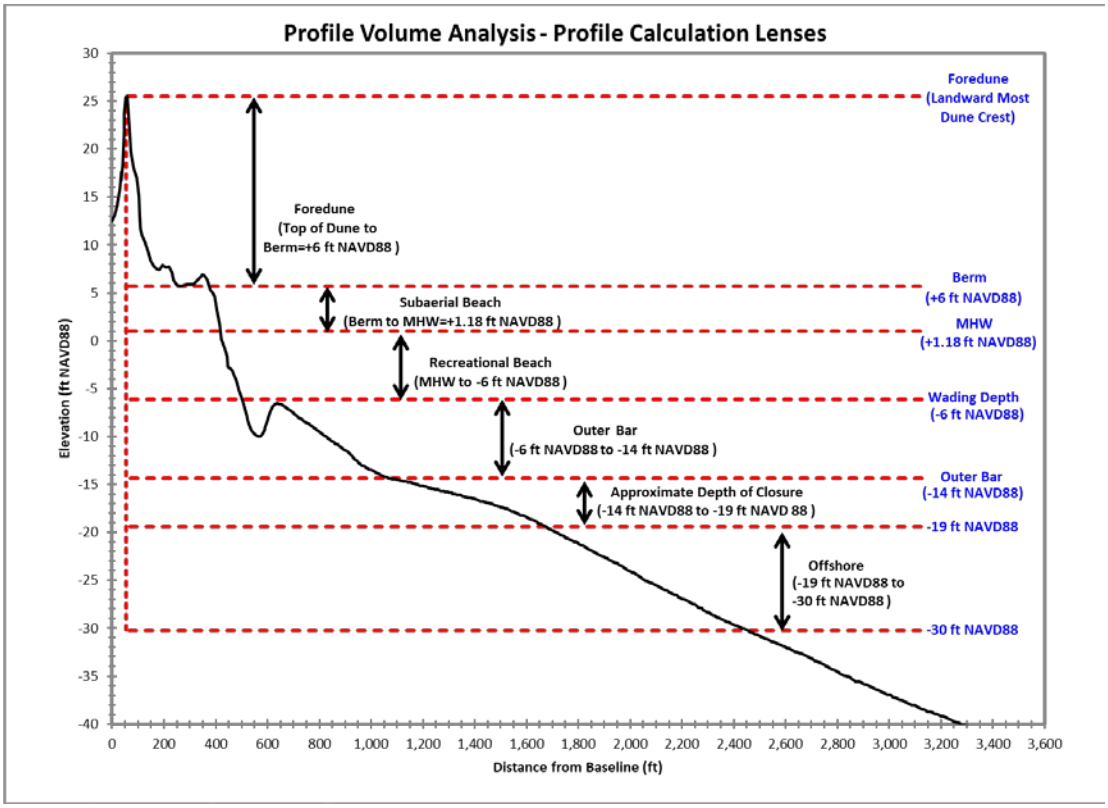


Figure 4-1: Volumetric Calculation Lenses for Historical Analysis

Past nourishment activities between surveys are also considered. The amounts of this nourishment were "netted out" by subtracting its volume, as determined by the historical profiles, to obtain estimates of historical background volume change rates.

Once the background erosion rates were determined per profile and annualized per year, the unit and cumulative volume change above each elevation could be plotted for comparisons of variability of change across the town oceanfront as well as to determine a preliminary estimate of annual need just to keep up with current conditions. Figure 4-2 presents the annualized unit volume change above -19 ft NAVD88 elevation from 2012-2022. As can be seen from Figure 4-2, the annualized volume changes can vary substantially between loss and accumulation both spatially and temporally, depending on longshore and cross-shore sediment transport within the study area and performance of previous projects.

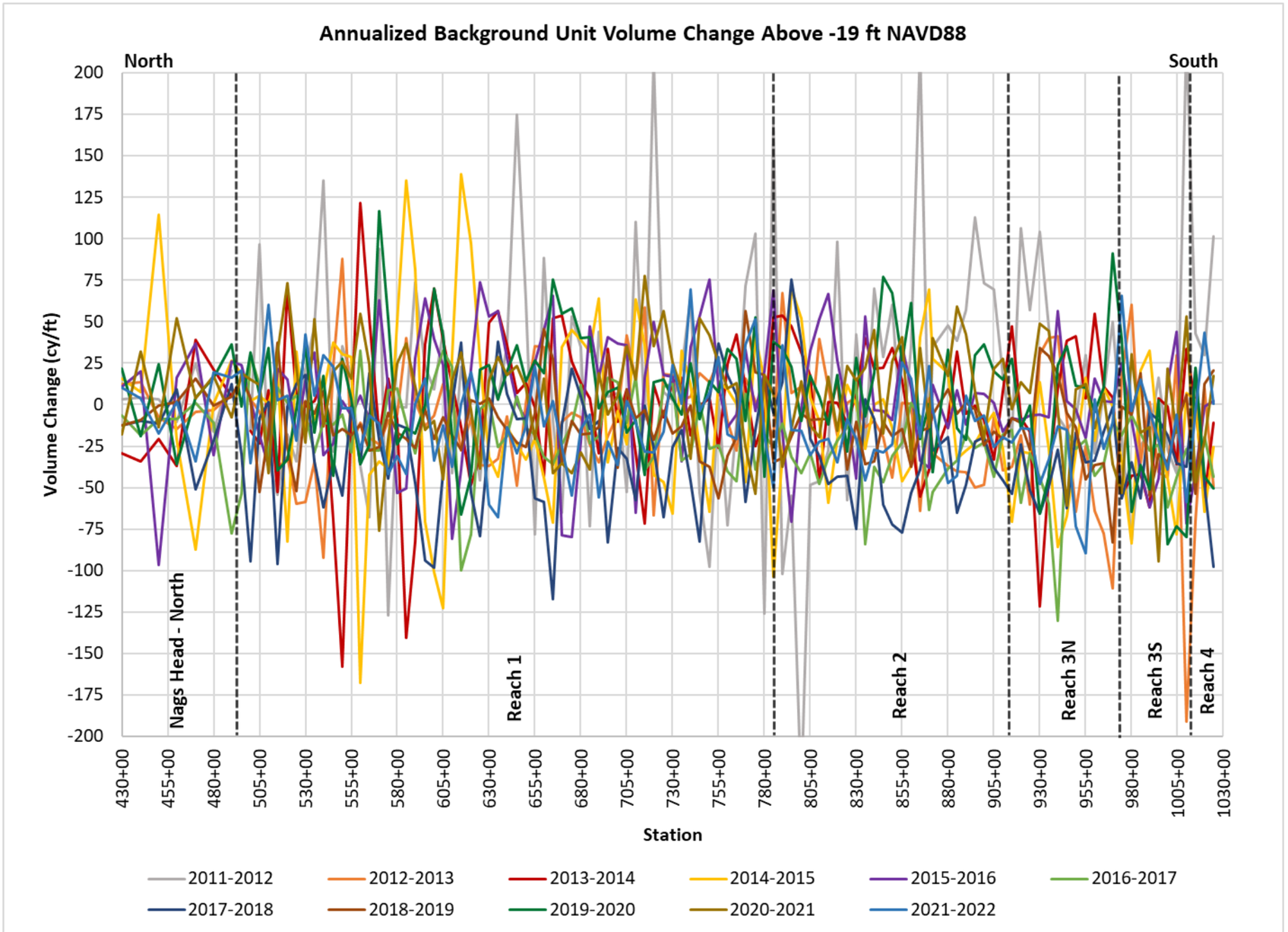


Figure 4-2: Annualized Background Unit Volume Change Above -19 ft NAVD88

Table 4-1 shows the average annualized volume change per reach calculated from 2012-2022 historical surveys. **Based on the results shown in this table, the peak volume losses occur above -19 ft NAVD88 and the overall average loss per year is approximately -450,469 cy/yr over all reaches.**

Table 4-1: Average Annual Volume Change by Reach, 2012-2022 (cy/year)

Reach	Above +6ft NAVD88	Above +1.2ft NAVD88	Above -6ft NAVD88	Above -14ft NAVD88	Above -19ft NAVD88
NH North	5,604	5,535	4,748	4,188	-4,928
Reach 1	33,608	-42,768	-127,682	-108,886	-124,566
Reach 2	13,851	-37,995	-99,523	-100,275	-106,537
Reach 3N	8,766	-23,331	-69,267	-88,176	-94,067
Reach 3S	-1,700	-24,626	-59,449	-70,847	-71,673
Reach 4	-2,597	-12,867	-30,782	-32,558	-48,699
Total	57,532	-136,052	-381,954	-396,554	-450,469

4.2.2 Statistical Analysis of Sediment Volume Needs

To enhance the accuracy of estimating future volume loss and determining the required sediment for beach nourishment over the next 50 years, a comprehensive analysis of historical volume losses was conducted. This analysis aimed to capture and statistically quantify the inherent variability present in the available data. By doing so, a more reliable basis for predicting and maintaining the desired level of protection can be established.

In order to understand the uncertainty and variability observed in the volume change data, Monte Carlo analysis was employed. Monte Carlo analysis is a powerful statistical modeling technique that utilizes random sampling to simulate a wide range of possible outcomes. By performing a Monte Carlo Simulation, we were able to generate a range of potential outcomes with associated probabilities for each result.

To facilitate the Monte Carlo Simulation analysis, the Crystal Ball software, developed by Oracle®, was utilized. This Microsoft Excel Add-in program provided the necessary tools and capabilities to perform the simulation effectively.

The analysis commenced by generating a model of possible outcomes. This involved substituting the historical annualized volume change observed at each transect with a normal distribution, characterized by its mean and standard deviation. Subsequently, the annual volume change was calculated repeatedly, with each calculation using a distinct set of random numbers within the range defined by the distribution curve. The simulation involved conducting 300,000 trials, with each iteration producing a new volume change estimate based on different random inputs. As the number of inputs increased, the accuracy of the outcomes improved, leading to a more refined analysis. The various outcomes generated by the simulation formed a distribution curve, with the most frequently occurring result positioned at the center.

These distribution curves can be utilized to derive non-exceedance probabilities, which describe the likelihood of volume change not surpassing a particular estimated value in any given year. For example, a 100% non-exceedance value indicates that, based on the available data, there is a 0% probability of erosion exceeding this threshold. Similarly, a 50% exceedance value implies that, in any given year, there is an equal chance of the annual erosion being greater or lesser than the indicated value. A 75% non-exceedance value signifies a 25% probability that a volume change will exceed the estimated value.

The individual results obtained for each profile were then aggregated across various sections of the beach to examine localized erosion/deposition patterns, as well as to determine overall volume needs on both an annual and long-term basis. The summary of the simulation outcomes for volume change over the designated beach management reaches, specifically established for the purposes of the master plan study, can be found in Table 4-2. Within the analyses, all reaches were erosional at the 50% probability level of non-exceedance. Results show an overall annual loss of approximately 451,218 cy (50%) and 771,341 cy (75%). Furthermore, Appendix B provides detailed results from the Monte Carlo simulation analysis for each study reach and analyzed elevation.

Table 4-2: Crystal Ball Analysis Results for Annual Background Volume Change

		Volume Change Above -19 ft, NAVD88 (cy/year)						
		North Reach	**Reach 1**	**Reach 2**	**Reach 3N**	**Reach 3S**	**Reach 4**	**Total**
Probability of Non-Exceedance	**5%**	+122,166	+129,596	+30,196	+15,350	+4,492	+26,583	+328,383
	10%	+92,382	+72,918	+975	-8,633	-12,635	+10,948	+155,955
	25%	+43,121	-21,294	-48,517	-48,633	-41,049	-15,302	-131,674
	50%	-11,834	-126,238	-103,228	-92,772	-72,653	-44,493	-451,218
	75%	-67,102	-231,117	-158,037	-137,131	-104,202	-73,752	-771,341
	90%	-145,722	-381,721	-236,973	-200,894	-149,497	-116,022	-1,230,829
	95%	-399,611	-815,692	-480,325	-388,371	-288,219	-252,286	-2,624,504

Since 2012, the Nags Head shoreline has experienced significant impacts from three major hurricanes: Hurricane Sandy (2012), Hurricane Matthew (2016), and Hurricane Dorian (2019). While the historical volume change data analyzed includes the effects of these past storms, it is essential to recognize the natural variability linked to the frequency and intensity of storm events. Furthermore, considering the potential intensification of storms due to climate change, it becomes even more critical to incorporate additional storm-induced volume losses in long-term planning.

To address this, a Monte Carlo Simulation was constructed using the Crystal Ball software, incorporating data on volumetric changes observed during Hurricanes Sandy, Matthew, and Dorian. Similar to the historical erosion analysis, this simulation involved generating a model of potential outcomes using the mean and standard deviation of volumetric losses recorded for each storm event. By conducting 250,000 trials, a distribution curve representing the range of possible outcomes per profile was developed. To assess the

overall impact on the beach management reaches, the volumetric changes determined for each profile were aggregated across the designated reaches. A summary of these simulation results can be found in Table 4-3.

The results of this analysis indicate the expected volume change for 50% non-exceedance is -1,128,394 cy and 75% non-exceedance is -1,349,667 cy per storm event. Based on the recent history of storm impacts to Nags Head, it is anticipated that one storm event could potentially impact the oceanfront every 3 years, which corresponds to 16 storms over the planning period of 50 years. Therefore, annualized volume change is -361,086 cy and -431,893 cy for 50% and 75% non-exceedance probabilities.

Table 4-3: Crystal Ball Results for Storm Induced Volumetric Change

		Volume Change Above -19 ft, NAVD88							
		North Reach	Reach 1	Reach 2	Reach 3N	Reach 3S	Reach 4	Total	Annualized Total*
		cy/storm							cy/year
Non-Exceedance	5%	-8,196	-241,750	-154,342	-87,881	-82,708	-11,986	-586,862	-187,796
	10%	-37,730	-277,882	-175,778	-104,486	-91,025	-19,822	-706,722	-226,151
	25%	-86,892	-337,751	-211,851	-132,148	-105,057	-32,842	-906,542	-290,093
	50%	-141,710	-404,342	-251,576	-162,870	-120,477	-47,419	-1,128,394	-361,086
	75%	-196,271	-470,706	-291,408	-193,382	-136,026	-61,874	-1,349,667	-431,893
	90%	-246,081	-530,811	-327,093	-221,070	-149,833	-75,036	-1,549,924	-495,976
	95%	-275,942	-566,003	-348,650	-237,488	-158,160	-82,900	-1,669,143	-534,126

** 16 storms in 50 years*

In determining the long-term sand requirements, both the estimations for annual background volume change and additional storm-induced volume losses were taken into account. The approach involved combining the 50% non-exceedance probability results for annual background erosion, which represent the historical trends without variability, with the variability introduced by additional storms. To maintain a conservative approach, the 75% non-exceedance probability was selected to represent the potential range of variability.

By combining the annual background erosion and the additional storm-induced volume losses, the annual material need is estimated as 883,111 cy. This estimation approximately corresponds to an 80% non-exceedance probability when considering only the annual background analysis (as indicated in Table 4-2). This probability suggests that, based on the historical volume change data collected between 2012 and 2022, there is a 20% possibility of exceeding the estimated material volume.

Over the 50-year planning period, the cumulative long-term sand requirement resulting from both background erosion and additional storms is determined to be 44,155,550 cy, as presented in Table 4-4. It is important to emphasize that this estimation intentionally adopts

a conservative approach to sand need determination, ensuring a cautious assessment of the overall sand requirements.

Table 4-4: Nags Head Long-Term Nourishment Need from Background Erosion and Additional Storms

Category	Volume Above -19 ft, NAVD88 (cy)
Annual Background Volume Change (50% non-exceedance probability)	-451,218
Annualized* Storm Volume Change (75% non-exceedance probability)	-431,893
Annual Total Volume Change	-883,111
50-yr Material Need	44,155,550

**16 storms in 50-years*

5.0 BEACH NOURISHMENT LEVEL OF PROTECTION ANALYSIS AND NOURISHMENT TRIGGER ASSESSMENT

5.1 Introduction

The Crystal Ball analysis outlined in Section 4.2.2 provides an estimate of the long-term sand volume needs to maintain the beaches based on historical background and storm erosion rates (approximately 1 Mcy/yr and 48.5 Mcy over a 50-year planning timeframe). The establishment of a long-term beach nourishment master plan also requires establishment of a preferred beach and dune profile design to achieve adequate protection for habitable structures and infrastructure, along with appropriate trigger conditions for renourishment actions. The preferred profile design, nourishment templates and renourishment triggers are generally based on establishing and maintaining a certain LoP from storm surge and waves along the Town's oceanfront.

A key element of the project purpose is to provide an equivalent LoP to upland structures across the Nags Head oceanfront – **not equal sand, but equal protection**. This LoP determination is also critical in confirming and adjusting the Town's nourishment triggers which are used both for Town nourishment project planning and for coordination with agencies such as FEMA. The current nourishment trigger is currently set at the condition where 50 percent of the material placed during the previous beach nourishment project has been lost across the whole island from the landward top of dune out to -19 ft NAVD88 (CSE, 2011). During the present master planning process, it is proposed to refine that condition to establish specific triggers for specific reaches and sub-reaches of the Town's shoreline, realizing that each reach and sub-reach has different erosion rates and different responses to storm conditions.

5.1.1 Representative Profiles and Reaches

The Nags Head beach profile monitoring program consists of 114 beach profiles along 59,500 ft of shoreline. The project and study area are divided into six reaches based on the shorefront characteristics. To evaluate the LoP for each of the shoreline reaches, 14 representative of existing conditions beach profile morphology in each reach and sub-reach were selected.

Table 5-1 presents the representative profiles that were chosen based on the May 2018 profile survey data. Since Nags Head received nourishment in May of 2019, the May 2018 data, considered to demonstrate a more natural state of the beach, was used to classify representative profiles. Representative profiles were selected based on physical beach characteristics such as berm elevation, dune height, volume of material above dune toe and historical erosion rates. and consideration of providing equivalent representation to all segments of the Town's shoreline. Detailed descriptions for each sub-reach, as well as the associated plots of the May 2018 profile surveys are contained in Appendix C. Figure 5-1 shows the profile locations within each reach.

Table 5-1: Reach Description and Representative Profiles

Reach	Nags Head Stations	Length (feet)	Representative Profile
Nags Head – North	430+00 – 490+00	6,250	460+00
Reach 1	495+00 – 520+00 & 540+00 - 550+00	4,500	520+00
	525+00 – 535+00 & 555+00 – 590+00	5,500	535+00
	595+00 – 660+00	7,000	625+00
	665+00 – 715+00	5,500	715+00
	720+00 – 775+00	6,000	735+00
	780+00 – 800+00	2,500	785+00
Reach 2	805+00 – 855+00	5,500	855+00
	860+00 – 880+00	2,500	865+00
	885+00 – 905+00	2,500	895+00
	910+00 – 930+00	2,500	920+00
Reach 3 - North	935+00 – 975+00	4,500	935+00
Reach 3 - South	980+00 – 995+00	2,000	980+00
	1000+00 – 1025+00	2,750	1020+00
Reach 4			

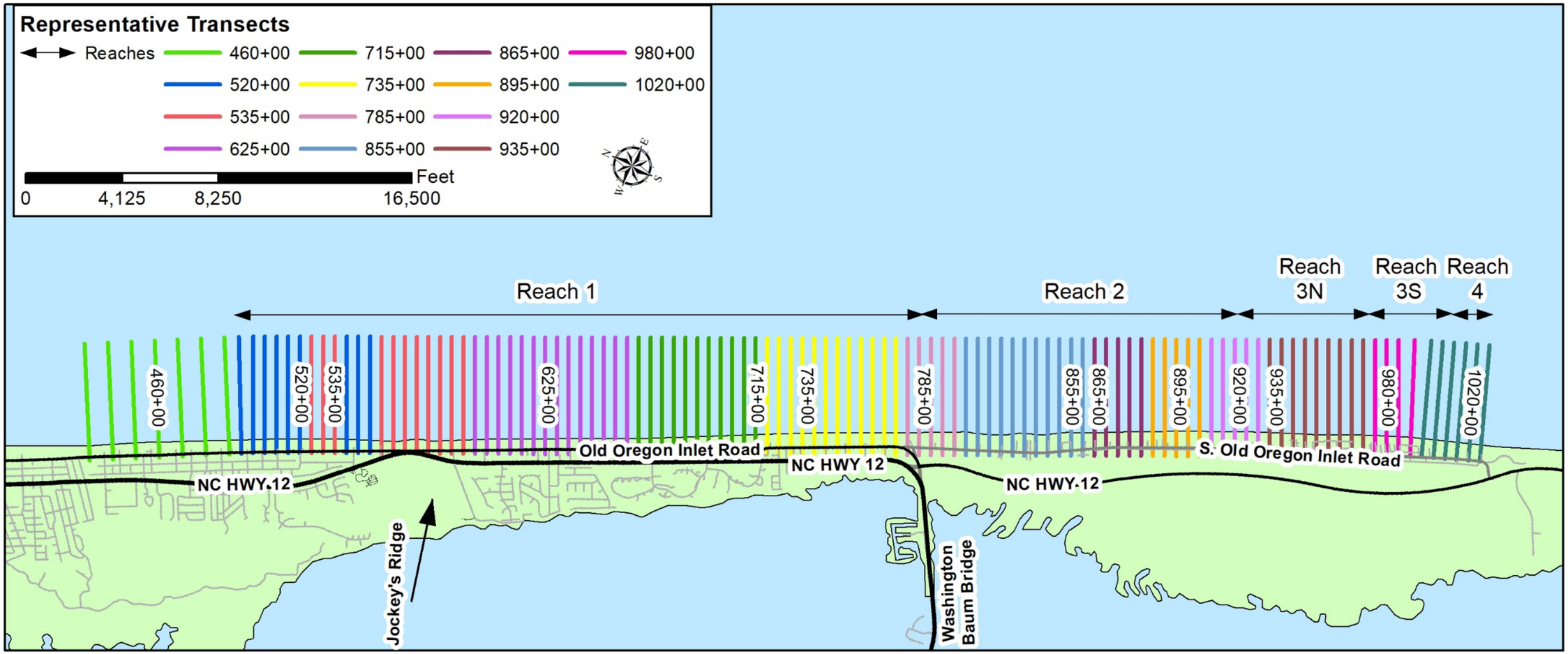


Figure 5-1: Location of Representative Transects

5.2 LoP Definitions

The LoP afforded is determined as the profile's ability to resist breaching and severe overtopping during extreme storm events of a certain annual probability of exceedance (stated as return period, the inverse of this probability) to avoid damage to upland structures and infrastructure.

The LoP is indicated as a set of qualitative categories indicating the degree to which the first row of structures would be impacted by a specific design storm. The LoP categories used in this study are illustrated in **Figure 5-2** and their definitions are given below.

- No Impact – Neither the eroded profile, water level, nor the maximum wave crest elevation indicate that sediment movement or moving water will occur at the first row of structures.

- Minor Overtopping – Eroded profile, water level, and maximum wave crest elevation indicate that the dune would be overtopped, but overtopping at first row of structures appears to be minimal. This category of impact is not considered, in the present study, as a severe impact for the LoP analysis.

- Major Overtopping – Eroded profile, water level, and maximum wave crest elevation, combined with position and elevation of first row of structures, indicate that the lower levels of structures are likely to be flooded or impacted by moving water. The threshold for this condition was defined as equal to or more than 0.65 ft^3/hr based on the values from EurOtop manual (EurOtop, 2018). This condition is considered as a severe impact for the present LoP analysis.

- Threatened – Profile eroded to very near the seaward limits of the first row of structures, such that the stability of the foundations may be threatened. This is considered a severe impact for the present LoP analysis.

- Undermined – Profile eroded to the position of (or landward of) the first row of structures, thus undermining their foundations. This is considered a severe impact for the present LoP analysis.

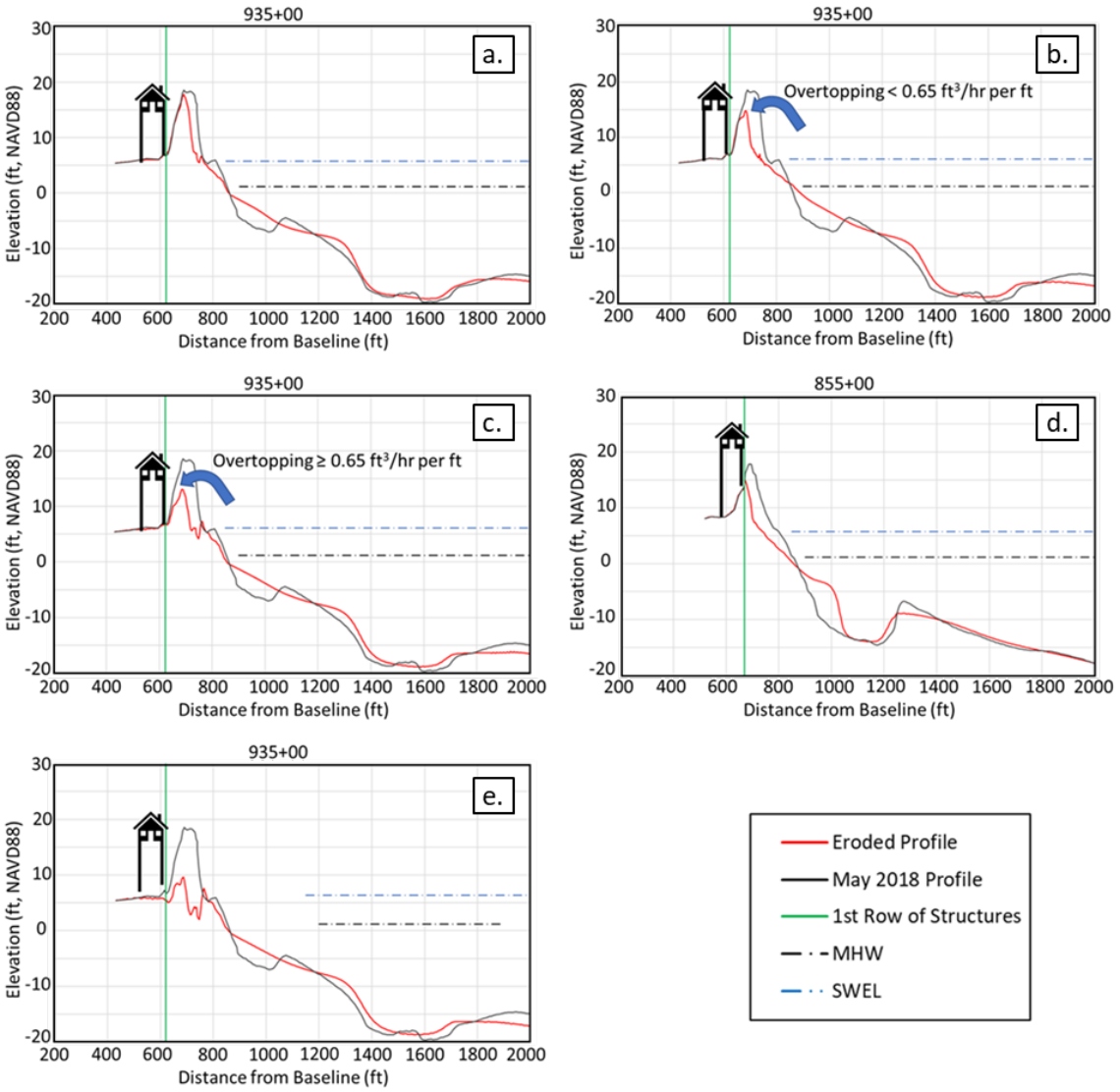


Figure 5-2: LoP Categories: (a) No Impact, (b) Minor Overtopping, (c) Major Overtopping, (d) Threatened, (e) Undermined

As described in Appendix C, the CSHORE design storm surge and wave conditions were developed synthetically based on analysis of historical hurricanes and tropical storms, combined with statistical estimates of extreme water levels (based on NOAA Duck tide gauge data) and offshore extreme wave conditions (based on FRF wave buoy data) at various return periods. A typical pattern or "shape" of storm surge and waves was created based on Hurricane Isabel's and Hurricane Dorian's patterns and an empirical relationship between peak storm wave intensity and duration of the rising and falling legs. **Hurricane Dorian and Hurricane Isabel were estimated to have been approximately 5-year and 50-year return period wave events at this location, respectively.**

Peak wave periods occurring during storms were found to be loosely correlated with storm peak significant wave height. A relationship between peak wave period (T_p) and significant wave height (H_s) was determined and applied to generate wave periods for each design storm during storms. Peak values of waves and water levels input to CSHORE are given in Table 5-2.

Table 5-2: Boundary Wave Height, Wave Period, and Total Water Level Conditions for CSHORE at Peak of Design Storm Simulations

Return Period	H_s (ft)	T_P (sec)	Water Level ft, NAVD88
2-year	14.7	10.1	4.88
5-year	16.1	10.4	5.18
10-year	20.1	11.8	5.41
25-year	23.2	12.4	5.73
50-year	26.2	13.8	6.06
100-year	29.9	14.1	6.39

5.3 Numerical Modeling: CSHORE Storm Profile Response

In addition to historical volume change, determination of how the beach would respond to various magnitude storm events is a significant factor in design. This response is evaluated through numerical modeling. Beach profiles respond most significantly to elevated water levels and waves associated with storms. Storm-induced beach profile evolution simulations were conducted for representative survey profiles in each reach / sub-reach using the CSHORE numerical model. The model was calibrated to observed beach profile morphology from the 2012 pre- and post-Hurricane Sandy survey data and verified using the 2016 pre- and post-Hurricane Matthew survey data.

The primary purpose of the beach profile evolution numerical modeling is to assess the LoP from storm surge and waves afforded by the beach and dune system – under existing conditions and with different project alternatives which are covered in later sections of this report.

5.3.1 CSHORE Model Description

CSHORE is a one-dimensional (1D) profile evolution model developed by University of Delaware, Center for Applied Coastal Research and USACE to predict waves, currents, and bed-evolution in the nearshore. The CSHORE domain assumes a shore-perpendicular (cross-shore) profile with uniform grid spacing, with the origin offshore ($x = 0$) and positively increasing with distance onshore. A foundational assumption of CSHORE is alongshore uniformity, although obliquely incident waves and longshore currents are included. The governing equations are a combination of the time-averaged, depth-

integrated continuity, cross-shore and alongshore momentum, wave action, and roller energy equations. CSHORE also incorporates empirical formulas to account for irregular wave runup, overtopping, and seepage, as well as a probabilistic model of the intermittently wet/dry zone to predict wave runup and overwash. The model is described in detail in Johnson et al. (2012) and Kobayashi (2016).

The CSHORE model is based on cross-shore sediment transport and morphology processes, and it does not include the effects of longshore transport gradients. While it is recommended for FEMA assessments of foreshore and dune profile evolution (FEMA, 2018), CSHORE is not intended for simulating post-storm recovery of the beach profile, as would naturally occur in many coastal systems including Nags Head, or for long-term beach profile evolution. It is also not intended for direct support of long-term shoreline change studies, because long-term shoreline change is driven in part by longshore transport gradients and post-storm profile recovery. However, the use of CSHORE is appropriate to assess the ability of the beach and dune along Nags Head to protect landward properties and infrastructure from direct wave impact and erosion during storm waves and surges.

5.3.2 CSHORE calibration

CSHORE simulations are driven by the combined effects of storm waves acting on elevated storm water levels. At each calculation point along the profile, the model transforms the wave heights, periods and angles given as input using the linear wave and current theory. Wave runup is also computed. The model computes additional elevation of input water levels due to wave action (wave setup), and these adjusted wave and water level values are used in the profile change calculations.

Model calibration and validation allows for greater confidence in the model-predicted erosion results and engineering conclusions based on those results. Calibration was accomplished by iteratively adjusting several CSHORE parameters describing sediment transport processes. Modeled profile response was compared to the observed post-storm profiles at each representative profile, and CSHORE model parameters were adjusted to produce more accurate profile responses.

Initializing and running a CSHORE model simulation requires an initial bathymetry in the computational domain, as well as wave and water level boundary condition data to force the model. The main inputs to the CSHORE model include:

- Profile data – initial bed elevation at each node in the model domain;
- Wave and water level conditions – Wave height, wave period, wave direction and mean water level at the model boundary for each time step; and
- Sediment transport parameters – physical characteristics of the sediment comprising the beach and the empirical sediment transport parameters that are used to characterize cross-shore sediment transport and calibrate the model.

These inputs are discussed further in the following sections. NAVD88 was used as the common vertical datum for all of the CSHORE model inputs and outputs.

5.3.3 Profile Data

The CSHORE model was calibrated to observed beach profile morphology due to Hurricane Sandy, which impacted Nags Head at the end of October 2012. The pre-storm conditions that were used as input for the CSHORE model were represented by annual survey data that was collected in June 2012 prior to Hurricane Sandy. Post-storm survey data was collected within one month of the storm.

Following calibration of the CSHORE model, the calibrated model parameters were used to simulate profile changes due to a completely independent storm event, as validation that the model would perform acceptably for other storms. The model was validated to observed beach profile morphology due to Hurricane Matthew, which impacted Nags Head at the beginning of October 2016. The pre-storm conditions used in CSHORE were represented by annual survey data that was collected in June 2016 prior to Hurricane Matthew. Post-storm survey data was collected within two weeks of the storm in October 2016.

5.3.4 Water Levels and Wave Conditions

The wave and water level time series input to the CSHORE simulations for the calibration (Hurricane Sandy) and validation (Hurricane Matthew) storms are shown in Figure 5-3 and Figure 5-4.

Hurricane Sandy wave height, period, and direction were collected from the Duck, NC, FRF directional wave gauge 44056 (in 56 ft water depth) between October 25, 2012 and November 1, 2012. During this time, the peak significant wave height recorded was 21 ft with a peak wave period of 18 seconds. This wave height was determined to be equivalent to the 12-year return period storm wave condition (Appendix C).

Water level data was collected from the nearby FRF tide station 8651370. However, during the storm, the gauge malfunctioned and stopped recording after the peak storm surge. Before the FRF tide gauge malfunctioned, it measured significant storm surge of 4.5 ft NAVD88. This peak water level was calculated to be equivalent to the 10-year return period storm.

To generate the rest of the water level input for the CSHORE simulations the storm surges rising and falling legs were assumed to be similar and the water level data before the first peak (hour 78) was mirrored and affixed to the final recorded water level. This assumed trend was also observed in the closest tide station, Oregon Inlet Marina.

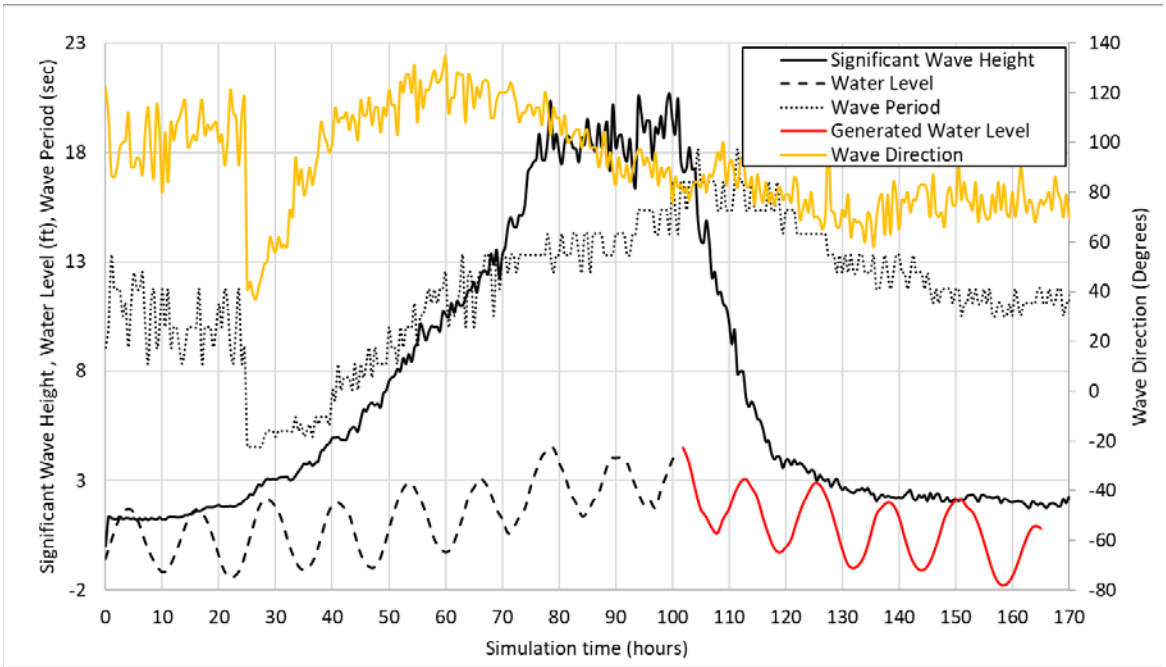


Figure 5-3: CSHORE Input Waves and Water Level, Hurricane Sandy (2012)

Hurricane Matthew impacted Nags Head at the beginning of October 2016. Wave height, period, and direction for this storm were collected from the FRF directional wave gauge 44056 between October 25, 2016 and November 1, 2016. During this time, the peak significant wave height recorded was 16.1 ft with a peak wave period of 13 seconds. This wave height was determined to be equivalent to the 5-year return period storm. Water level data was collected from the FRF tide station 8651370. The surge associated with Matthew was 3.2 ft (NAVD88) at FRF. The peak water elevation equates to the 3.1-year return period storm at Nags Head.

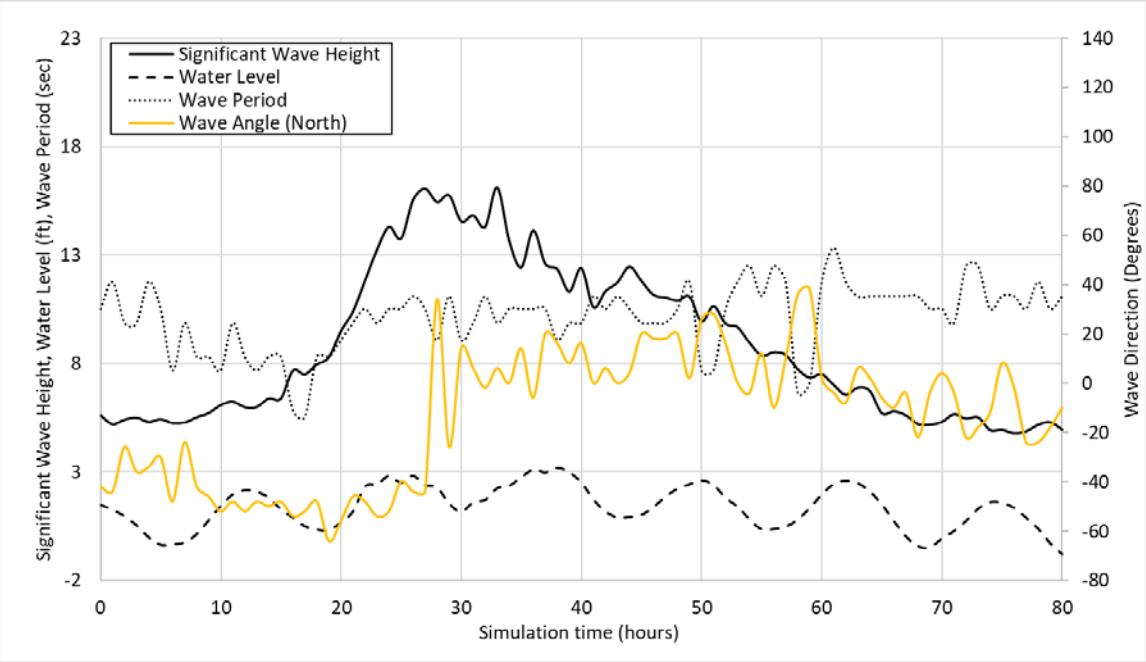


Figure 5-4: CSHORE Input Waves and Water Level, Hurricane Matthew (2016)

5.3.5 Sediment Transport Parameters

The CSHORE model input includes eight parameters that influence the rate of sediment transport. The median sediment diameter (D_{50}), the sediment fall velocity (w_f), the sediment maximum slope (tan Φ), and the specific gravity (s) parameters describe the physical characteristics of the beach and thus was not adjusted for the model calibration purposes.

Surface sediment sampling and laboratory gradation testing (CSE, 2018) indicated that a median grain size of D_{50} = 0.30 mm is representative of the sand comprising the beach and dune at the project site. Using this historical measured D_{50} for the study area, the sediment fall velocity is then calculated as 0.045 (m/s) based on Soulsby (1997) optimization. The default values for the Atlantic Ocean were used for the rest of the physical sediment characteristics (USACE, 2019).

CSHORE is primarily calibrated by adjusting the remaining four sediment transport coefficients: bedload parameter (b), suspended load parameter (a), and wave breaking (e_b) and bottom friction (e_f) suspension efficiency parameters.

5.3.6 Historical Storm Model Simulation Results

CSHORE parameters were calibrated to replicate, to the extent possible, the impacts of Hurricane Sandy at 14 representative profiles. The calibrated model results were then validated by simulating the impacts of Hurricane Matthew. Charts of the full set of CSHORE results for both storms are provided in Appendix C.

Figure 5-5, Figure 5-6, and Figure 5-7 show typical CSHORE calibration model results for Hurricane Sandy at Nags Head profiles 520+00, 715+00, and 1020+00, respectively. These profiles are representative of the CSHORE calibration set. The plots show the pre and post storm surveyed profiles and the modeled profile that was created at the end of the CSHORE simulation. CSHORE generally erodes the upper beach (above MHW) in a manner similar to the measured post-storm profiles, and it predicts the landward limit of erosion well at most profiles. However, CSHORE simulations are unable to capture the bar movements. The results show the trough landward of the nearshore bar being filled in, but the measured profiles do not indicate significant filling. CSHORE also erodes the seaward face of the bar, whereas the measured profiles show the bar remaining intact and moving seaward.

Part of the difference between the CSHORE simulations and post storm surveys might be due to the dynamic nature of the intertidal zone and sand bars compared to the subaerial beach. Since post storm surveys are not performed immediately after the storms, the surveys also include the recovery at these locations that occurs between the storm and post storm survey.

CSHORE is used in the present study primarily to estimate the degree of beach and dune erosion (including overtopping or breaching of dunes), with associated risk to upland structures landward of the dune, for determining the LoP afforded by existing and proposed beach profile scenarios. The CSHORE model calibration therefore focused on achieving agreement with measured profiles over the upper beach face, beach berm, and dune areas, and the calibration is generally successful in that regard. See Table 5-3 for a complete list of the calibration parameters used in this analysis.

Table 5-3: CSHORE Calibration Parameters

Variable Name	Default Value	Calibrated Value	
		430+00 – 975+00	975+00 - 1025+00
Median sediment diameter (D_{50})	0.3	0.30	
Sediment fall velocity (w_f),	-	0.045	
Sediment maximum slope (tan Φ),	0.63	0.63	
Specific gravity (s)	2.65	2.65	
Bedload parameter (b)	0.001	0.006	0.004
Suspended load parameter (a)	0.5	0.05	0.05
Wave breaking suspension efficiency (e_b)	0.005	0.02	0.01
Bottom friction suspension efficiency (e_f)	0.015	0.02	0.01

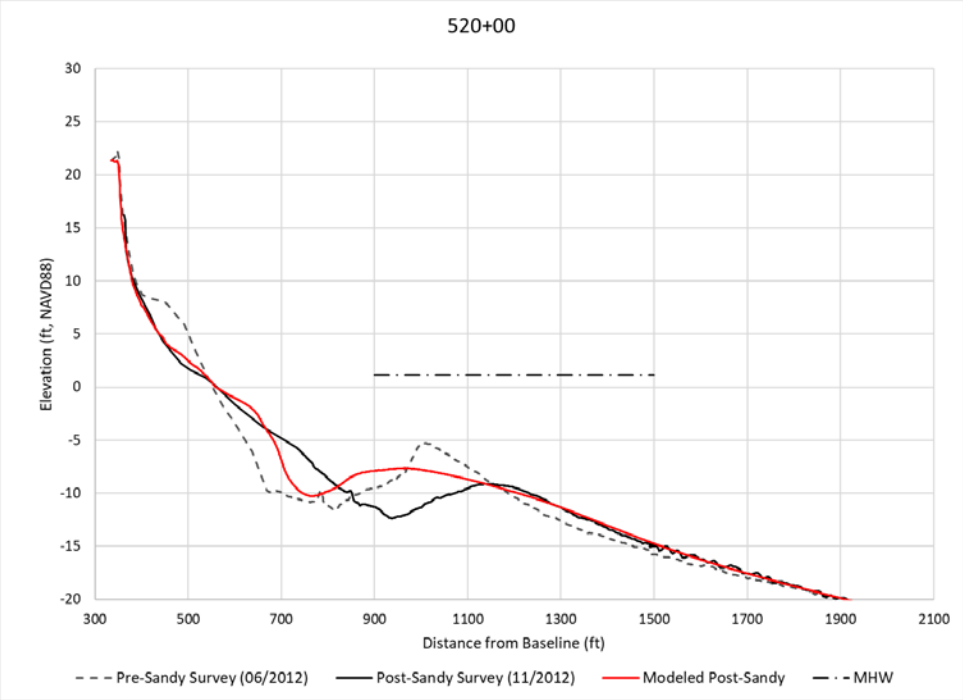


Figure 5-5: CSHORE Calibration: Hurricane Sandy at 520+00 (Bainbridge Street)

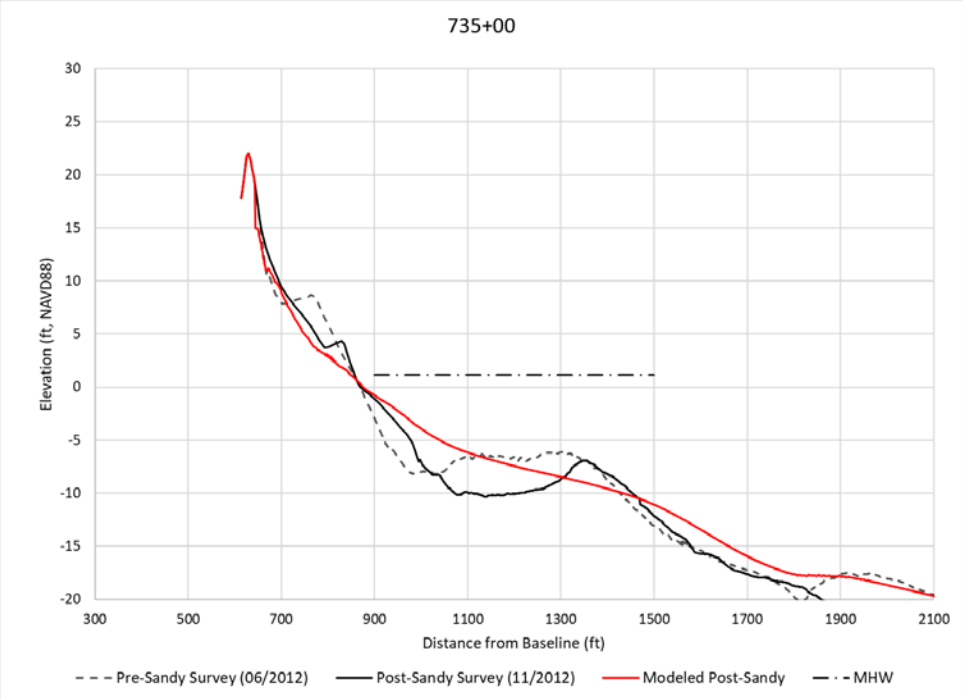


Figure 5-6: CSHORE Calibration: Hurricane Sandy at 735+00 (E. Flicker Street)

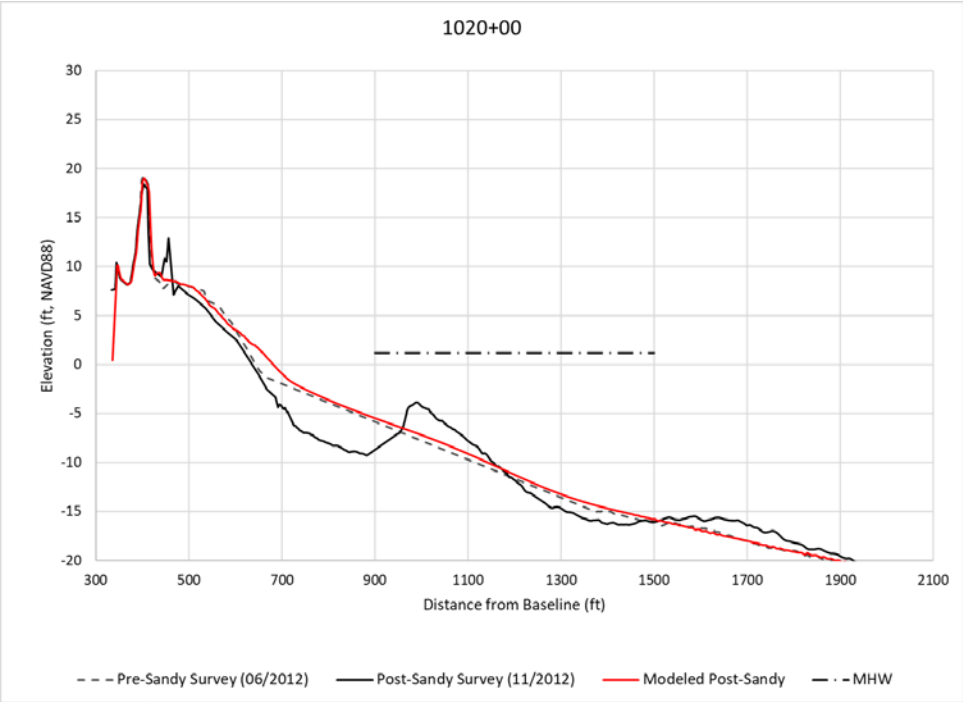


Figure 5-7: CSHORE Calibration: Hurricane Sandy at 1020+00 (E. McCall Court)

The calibrated CSHORE model parameters were used in simulations of Hurricane Matthew (October 2016), with representative results shown in Figure 5-8, Figure 5-9, and Figure 5-10. The Hurricane Matthew CSHORE simulations generally showed greater erosion of the intertidal and upper beach than the survey data indicate. In the validation dataset CSHORE was not able to reproduce the accretion on the upper beach between 0 ft and +7 ft NAVD88 that was observed in some profiles (Figure 5-8). Similar to the calibration simulations, the validation dataset also was unable to reproduce the bar patterns seen in the post-storm survey data.

The agreement between CSHORE and post-storm survey data, in terms of predicting upper beach and dune erosion and landward limits of erosion, is sufficient for the purposes of estimating levels of protection for this study. Section 5.4 describes the utilization of CSHORE to support LoP determinations.

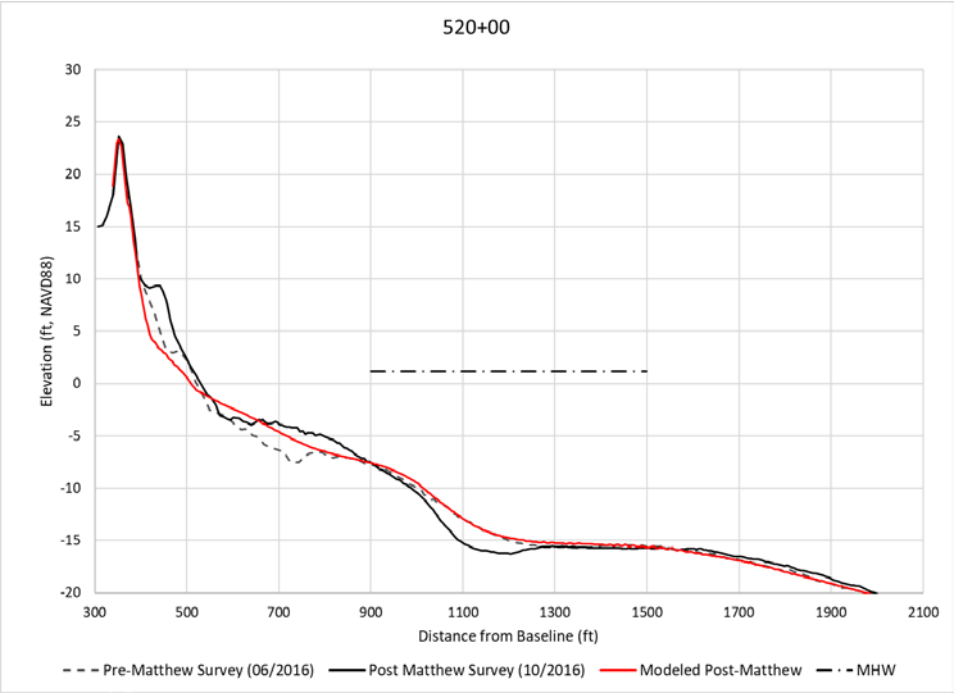


Figure 5-8: CSHORE Validation: Hurricane Matthew at 520+00 (Bainbridge Street)

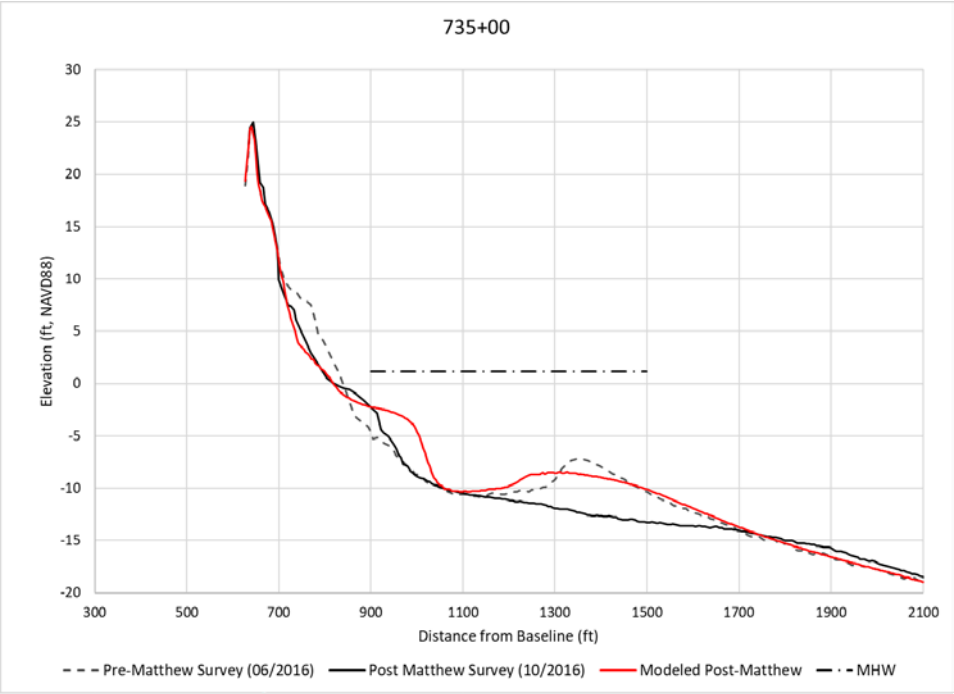


Figure 5-9: CSHORE Validation: Hurricane Matthew at 735+00 (E. Flicker Street)

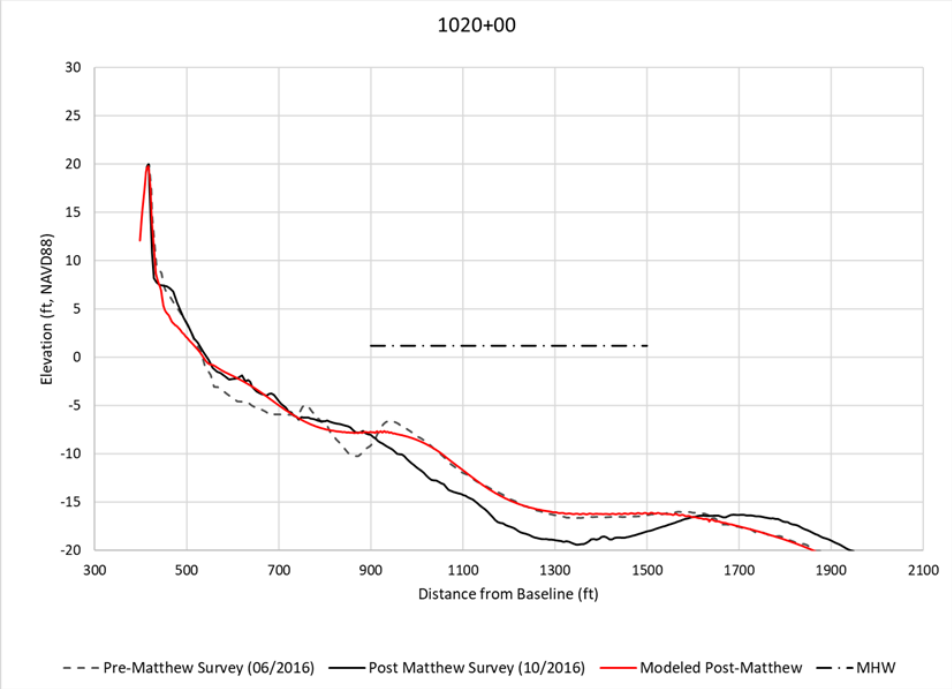


Figure 5-10: CSHORE Validation: Hurricane Matthew at 1020+00 (E. McCall Court)

5.4 LoP with Pre-Nourished Conditions (May 2018) Profiles

The LOP offered by the pre-nourishment conditions are of interest since they reflect the most vulnerable conditions that Town experienced during the most recent nourishment cycle. The May 2018 annual monitoring profiles which reflect the conditions before the 2019 Beach Nourishment Project were selected as representative of the pre-nourished conditions. The "first row of structures" positions utilized in the LoP evaluations were digitized from 2018 aerial photography. Structures positions used in the LoP analysis were an average of the positions adjacent to each representative profile, based on a line connecting the seaward edges of the structures along the Town's shoreline.

The post-storm beach and dune profiles resulting from the CSHORE simulations were inspected and coastal engineering judgment was applied to conclude the LoP afforded by the pre-nourishment profiles. The evaluation involved assessing the landward limit of dune erosion and potential for dune flooding / overtopping – indicated by the CSHORE simulations of the synthetic design storms – relative to the position of the most seaward line of development (most seaward or "first row" of upland structures) at each of the 14 representative profiles along Nags Head (Table 5-1).

Table 5-4 summarizes the LoP resulting at each of the 14 representative profiles for the 25-year, 50-year, and 100-year return period (4%, 2%, and 1% annual chance, respectively) synthetic design storms. Additionally, Appendix C presents LoP conditions of post-nourishment (August 2019) profiles.

Table 5-4: LoP for Pre-Nourished Conditions CSHORE Profiles

Reach	Rep. Profile	Initial Volume (cy/ft)	25-year RP LoP	50-year RP LoP	100-year RP LoP
Nags Head – North	460+00	578	No Impact	No Impact	No Impact
Reach 1	520+00	509	No Impact	Minor Overtopping	Threatened
	535+00	472	No Impact	Threatened	Undermined
	625+00	506	No Impact	Major Overtopping	Undermined
	715+00	501	No Impact	Minor Overtopping	Threatened
	735+00	490	No Impact	Major Overtopping	Undermined
	785+00	610 446	No Impact	Threatened	Undermined
Reach 2	855+00	499	Threatened	Undermined	Undermined
	865+00	485	Minor Overtopping	Undermined	Undermined
	895+00	504	Threatened	Undermined	Undermined
	920+00	464 407	No Impact	Minor Overtopping	Undermined
Reach 3 - North	935+00	373	No Impact	Major Overtopping	Undermined
Reach 3 - South	980+00	509	Undermined	Undermined	Undermined
	1020+00	472	Major Overtopping	Threatened	Undermined
Reach 4					

The CSHORE simulations indicated that for the May 2018 pre-nourishment conditions, the beach and dune system provided a LoP equivalent to No Impact or Minor Overtopping at the first row of structures for 10 of the representative profiles in the 25-year return period design storm CSHORE simulations. All the profiles located in Nags Head North, Reach 1, and Reach 3 North provided adequate protection against the 25-year return period event while severe impacts were observed at the profiles at Reaches 2, 3 South, and 4.

At the 50-year return period design storm level, severe impacts to the first row of structures were indicated at 10 of the representative profiles. Finally, severe impacts were indicated at all representative profiles except within Nags Head North at the 100-year return period design storm level. Figure 5-11 through Figure 5-19 show sample May 2018 beach profiles, the seaward limits of the first row of structures, and CSHORE results for Nags Head Stations 520+00 (Reach 1), 865+00 (Reach 2) and 980+00 (Reach 3 South) for the three

design storm levels in Table 5-2. Appendix C contains plots of the CSHORE results at all 14 profiles.

During the simulations, it was observed that several transects exhibited an instability within the profile, typically occurring once the dune had been undermined. Figure 5-16 provides an illustrative example of such instability observed at transect 865. The instability manifests as fluctuations within the profile and is attributed to inland sediment transport rates, as calculated by CSHORE, exceeding those observed on the beach face. Since the instability occurs subsequent to dune undermining and the assignment of the LoP to the profile, the impact of this instability on the analysis was considered negligible.



Figure 5-11: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 520+00 (Bainbridge Street)

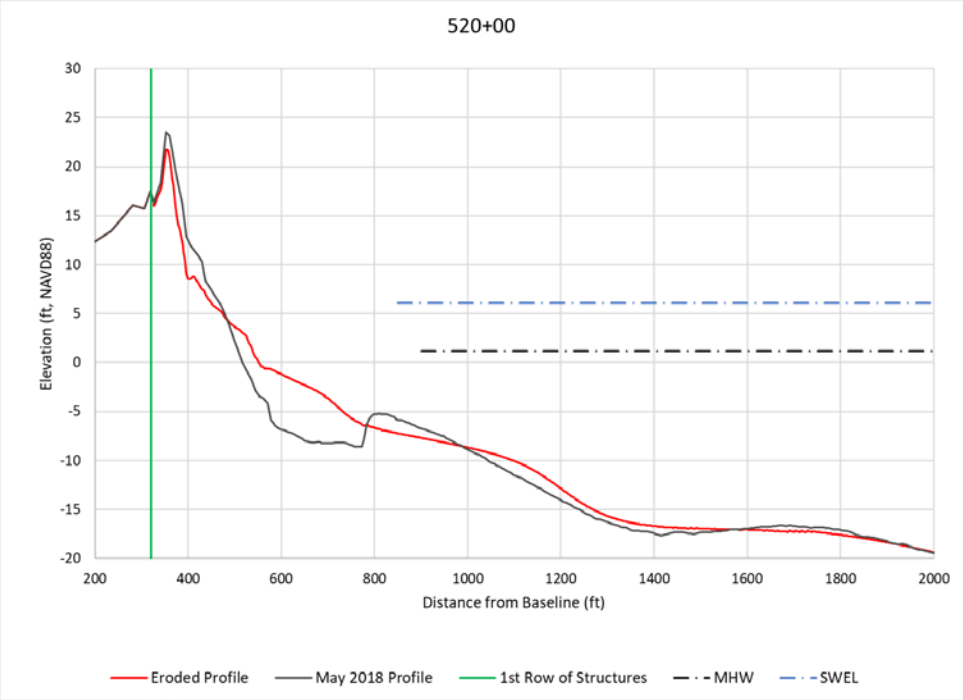


Figure 5-12: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 520+00 (Bainbridge Street)

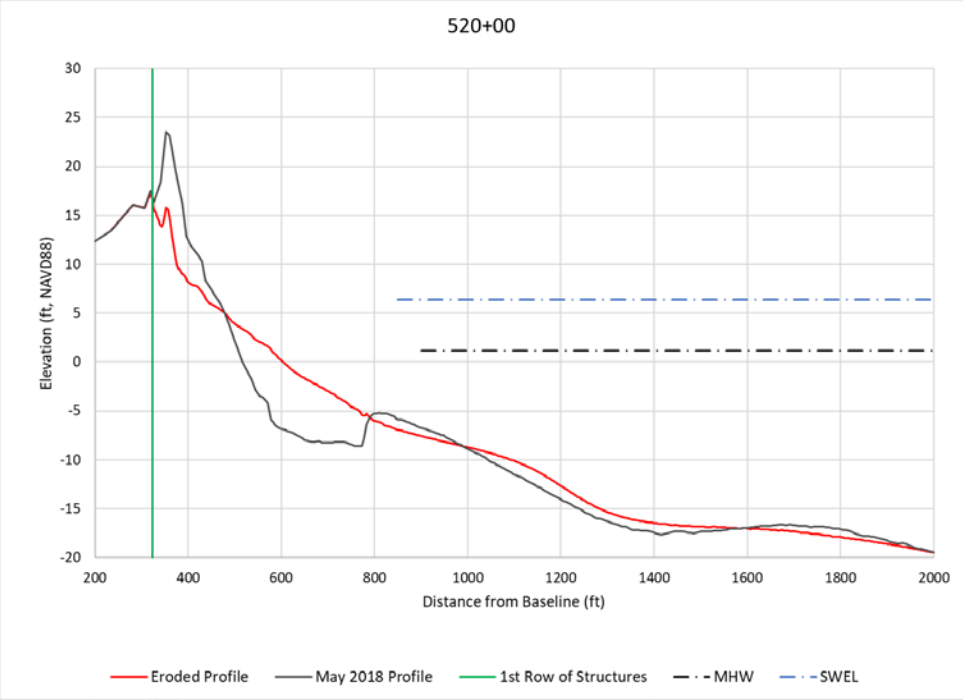


Figure 5-13: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 520+00 (Bainbridge Street)

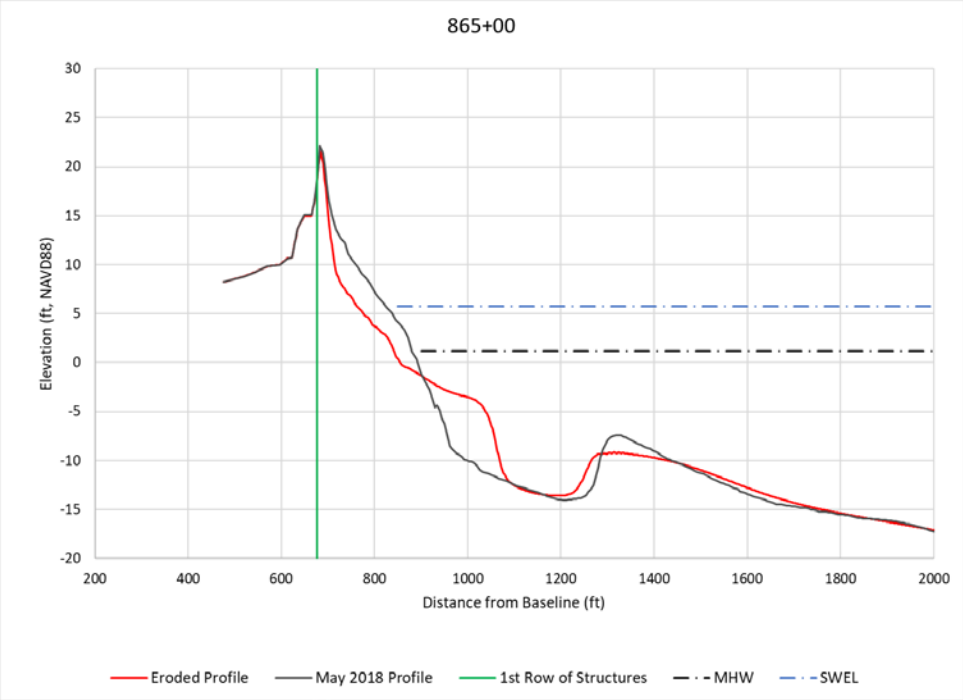


Figure 5-14: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 865+00 (E Ida Street)

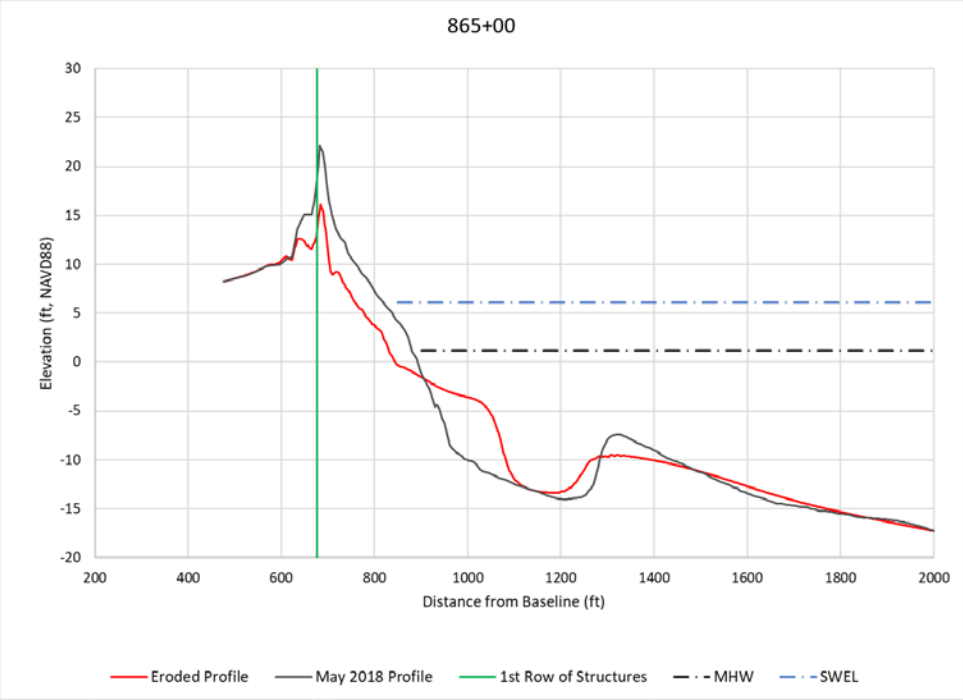


Figure 5-15: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 865+00 (E Ida Street)

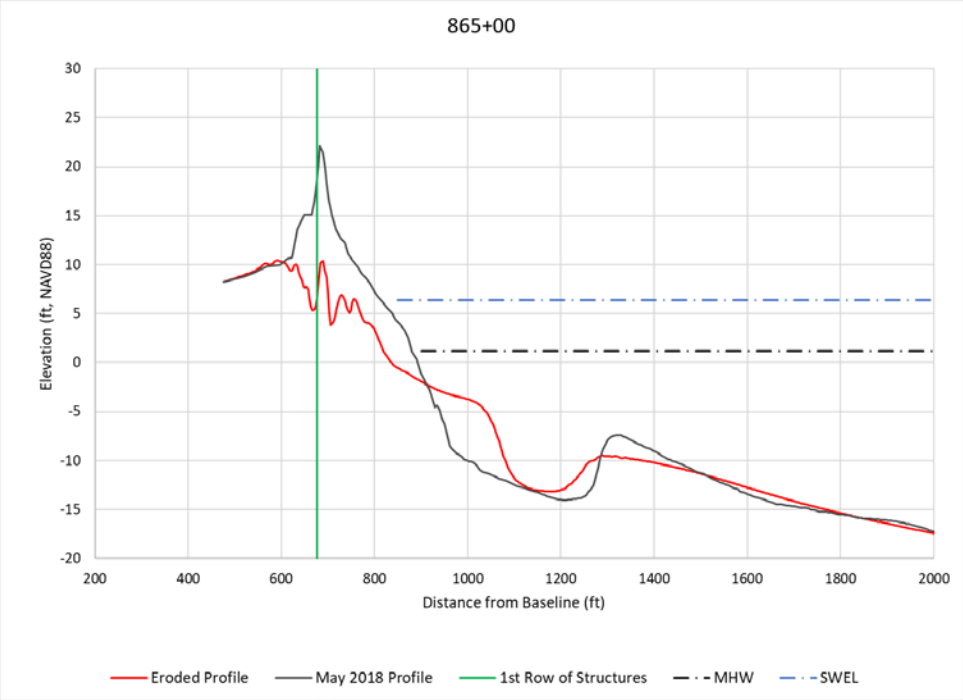


Figure 5-16: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 865+00 (E Ida Street)

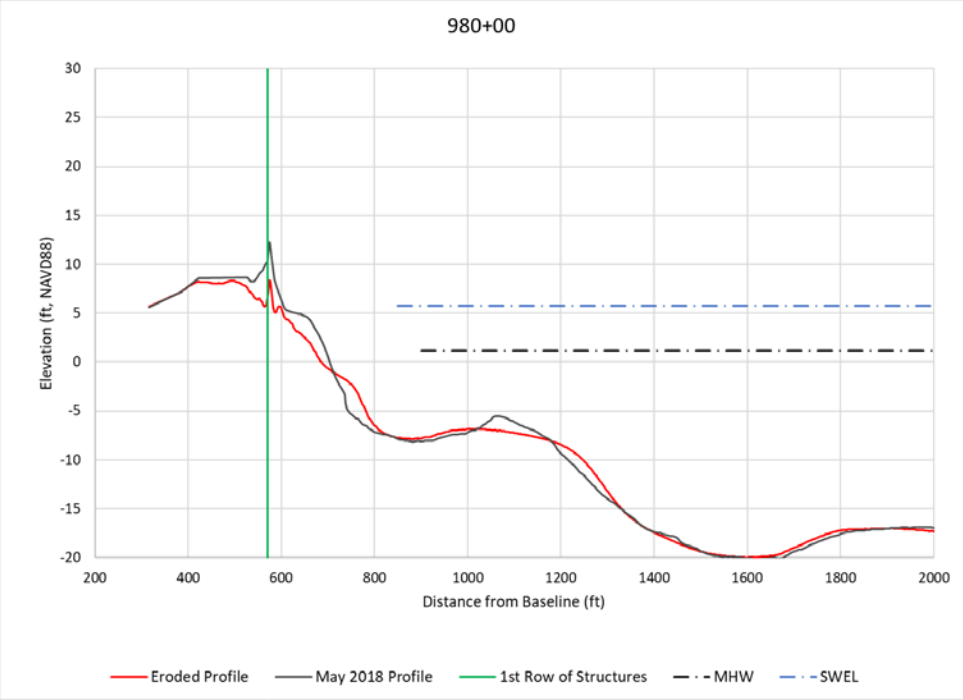


Figure 5-17: CSHORE Results, Pre-Nourished Conditions, 25-year RP, Station 980+00 (E Altoona Street)



Figure 5-18: CSHORE Results, Pre-Nourished Conditions, 50-year RP, Station 980+00 (E Altoona Street)

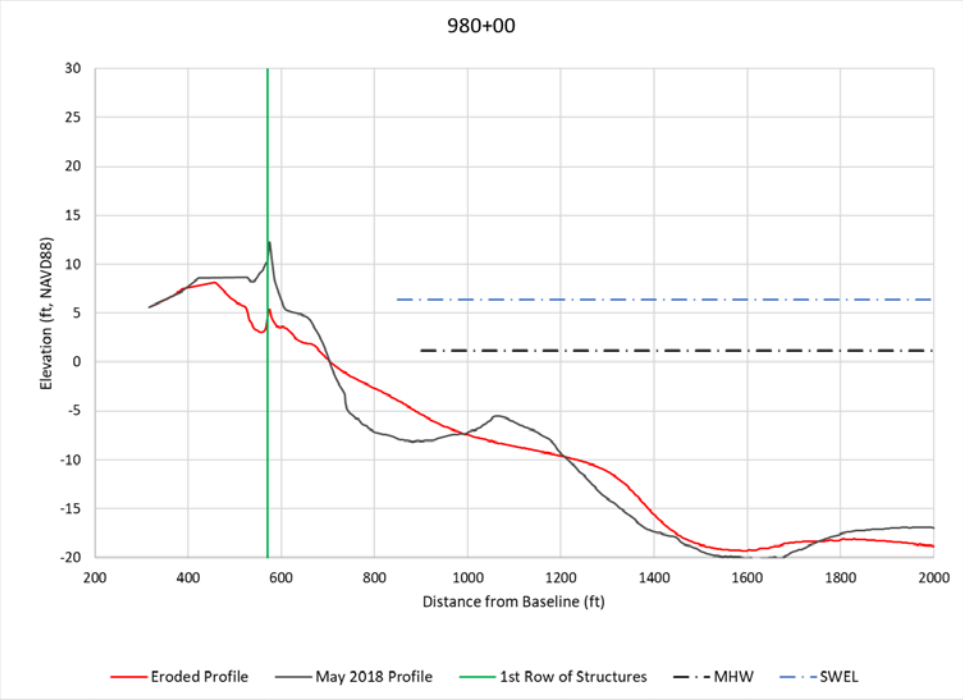


Figure 5-19: CSHORE Results, Pre-Nourished Conditions, 100-year RP, Station 980+00 (E Altoona Street)

Profile volumes seaward of the dune crest and above -19 ft NAVD88 computed on May 2018 pre-nourishment conditions CSHORE initial profiles (i.e. pre-storm profiles) are shown in Figure 5-20. The bars for all 14 profiles are color coded to indicate the LoP categories for the 25-year return period design storm. The green bars indicate No Impact, while the blue bars indicate Minor Overtopping and the red and orange bars indicate Severe Impacts.

Figure 5-21 and Figure 5-22 show the same type of information but with the bars color-coded to indicate LoP in the 50-year and 100-year return period design storms, respectively.

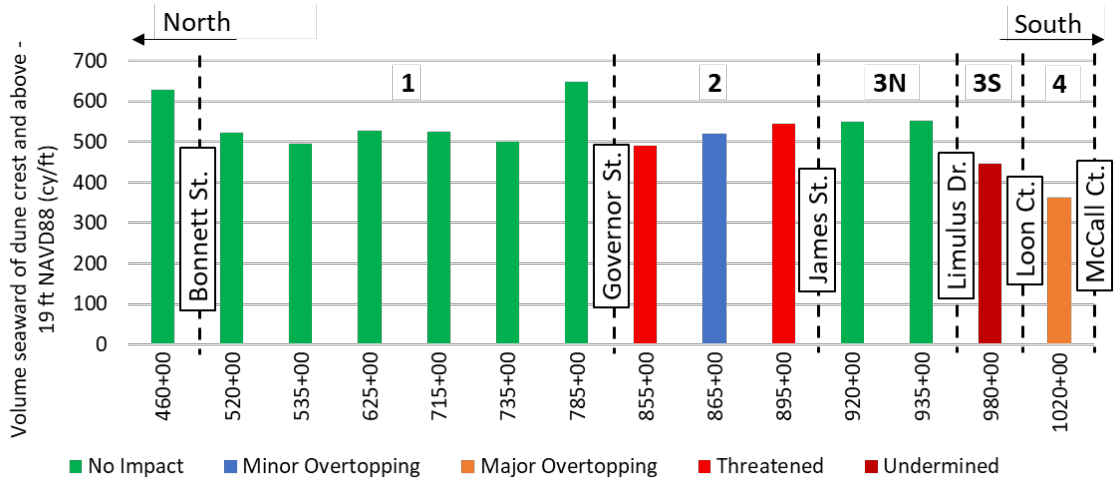


Figure 5-20: Pre-Nourishment Condition CSHORE Pre-Storm Profile Volumes Coded for 25-year Return Period LoP

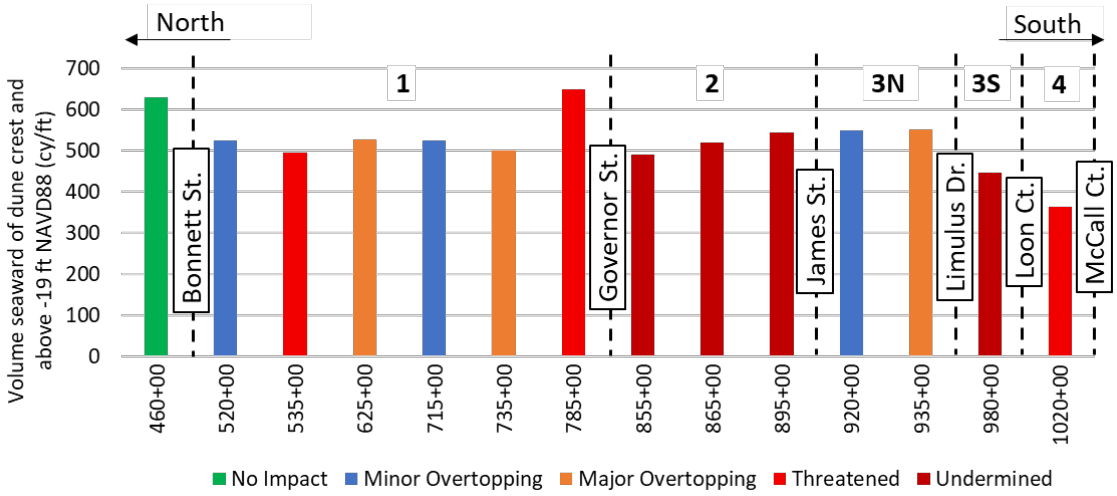


Figure 5-21: Pre-Nourishment CSHORE Pre-Storm Profile Volumes Coded for 50-year Return Period LoP

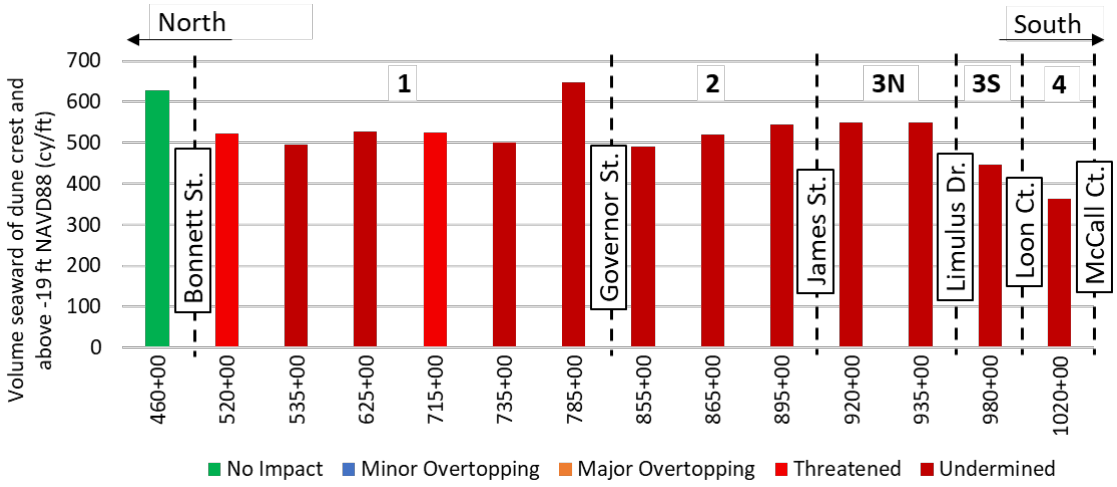


Figure 5-22: Pre-Nourishment CSHORE Pre-Storm Profile Volumes Coded for 100-year Return Period LoP

In summary, the May 2018 existing conditions of the beach and dune system are considered to provide a sufficient LoP along the northern and middle portions of Nags Head for up to a 25-year return period design storm event. Before the nourishment event, the representative profiles at Reaches 3 South and 4 do not have sufficient material available to protect the structures. With the 50-year return period design storm most of the representative profiles become vulnerable and all the profiles are severely impacted during the 100-year return period storm.

The next step in the process is to determine adjustments to the beach profile design that would achieve an acceptable LoP along the Town's oceanfront in the design storm events. Section 5.5 of the report extensively examines and documents the specific beach profile configurations required to achieve desired levels of protection in these storms.

5.5 Beach Nourishment Design Scenarios and LoP Determinations

The beach profile geometry, including dune height and width, as well as berm elevation and width, required to achieve the acceptable LoP (No Impact or Minor Overtopping) for targeted storm return periods, was developed iteratively using CSHORE simulations.

Various beach nourishment template alternatives were explored, aiming to construct initial dune and beach berm enhancements when required, in order to attain an acceptable LoP for each design storm. During the formulation of these beach profile templates, it was assumed that a constructed beach nourishment would incorporate additional advance fill to account for both background erosion and storms expected to occur between each planned nourishment interval. The primary objective was to ensure that, at the conclusion of the nourishment cycle, the minimum beach profile would be available, consistently enabling the achievement of the targeted LoP along the Town's oceanfront. The estimation of the required advance fill for each reach and sub-reach was based on historical monitoring data and findings from the Crystal Ball analysis outlined in Section 4.2.2.

5.5.1 Approach

CSHORE simulations were employed in an iterative manner to determine the beach profile geometry necessary to achieve the desired LoP for the design storms. Figure 5-23 illustrates the approach taken during this process.

During the development of design templates, some profiles were adjusted by adding volumes to the dune and berm, while others were modified by removing dune and berm volume.

At profiles where additional dune and berm construction was required to achieve No Impact or Minor Overtopping under the targeted return period storm, the approach involved increasing the berm width and making adjustments to the dune's height and width. Subsequently, CSHORE, was employed to assess the modified profile's performance during the design storm and determine its ability to achieve a satisfactory LoP. This iterative process continued until the profile demonstrated satisfactory performance for the targeted storm return period.

In cases where profiles exceeded the desired LoP for the targeted storm return period, the profile the iterative design process involved gradually reducing the volumes of the profiles to identify the point at which the profile would still provide acceptable performance during the CSHORE simulation for the targeted return period storm. This erosion process allowed for the determination of the minimum required beach and dune volumes necessary to maintain the desired LoP for the designated storm event.

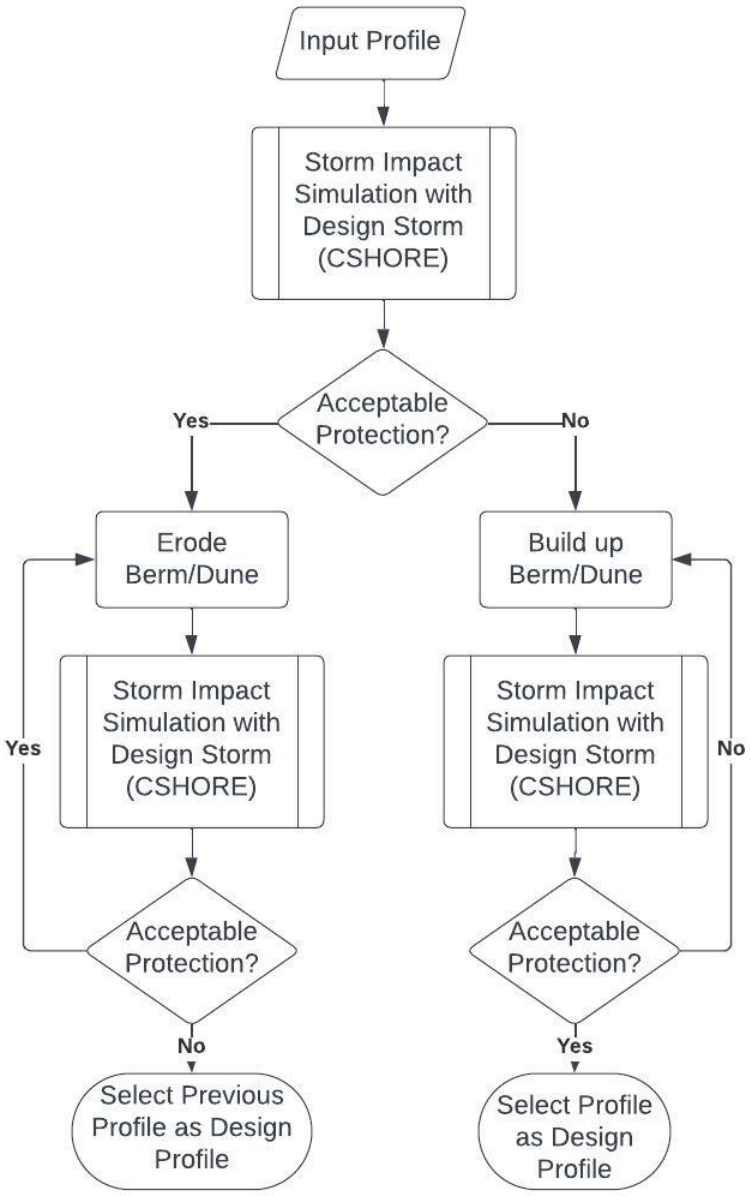


Figure 5-23: LOP Beach Nourishment Design Process

Input Profiles

The input profiles selected for the design process were representative profiles from the May 2018 pre-nourished conditions, which accurately reflected the conditions before the implementation of the 2019 Beach Nourishment Project. These profiles were chosen to initiate the design process from the least protected conditions, providing a starting point for assessing the necessary improvements in achieving the desired LoP.

Design Storms

During the development of design templates, storm return periods of 25 and 50 years were taken into account. Return periods less than 25 years were not considered, as most representative profiles demonstrated acceptable LoP, with no severe impacts observed, in the 25-year return period design storm. Consequently, for a significant portion of the Town's oceanfront, there would be no need for initial berm or dune expansion to create a beach nourishment template with satisfactory LoP for the 25-year return period storm. It is, therefore, justifiable to consider maintaining this LoP as the lower limit for proactive beach management planning going forward.

On the other hand, the 100-year return period storm was not included in the design considerations due to the substantial additional volume and corresponding cost required to achieve sufficient LoP. Results and interpretation of LoP design profile development for each of the design storms are discussed below.

5.5.2 Beach Nourishment LoP Design

25-year Storm Design Profiles

The CSHORE simulations described in Section 5.4 indicated that the 2018 pre-nourished conditions beach and dune system provided a LoP equivalent to No Impact or Minor Overtopping at the first row of structures for 10 of the representative profiles in the 25-year return period design storm CSHORE simulations. All the profiles located in Nags Head North, Reach 1 and Reach 3 North provided adequate protection against the 25-year event while the profiles at Reaches 2, 3 South and 4 indicated severe impacts. Therefore, during development of design templates some of the pre-nourishment profiles were modified by adding dune and berm volumes, while several others were modified by removing dune and berm volume.

Figure 5-24 through Figure 5-26 depict the profiles from May 2018, the design profiles (identified as CSHORE Input), and the results of the 25-year return period storm CSHORE simulations for profiles 520+00, 865+00, and 980+00. Appendix C contains plots of the CSHORE results at all 14 profiles.

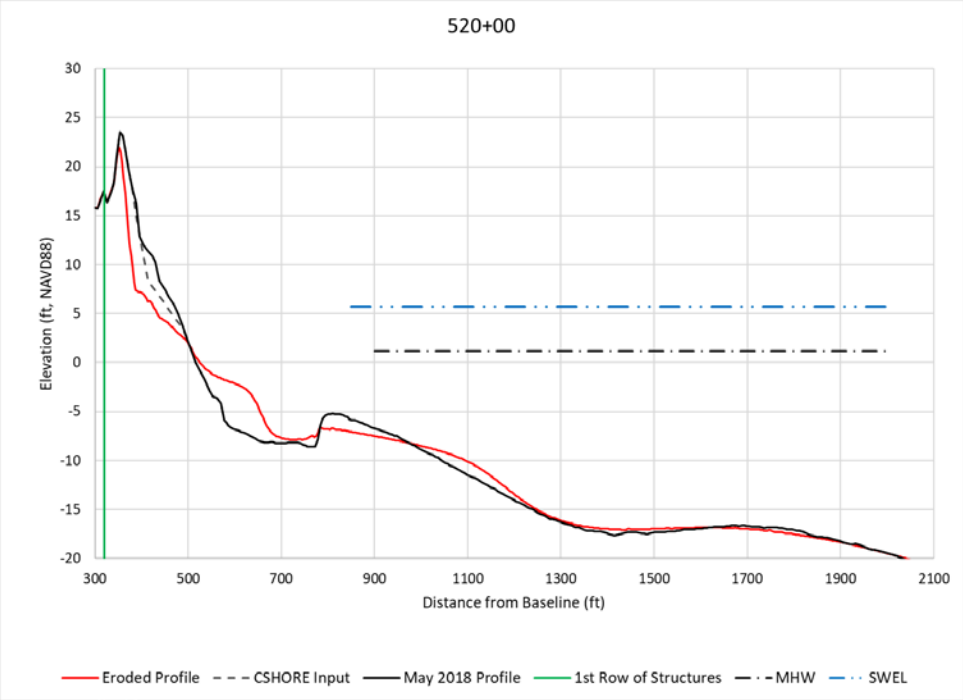


Figure 5-24: CSHORE Results, Design Scenario #2, 25-year RP, Station 520+00 (Bainbridge Street)

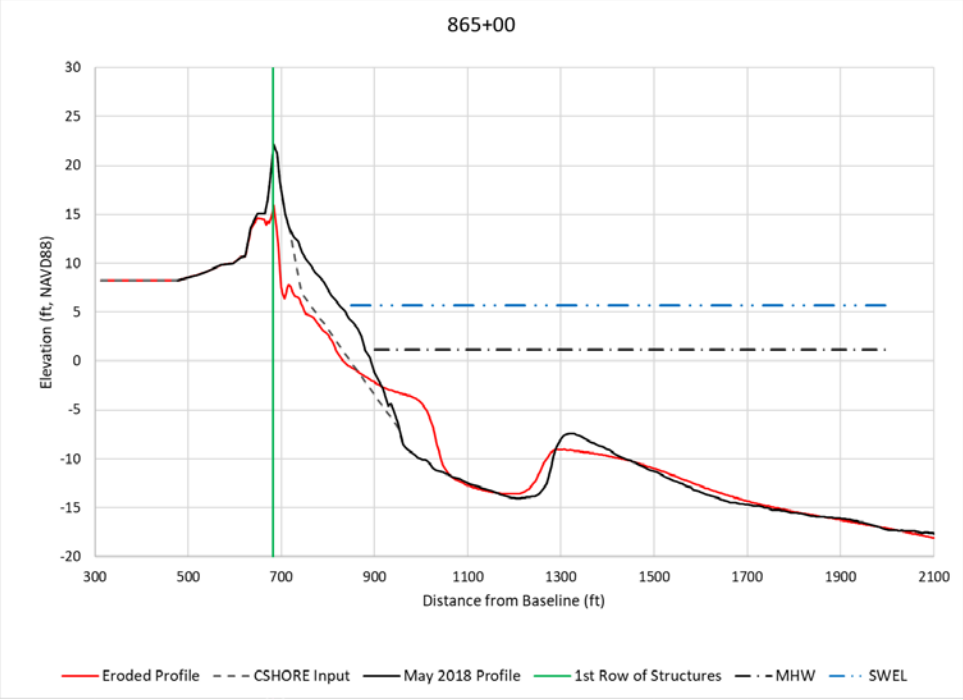


Figure 5-25: CSHORE Results, Design Scenario #2, 25-year RP, Station 865+00 (E Ida Street)



Figure 5-26: CSHORE Results, Design Scenario #2, 25-year RP, Station 980+00 (E Altoona Street)

The construction of additional dune and berm volume to create a beach nourishment design with acceptable LOP against 25-year design storm would require approximately 0.62 Mcy of quality beach sediment. The construction would be required in reaches as identified in Table 5-5, with the approximate required volumes per linear foot of shoreline. Charts for each profile in the table showing CSHORE initial and final (eroded) profiles plus May 2018 surveyed profiles and position of first row of structures are shown in Appendix C.

Table 5-5: Additional Dune and Berm Volume Required to Achieve 25-year Storm LoP

Reach	Length (ft)	Rep. Profile	Volume Above -19 ft, NAVD88 Required to Achieve 25-year LoP (cy/lf)	May 2018 Volume Above -19 ft (cy/ft)	Difference (cy/ft)
Nags Head – North	6,250	460+00	355	577.6	-222.6
Reach 1	4,500	520+00	503	509.4	-6.4
	5,500	535+00	451	471.8	-20.8
	7,000	625+00	478	506.3	-28.3
	5,500	715+00	479	501.3	-22.3
	6,000	735+00	443	489.5	-46.5
	2,500	785+00	604	610.3	-6.3
Reach 2	5,500	855+00	491	446.4	+44.1
	2,500	865+00	471	499.1	-28.1
	2,500	895+00	526	485.2	+41.0
	2,500	920+00	463	504.1	-41.1
Reach 3 - North	4,500	935+00	464	464.2	-0.2
Reach 3 - South	2,000	980+00	461	407.0	+53.9
	2,750	1020+00	401	373.2	+28.0
Reach 4					

50-year Return Period Storm Results

According to the CSHORE simulations discussed in Section 5.4 it was found that the beach and dune system in the 2018 pre-nourished conditions offered a LoP corresponding to No Impact or Minor Overtopping at the first row of structures for multiple representative profiles (460+00, 520+00, 715+00 and 920+00) . These profiles were subjected to erosion until the minimum volumed profile capable of delivering satisfactory results during a CSHORE 50-year storm simulation was attained. The remaining profiles were modified by adding dune and berm volumes, until acceptable LoP was achieved.

Figure 5-27 through Figure 5-32 depict the design profiles (identified as CSHORE Input), and the results of the 25-year and 50-year return period storm CSHORE simulations for profiles 520+00, 865+00, and 980+00. Appendix C contains plots of the CSHORE results at all 14 profiles.

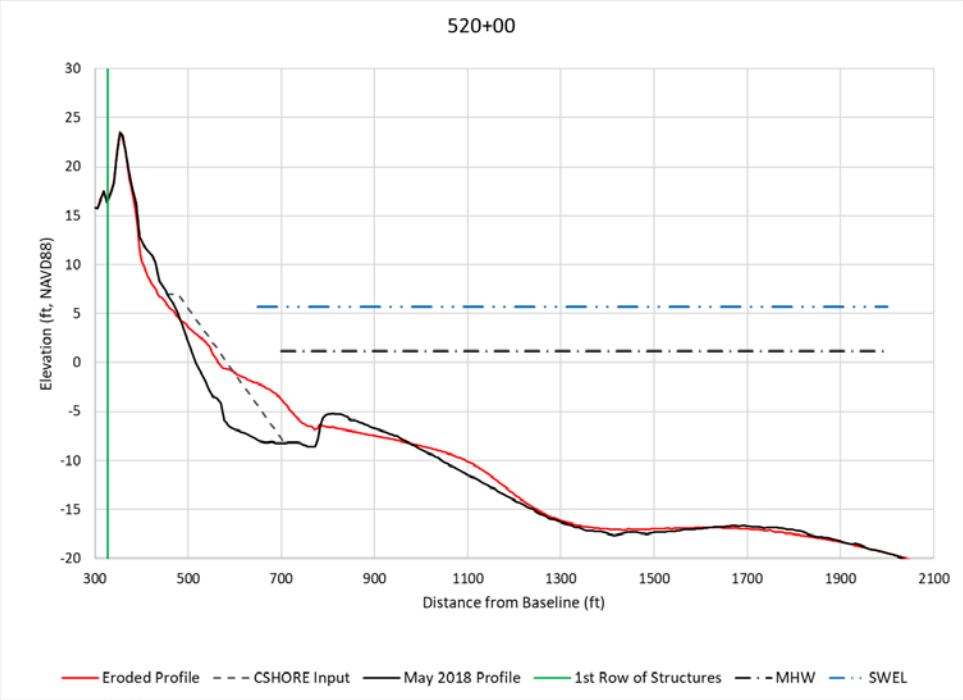


Figure 5-27: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 520+00 (Bainbridge Street)

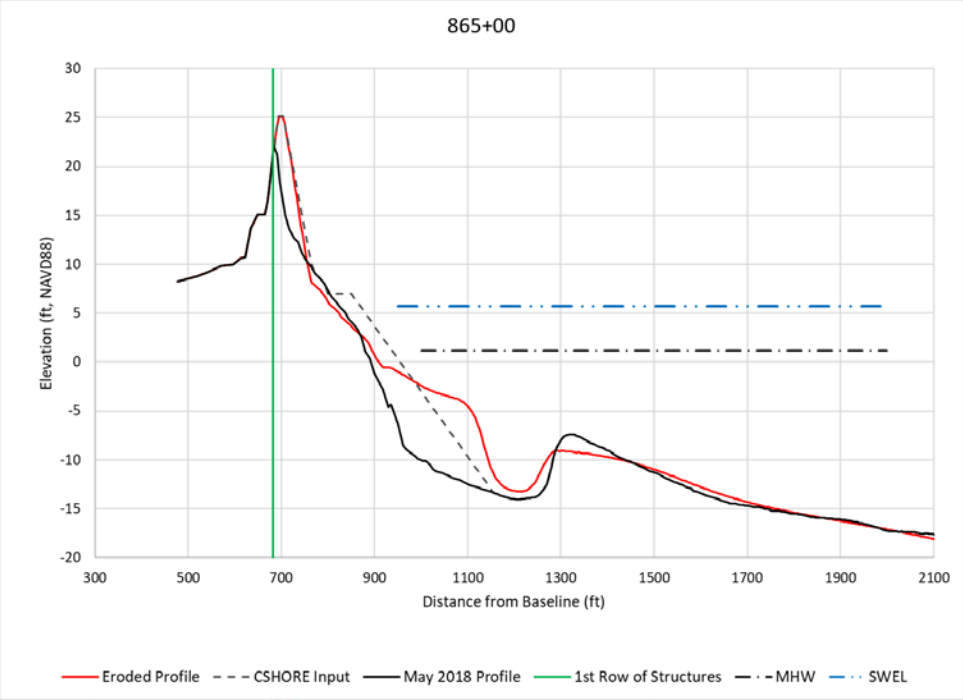


Figure 5-28: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 865+00 (E Ida Street)

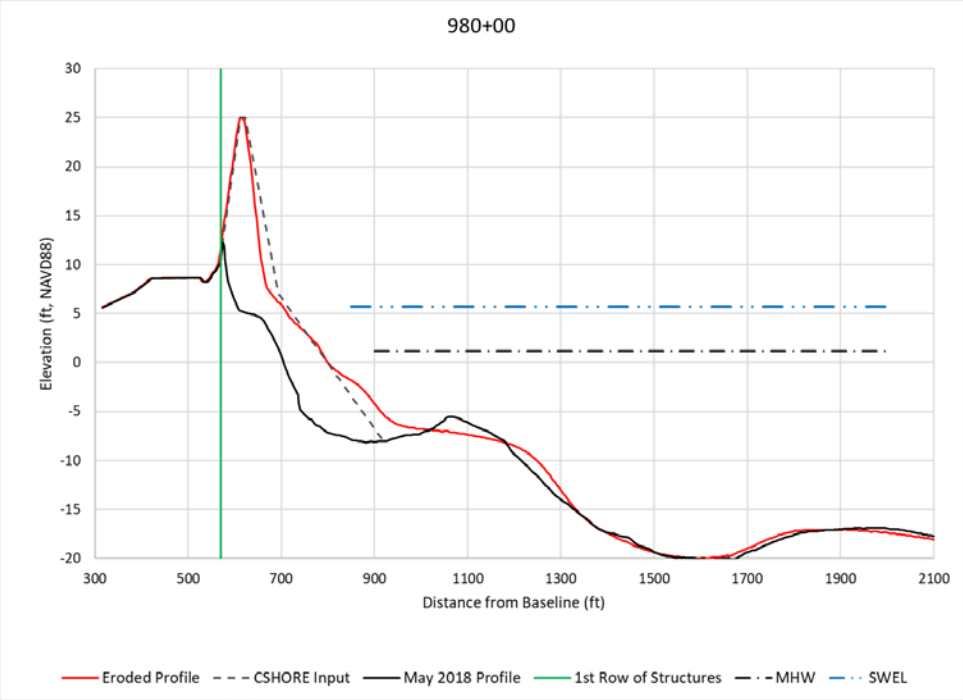


Figure 5-29: CSHORE Results, 50-yr LoP Design, 25-year RP, Station 980+00 (E Altoona Street)

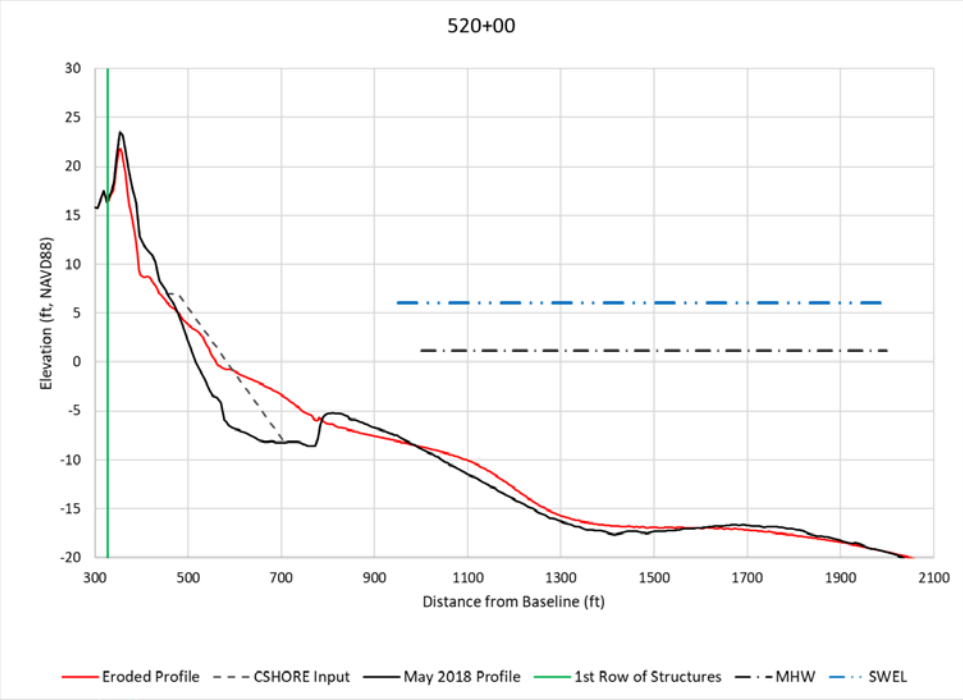


Figure 5-30: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 520+00 (Bainbridge Street)

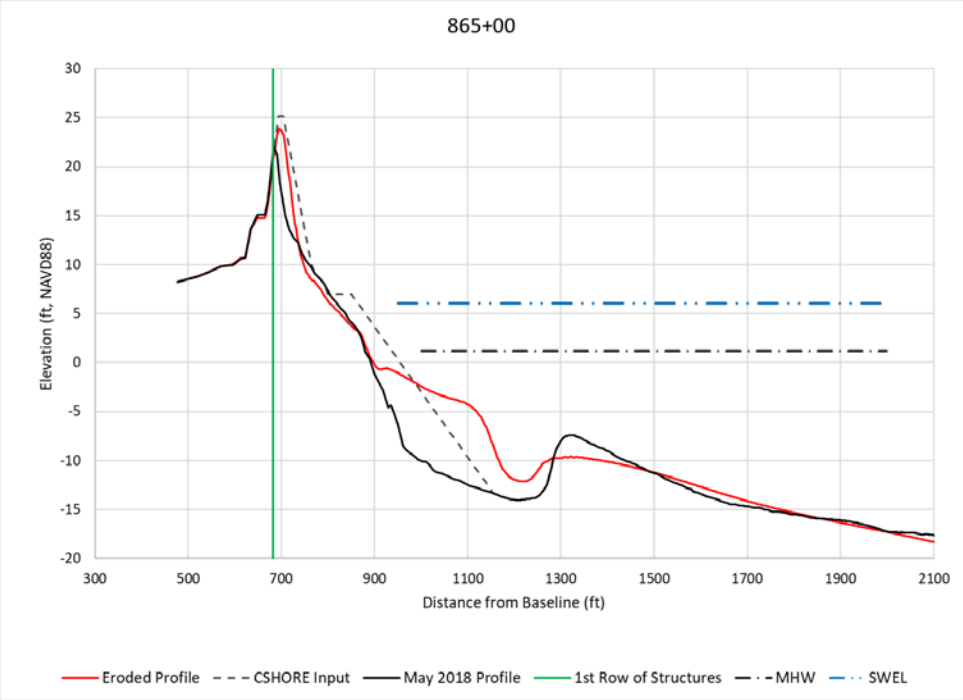


Figure 5-31: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 865+00 (E Ida Street)

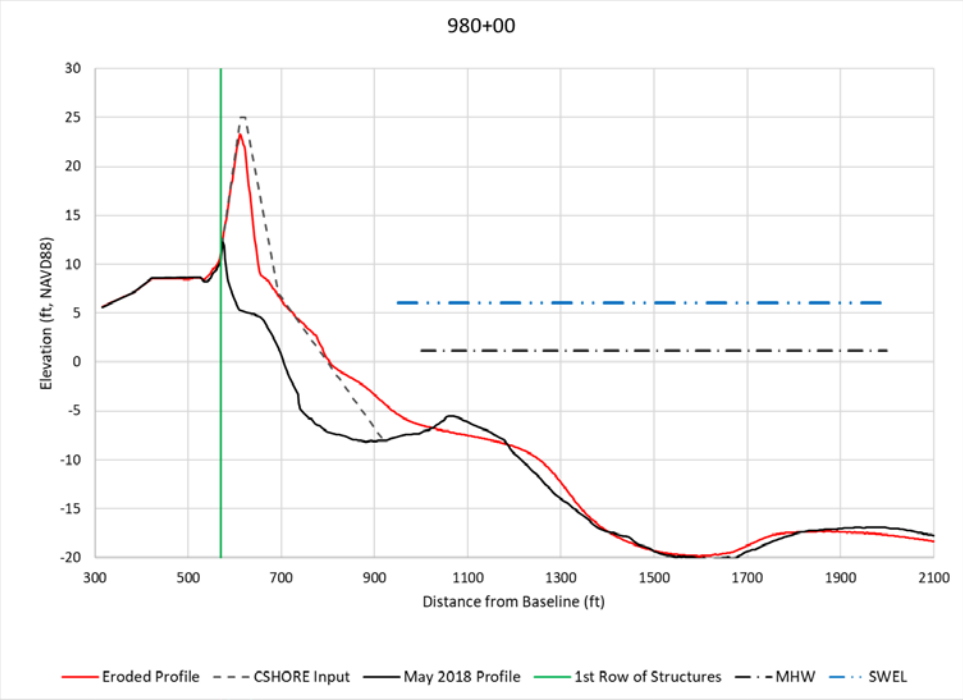


Figure 5-32: CSHORE Results, 50-yr LoP Design, 50-year RP, Station 980+00 (E Altoona Street)

The construction of additional dune and berm volume to create a beach nourishment design with acceptable LOP against 50-year design storm would require approximately 3.3 Mcy of quality beach sediment. The construction would be required in reaches as identified in Table 5-6, with the approximate required volumes per linear foot of shoreline. Charts for each profile in the table showing CSHORE initial and final (eroded) profiles plus May 2018 surveyed profiles and position of first row of structures are shown in Appendix C.

Table 5-6: Additional Dune and Berm Volume Required to Achieve 50-year Storm LoP

Reach	Length (ft)	Rep. Profile	Volume Above -19 ft, NAVD88 Required to Achieve 25-year LoP (cy/lf)	May 2018 Volume Above -19 ft, NAVD88 (cy/ft)	Difference (cy/ft)
Nags Head – North	6,250	460+00	466	577.6	-111.6
Reach 1	4,500	520+00	543	509.4	+34.1
	5,500	535+00	546	471.8	+74.13
	7,000	625+00	526	506.3	+19.7
	5,500	715+00	532	501.3	+30.7
	6,000	735+00	547	489.5	+57.1
	2,500	785+00	646	610.3	+36.2
Reach 2	5,500	855+00	586	446.4	+139.9
	2,500	865+00	570	499.1	+70.5
	2,500	895+00	588	485.2	+102.5
	2,500	920+00	533	504.1	+28.6
Reach 3 - North	4,500	935+00	525	464.2	+61.3
Reach 3 - South	2,000	980+00	503	407.0	+101.0
	2,750	1020+00	463	373.2	+89.4
Reach 4					

5.5.3 LoP Summary

As outlined in the previous sections, some targeted dune building and berm addition in various reaches would be required to provide protection for a 25-yr event along the entire Nags Head shoreline, while adequate protection against a 50-year event would require a wider profile which would be applied to all reaches but the Nags Head North reach. As stated previously, when representative pre-nourishment conditions are considered, a project of approximately 0.6 and 3.3 Mcy would be needed to provide 25-yr and 50-yr event LoP, respectively. Table 5-7 summarizes the volume placement required at each representative profile at representative pre-nourishment conditions to provide adequate

protection against 25- and 50-year events. These volumes are dependent on the beach conditions before a nourishment event and can vary. As a conservative approach, the condition of the beach before the 2019 nourishment project was considered in this study to develop a likely maximum needed volume to provide adequate protection.

Table 5-7: Placement required for 25-yr and 50-yr LoP at May 2018 shoreline conditions

Reach	Length (feet)	Rep. Profile	25-yr LoP Placement (cy)	25-yr LoP Placement Density (cy/ ft)	50-yr LoP Placement (cy)	50-yr LoP Placement Density (cy/ ft)
North	6,250	460+00	0	0.0	0	0.0
Reach 1	4,500	520+00	0	0.0	153,450	34.1
	5,500	535+00	0	0.0	407,715	74.13
	7,000	625+00	0	0.0	137,900	19.7
	5,500	715+00	0	0.0	168,850	30.7
	6,000	735+00	0	0.0	342,600	57.1
	2,500	785+00	0	0.0	90,500	36.2
Reach 2	5,500	855+00	242,550	44.1	769,450	139.9
	2,500	865+00	0	0.0.	176,250	70.5
	3,000	895+00	123,000	41.0	256,250	102.5
	2,500	920+00	0	0.0	71,500	28.6
Reach 3 - North	4,500	935+00	0	0.0	275,850	61.3
Reach 3 - South	2,000	980+00	107,800	53.9	202,000	101.0
Reach 4	2,750	1020+00	77,000	28.0	245,850	89.4
TOTAL			**550,350**		**3,298,165**	

Figure 5-33 also shows the difference in the volume trigger above the -19 ft elevation (volume from top of landward dune out to -19 ft NAVD88, see Figure 4-1) that would be needed to provide protection for a 50-yr event versus the 25-yr event and the volume available in the representative profiles at May 2018 survey (before nourishment).

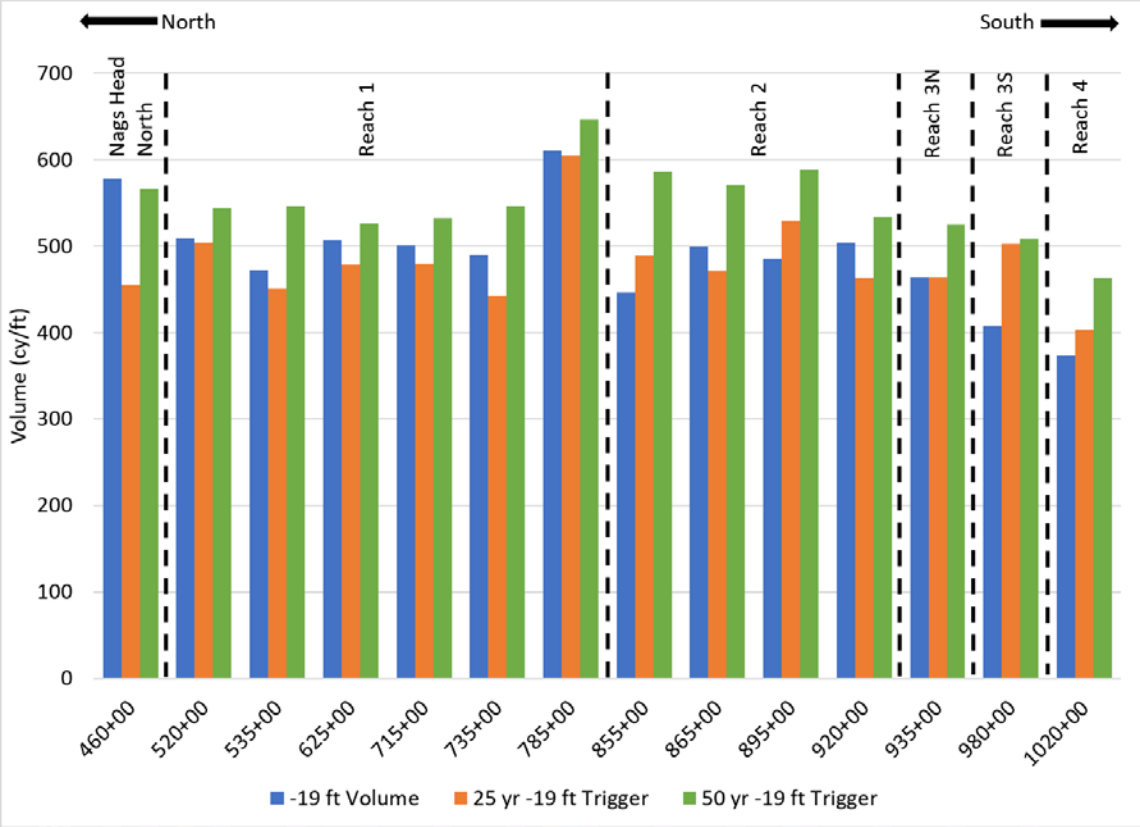


Figure 5-33: 50-yr Event Trigger vs. 25-yr Event Trigger vs. 2018 Volume (-19 ft NAVD88)

Figure 5-34 through Figure 5-47 also show how the 50-yr event trigger will be difficult to maintain over time given historical volumes over the monitoring dataset. While in some areas, the 50-yr LoP could be reached, it would be difficult to maintain it over the entire town. For the following figures, please note that the bars show the volume present above -19 ft NAVD88 for each of the years data are available. The top black line represents the 50-yr event volume trigger while the bottom red line represents the 25-yr event volume trigger.

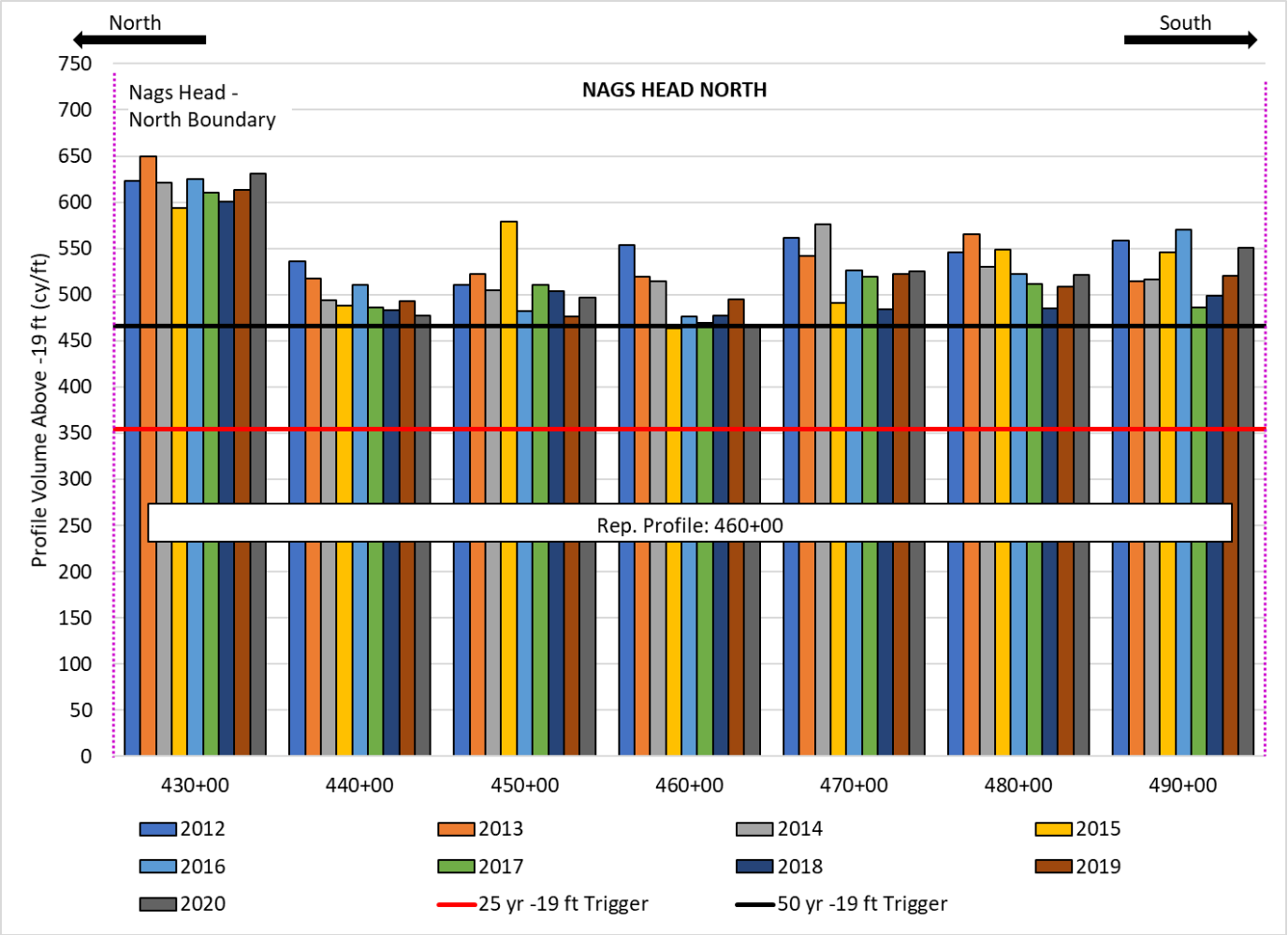


Figure 5-34: Profile Volume Above -19 ft NAVD88 – Representative Profile 460+00 (430+00 – 490+00)

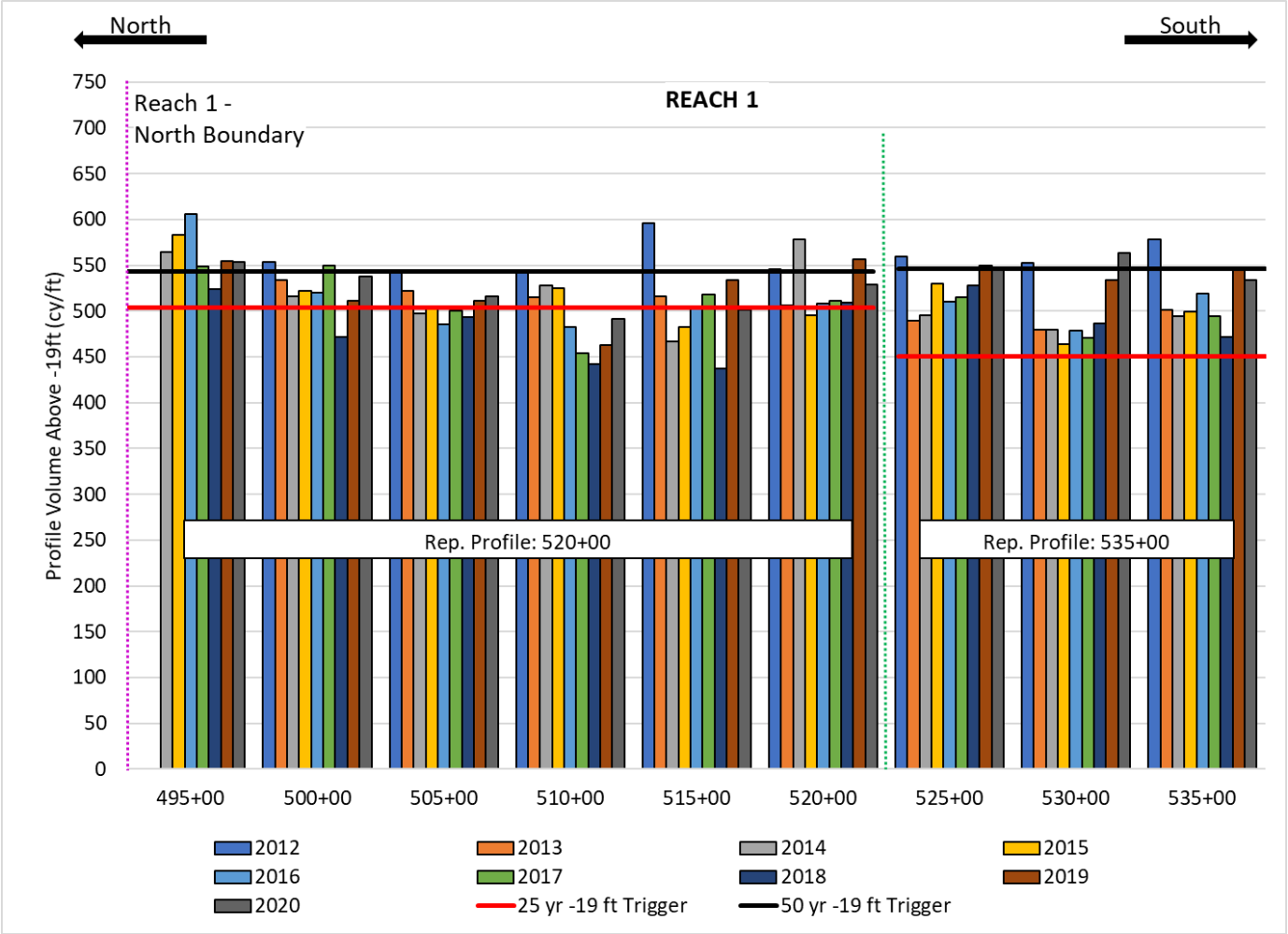


Figure 5-35: Profile Volume Above -19 ft NAVD88 – Representative Profiles 520+00 and 535+00 (495+00 – 535+00)

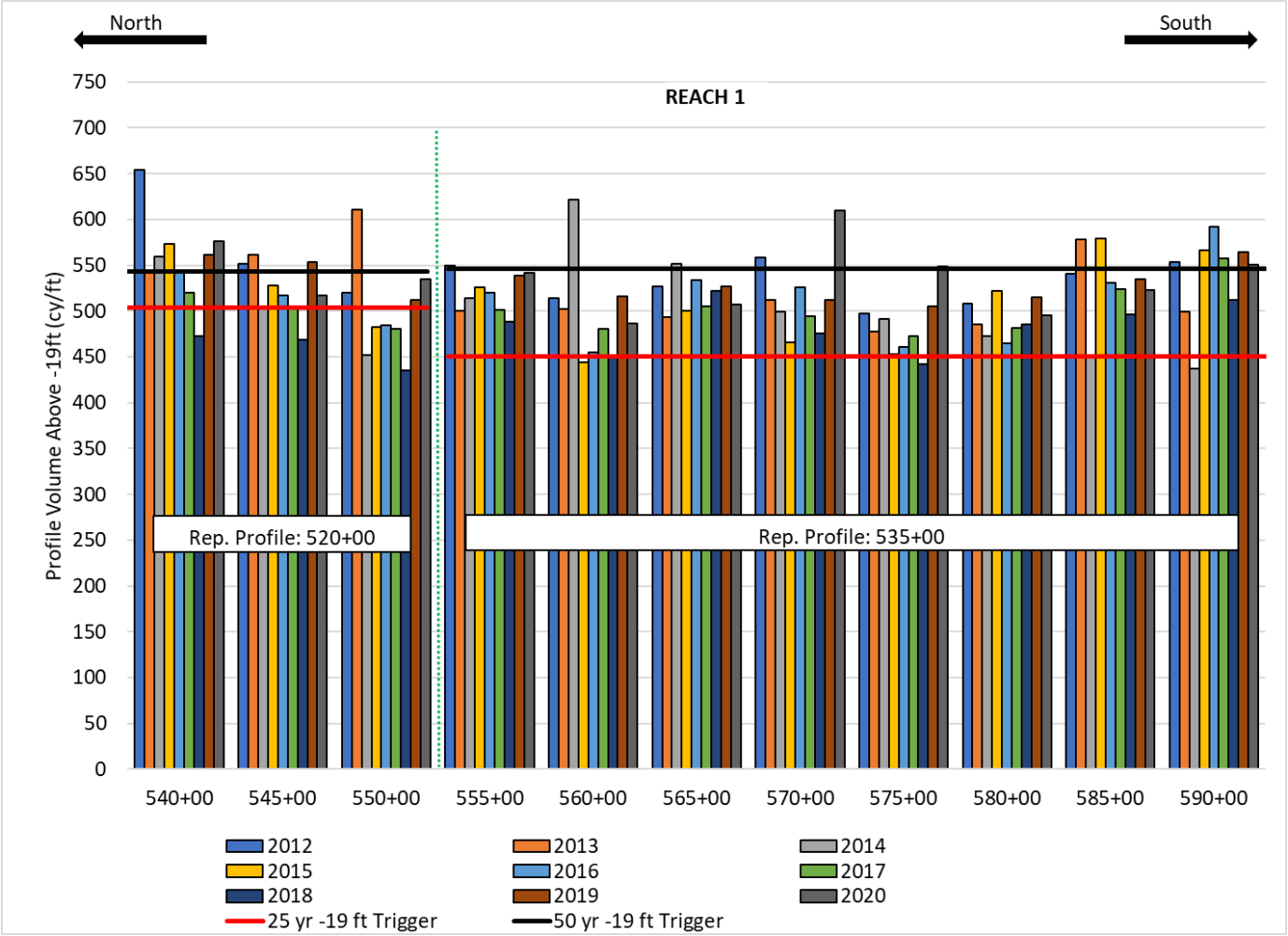


Figure 5-36: Profile Volume Above -19 ft NAVD88 – Representative Profile 520+00 and 535+00 (540+00 – 590+00)

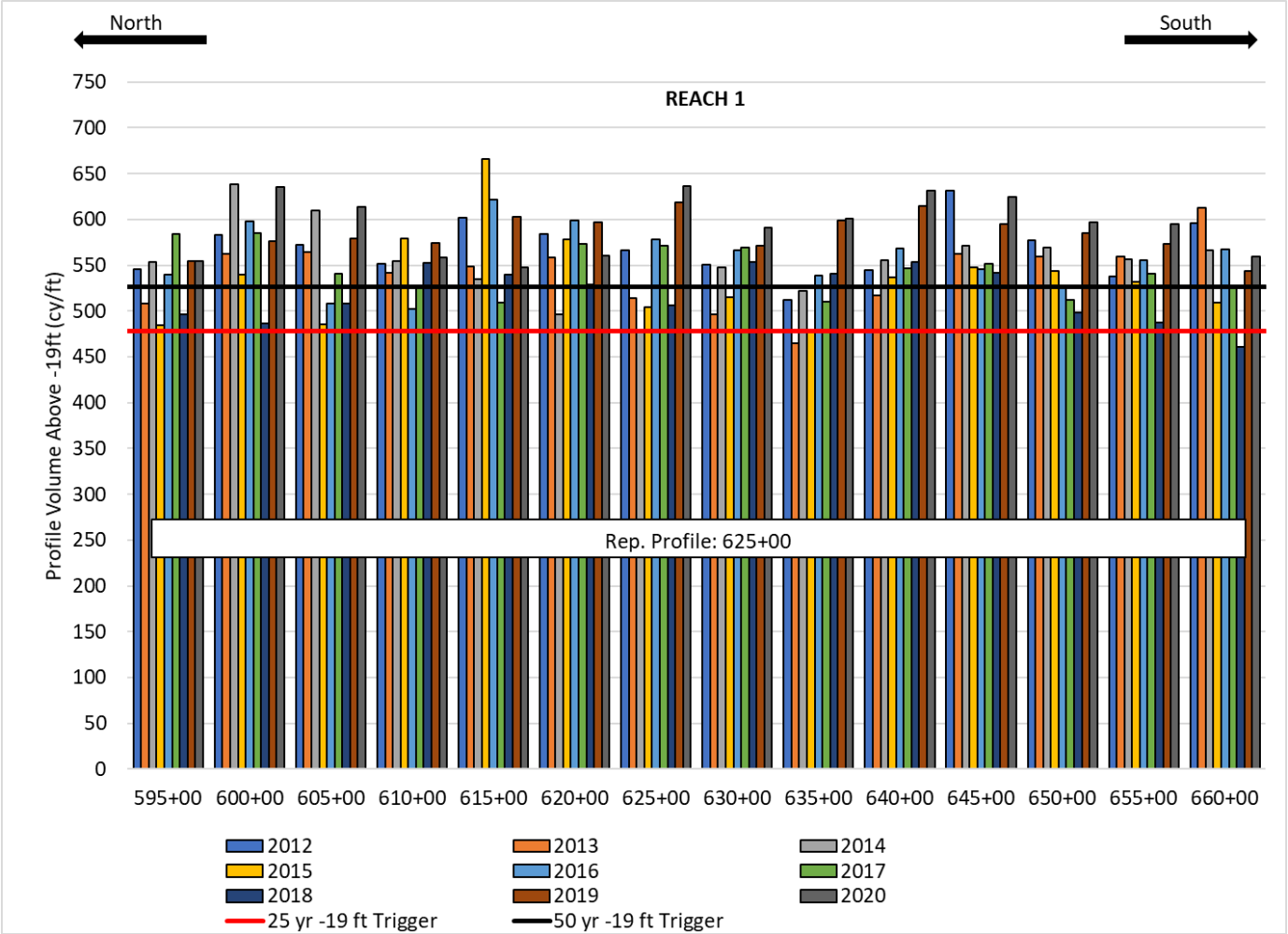


Figure 5-37: Profile Volume Above -19 ft NAVD88 – Representative Profile 625+00 (595+00 – 660+00)

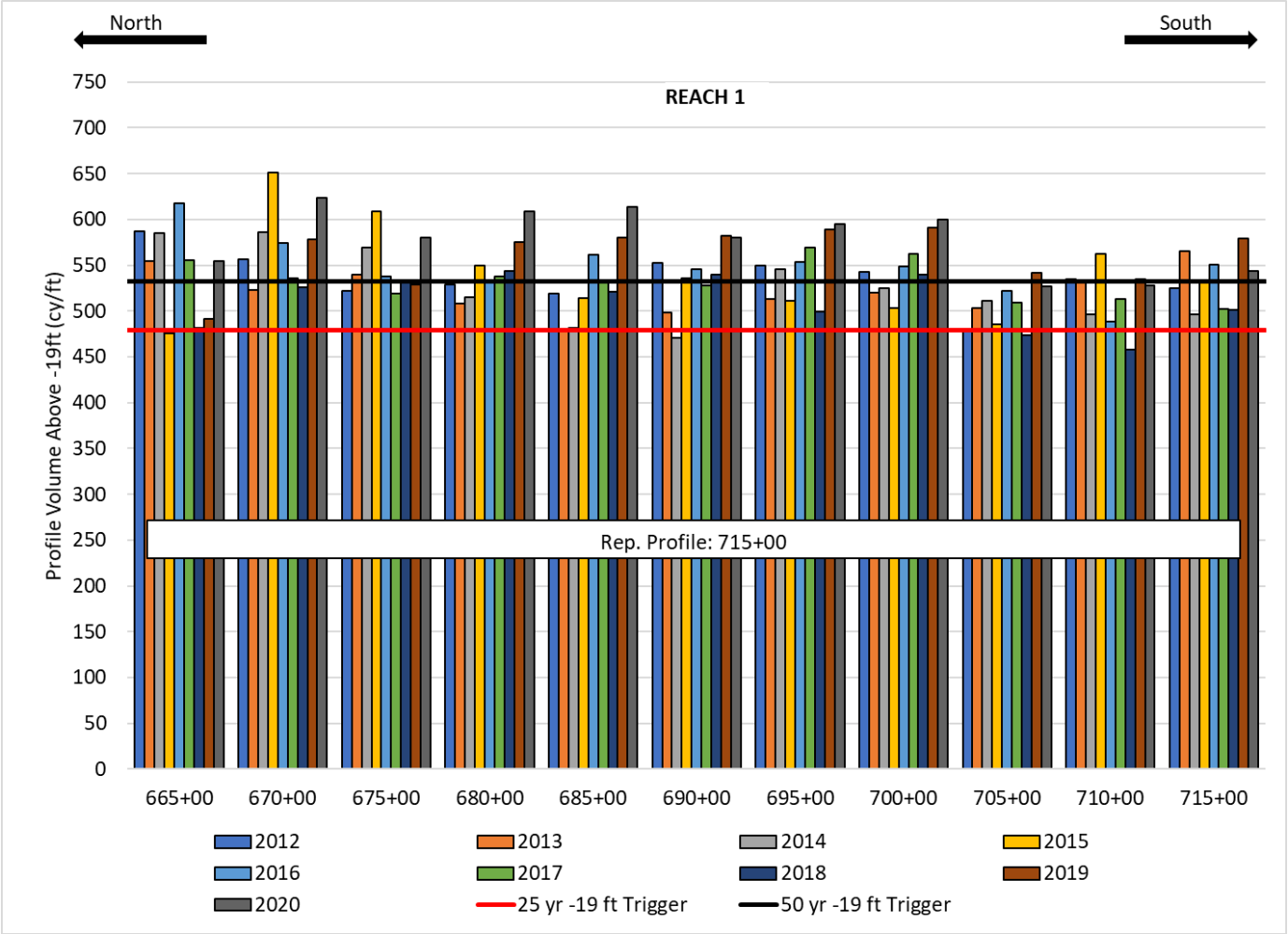


Figure 5-38: Profile Volume Above -19 ft NAVD88 – Representative Profile 715+00 (665+00 – 715+00)

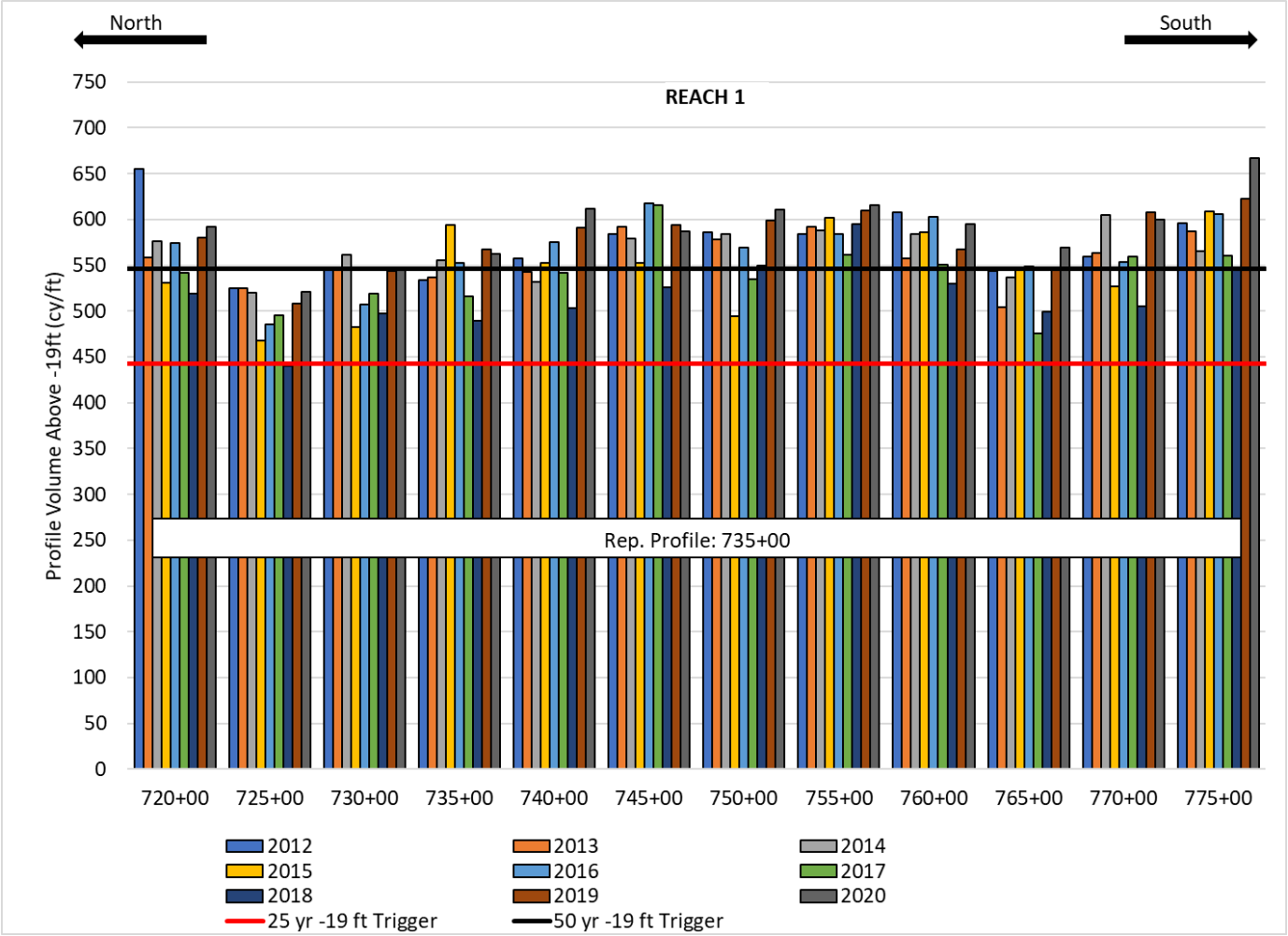


Figure 5-39: Profile Volume Above -19 ft NAVD88 – Representative Profile 735+00 (720+00 –775+00)

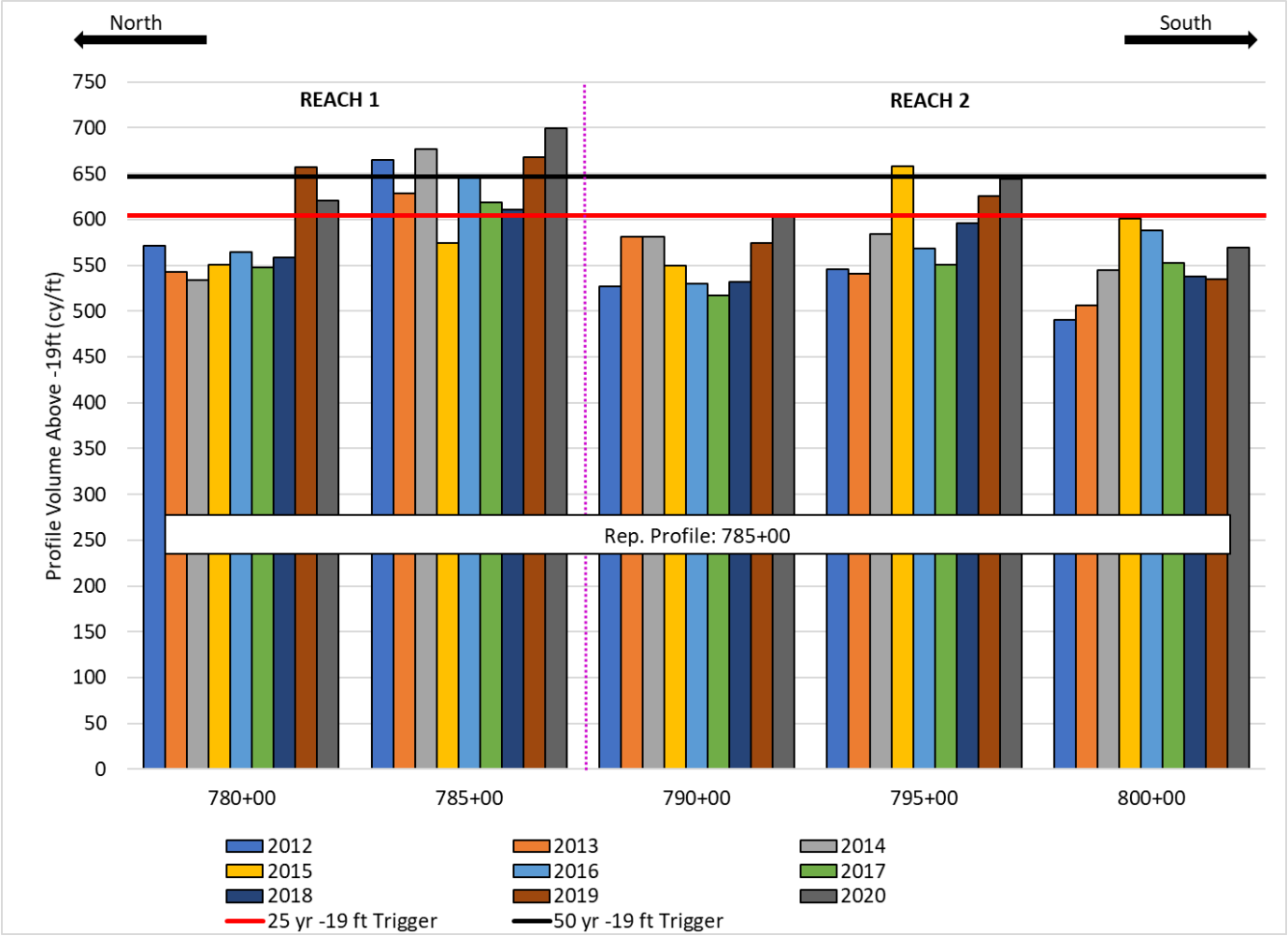


Figure 5-40: Profile Volume Above -19 ft NAVD88 – Representative Profile 785+00 (780+00 – 800+00)

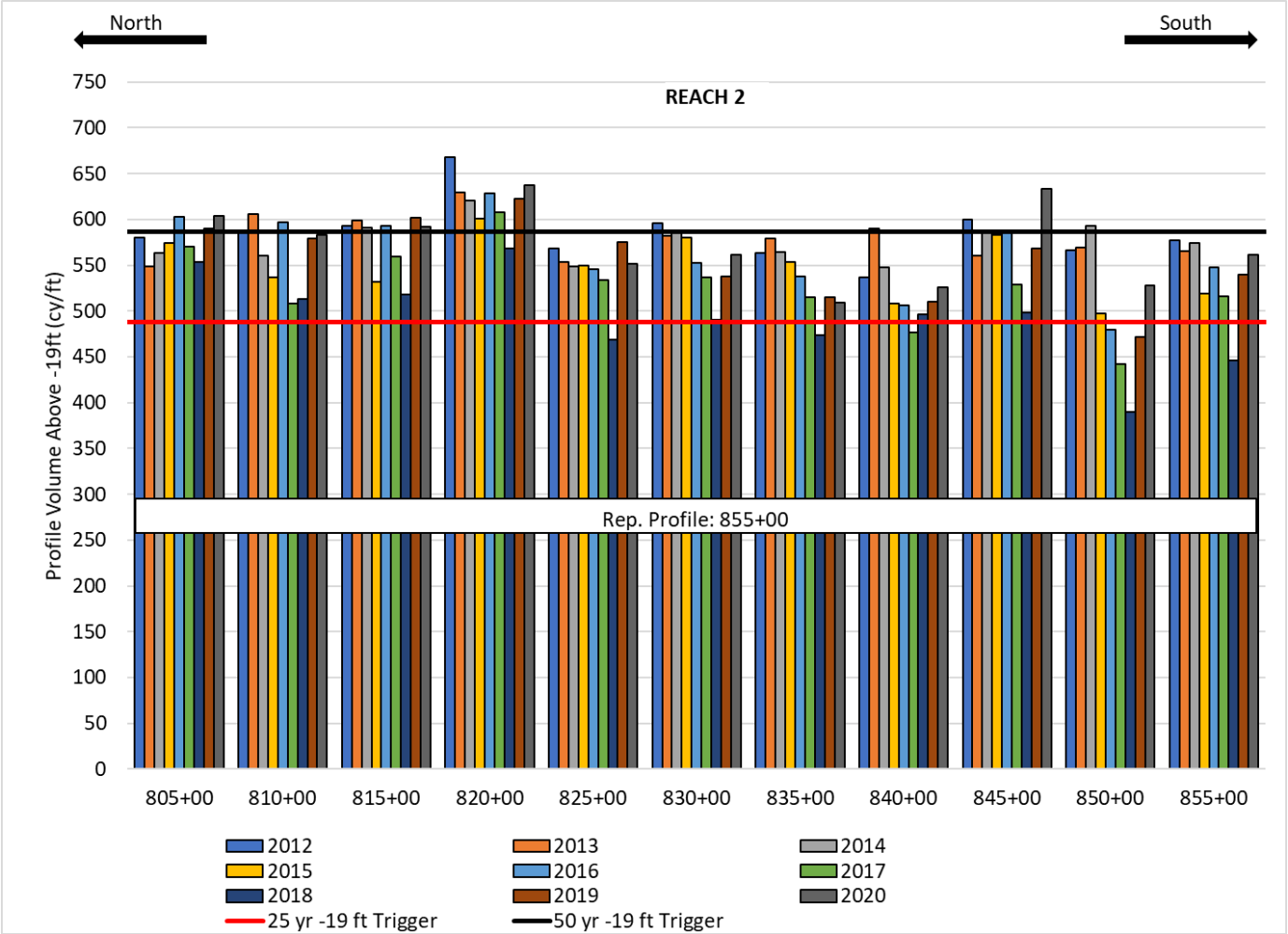


Figure 5-41: Profile Volume Above -19 ft NAVD88 – Representative Profile 855+00 (805+00 – 855+00)

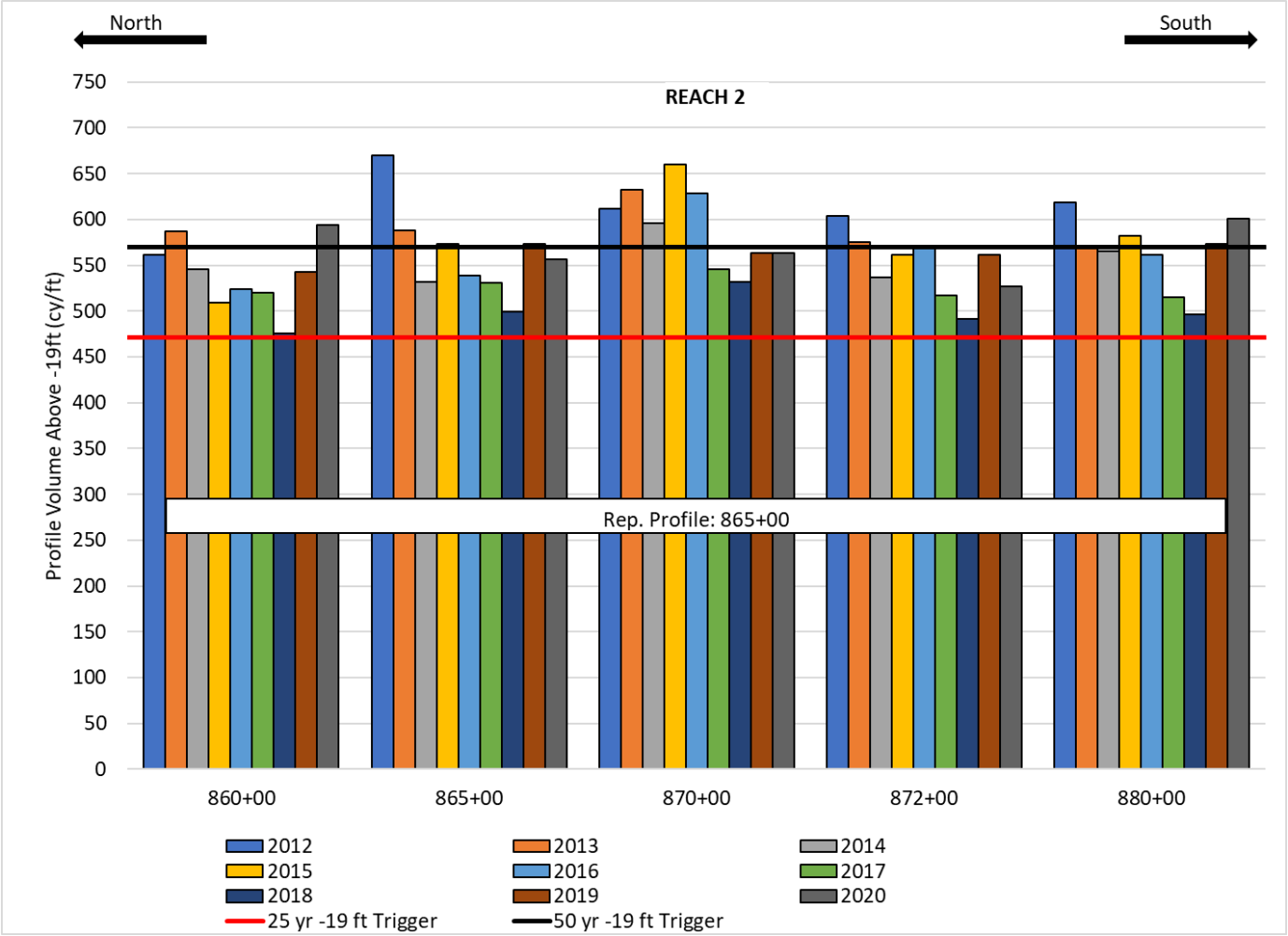


Figure 5-42: Profile Volume Above -19 ft NAVD88 – Representative Profile 865+00 (860+00 – 880+00)

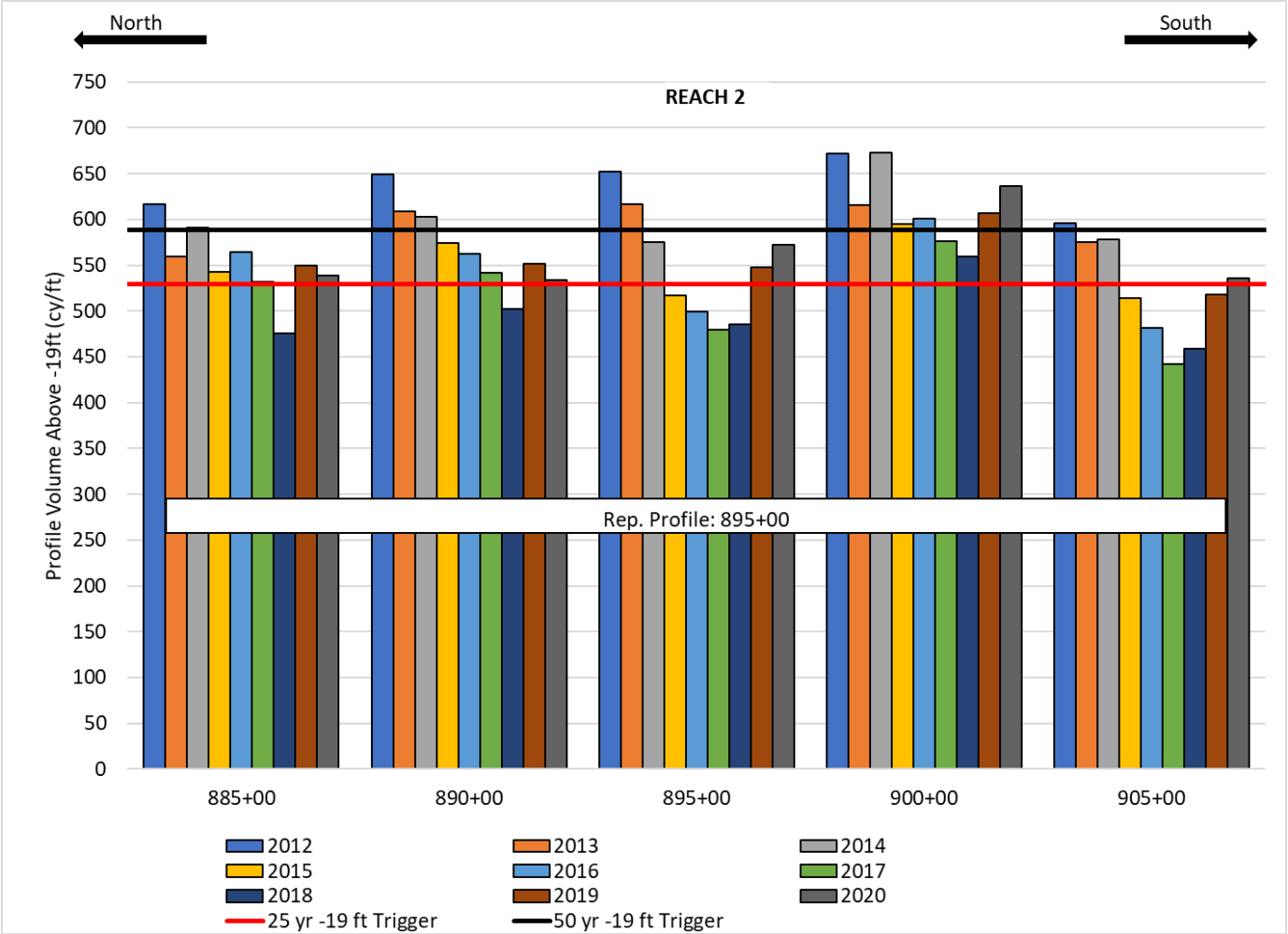


Figure 5-43: Profile Volume Above -19 ft NAVD88 – Representative Profile 895+00 (885+00 – 905+00)

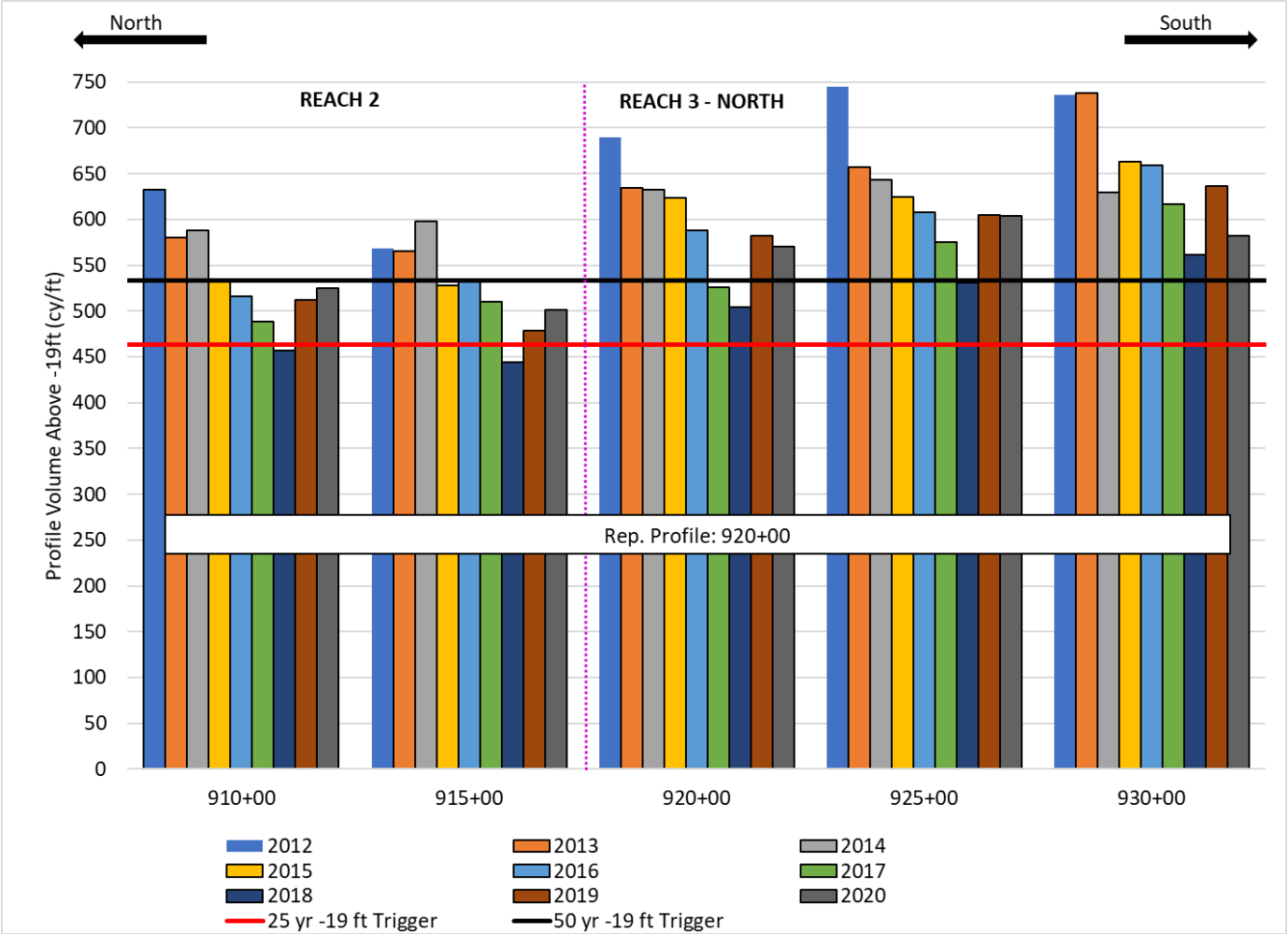


Figure 5-44: Profile Volume Above -19 ft NAVD88 – Representative Profile 920+00 (910+00 – 930+00)

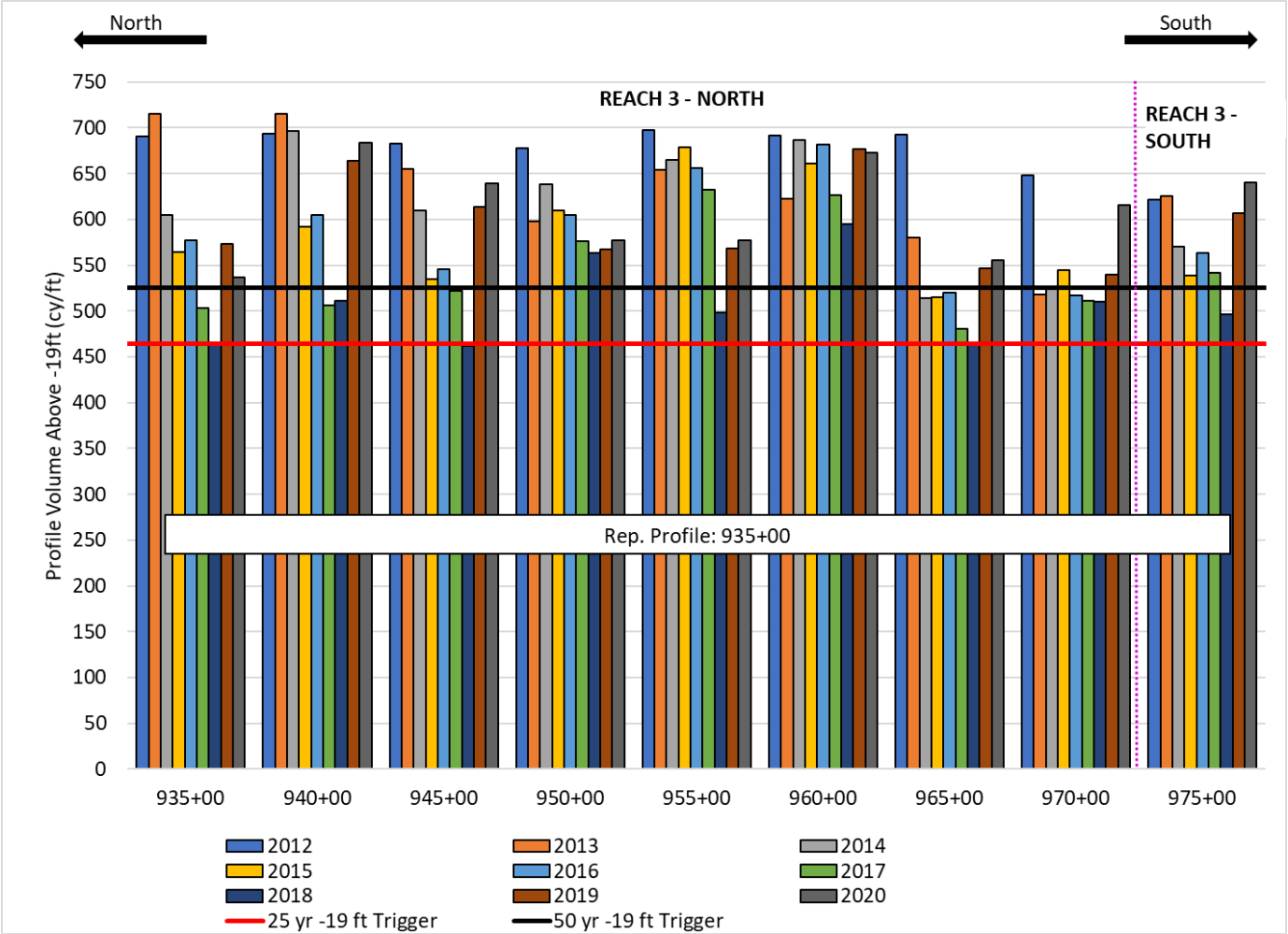


Figure 5-45: Profile Volume Above -19 ft NAVD88 – Representative Profile 935+00 (935+00 – 975+00)

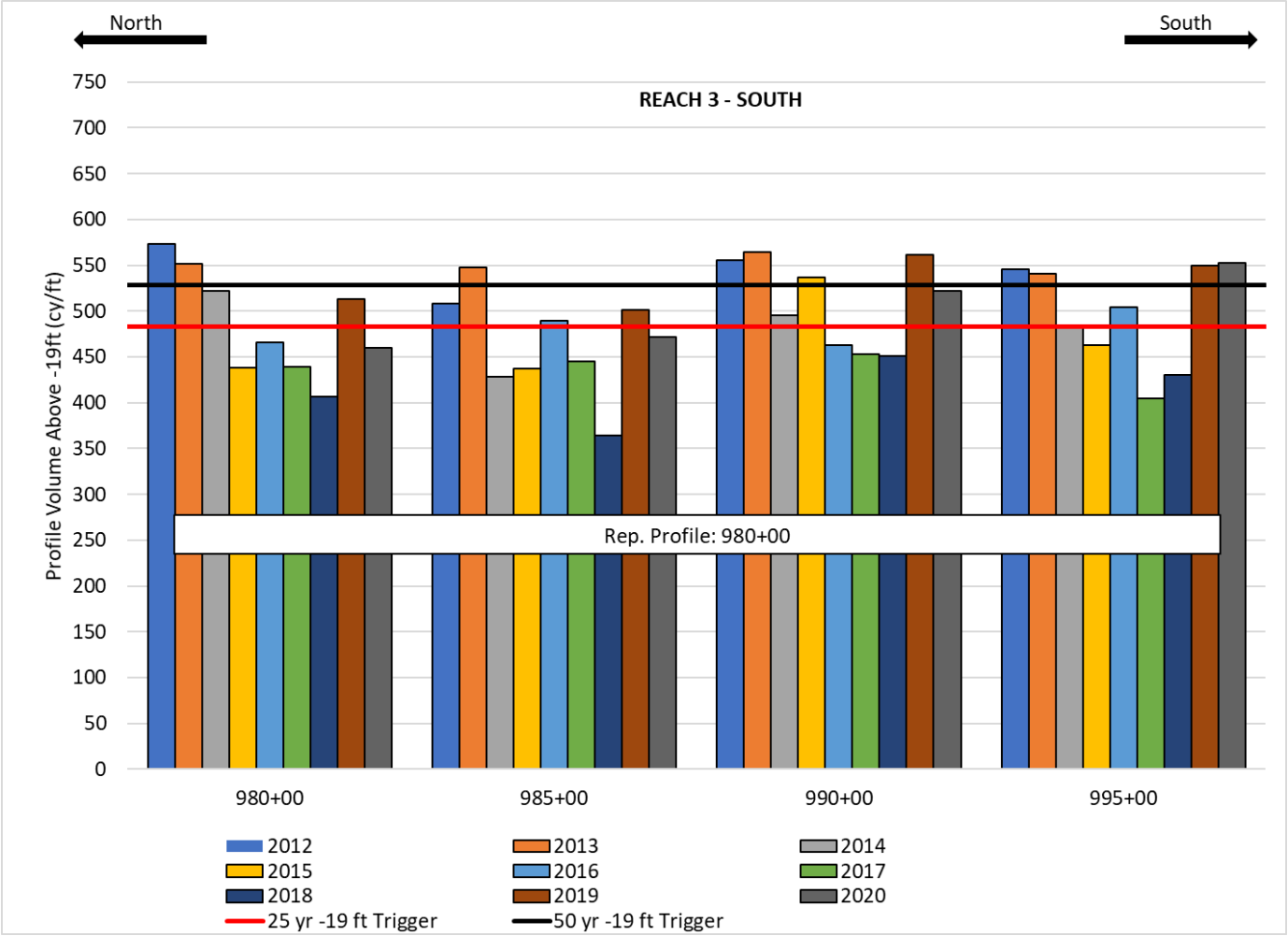


Figure 5-46: Profile Volume Above -19 ft NAVD88 – Representative Transect 980+00 (980+00 – 995+00)

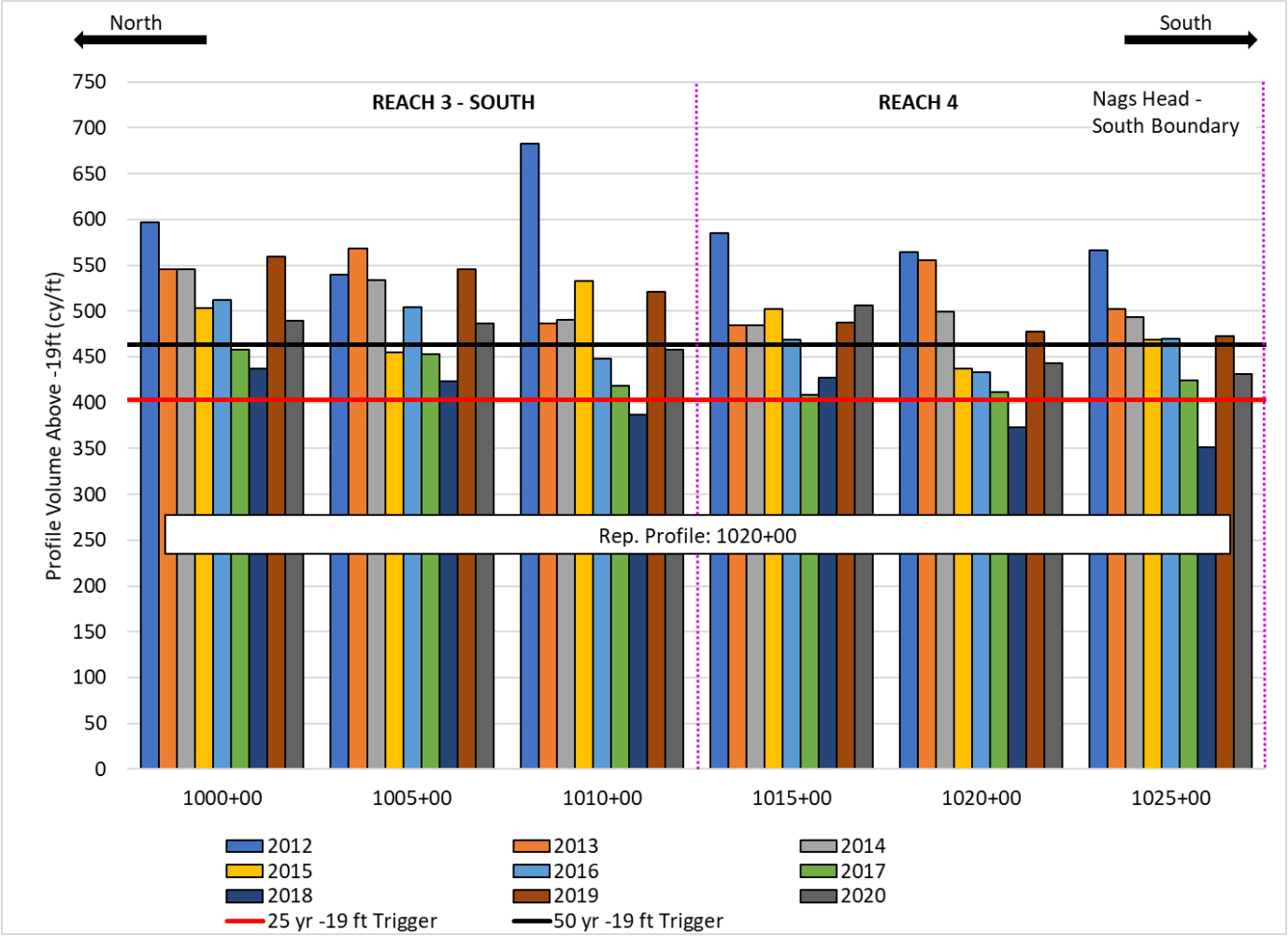


Figure 5-47: Profile Volume Above -19 ft NAVD88 – Representative Transect 460+00 (1020+00 – 1025+00)

5.5.4 Consideration of Sea Level Rise

As discussed in Section 3.2.4, NOAA guidance indicate relative sea level change (RSLC) values ranging from rise of approximately 1 ft to 3 ft in the project vicinity at a point in time 50 years into the future.

The designed dune height, and to a lesser extent the berm height, have been optimized to provide acceptable LoP in a specific design storm return period event. An implication of sea level rise is that the shoreline is expected to retreat in response to the changes in sea level if no action is taken. The dune crest and berm elevations would need to rise by approximately the same amount as relative sea level to maintain an equivalent LoP. An evaluation of the amount of sand volume (V) that would be required to accommodate this required increase in dune crest and berm height and maintain the shoreline position has been performed using the Bruun Rule (Brunn, 1962), Equation 5.1:

$$V = L_{shoreline} \times S \times w_{profile} \qquad \text{Equation 5.1}$$

Where $L_{shoreline}$ is the length of the Nags Head shoreline, S is the amount of sea level rise (SLR) anticipated during the 50-year master plan timeframe, and $w_{profile}$ is the profile width from the dune crest to the -14 ft contour. The analysis has been performed using the representative profiles described in Section 5.1.1. The distance ($w_{profile}$) between the dune crest and the -14 ft NAVD88 contour was measured for each of the profiles and the average value was determined to be approximately 850 ft. RSLR scenarios were determined using the Duck tide gauge location (Section 3.2.4), and adjusted to consider only rise between 2022 and 2072. Equation 5.1 was then used to determine the estimated volume to accommodate this rise. Results are presented in Table 5-8.

Table 5-8: Additional Volumes Needed to Adapt to RSLC Scenarios

Sea Level Change Scenario	2022 RSLR (ft)	2072 RSLR (ft)	2072 RSLR adjusted to 2022 baseline (ft)	$L_{shoreline}$ (ft)	$W_{profile}$ (ft)	Volume (Mcy)
Intermediate Low	0.45	1.86	1.41	59,500	850	2.6
Intermediate	0.45	2.28	1.83	59,500	850	3.4
Intermediate High	0.45	2.95	2.5	59,500	850	4.7

It is noted that changes to the target beach profiles due to sea level change would be made gradually over the project lifetime. The approximate volumes in Table 5-8 are provided for inclusion in planning efforts for sediment need. In practice, monitoring data would be used to adjust individual maintenance renourishments, dune enhancement projects, and post-storm recovery nourishments as needed as time progresses. In this way, the required elevation and volume changes would be achieved progressively over the plan's lifetime.

5.6 Nourishment Trigger Determination

With the 25-yr event selected as the finalized LoP, the nourishment triggers were developed. Table 5-9 shows the various trigger volumes above -19 ft NAVD for both the 25-yr event as well as the amount in place as of May 2018 (pre-nourishment).

Nonetheless, while determination of the individual sub-reach triggers was needed, it would not be practicable to have individual nourishment actions be dictated by a single sub-reach while adjacent sub-reaches would not require sand placement. Therefore, the individual sub-reaches were combined in a weighted average to determine reach-wide triggers as shown in Table 5-9.

Table 5-9: Trigger Volumes Above -19 ft NAVD88 for 25-yr Event

Reach	Length (ft)	Rep. Profile	25-yr Trigger Volume (cy/ ft)	Reach Trigger for 25-yr event (cy/ft) (Weighted)	May 2018 Volume Above -19 ft (cy/ ft)
North	6,250	460+00	355	355	578
Reach 1	4,500	520+00	503	470	509
	5,500	535+00	451		472
	7,000	625+00	478		506
	5,500	715+00	479		501
	6,000	735+00	443		490
	2,500	785+00	604		610
Reach 2	5,500	855+00	491	502	446
	2,500	865+00	471		499
	2,500	895+00	526		485
	2,500	920+00	463		504
Reach 3 - North	4,500	935+00	464	446	464
Reach 3 - South	2,000	980+00	461		407
Reach 4	2,750	1020+00	401		373
TOTAL	59,500			464	

5.7 Long-Term Sediment Volume Need

The volumes from the beach profile statistical analysis presented in 4.2.2 are combined with the initial LoP volume need (Section 5.5.2), and the relative sea level rise need (Section 5.5.4) to develop a long-term sediment volume need, presented in Table 5-10. A relatively high estimate of potential volumetric losses during dredging has also been

computed. This volume estimate is considered to be conservative and can be compared with sand volumes available from identified borrow sources to provide assurance that the beach nourishment master plan can be executed successfully.

Table 5-10: Long-Term (50-Year) Sediment Volume Need

Crystal Ball	**Background Erosion 50 years (50%)**	22.5 Mcy		
	Additional Storms (75%)	21.5 Mcy		
LoP (25 year) Design		0.6 Mcy		
Relative Sea Level Rise (NOAA, 2022)		**Intermediate Low**	**Intermediate**	**Intermediate High**
		2.6 Mcy	3.4 Mcy	4.7 Mcy
TOTAL		**46.7 Mcy**	**47.5 Mcy**	**48.8 Mcy**
Assumed 20% losses during dredging		*56.0 Mcy*	*57.0 Mcy*	*58.6 Mcy*

6.0 EVALUATION OF HISTORICAL SHORELINE EVOLUTION

6.1 Purpose and Definitions

In addition to designing nourishment profiles, the predicted life of the nourishment projects and their effect on neighboring stretches of beach must also be determined. Using the knowledge gained from historical monitoring and the cross-shore profile evolution modeling in CSHORE about the LoP required, the longshore behavior of these projects must then be analyzed to fully understand the effect on the system. In order to perform these analyses, an understanding of historical shoreline behavior/evolution is needed.

6.2 Analytical/Empirical Analysis

DCM has developed average long-term rates of shoreline change over approximately 50 years from 1949 to 2016. Figure 6-1 shows the 2020 DCM erosion rates along Nags Head (NCDCM, 2020). It should be noted that these erosion rates inherently include the nourishment activities which took place on the island. Therefore, actual erosion rates are higher than those computed by NCDCM. These erosion rates do provide some insight into shoreline change patterns along the island. The shoreline erosion rate increases from north to south with the most severe erosion occurring at the southern end of the town. This is in agreement with the monitoring data from the past decade.

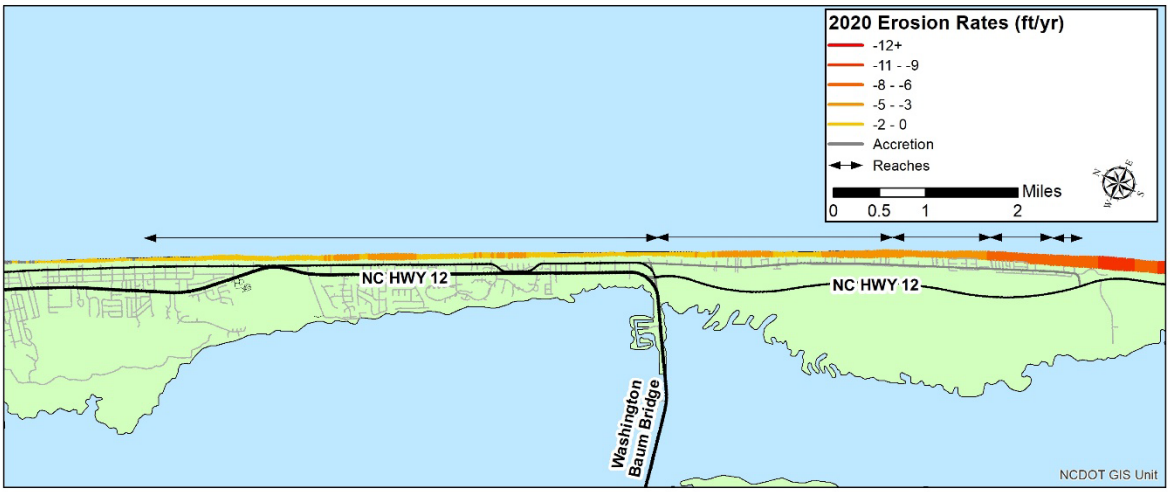


Figure 6-1: NCDCM 2020 Long-Term Erosion Rates

6.3 Numerical Modeling: GenCade

GenCade is a 1-D numerical model that combines the capabilities of GENESIS and Cascade, allowing for engineering design level calculations with the ability to span long, regional segments of shoreline that may contain inlets. GenCade is designed to simulate long-term shoreline change based on spatial and temporal differences in longshore

sediment transport induced primarily by wave action. The GenCade modeling system allows for a number of user-specified inputs including wave inputs, initial shoreline positions, coastal structures and their characteristics, beach fills; and inlet system shoal volumes, all of which aid in the calculation of sediment transport and shoreline change. This model was developed at the U.S. Army Corps of Engineers (USACE), Engineer Research and Development Center (ERDC), Coastal Inlets Research Program (CIRP). For a more detailed description of the GenCade model, the reader is referred to the GenCade Version 1 Model Theory and User's Guide (Frey, et al., 2012). GenCade operates within the Surface-water Modeling System (SMS), a suite of tools developed by Aquaveo. The software version used is GenCade 1.6 updated July 2015, obtained from CIRP's website (http://cirp.usace.army.mil/products/gencade.php).

The GenCade model has the potential for many applications in the coastal environment, including evaluation of longshore sediment transport, analysis of beach fill performance, or the analysis of the impact of coastal structures on shoreline change.

The main inputs to the GenCade model include:

- Shoreline Position Data – one-dimensional description of the shoreline position relative to a straight baseline position,
- Wave Data – long-term time dependent description of wave heights, periods, and directions applicable to the study srea,
- Coastal Structures – position and characteristics of coastal structures (breakwaters, groins, jetties, or seawalls) acting along the study area,
- Beach Fill – starting and ending dates and location of beach fill defined by an added berm width,
- Inlet Shoal Volumes – Ebb, Flood, Left Bypass, Left Attachment, Right Bypass, and Right Attachment
- Sediment and Beach Characteristics – effective grain size, average berm height, and closure depth for the study area,
- Regional Contour – an offshore contour to account for bathymetry which may affect wave direction/energy
- Boundary Conditions – seaward boundary conditions for the input wave data and lateral boundary conditions for the shoreline (left and right).
- Sediment Transport Parameters – used to characterize longshore sediment transport and calibrate the model.

6.3.1 Modeling Scope

Application of the GenCade model enhances the understanding of historical longshore sediment transport and erosional patterns along the Nags Head study area. It also provides additional information to evaluate shoreline stabilization and restoration alternatives.

To establish the appropriate model parameters, the GenCade model was calibrated and validated for the June 2015 to April 2019 time period using historical Mean Sea Level (MSL) shoreline positions from periodic survey evaluations and coinciding wave data transformed to nearshore from the offshore wave data. GenCade is primarily calibrated by adjusting the longshore sand transport coefficients (K_1 and K_2). Additionally, the model may be calibrated by adjusting the characteristic transmissivity or permeability of offshore breakwaters, groins, or jetties, where applicable. Furthermore, boundary condition parameters (e.g. smoothing, wave input adjustments) may be altered to achieve calibration, or to test the model sensitivity. An offshore regional contour may also be incorporated to account for any bathymetric features that may impact wave direction and energy along the shoreline.

Once a calibrated model was developed, the model was run for a verification time period from June 2012 to June 2016. This verification time period included Hurricane Sandy and an absence of multiple engineering projects, ensuring that the model performed correctly during large gaps in between nourishment intervals. Shoreline positions from the periodic survey evaluations were used in conjunction with wave data transformed to nearshore from the offshore wave data.

The GenCade model coverage extended from Nags Head – north end (Station 460+00) to south of Nags Head (Station 1080+00).

6.3.2 Calibration Model

The GenCade model was calibrated to reflect the historical trends of longshore sediment transport and the resulting shoreline change over the study area. The overall calibration time period was based on the availability of quality measured shoreline data and measured wave gauge data.

For this study, the general calibration procedure involved:

- establishing known model inputs including shoreline position, waves, locations of structures, sediment and beach characteristics, and boundary conditions,
- establishing initial sediment transport parameters and adjusting these parameters until the relative shoreline response (erosion/accretion) and sediment transport rates matched historical trends, and
- adjusting the regional contour to account for bathymetric influences on targeted areas of shoreline (erosion hotspots).

This calibration sequence was followed using known inputs and default initial parameters. Then, particular input parameters (sediment transport parameters, smoothing, wave input adjustments etc.) were revisited and the sensitivity of the model response to changes in these parameters was tested. In many cases, a given parameter was adjusted to yield a more accurate shoreline response. The final determined input data for the calibration model is presented in the following sections. Neither beach nourishment nor coastal structures were present during the calibration time period.

Shoreline Position Data

For shoreline input, the GenCade model requires the shoreline be specified in a station-offset formulation whereby the station represents a position along a landward baseline and the offset is the perpendicular distance from this baseline to the shoreline. The initial shoreline used in the GenCade model was the June 2015 MSL shoreline, based upon the CSE June 2015 survey. The final reference shoreline to which the model was calibrated was the April 2019 shoreline, based upon the CSE 2019 pre-nourishment survey.

Wave Data

The wave transformation study was conducted utilizing the MIKE 21 Spectral Waves (SW) model (DHI, 2014) to calculate wave conditions approaching the beach of Town of Nags Head, NC. MIKE 21 SW simulates the growth, decay and transformation of wind-generated waves and swells in offshore and nearshore coastal areas. The MIKE 21 SW model discussed in Appendix A was used to transform the offshore time series of waves from the relatively deep water NDBC stations to nearshore positions at Nags Head. The model simulated nearshore wave conditions were extracted at 12 stations with approximate depths of -33.0 ft NAVD88 along the shoreline. The nearshore wave data, which include both storm and non-storm wave conditions, were utilized as representative wave conditions to evaluate long-term shoreline changes.

For the long-term wave transformation simulations, NDBC 44095 measured wave data was used for the open boundary conditions. The wave transformation model was run for the period of 2012 to 2019.

Sediment and Beach Characteristics

The selected effective grain size assumed in the GenCade model was 0.35 mm. This grain size was determined based on analysis of measured sediment data collected and analyzed by CSE (2005).

The average berm height was defined as +7 ft NAVD88 and the closure depth was set to -15 ft NAVD88. These values were determined based on observations of measured survey data during the calibration and verification time period from the ongoing periodic surveys.

Sediment Transport Parameters

Longshore sediment transport is characterized by the transport parameters K_1 and K_2 in GenCade. The transport rate coefficient, K_1, is used to control the time scale and magnitude of the simulated shoreline change, while K_2 is used to control shoreline change and longshore sand transport in the vicinity of structures. Although the values of K_1 and K_2 have been empirically estimated, these coefficients are treated as calibration parameters in GenCade and range in value from 0 to 1.0.

The calibration models were initially run with the default K_1 and K_2 coefficients, where $K_1 = 0.5$ and $K_2 = 0.25$. The resulting April 2019 model shoreline was compared with the measured April 2019 shoreline and the coefficients were adjusted to achieve the closest match in the model results and the measured shoreline position. Through this procedure, it was determined that slightly decreasing the K_1 value resulted in shoreline response which was most indicative of historical patterns. The final calibration transport coefficient values were chosen to be $K_1 = 0.3$ and $K_2 = 0.25$.

Regional Contour

The regional contour is one of the many adjustment tools within GenCade that allows the model to more realistically represent the behavior of the prototype shoreline. The use of a regional contour allows the modeler to specify the underlying shoreline shape that the model will evolve towards, rather than having the model evolve toward a straight line. It is the result of all the large-scale, alongshore forcing-function non-homogeneities and underlying geology that are not accounted for in GenCade and that, in combination, cause the real-world shoreline to attain a non-straight, long-term equilibrium planform shape. A regional contour was applied in the current model study. The regional contour was initially developed based on initial shoreline and fine-tuned during the calibration.

Boundary Conditions

The required boundary condition inputs for GenCade include the seaward wave data boundary conditions and the lateral boundary conditions at the left (north) and right (south) ends of the shoreline as described following.

Seaward Boundary Conditions

Within the seaward boundary conditions, the user may modify the input wave conditions (wave height and direction) by factors to analyze the impact changes in modeled wave conditions have on the resulting shoreline response. During calibration it was determined that the input wave height and wave angle derived from the MIKE 21 SW model results were representative of nearshore conditions and were used without modification.

Lateral Boundary Conditions

The north (left) boundary of the model was established at north of the historical nourishment area of Nags Head where a moving boundary of -3.7 ft/yr was established based on the initial and reference shoreline position data.

The south (right) boundary of the model was located south of Nags Head town limits. It was determined that due to the historical erosion, a moving boundary of -18.3 ft/yr would be appropriate.

Calibration Model Results

Multiple GenCade model runs were completed to achieve a reasonably calibrated model. The GenCade model calibration parameters are presented in Table 6-1.

Table 6-1: Calibrated GenCade Model Setup Parameters

No.	Parameter Name	Value
1	Cell size	40 ft
2	Grain size	0.35 mm
3	Average berm height	7 ft
4	Closure depth	15 ft
5	Longshore sand transport coefficient, K1	0.3
6	Longshore sand transport coefficient, K2	0.25
7	Lateral boundary for North boundary	Moving (-3.7 ft/yr)
8	Lateral boundary for South boundary	Moving (-18.3 ft/yr)

Shoreline Change

Figure 6-2 illustrates the comparisons between the observed (solid blue line) shoreline changes at each survey transect and model simulated shoreline changes (solid red line) at the MSL water location between June 2015 and April 2019. In general, the simulated shoreline changes are in reasonable agreement with the observed shoreline changes at most locations along the Nags Head beach between June 2015 and April 2019.

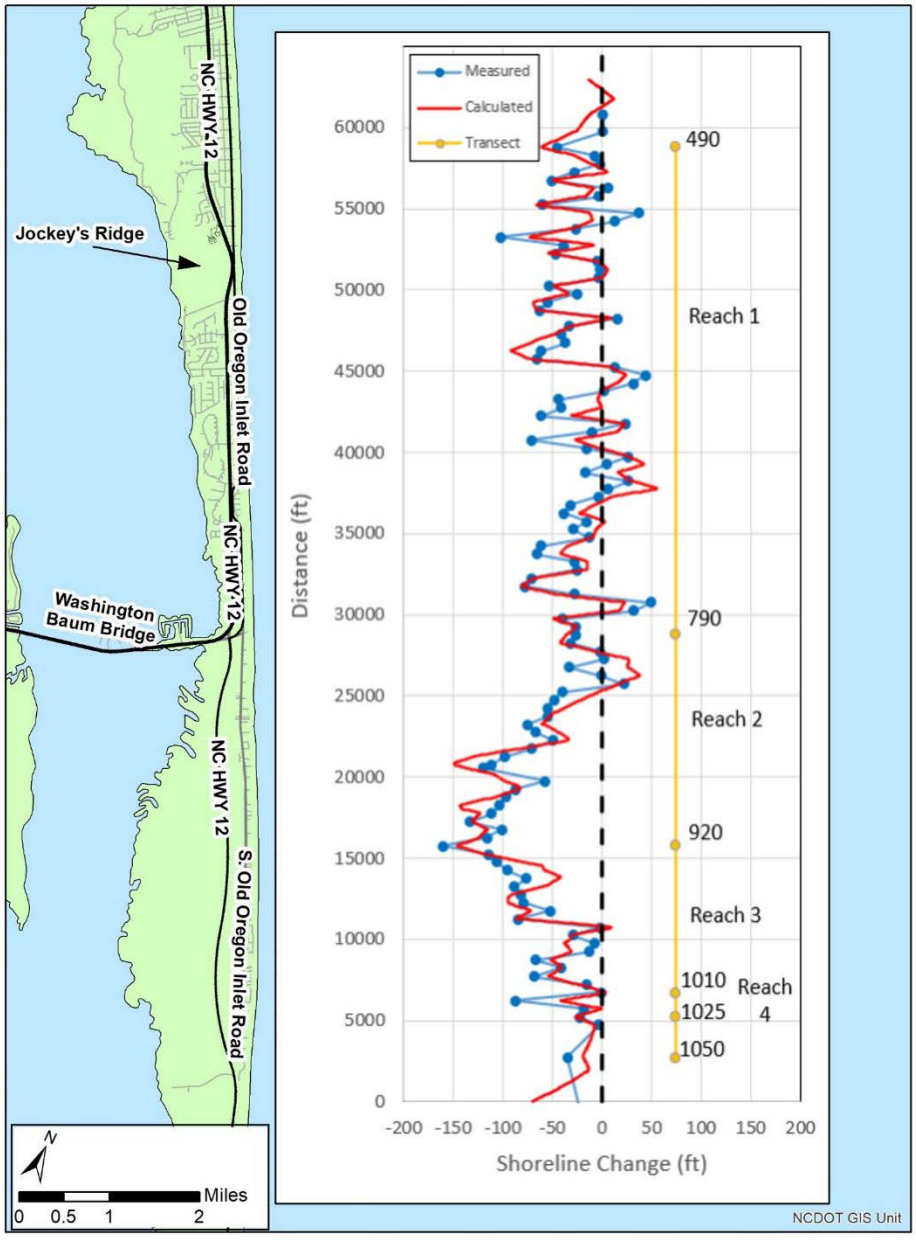


Figure 6-2: GenCade Calibration – Comparison of Model Simulated and Measured Shoreline Changes (Model Calibration, Jun. 2015 to Apr. 2019)

Longshore Sediment Transport

The calculated net longshore sediment transport rates between June 2015 and April 2019 are illustrated in Figure 6-3. In Figure 6-3 the positive sediment transport is from north to south, and the negative sediment transport is from south to north. The shoreline model simulated net longshore sediment transport rates are between approximately -200,000 cy/yr (sediment transport to north) and 240,000 cy/yr (sediment transport to south) between June 2015 and April 2019. Note that a reversal of transport direction is modeled within Reach

2, where north of this location sediment transport is to the north, and south of this location sediment transport is to the south.

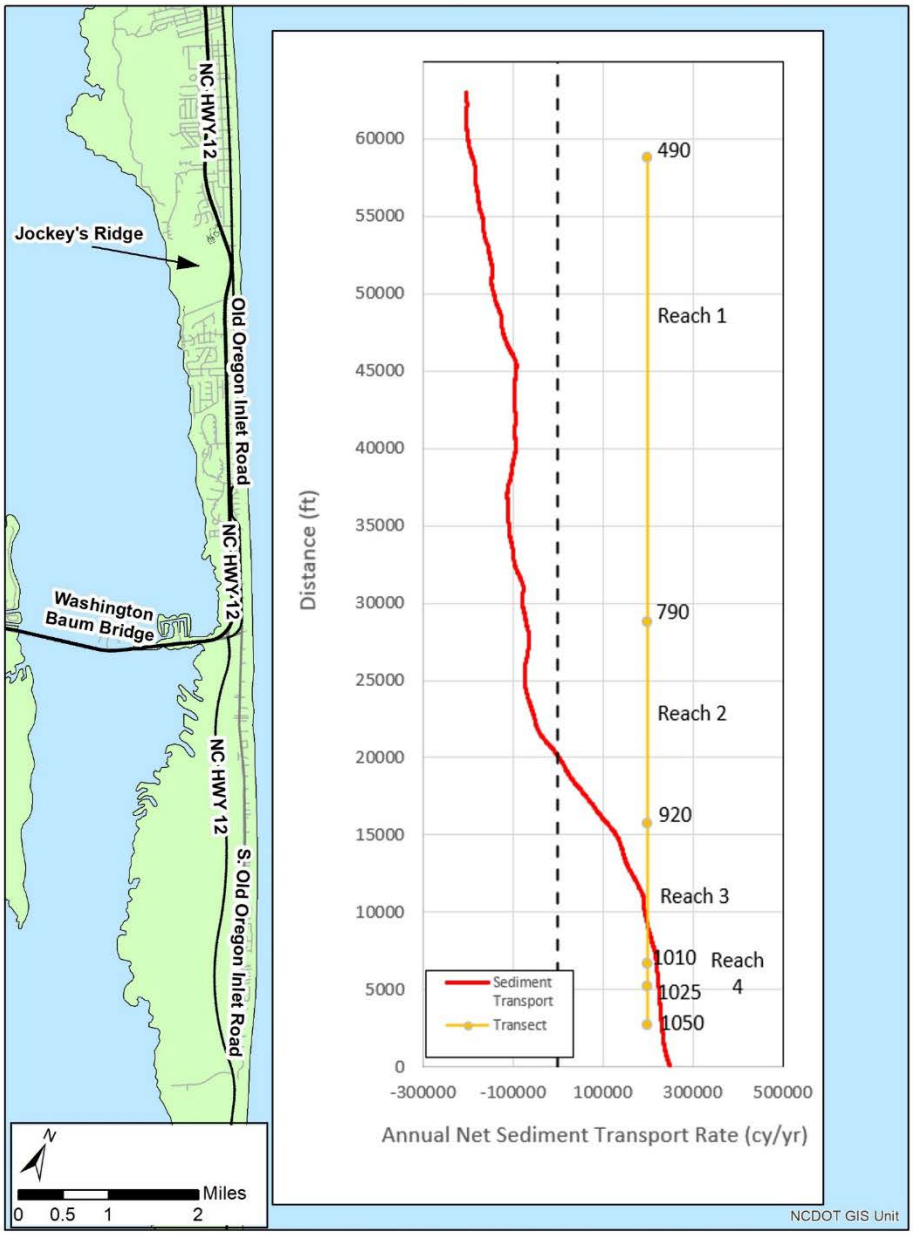


Figure 6-3: GenCade calibration – Calculated Net Longshore Sediment Transport Rates (Jun. 2015 to Apr. 2019)

6.3.3 Model Validation

To validate the shoreline response in GenCade based on the calibration coefficients chosen during the calibration process, a validation model was set up from June 2012 through June 2016. Only input shorelines, beach fills, wave data, and boundary conditions were varied

from the calibration model to reflect the new time period being modeled. All structures, beach characteristics, and sediment transport parameters were held consistent with those used in the calibration model (Table 6-1**)**.

Shoreline Position Data

The initial shoreline used in the GenCade model validation was the June 2012 MSL shoreline, based upon the CSE June 2012 survey. The final reference shoreline to which the model was validated was the June 2016 shoreline, based upon the CSE 2016 annual monitoring survey.

Wave Data

As with the calibration model, MIKE 21 SW model (Appendix A) was used to transform the offshore time series of waves from the NDBC station to nearshore positions to develop a wave time series from June 2012 to June 2016. The nearshore wave data were then extracted at 12 stations with approximate depths of -33.0 ft NAVD88 along the shoreline to be used in GenCade validation.

Boundary Conditions

As mentioned previously, the required boundary condition inputs for GenCade include the seaward wave data boundary conditions and the lateral boundary conditions at the left (north) and right (south) ends of the shoreline. The boundary conditions for model validation were the same as those in the calibration model.

Validation Model Results

Figure 6-4 illustrates the comparisons between the observed (solid blue line) shoreline changes at each survey transect and model simulated shoreline changes (solid red line) at the MSL location between June 2012 and June 2016. The simulated shoreline changes are in reasonable agreement with the observed shoreline changes at most locations along the Nags Head beach between June 2012 and June 2016.

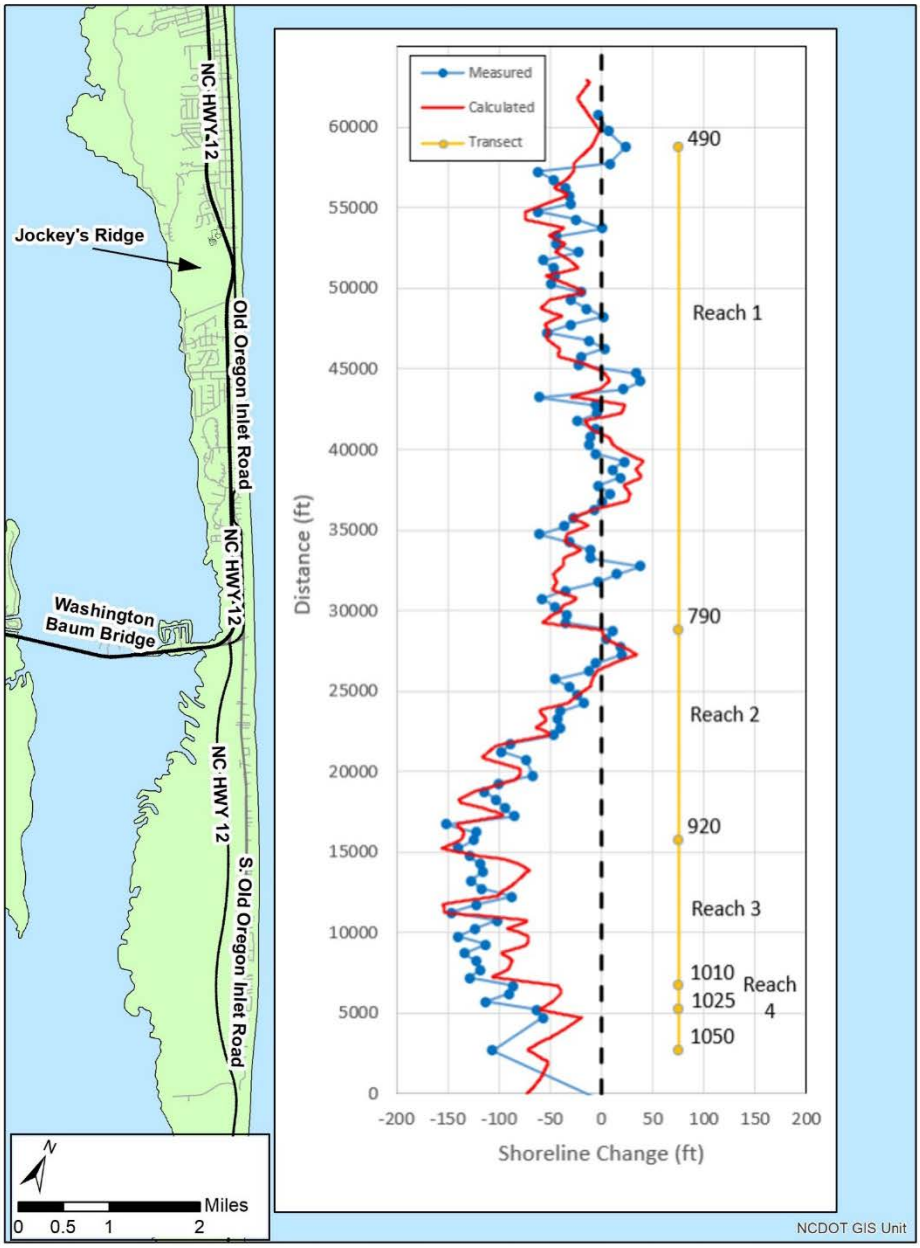


Figure 6-4: GenCade validation - Comparison of Model Simulated and Measured Shoreline Changes (Model Validation, Jun. 2012 to Jun. 2016)

The calculated net longshore sediment transport rates between June 2012 and June 2016 are illustrated in Figure 6-5. The shoreline model simulated net longshore sediment transport rates are between approximately -100,000 cy/yr (sediment transport to north) and 450,000 cy/yr (sediment transport to south) between June 2012 and June 2016. For this time period, a reversal of transport direction is modeled within Reach 1, where in the northern part of Reach 1, sediment transport is to the north, and south of this location sediment transport is to the south.

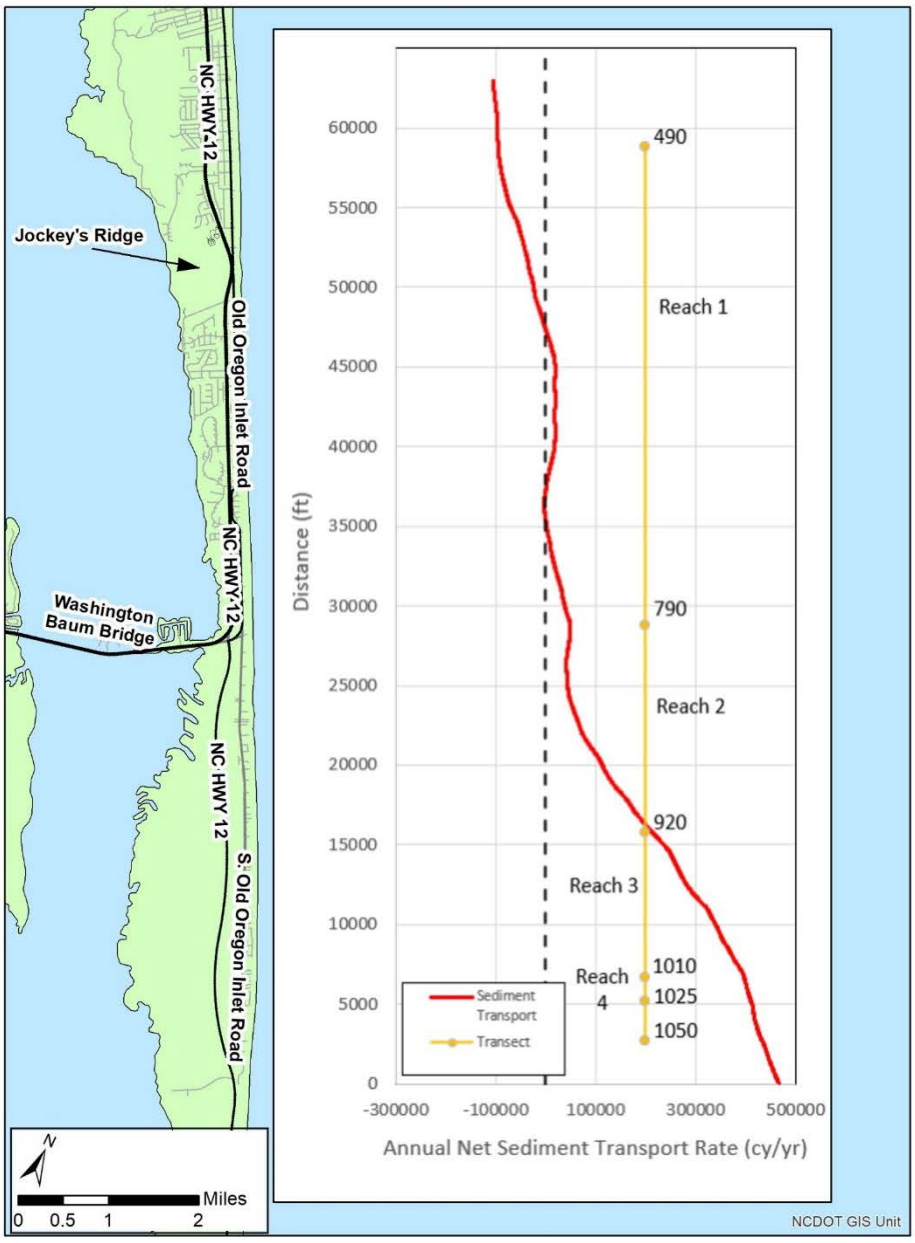


Figure 6-5: GenCade validation - Calculated Net Longshore Sediment Transport Rates (Jun. 2012 to Jun. 2016)

7.0 ENGINEERING ALTERNATIVES CONSIDERED

This chapter provides an evaluation of various alternatives aimed at managing the Nags Head shoreline. By examining the benefits, costs, and disadvantages associated with each option, this analysis equips decision-makers with crucial information necessary to establish a robust management framework for the town's shoreline over the next 50 years.

7.1 No Action: No Further Beach Nourishment

The Town of Nags Head has conducted four beach and dune nourishment projects along the Nags Head oceanfront since 2004 as described in Section 3.7, with approximately 9.5 Mcy of sand placed on Nags Head. In order to evaluate the consequences of discontinuing beach nourishment, a numerical modeling analysis was completed using the calibrated and validated model described in Section 6.3 to develop a forecast shoreline position for the 50-year planning horizon.

This numerical modeling forecast began with the most-recent surveyed shoreline dated May 2022. Because the future wave conditions are unknown, modeled past wave conditions from 2012-2019 repeated consecutively for the 50-year time frame were used as an approximation of likely future conditions. The resulting modeled shoreline was then imported into ArcGIS and compared with structure locations along the length of the town's shoreline. Modeled shoreline recession ranged from approximately 4 ft/yr at the northern end of Reach 1 to 18 ft/yr at the southern end of Reach 4. The land value, building value, and miscellaneous value of the impacted parcels were totaled to estimate the potential value of damage that could occur if no nourishment activities were performed. Structures, and their associated parcels, were considered impacted if the modeled 50-year shoreline came within 20 ft of the main structure footprint. According to rule 15A NCAC 07H.0308(a)(2), NC DCM considers a structure imminently threatened if "its foundation, septic system, or right-of-way in the case of roads is less than 20 feet away from the erosion scarp". Based on this analysis, approximately 1330 parcels were impacted, containing a total value of $805 million, which constitutes approximately 21% of the total property value of the Town of Nags Head. Table 7-1 presents a summary of the values.

Table 7-1: Value of Impacted Parcels

Value Type	Value Amount ($)
Land Value	$453,790,300
Building Value	$331,614,300
Misc. Value	$19,816,900
Total	**$805,221,500**

In addition to the actual land and building values, the Town would incur losses to annual property tax collections. The current tax structure imposes a 0.3300 tax rate for the Town of Nags Head with an additional 0.1430 tax rate to oceanfront homeowners. A further 0.005

tax rate is assessed to homeowners in the northern portion of the Town that does not receive as much nourishment and a 0.010 tax rate to homeowners in the southern portion of the Town that typically receives more nourishment. It is estimated that based on the impacted parcels, potential losses to annual property tax could reach $3.9 million. It should be noted that Nags Head makes up approximately 18% of the property tax base for Dare County. Any impacts to property values and tax collections would likely resonate throughout the County as well. Table 7-2 presents a summary of the property tax values.

Table 7-2: Property Tax Values

Tax Description	Tax Rate	Tax Amount
Town of Nags Head	0.330	$2,657,231
Beach Nourishment - Oceanfront	0.143	$1,151,467
Beach Nourishment – North	0.005	$40,261
Beach Nourishment - South	0.010	$80,522

It should also be considered that a well-maintained beach has a large economic impact on the Town of Nags Head, which is highly dependent on tourism. Nags Head beach is a major economic driver for the Town and the surrounding Dare County. The economy generates economic activity through home rentals, hotel visitation, food and beverage services, recreational fishing and water-sports charters, commercial fishing, fishing tournaments and associated support services. Based on the 2016 Beach and Inlet Management Plan Update, beach recreation values for the Town of Nags Head total almost $594 million when direct impacts, total impacts, and local sales tax revenue were considered. If the beach were not maintained, the Town would have the potential to lose revenue from beach recreation. Table 7-3 presents a summary of beach recreation values, in 2014 dollars, for the Town of Nags Head.

Table 7-3: Beach Recreation Values (BIMP, 2016)

Value Type	Value
Direct Impact Expenditures	$186,572,268
Total Impact Output/Sales/Business Activity	$393,410,745
Local Tax Revenue	$13,730,542
Total	**$593,713,555**

For reference, gross occupancy tax collections for the Town of Nags Head totaled $210,802,662 in 2022. This value could be greatly impacted if the beaches are not maintained and impacts would likely resonate throughout the County as well. Figures showing the impacted parcels overlain on February 2022 aerial photography are presented in Appendix D.

7.2 Beach Nourishment Alternatives

This section considers beach nourishment alternatives that would place beach-compatible sand along the Nags Head shoreline from Reach 1 to Reach 4, with volumes based on the Crystal Ball analysis of historical volumetric erosion rates. Different placement intervals are considered and the volume need for each project is adjusted to develop typical project cost estimates (2023 dollars). Detailed cost estimates are presented in Appendix E.

7.2.1 North Reach Considerations

As described in Section 1.1, the Nags Head – North reach extends from stations 430+00 to 490+00, a distance of 6,250 ft. This section of shoreline is currently eroding at less than 5,000 cy/year (above the -19 ft contour, see Section 4.2.1). At that rate, and with current beach and dune volumes, there would only be one beach nourishment needed in this reach to meet background erosion needs during the 50-year master plan time frame, approximately 48 years in the future. (It is noted that storm impacts could necessitate additional nourishment.) For this reason, the North Reach has not been included in the beach nourishment master plan alternatives discussed. However, the volumetric needs for both background and storm erosion in this reach have been included in the long-term sediment volume need presented in Section 5.7.

7.2.2 Initial Volume to Attain Equivalent Level of Protection (LoP)

In order to provide an equal level of protection to each reach of the Town's shoreline, an initial volume of sand placement is required as described in Section 5.5.3. This volume of 0.6 Mcy was added to each of the alternatives for the first project in the 50-year master plan. The cost of this initial placement was estimated at approximately $6.5 M (2023 dollars).

7.2.3 Nourishment Interval Comparisons

Nourishment intervals of 4, 5, 6, and 8 years were considered with nourishment placed along the entire nourished shoreline of Nags Head (Reach 1 to Reach 4), as shown in Figure 7-1. Volume requirements for each nourishment at these intervals were determined using the Crystal Ball volumetric estimates described in Section 4.2.2. The volumetric requirements for each maintenance project at these intervals are presented in Table 7-4.

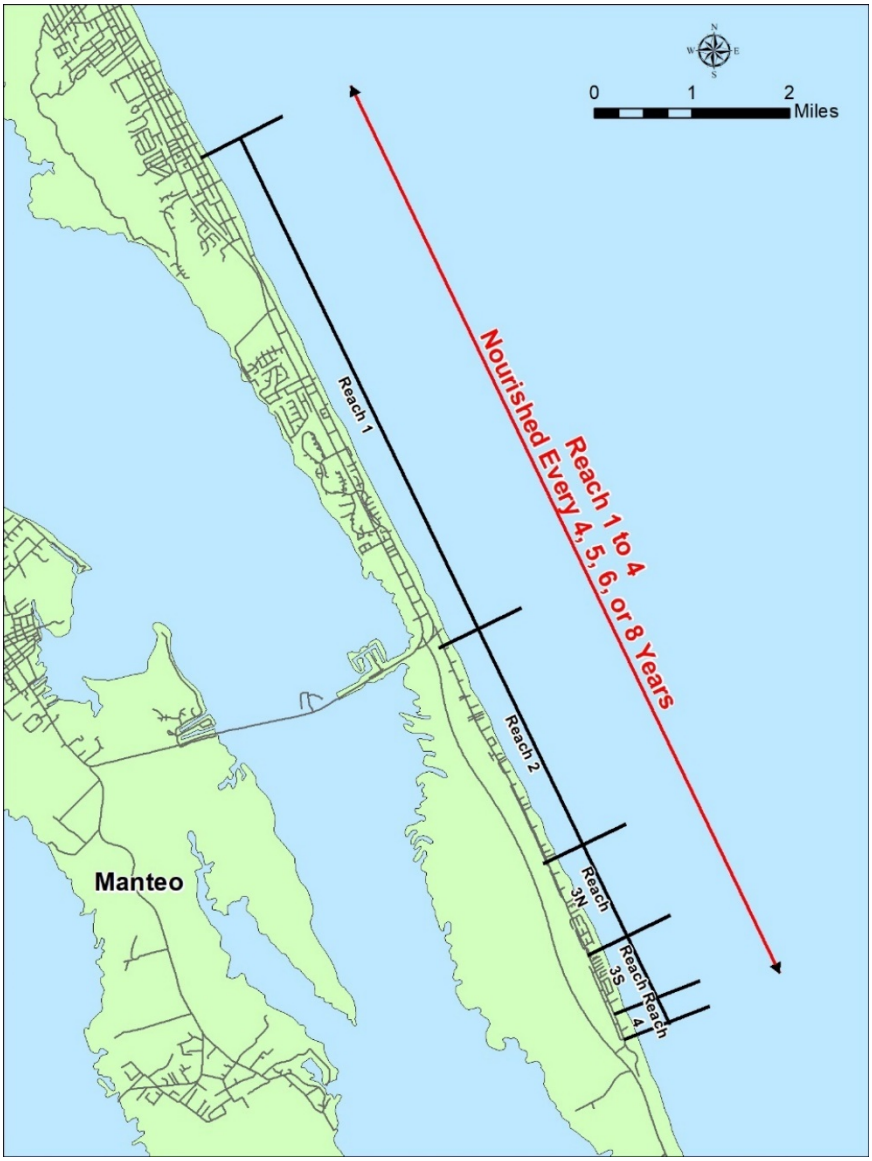


Figure 7-1: Beach Nourishment Alternatives

Table 7-4: Placement Volumes for Varying Nourishment Cycles

Reach	Annual Volumetric Loss (cy/year)	Placement Volume (4 year cycle) cy	Placement Volume (5 year cycle) cy	Placement Volume (6 year cycle) cy	Placement Volume (8 year cycle) cy
Reach 1 (500+00 - 785+00)	126,238	504,952	631,190	757,428	1,009,904
Reach 2 (790+00 - 915+00)	103,228	412,912	516,140	619,368	825,824
Reach 3N (920+00 - 970+00)	92,772	371,088	463,860	556,632	742,176
Reach 3S (975+00 - 1005+00)	72,653	290,612	363,265	435,918	581,224
Reach 4 (1010+00 - 1025+00)	44,493	177,972	222,465	266,958	355,944
Total Volume Per Project		**1,757,536**	**2,196,920**	**2,636,304**	**3,515,072**

These volumetric requirements were used to develop cost estimates for each project (in 2023 dollars) as shown in Table 7-5. These costs were multiplied by the number of nourishment cycles over the 50-year master plan timeframe, and the cost to attain the 25-year LoP with the first project was added to the first nourishment, to obtain the estimated 50-year total cost. This was then divided by either 48 or 50 years (depending on the interval, to give comparable estimates) to obtain an average annual cost for beach maintenance over the 50 years (Table 7-5). Additionally, to evaluate potential differences in costs due to occurrence of projects in varying future years, engineering economics calculations were performed. These variations in timing did not significantly affect the cost comparison of alternatives.

It is noted that the costs for post-storm recovery projects have not been included in these estimates because they are anticipated to be covered by FEMA reimbursement per 44 CFR § 206.226(j)(2). Additionally, the approximations of future volumes that could be needed to meet the demands from sea level rise are provided in Section 5.5.4 and are included in the overall sediment volume need presented in Section 5.7.

Table 7-5: Project Costs for Varying Nourishment Cycles (2023 dollars)

Nourishment Interval	Number of Nourishment Cycles	25-Year LOP Cost	Single Nourishment Cost	50-Year Total Cost	Cost Per Year
4-year	12	$6.50 M	$24.71 M	$303.01 M	$6.31 M*
5-year	10	$6.50 M	$29.14 M	$297.85 M	$5.96 M**
6-year	8	$6.50 M	$33.43 M	$273.94 M	$5.71 M*
8-year	6	$6.50 M	$42.33 M	$260.45 M	$5.43 M*

*Based on 48 Years
**Based on 50 Years

7.2.4 Discussion

As shown in Table 7-5, the least cost beach nourishment alternative evaluated over the 50-year master plan timeframe is the 8-year nourishment cycle. This is due to this alternative requiring fewer projects and placing more sand in each project, which allows for lower mobilization and demobilization costs and lower costs per cubic yard of sand placement. However, a 6-year cycle has some advantages and is not substantially more expensive than the 8-year cycle alternative. The 6-year cycle allows for less expensive individual projects and more frequent ability to adapt to changes in volumetric erosion rates. The nourishment interval is also flexible in that if volumetric triggers are not reached, the time period between projects can be extended.

Some general advantages of nourishing all reaches in each project are that this practice reduces the number of projects required over the 50-year planning horizon, and therefore minimizes mobilization/demobilization costs as well as the number of times the permitting process is required. Additionally, it may be perceived as equitable by residents and property owners as all of the reaches are nourished each time. One disadvantage of choosing this approach is that because of the lower volumetric erosion rate in Reach 1, there is a higher unit cost for material placed with less fill density (fewer cy per ft of beach). Additionally, a larger area is affected by the disruptions associated with the nourishment project each time.

7.3 Phased Beach Nourishment Alternatives

This section considers beach nourishment alternatives with a phased approach, where the interval between placement events would differ between Reach 1 and Reaches 2 to 4, as shown in Figure 7-2. Because the volumetric erosion rate in Reach 1 is less than that of the other reaches, this approach would provide some efficiencies in placement of material within Reach 1. Required volumes are again based on the Crystal Ball analysis of historical

volumetric erosion rates. Different phasing intervals are considered and the volume need for each project is adjusted to develop typical project cost estimates (2023 dollars).

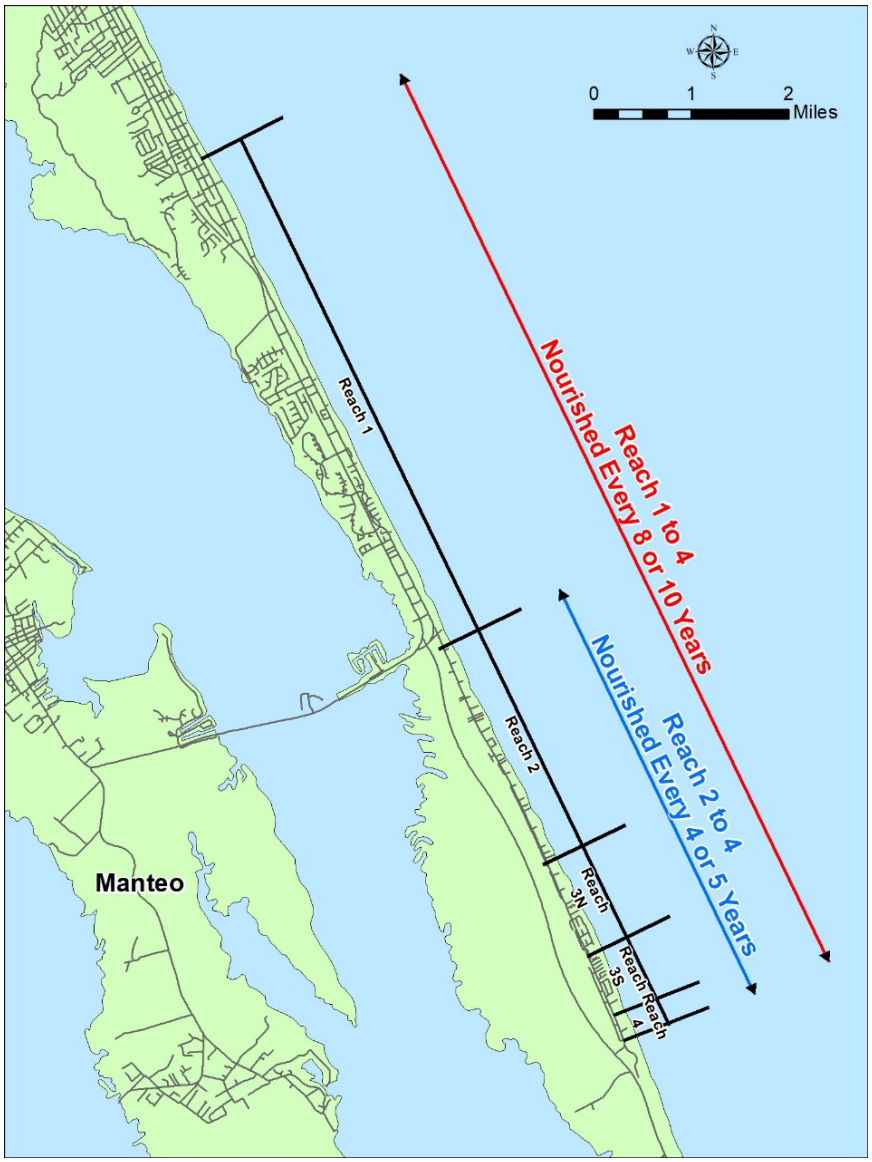


Figure 7-2: Phased Beach Nourishment Alternatives

7.3.1 Phased Interval Comparison

Two phased beach nourishment intervals were considered:

(1) Reaches 2 to 4 nourished every 4 years, and Reach 1 added to the nourishment area every 8 years, and

(2) Reaches 2 to 4 nourished every 5 years, and Reach 1 added to the nourishment area every 10 years.

The volume requirements for each cycle are presented in Table 7-6. The placement volumes for each project for Reach 2, Reach 3N, Reach 3S, and Reach 4 are the same as in the 4-year cycle and 5-year cycle for the non-phased approach. For Reach 1, the placement volume at the 8-year cycle is twice that of the 4-year non-phased cycle, and the placement volume at the 10-year cycle is twice that of the 5-year non-phased cycle. Essentially, in this approach the Town would nourish Reach 1 at a longer interval with more volume placed each time.

Table 7-6: Placement Volumes for Phased Nourishment Cycles

		Phased with 4/8 year cycles		Phased with 5/10 year cycles	
Reach	Annual Volumetric Loss (cy/year)	Placement Volume (cy) every 4 years	Placement Volume (cy) every 8 years	Placement Volume every 5 years	Placement Volume (cy) every 10 years
Reach 1 (500+00 - 785+00)	126,238	--	1,009,904	--	1,262,380
Reach 2 (790+00 - 915+00)	103,228	412,912	412,912	516,140	516,140
Reach 3N (920+00 - 970+00)	92,772	371,088	371,088	463,860	463,860
Reach 3S (975+00 - 1005+00)	72,653	290,612	290,612	363,265	363,265
Reach 4 (1010+00 - 1025+00)	44,493	177,972	177,972	222,465	222,465
Total Volume Per Project		**1,252,584**	**2,262,488**	**1,565,730**	**2,828,110**

As with the non-phased alternatives, volumetric requirements were used to develop cost estimates for each project (2023 dollars) as shown in Table 7-7. These costs were multiplied by the number of nourishment cycles over the 50-year master plan timeframe and the cost to attain the 25-year LoP with the first project was added to obtain the estimated 50-year total cost. This was then divided by either 48 or 50 years (depending on the interval) to obtain an average annual cost for beach maintenance over the 50 years (Table 7-7). The 5/10 phased approach has a lower cost over the lifetime of the master plan due to the lower number of projects required. To evaluate potential differences in costs due to occurrence of projects in varying future years, engineering economics calculations were performed. The variations in timing of projects did not significantly affect the cost comparison of alternatives.

Table 7-7: Project Costs for Phased Nourishment Cycles (2023 dollars)

Nourishment Interval	Number of Nourishment Cycles	25-Year LOP Cost	Single Nourishment Cost (4 year cycle)	Single Nourishment Cost (8 year cycle)	50-Year Total Cost	Cost Per Year
R2-4: 4-yr, R1-4: 8-yr	6 & 6	$6.50 M	$18.18 M	$30.64 M	$299.43 M	$6.24 M*
Nourishment Interval	**Number of Nourishment Cycles**	**25-Year LOP Cost**	**Single Nourishment Cost (5 year cycle)**	**Single Nourishment Cost (10 year cycle)**	**50-Year Total Cost**	**Cost Per Year**
R2-4: 5-yr, R1-4: 10-yr	5 & 5	$6.50 M	$21.15 M	$36.46 M	$294.51 M	$5.89 M**
						*Based on 48 Years **Based on 50 Years

7.3.2 Discussion

By waiting longer to nourish Reach 1 (longer interval cycle), the phased approach requires higher volumetric density of the placement in that reach and therefore results in lower costs per cubic yard. In addition, the Reach 1 portion of the Town's shoreline is not subject to the disturbances associated with project construction as often. Phasing also alternates between a lower-cost and a higher-cost project, which may have financing advantages for the Town. However, because there are more frequent projects (short interval cycle) in the phased approach than in the 6-year cycle or 8-year cycle where all of the reaches are nourished, overall mobilization and demobilization costs for the 50-year master plan timeframe are higher. Additionally, more frequent projects increase the number of times the environmental permitting process is required.

7.4 Beach Nourishment with Structures Alternatives

Because of the high rates of erosion in South Nags Head (Reach 3S and Reach 4), structural alternatives were considered to reduce these erosion rates, and therefore the required beach nourishment volumes. The structures considered were nearshore breakwaters and a terminal groin. The structural alternatives evaluated were paired with beach nourishment. Placing structures without a designed beach nourishment program could result in additional erosion and shoreline recession, especially downdrift of the structures.

7.4.1 Nearshore Breakwaters with Beach Nourishment

Four nearshore breakwater layouts were considered in this analysis. All of the layouts were designed to allow for some sediment bypassing to minimize downdrift impacts. The calibrated and validated shoreline change model described in Section 6.3 was used to evaluate the effectiveness of each alternative in reducing shoreline erosion. The reduced erosion was considered in developing beach nourishment designs for the breakwater alternatives. Costs were estimated for breakwater construction and for beach nourishment for each alternative.

Breakwater Alternatives 1/1A

The first breakwater alternative (1) included breakwaters with typical length of 250 ft, gap width of 250 ft, and distance from the nourished shoreline of 280 ft, as shown in Figure 7-3. This alternative was modified as 1A by removing the northernmost five of these breakwaters to minimize the impact footprint.

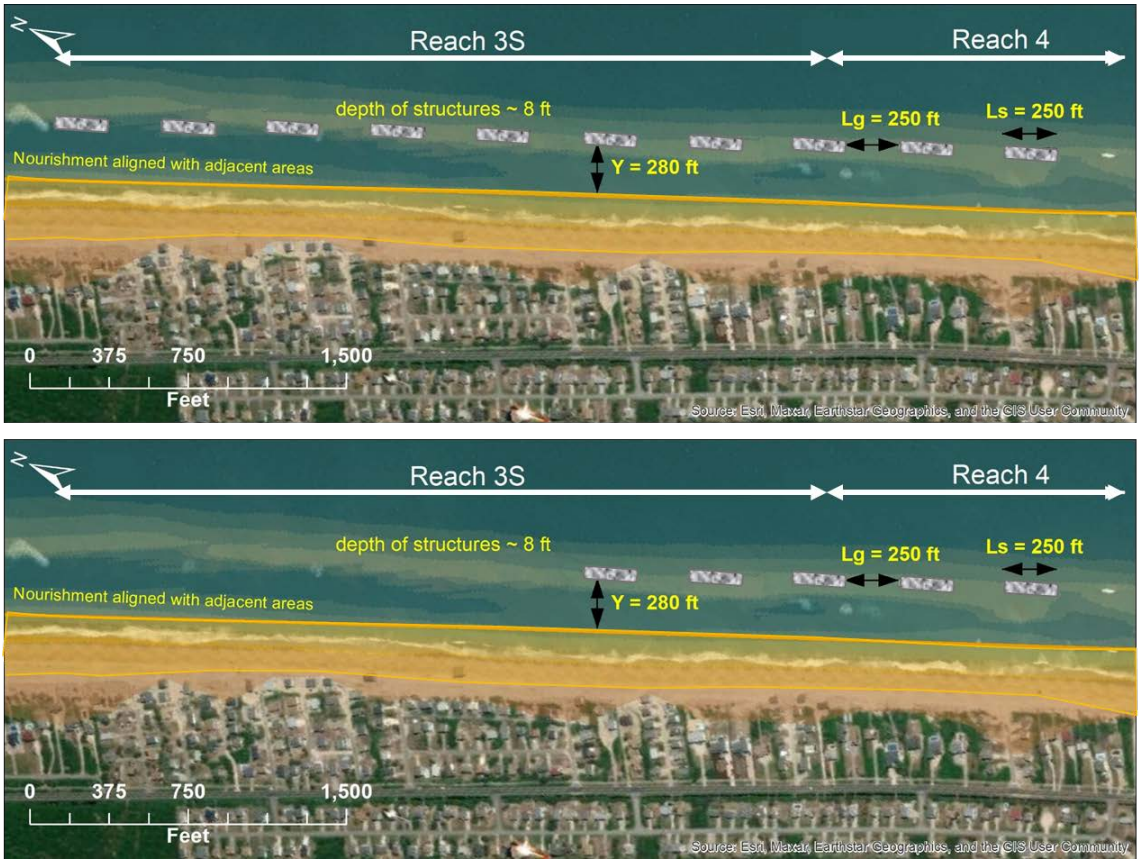


Figure 7-3: Breakwater Alternatives 1 (top panel) and 1A (bottom panel). Alternative 1 includes ten (10) breakwaters and Alternative 1A includes only the southernmost five (5) breakwaters.

Breakwater Alternatives 2/2A

The second breakwater alternative (2) included shorter breakwaters with typical length of 175 ft, an increased gap width of 400 ft, and an increased distance from the nourished shoreline of 350 ft, as shown in Figure 7-4. Alternative 2A was developed by removing the northern four breakwaters and consists of the southernmost five breakwaters (Figure 7-4).

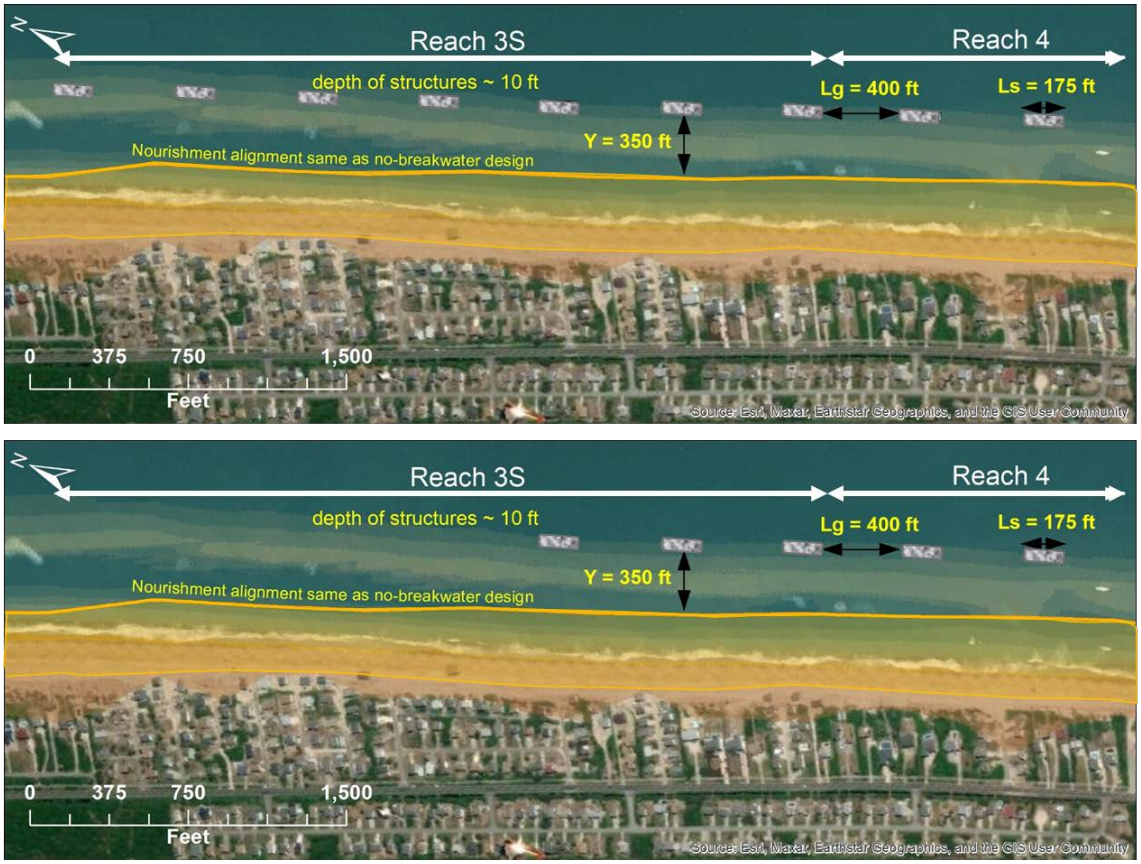


Figure 7-4: Breakwater Alternatives 2 (top panel) and 2A (bottom panel). Alternative 2 includes nine (9) breakwaters and Alternative 2A includes only the southernmost five (5) breakwaters.

7.4.2 Shoreline Modeling: Nearshore Breakwaters

These alternatives were further examined using the calibrated and validated GenCade model described in Section 6.3 to estimate the potential reduction in erosion rates if nearshore breakwaters were constructed. Results are shown in Figure 7-5 for a 6-year time period, with wave conditions from July 2013 to June 2019.

All of the nearshore breakwater alternatives decreased erosion in the associated reaches compared with nourishment only. Most of the benefit of the breakwaters was retained when only the southernmost five breakwaters of each alternative were constructed. As expected, the longer breakwaters with smaller gaps, constructed closer to the nourished shoreline

(Alternative 1/1A), were more effective at retaining sand. Alternative 1A shows the best performance in reducing erosion compared with nourishment only, however, there is still a substantial amount of erosion when the final shoreline is compared with the initial nourished shoreline in the GenCade model analysis.

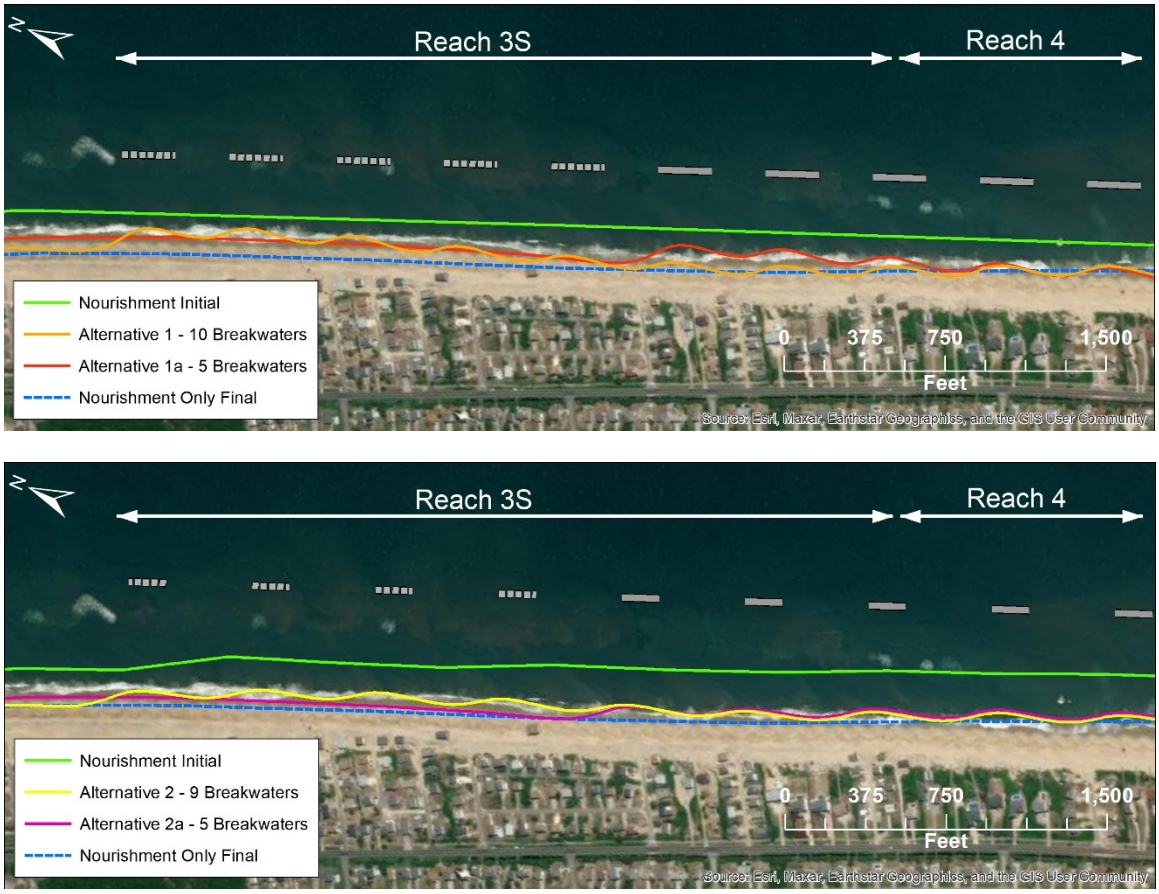


Figure 7-5: GenCade Shoreline Modeling Results for Nearshore Breakwaters Alternatives. Top panel shows Alternatives 1/1A, bottom panel shows Alternatives 2/2A. Dashed breakwaters are removed for the 1A and 2A alternatives.

7.4.3 Nearshore Breakwaters Comparisons

Placement volumes for nearshore breakwater alternatives were developed using the reduction in erosion rate due to the breakwaters to determine the annual volume needs for beach nourishment and are shown in Table 7-8. As noted previously, Alternative 1A, with five breakwaters, required the smallest placement volume in Reach 3S and Reach 4 of all of the breakwater alternatives examined.

To develop cost estimates, an initial project was considered to be constructed concurrently with the breakwaters, and those volumes were identical to the 6-year cycle alternative

described in Section 7.2.3. Subsequent project volumes were as shown in Table 7-8 and Table 7-9.

Table 7-8: Placement Volumes for Nearshore Breakwater Alternatives1 and 1A

Reach	Alternative 1 Annual Volumetric Loss (cy/year)	Alternative 1 Placement Volume (6 year cycle) cy	Alternative 1A Annual Volumetric Loss (cy/year)	Alternative 1A Placement Volume (6 year cycle) cy
Reach 1 (500+00 - 785+00)	126,238	757,428	126,238	757,428
Reach 2 (790+00 - 915+00)	103,228	619,368	103,228	619,368
Reach 3N (920+00 - 970+00)	92,772	556,632	92,772	556,632
Reach 3S (975+00 - 1005+00)	68,963	413,778	66,948	401,688
Reach 4 (1010+00 - 1025+00)	42,911	257,466	42,048	252,288
Total Volume Per Project		**2,604,672**	--	**2,587,404**

Table 7-9: Placement Volumes for Nearshore Breakwater Alternatives 2 and 2A

Reach	Alternative 2 Annual Volumetric Loss (cy/year)	Alternative 2 Placement Volume (6 year cycle) cy	Alternative 2A Annual Volumetric Loss (cy/year)	Alternative 2A Placement Volume (6 year cycle) cy
Reach 1 (500+00 - 785+00)	126,238	757,428	126,238	757,428
Reach 2 (790+00 - 915+00)	103,228	619,368	103,228	619,368
Reach 3N (920+00 - 970+00)	92,772	556,632	92,772	556,632
Reach 3S (975+00 - 1005+00)	68,287	409,722	69,177	415,062
Reach 4 (1010+00 - 1025+00)	42,622	255,732	43,003	258,018
Total Volume Per Project		**2,598,882**	--	**2,606,508**

Cost estimates for construction of each of the nearshore breakwater alternatives along with a 6-year beach nourishment cycle were developed and are shown in Table 7-10. Details of the estimate and cost estimates for other nourishment intervals are presented in Appendix E. The overall lowest cost breakwater alternative is Alternative 2A, which includes the lowest breakwater construction cost. The alternative that is most effective in reducing erosion rates and therefore has the lowest repeat nourishment cost was Alternative 1A.

Table 7-10: Cost Estimates for Nearshore Breakwater Alternatives with Beach Nourishment on a 6-Year Cycle (1 initial nourishment project and 7 repeat nourishment projects, 2023 dollars).

Nearshore Breakwater Alternative	25-Year LOP Cost	Initial Nourishment Cost	Repeat Nourishment Cost (6 year cycle)	Breakwater Cost	50-Year Combined Total Cost	Cost Per Year
1	$6.50 M	$33.43 M	$33.10 M	$118.57 M	$390.21 M	$8.13 M*
1A	$6.50 M	$33.43 M	$32.92 M	$60.08 M	$330.47 M	$6.88 M*
2	$6.50 M	$33.43 M	$33.04 M	$75.54 M	$346.77 M	$7.22 M*
2A	$6.50 M	$33.43 M	$33.12 M	$42.61 M	$314.38 M	$6.55 M*
*Based on 48 Years						

In general, none of the nearshore breakwater alternatives provided enough of a reduction in erosion to offset the cost of breakwater construction, and are all more expensive than any of the non-phased or phased beach nourishment alternatives.

7.4.4 Terminal Groin with Beach Nourishment

An alternative with a terminal groin at the southern end of the Town was also evaluated. The terminal groin preliminary design was comparable to the terminal groin constructed within the Town of Ocean Isle Beach in 2021/2022. The groin extended approximately 750 ft seaward of the 2022 mean high water shoreline with a rubble mound section, and 300 ft landward of mean high water with a sheet pile section to prevent flanking. The position of the groin centerline was approximately located at Transect 1025+00 at the southern limit of Reach 4. This groin would be constructed with an accompanying beach nourishment project. The conceptual alternative is shown in Figure 7-6.



Figure 7-6: Terminal Groin Alternative

7.4.5 Shoreline Modeling: Terminal Groin

The terminal groin alternative was further examined using the calibrated and validated GenCade model described in Section 6.3 to estimate the potential reduction in erosion rates if a groin were constructed. Wave conditions were the same as those evaluated in the nearshore breakwater alternatives, a 6-year time period, from July 2013 to June 2019. Varying permeability coefficients were considered to capture a range of effects. It is noted that in practice, groins are generally not very permeable as they are designed to retain sand. Results from the GenCade model are presented in Figure 7-7.



Figure 7-7: GenCade Shoreline Modeling Results for Terminal Groin Alternative.

As shown in Figure 7-7, the less permeable groins were more effective at retaining sand, with the groin with permeability 0.3 only slightly different than the nourishment only option. As is typical with groins, the downdrift area for both the permeability 0.1 and 0.2 cases showed adverse effects due to interruption in the longshore transport towards the south.

7.4.6 Terminal Groin Comparison

The modeled terminal groin with permeability 0.1 was shown to retain the most sand and was therefore considered in developing cost comparisons. This groin reduced volumetric losses within Reaches 3S and 4 to essentially zero, as shown in Table 7-11.

Table 7-11: Placement Volume for Terminal Groin Alternative (Permeability 0.1)

Reach	Annual Volumetric Loss (cy/year)	Terminal Groin Placement Volume (6 year cycle) cy	Terminal Groin Placement Volume (8 year cycle) cy
Reach 1 (500+00 - 785+00)	126,238	757,428	1,009,904
Reach 2 (790+00 - 915+00)	103,228	619,368	825,824
Reach 3N (920+00 - 970+00)	92,772	556,632	742,176
Reach 3S (975+00 - 1005+00)	0	0	0
Reach 4 (1010+00 - 1025+00)	0	0	0
Total Volume Per Project		**1,933,428**	**2,577,904**

The volume estimates in Table 7-11 were used to develop the cost estimates presented in Table 7-12. An initial project was assumed to be identical to either the 6-year or 8-year nourishment project, with subsequent projects developed using the volume requirements presented in Table 7-11. Details of the groin construction and nourishment project cost estimates are presented in Appendix E. While the terminal groin alternative appears to show the lowest costs over the master plan timeframe, these costs do not consider any mitigation that may be required due to adverse downdrift effects. These costs could become significant to the Town and negate any advantages provided by groin construction.

Table 7-12: Cost Estimates for Terminal Groin Alternative with Beach Nourishment. Costs consider initial nourishment cost plus either 7 (6-year cycle) or 5 (8-year cycle) repeat nourishment projects (2023 dollars).

Terminal Groin Alternative	25-Year LOP Cost	Initial Nourishment Cost	Repeat Nourishment Cost	Groin Cost	50-Year Combined Total Cost	Cost Per Year
6-year nourishment cycle	$6.50 M	$33.43 M	$26.15 M	$28.04 M	$251.05 M	$5.23 M*
8-year nourishment cycle	$6.50 M	$42.33 M	$32.82 M	$28.04 M	$240.99 M	$5.02 M*
						*Based on 48 Years

7.4.7 Discussion

Structural alternatives to reduce erosion rates in South Nags Head (Reach 3S and Reach 4) were considered in the alternatives analysis. Nearshore breakwaters added significant costs because the reduction in erosion provided by the breakwaters is not enough to substantially reduce the nourishment requirements. A groin alternative is shown to significantly reduce the erosion rates in Reaches 3S and 4, however, adverse downdrift effects are modeled within the Cape Hatteras National Seashore. These downdrift effects would likely add costs for required mitigation/downdrift sand placement. Finally, oceanfront erosion control structures are currently not allowed under North Carolina G.S. § 113A-115.1, with the exception of terminal groins constructed at the terminus of an island or on the side of an inlet. Because the town is not immediately adjacent to Oregon Inlet, the groin approach would not fall within this exception.

7.5 Additional Beach Nourishment Considerations

This section provides an overview of some of the additional factors that influence the decision-making process for beach nourishment projects. These include project funding sources, feasibility of construction, and tourism and recreation considerations. Future project costs may also be affected by the condition of the beach, timing of bidding, and utilization of existing dredge capacity.

7.5.1 Project Funding

Previous beach nourishment projects conducted by the Town have been funded using a combination of local (Town and County) and State funds. In addition, post-storm damage restoration of sand loss has been funded by the Federal Emergency Management Agency (FEMA). The Town typically secures municipal bonds to pay for its portion of the cost at the time of construction, and the bonds are then paid back throughout the life of the project.

The Town has developed Municipal Service Districts (MSDs) to levy additional property taxes to provide funding for beach nourishment. The funding plans recognize that the benefits of beach nourishment extend beyond the immediate oceanfront, and the MSD boundaries and rates take this into account. Beach nourishment maintains the beach as a key piece of the Town's infrastructure. A well-maintained beach not only provides protection to properties throughout the Town but also results in increased property values.

In addition to these Town funds, Dare County maintains a Beach Nourishment Fund which has historically supported the Town's beach renourishment projects. A 2 percent portion of the County's 6 percent Occupancy Tax is allocated to this fund. This fund is restricted by legislation to be used for the placement of sand from other sources, planting of vegetation and building of structures that are in conformity with the North Carolina Coastal Area Management Act (CAMA), e.g. dunes and sand fencing, for the purpose of widening the beach to benefit public recreational use and to mitigate damage and erosion from storms to inland property.

The State's CSDM Fund program accepts applications for grant funding by local governments to support beach nourishment, dune construction, or other projects that mitigate or remediate coastal storm damage to the ocean beach and dune systems of the State. Local cost share of at least one non-State dollar for every dollar from the fund is required.

For post-storm repairs of beach nourishment projects, FEMA has provided funding under the Category G Public Assistance program for Permanent Work - Engineered Beaches. The post-Dorian beach nourishment project constructed in 2022 was undertaken utilizing these funds. Documentation of losses of beach sand, vegetation, and sand fencing is necessary to obtain approvals for the FEMA Category G funding.

Funding considerations may constrain a beach nourishment project in terms of the volume that is able to be placed with the available funds, as well as the timing of projects if funding sources take time to secure or favorable bids are not received from contractors. This may result in delays or constrain the amount of advance fill that is able to be placed. In general, the sooner a project is advertised in advance of the desired construction window, the more favorable the bids.

7.5.2 Constructability

For beach nourishment project construction, there is generally a minimum fill volume density that is economically feasible for a contractor to construct. This volume density may vary depending upon the borrow source characteristics, dredging and placement methodology, and desired template. For example, a larger dredge may lose some efficiency when trying to construct a smaller fill density template due to the higher quantity and velocity at which sand is pumped onto the beach, causing them to have to temporarily stop pumping one or more times while emptying a load in order to allow time for crews on the beach to grade the fill template before moving down the beach. This anticipated downtime

is calculated into the contractor's bid prices, raising the unit price (price per cubic yard) of sand.

Therefore, for any given nourishment event, there may be reaches of beach where additional quantity is warranted – above and beyond what is required based on actual erosion rates – to achieve the most economically feasible construction template for that nourishment event. That being said, additional quantity to achieve this economic efficiency equates to overall higher project costs. The engineering design and permitting of each nourishment event should include analysis to determine whether higher volumes with lower unit costs or lower volumes with higher unit costs will be more advantageous for the Town in terms of overall project cost.

Previous experience has indicated that minimum fill densities of approximately 20 cy/ft are economically feasible for the medium to large hopper dredges that exist in the current dredging plants of contractors qualified to do this type of work. Therefore, this value of 20 cy/ft is often used to analyze the above-mentioned scenario and determine the most cost-effective construction template for the Town that provides the desired storm protection.

7.5.3 Tourism and Recreation

In addition to beach nourishment providing protection for the Town's infrastructure, there are also recreational benefits to consider. The Town's beaches drive tourism, with thousands of visitors annually. In the winter season, beach driving is allowed, while in summer only emergency vehicles are permitted. The available width of beach for recreation is increased in the short term after each nourishment project, with advance fill placed in anticipation of equilibration and long-term erosion taking place until the next project.

For the purposes of this discussion, recreational beach width is defined as the horizontal distance between the seaward toe of the dune and the Mean High Water (MHW) shoreline position. Because the MHW shoreline is highly variable, adjusting to monthly and seasonal wave conditions, there is significant variability in the beach width in both the short- and long-term. Examination of the annual monitoring data reveals that changes in the shoreline position on the order of 50-90 ft are common from year to year, and even shorter-term changes can occur after storm events. This results in corresponding changes in beach width, as the position of the dune is less variable from year to year. In general, the Town's beaches are narrower in winter than in summer, as material is transported from the beach face into the nearshore under higher wave conditions. The beach typically widens during the summer months, when conditions tend to be less severe.

When the beach width is very narrow, space for recreational activities is constrained, resulting in a negative experience for beach users. Desirable beach widths for lower-volume winter season usage (beach driving, surf fishing, walking, etc.) are a minimum of 50 ft from the dune toe to the MHW line (typical high tide line). During heavier usage in summer, desirable beach widths are approximately 100 ft or greater. Beach widths at representative profiles for each reach were examined as of the 2023 annual monitoring

(June) and fall monitoring (October). Table 7-13 presents the measured beach widths at these profile locations.

Table 7-13: Representative Beach Widths in Summer and Fall 2023

Rep. Profile	Summer 2023 Beach Width (ft)	Fall 2023 Beach Width (ft)
460+00	67	not surveyed
520+00	83	42
535+00	92	64
625+00	67	76
715+00	68	63
735+00	35	57
785+00	82	95
855+00	122	77
865+00	142	87
895+00	105	70
920+00	79	84
935+00	91	62
980+00	69	53
1020+00	80	76

As shown in Table 7-13, several reaches within the Town currently have beach widths less than the desirable summer (and/or winter) recreational beach width. In many of these areas, the dunes are large enough along with the existing beach width to provide the design level of protection (See Section 5.5) to the landward infrastructure. However, the Town may choose to increase the volume of a planned beach nourishment to provide additional recreational beach width. Considering the distance between the active berm height (+6 ft NAVD88) and the depth of closure (-19 ft NAVD88) of 25 ft and placement along 1 ft of beachfront, for every additional 1 ft of beach width desired, 1 ft * 1ft * 25 ft/27 cy/ft = 0.92 cy of sand should be placed. A general rule of thumb for project planning and budgeting could consider each additional 1 cy of sand placed could provide approximately 1 ft of additional beach width. It is noted that this approximation is based upon the assumption of an equilibrium profile that is translated in the cross-shore direction, and that the natural beach response is variable.

Given the dynamic nature of coastlines, the volume needed to sustain a recreational beach width is anticipated to fluctuate between nourishment events. Nonetheless, using the rule of thumb outlined above it is possible to estimate the additional material required by the LOP profiles described in Section 5.5 to maintain the desired 100 ft beach width on average during the nourishment interval. Figure 7-8 illustrates this design concept, with the orange line indicating the advanced fill necessary to counteract background erosion and the purple line representing the fill essential for maintaining the desired beach width during the nourishment period. Table 7-14 presents the additional volume required to attain an

approximately 100 ft beach width during the nourishment interval, considering the base LOP profile. It is noted that for a specific beach nourishment event, these volumes would vary depending upon the condition of the beach at the time of design.

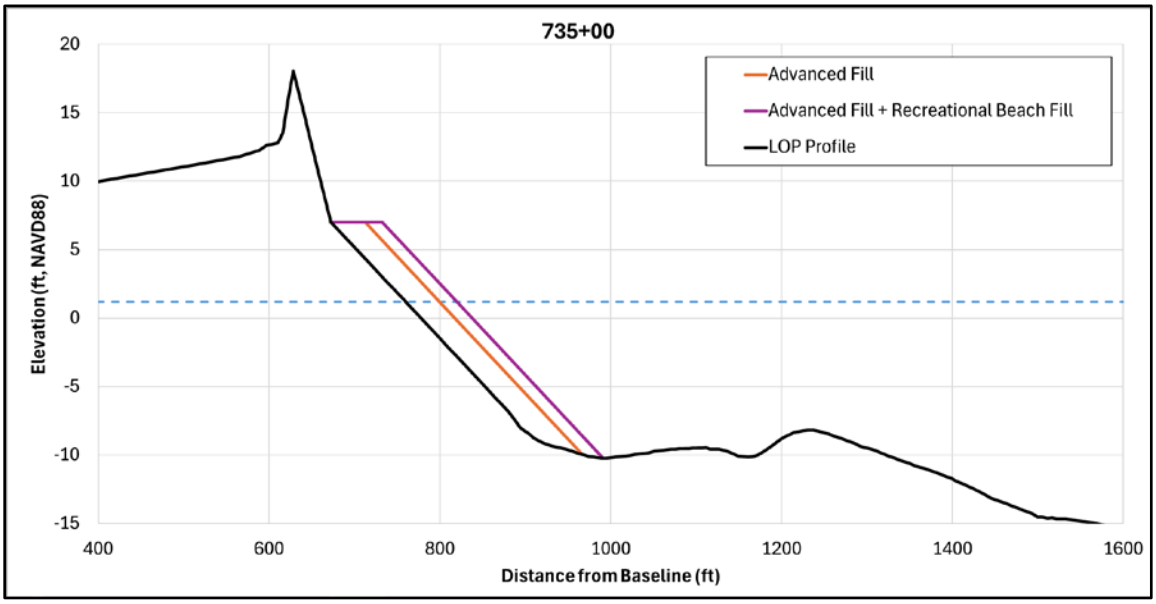


Figure 7-8: Example Design Fill for Achieving Recreational Beach Width

Table 7-14: Additional Berm Volume Required by the LOP Profiles to Achieve Recreational Beach Width

Reach	Length (ft)	Rep. Profile	Volume Above -19 ft, NAVD88 Required to Achieve 25-year LoP (cy/lf)	Additional Volume Required to Achieve Recreational Beach Width (cy/ft)
Nags Head – North	6,250	460+00	355	13
Reach 1	4,500	520+00	503	39
	5,500	535+00	451	35
	7,000	625+00	478	14
	5,500	715+00	479	13
	6,000	735+00	443	13
	2,500	785+00	604	19
Reach 2	5,500	855+00	491	15
	2,500	865+00	471	13
	2,500	895+00	526	n/a
	2,500	920+00	463	28
Reach 3 - North	4,500	935+00	464	13
Reach 3 - South	2,000	980+00	461	3
	2,750	1020+00	401	n/a
Reach 4				

7.5.4 Future Project Costs and Cost Variability

In addition to the funding, constructability, and recreational considerations discussed, there are other factors affecting the decision-making process and future project costs. Dredging market conditions play a large role in the overall cost of a project. Due to the limited number of dredging contractors that can perform this type of work, dredge plant availability is often at a premium. Availability can be impacted by high numbers of projects on the horizon and/or late timing of the bidding process. Hurricane damage on any portion of the east coast or gulf coast during a particular year could tie up dredge plant availability for years to come with storm damage restoration projects. Lower dredge plant availability leads to higher prices for construction by contractors who are assuming a risk to perform the work on time. In addition, the timeliness of a bid could also impact total project cost. The earlier the project can be bid, the more likely it is to receive lower prices due to less scheduling conflicts by the contractors.

Due to the impact of dredge market conditions on overall project price, it is difficult to estimate future project costs. Table 7-15 examines the mobilization/demobilization and sand placement costs of reach of the three nourishment projects constructed in the Town

of Nags Head. For the 2011 and 2019 Town of Nags Head renourishment costs, prices for sand placement ($/cy) increased approximately 5% per year in the eight years between projects, elevating the cost from $5.55/cy in 2011 to $8.16/cy in 2019. For the 2022 post-Dorian renourishment project, prices for sand placement ($/cy) increased approximately 6% per year in the three years since the 2019 renourishment project, elevating the cost from $8.16/cy in 2019 to $9.76/cy in 2022. In terms of mobilization/demobilization, for the 2011 and 2019 Town of Nags Head renourishment projects, prices increased approximately 6.5% per year in the eight years between projects, elevating the cost from $2.4M in 2011 to $4.0M in 2019. For the 2022 post-Dorian renourishment project, prices increased approximately 7.9% per year in the three years since the 2019 renourishment project, elevating the cost from $4.0M in 2019 to just over $5M in 2022.

Table 7-15: Historical Project Costs

Project	Mob/Demob Lump Sum ($)	Sand Placement Unit Cost ($/cy)
2011 Nourishment Project	$2,399,000	$5.55
2019 Nourishment Project	$4,000,000	$8.16
2022 Post-Dorian Project	$5,023,000	$9.76

However, it should be noted that the 5% to 6% inflation in sand placement prices and 6% to 8% inflation in mobilization/demobilization prices previously experienced may not always be the case for future nourishment projects which will strongly depend on dredge plant availability at the time of bidding. There also may exist certain dredging market conditions where dredging prices may go down from one year to the next. For example, the 2019 Town of Nags Head renourishment project was originally bid with the anticipation of construction in 2018. However, dredge market conditions were such that the lowest qualified bid for 2018 construction was 42% higher than the lowest qualified bid for 2019 construction. Therefore, the project construction was postponed until 2019 in order to take advantage of the significantly better pricing. Table 7-16 presents the difference in sand placement and mobilization/demobilization bid costs received for the project which was ultimately constructed in 2019. As can be seen, for 2019 construction the mobilization/demobilization costs decreased by more than 50% whereas sand placement unit costs decreased by approximately 25% compared to the 2018 construction bids.

Table 7-16: 2018 versus 2019 Project Construction Bid Costs

Project	Mob/Demob Lump Sum ($)	Sand Placement Unit Cost ($/cy)
2018 Nourishment Project Bids	$8,500,000	$10.89
2019 Nourishment Project Bids	$4,000,000	$8.16

Acknowledging the difficulty in estimating future project costs, it is anticipated the 2027 project will cost approximately $38.2M based on current market conditions and volume

estimates. A breakdown of the estimated costs is presented in Table 7-17. It should be noted that the estimated sand placement costs ($13.72/cy) would equate to an annual increase of 7% since the 2022 project, and the estimated mobilization/demobilization costs ($6.0M) would equate to a 3.6% annual increase from the 2022 project. Therefore, current market conditions indicate a slightly larger increase in sand placement costs than has historically been seen for Town projects but a smaller than average increase in mobilization/demobilization costs than has historically been seen.

Table 7-17: Estimated Project Costs for 2027

Item	Approximate Costs
Sand Placement Cost (2,222,800 cy)	$30.5 M
Mob/Demob Cost	$6.0 M
Sand Fencing and Dune Planting Cost	$400,000
Engineering & Permitting & Construction Administration	$850,000
Field Investigations*	$420,000
Total	$38.2 M

*TBD if this would be required by agencies.

This information provides context for considerations that will likely affect future project costs. The Town's ongoing monitoring efforts will provide updated information on beach conditions and estimated volume needs.

7.6 Dune Stabilization and Preservation

As noted in Section 3.8, the Town has historically included dune stabilization efforts such as sand fencing and dune grass planting in beach nourishment efforts. In addition to beach nourishment, maintenance of established dunes through best management practices is an important part of preserving and growing a healthy dune system. Dune planting is a proven method of stabilizing dunes and capturing sand, contributing towards dune growth. In addition, the wind conditions in Nags Head allow for a considerable amount of aeolian transport for which sand fencing has proven successful in capturing sand as well.

In order to create a robust vegetation system, it is recommended to participate in seasonal inspections and planting so as to allow for planting of multiple species of dune vegetation throughout the year. Inspection in the spring (March/April timeframe), after nor'easter season, is recommended followed by Sea Oats and Bitter Panicum planting from May to September. Inspection in late fall (October/November timeframe), after hurricane season, is also recommended followed by planting of American Beachgrass from November to March.

The Town receives $24,000 annually from the Dare County Beach Nourishment Fund for dune stabilization efforts. The Dare County funds have been used towards annual sand fence installation or beach grass plantings. This amount may be supplemented periodically

by the Town to provide more extensive treatments along the oceanfront. Areas where dunes have minimal or no stabilization/vegetation will be targeted to ensure full coverage throughout the project area. Dune stabilization efforts are typically conducted during the fall/winter months annually. Additionally, grant funding has permitted large scale stabilization efforts to occur across beach nourishment project area. An example of this is the Coastal Storm Damage Mitigation (CSDM) grant that was awarded in 2022 to provide vegetative sprigging along a 10-mile stretch of the Town's oceanfront. Grant funding can provide opportunities to implement a variety of plant species to provide a more diverse and habitat friendly environment.

Regarding sand fencing replacement or supplementation, the Town typically seeks to maintain a minimum of one (1) row of functional sand fencing. Environmental agency concerns over endangered species interaction with sand fencing has caused the Town to recently take a less aggressive approach to maintaining and supplementing sand fencing than in previous years. In areas where existing sand fence is exposed less than 12 inches, it may be possible to augment the fencing by installation of new fencing immediately adjacent to the existing fence.

It should be noted that any planting or sand fencing damages associated with FEMA Public Assistance Category G storm events should be catalogued with the post-storm inspection and are often replaced through a FEMA reimbursement project which typically replaces sand lost during the storm and then replants vegetation and reinstalls sand fencing in areas that were damaged.

Please refer to Appendix F for additional dune planting and sand fencing guidelines from the Town of Nags Head, NC DCM, and US Fish and Wildlife Service.

Typical unit costs for sand fence and dune vegetation are presented in Table 7-18 for reference, in 2023 dollars. It is important to note that American Beachgrass requires three (3) sprigs per hole while Sea Oats and Bitter Panicum only require one (1) sprig per hole.

Table 7-18. Sand Fence and Dune Vegetation Costs

Stabilization Technique	Unit	Unit Price (2023)
Sand Fence	LF	$8.27
American Beachgrass	Sprig	$0.36
Sea Oats/Bitter Panicum	Sprig	$1.29

7.7 Summary of Alternatives

While there are advantages and disadvantages of each of the presented alternatives, some of the alternatives are more beneficial than others.

If the Town prefers to nourish the entire beach in each project, a 6-year nourishment cycle is recommended. Although an 8-year cycle minimizes the overall costs during the

timeframe of the master plan, the 6-year cycle includes a more reasonable volume of placement in the reaches with the highest volumetric erosion rates. The 6-year cycle allows for less expensive individual projects and more frequent ability to adapt to changes in volumetric erosion rates. The nourishment interval is also flexible in that if volumetric triggers are not reached, the time period between projects can be extended, or the spatial limits of the project can be customized. Some general advantages of nourishing all of the reaches in each project are that this practice reduces the number of projects required over the 50-year planning horizon, reducing mobilization/demobilization costs as well as the number of times the permitting process is required. Additionally, it may be perceived as equitable by residents and property owners as all of the reaches are nourished each time. However, in this case all of the reaches are affected by the disruptions and potential environmental impacts associated with the nourishment project every time.

If the phased approach is preferred, the 5/10 year cycles are the less expensive option over the 50-year master plan timeframe. The phased approach results in lower unit costs for sand placement in Reach 1, because there is higher fill density for each project. In addition, the Reach 1 portion of the Town's shoreline is not subject to the disturbances and environmental impacts associated with project construction as often. Phasing also alternates between lower-cost and higher-cost projects, which may have financing advantages for the Town. However, because there are more frequent projects in Reaches 2 to 4 under the phased approach than in the 6-year cycle where all of the reaches are nourished, overall mobilization and demobilization costs for the 50-year master plan timeframe are higher. Additionally, more frequent projects increase the number of times the environmental permitting process is required.

Additional considerations for beach nourishment project design include project funding sources, feasibility of construction, and tourism and recreation. These factors can influence design and construction and can be evaluated on a project-by-project basis. Funding considerations may constrain a beach nourishment project in terms of the volume that is able to be placed with the available funds, as well as the timing of projects if funding sources take time to secure or favorable bids are not received from contractors. For beach nourishment project construction, there is generally a minimum fill volume density that is economically feasible for a contractor to construct. This volume density may vary depending upon the borrow source characteristics, dredging and placement methodology, and desired template. In addition to beach nourishment providing protection for the Town's infrastructure, there are also recreational benefits to consider. The Town may choose to increase the volume of a planned beach nourishment to provide additional recreational beach width.

Maintenance of established dunes through best management practices is an important part of preserving and growing a healthy dune system. Dune planting along with installation of sand fencing is a proven method of stabilizing dunes and capturing sand, contributing towards dune growth. To create a robust vegetation system, it is recommended to participate in seasonal inspections and planting to allow for planting of multiple species of dune vegetation throughout the year.

The structural alternatives have more disadvantages than advantages and are not recommended at this time.

8.0 BORROW SOURCE ANALYSIS

Based on the results of the Crystal Ball analyses and sea level rise estimates (Section 5.7), it is anticipated that the Town needs to identify borrow site(s) with approximately 49 Mcy of sand to meet the Town's 50-year nourishment need. Along with information available for borrow area S1 (Section 3.6), additional evaluations were conducted in effort to delineate an overall long-term borrow site containing a minimum of 49 Mcy of beach-compatible sand meeting the 15A NCAC 07H.0312 (1) rule parameters for recipient beaches.

Using the previous USACE delineation for borrow area S1 as the basis (Figure 8-1), additional data were obtained in effort to delineate multiple regions within this borrow area that contain a cumulative volume of 49 Mcy. A portion of borrow area S1 has been previously dredged for prior Town projects including the most recent post Hurricane Dorian project completed in 2022.

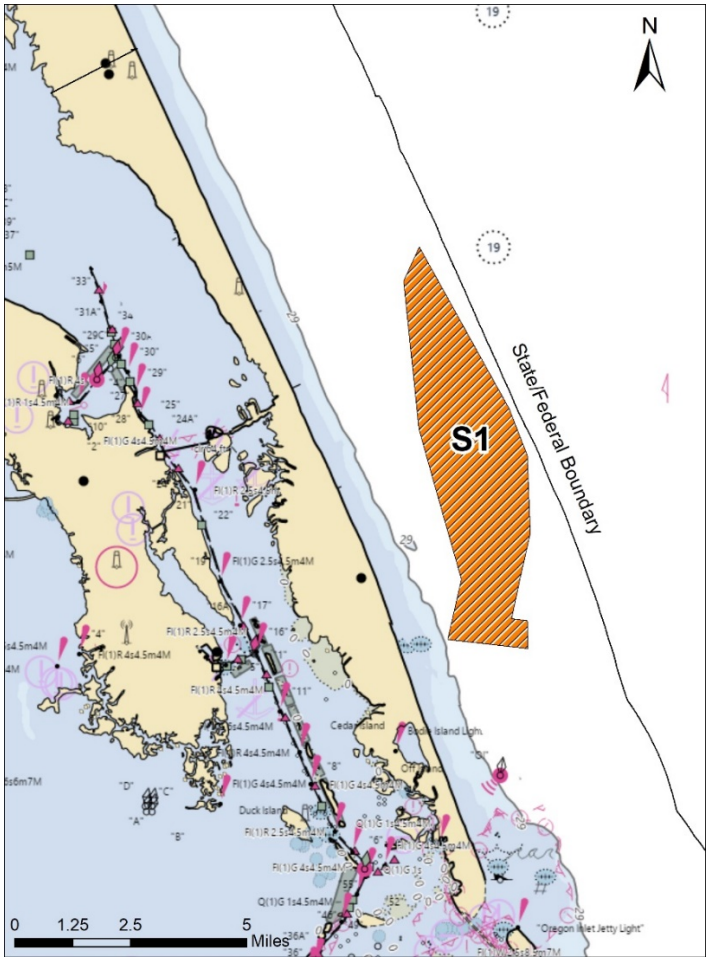


Figure 8-1: Borrow Area S1

8.1 Borrow Area Bathymetry

There are two recent bathymetric surveys. A July 2021 survey conducted by Geodynamics covers the full borrow area S1. To capture post-dredge conditions following the Town's 2022 Post-Dorian Renourishment Project, a survey was completed in August 2022 by Gahagan & Bryant Associates, Inc. The 2021 survey data was employed to estimate the total sediment volume within the proposed borrow area above the designated cut elevation(s). The 2022 survey data was utilized to quantify the material removed from the locations within the S1 borrow area that were utilized since the 2021 survey and exclude those areas from the future sediment availability calculations.

8.2 Geotechnical Investigations

Vibracore investigations within Borrow Area S1 were conducted under three individual mobilizations as shown in Figure 8-2. In June 2021, 43 vibracores were acquired by Athena Technologies, Inc.) for the design of the 2022 Post-Dorian Renourishment Project. An additional 250 vibracores were acquired in August/September 2021 by Amdrill, Inc. in the northern two thirds of Borrow Area S1. The southern third of the Borrow Area was had vibracores extracted in August 2022 (Amdrill, Inc.). The selection of vibracore locations in these investigations were chosen to conform to the current state rules and regulations governing sediment investigations, as outlined in 15A NCAC 07H.0312.

Based on the coring logs and the visual changes in material characteristics, the vibracores collected by Athena were divided into 262 sub-samples, while the Amdrill vibracores were split into 960 sub-samples, following the guidelines outlined in ASTM D 2487. These sub-samples were then subjected to grain size distribution analysis, adhering to ASTM D 6913, which involved the use of the following sieve sizes: 3/4-inch, 5/8-inch, 7/16-inch, 5/16-inch, No. 3.5, No. 4, No. 5, No 7, No. 10, No.14, No. 18, No. 25, No. 35, No. 45, No. 60, No. 80, No. 120, No. 170, No. 200, and No. 230. Additionally, the sub-samples underwent analysis to determine carbonate content, employing the Twenhofel and Tyler acid digestion method (1941). The shell content was visually estimated using the Terry and Chilingar method (1955). The laboratory results of the sediment sample analyses are presented in Appendix G.

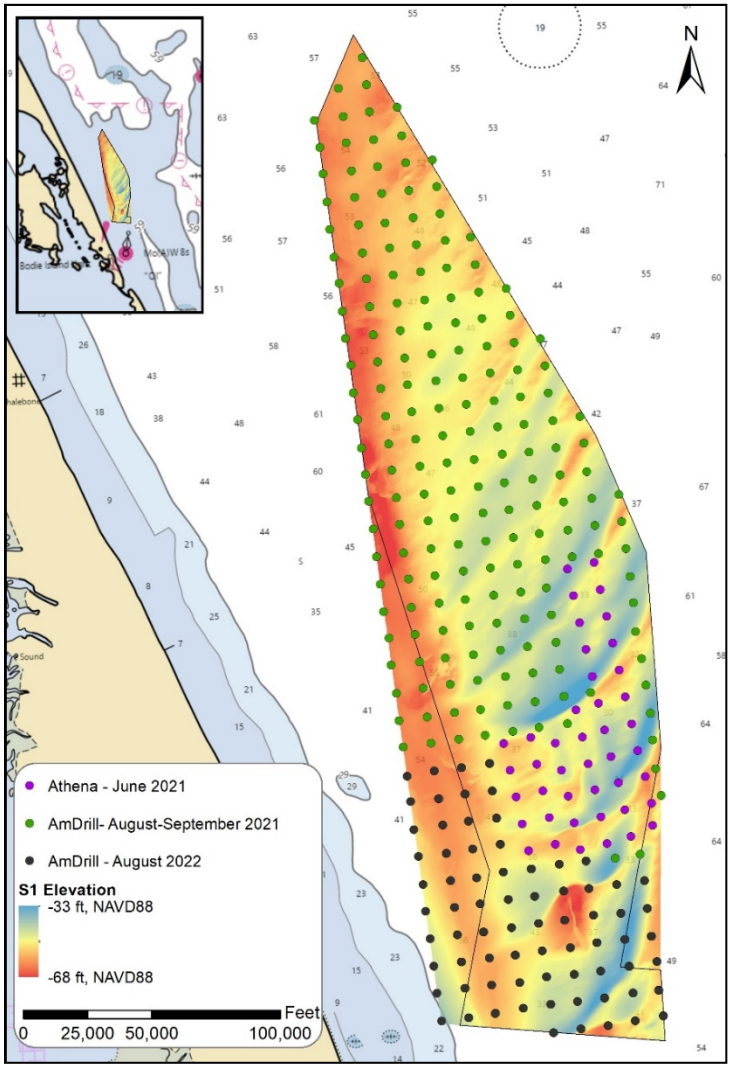


Figure 8-2: Vibracore Locations

8.3 Potential Borrow Area Delineation

Based on the sediment analysis of each vibracore, a preliminary maximum dredge cut elevation (bottom of allowable cut elevation) of compatible material was delineated two feet above the boundary with non-compatible material (Figure 8-3). This two-foot buffer accounts for potential variability in dredging, uncertainties in extrapolating conditions between core samples, and it is intended to avoid dredging non-compatible material.

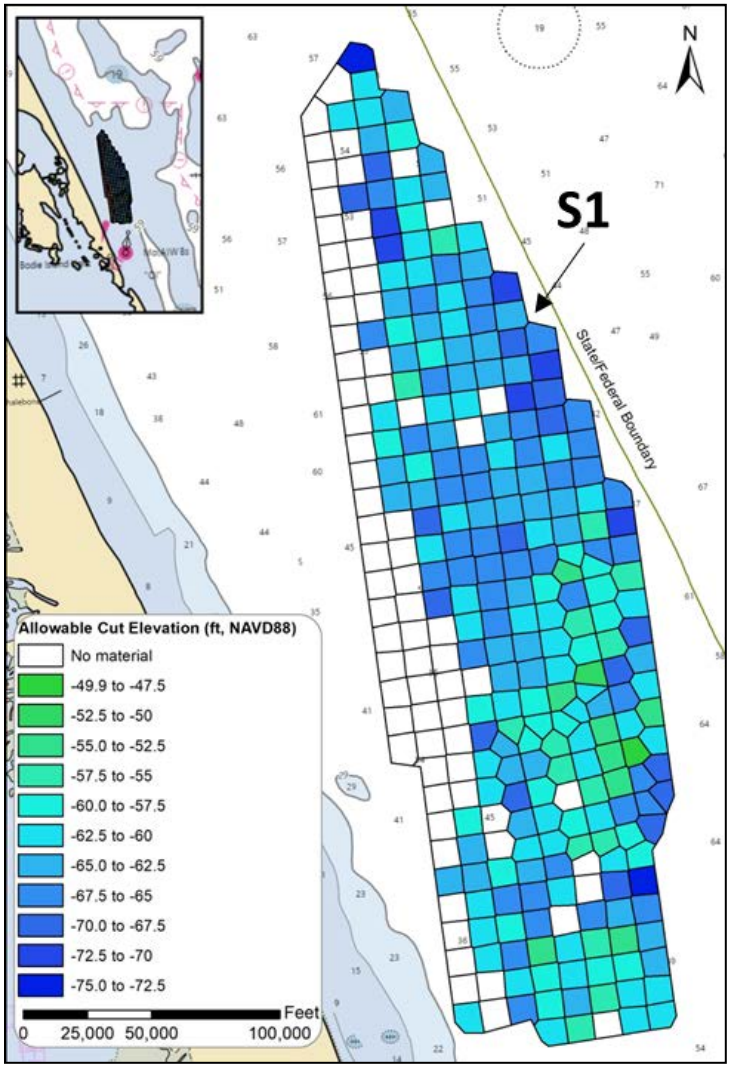


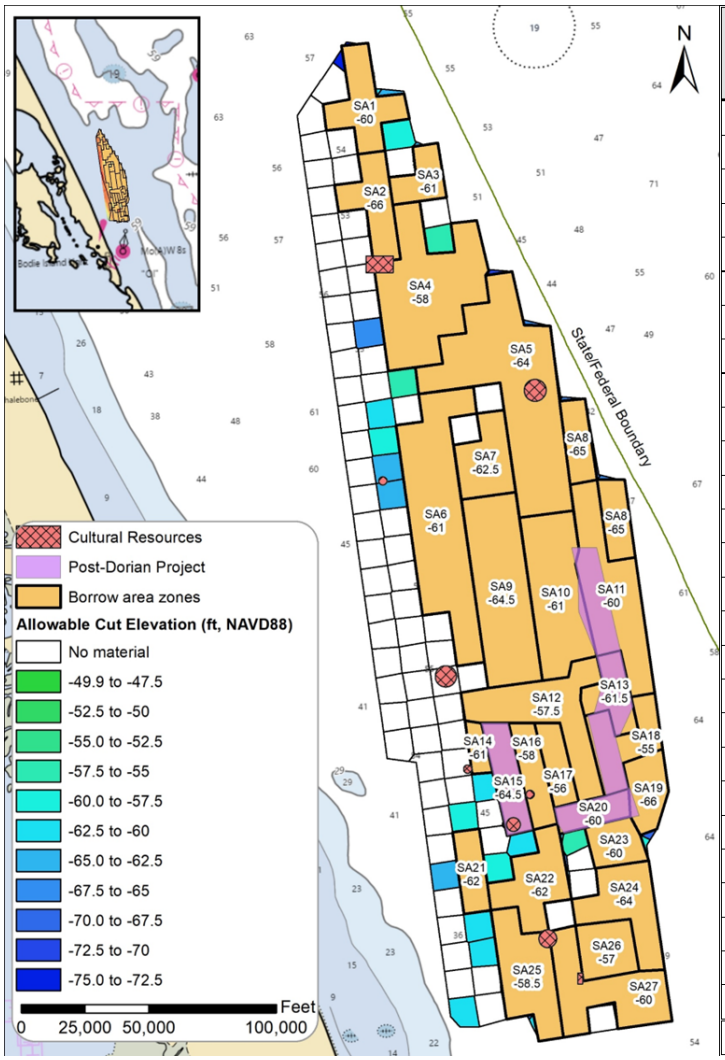
Figure 8-3: Bottom of Allowable Cut Elevation

To provide economical and constructable dredge cut lengths and elevations, the analyzed cores were grouped into larger zones within borrow area S1 where the dredging elevation was made consistent for the zone. The lowest cut elevation that still maintained a two-foot buffer above non-compatible material was selected as the maximum dredge cut elevation for each borrow area zone. Figure 8-4 illustrates the identified borrow area zones and their corresponding cut elevations.

Once the borrow area zones were established, the material between the sub-area cut elevation and the surface was determined using the following steps:

(1) Creating a difference surface by comparing the July 2021 surface with the cut elevation assigned to sub-areas.
(2) Creating 400 ft buffers around cultural resources and excluding these areas from consideration.

(3) Removing the areas that were utilized during the 2022 Post-Dorian Renourishment Project.
(4) Adding the "positive" surfaces and multiplying them by the cell area.
(5) By following this process, the areas containing compatible material between the cut elevation and the surface were identified, considering cultural resources, previous renourishment activities, and surface variations.



Zone	Allowable Cut Elevation (ft, NAVD88)	Available Sand to Cut Elevation (cy)
SA1	-60	236,947
SA2	-66	1,476,340
SA3	-61	423,663
SA4	-58	2,306,244
SA5	-64	10,013,758
SA6	-61	5,949,522
SA7	-62.5	2,308,713
SA8	-65	2,902,471
SA9	-64.5	8,501,582
SA10	-61	5,796,575
SA11	-60	3,917,228
SA12	-57.5	4,195,481
SA13	-61.5	420,665
SA14	-61	329,510
SA15	-64.5	111,967
SA16	-58	692,023
SA17	-56	473,870
SA18	-55	1,272,303
SA19	-66	1,320,016
SA20	-60	USED
SA21	-62	626,489
SA22	-62	2,474,583
SA23	-60	1,374,315
SA24	-64	3,308,557
SA25	-58.5	2,160,860
SA26	-57	1,867,713
SA27	-60	3,424,295
SUM		67,885,691

Figure 8-4: Borrow Area Sub-zones and Corresponding Maximum Dredge Cut Elevations

Based on the maximum dredge cut elevation established for the borrow area zones within borrow area S1, approximately 67.9 Mcy of beach compatible material is made available. This quantity is considered sufficient to accommodate the estimated placement requirement of approximately 49 Mcy for the town's beach management efforts over the next 50 years.

8.4 Potential Impacts of Borrow Site Dredging on the Nearshore Wave Climate

To quantify any potential impacts of dredging the borrow site on the wave climate along the Nags Head shoreline, a numerical modeling study was performed. Appendix A contains the full modeling study report. The MIKE 21 Spectral Waves (SW) model was employed to transform offshore wave conditions to the nearshore. Once the model was calibrated and validated (Appendix A), two bathymetric conditions were considered: 1) existing surveyed conditions based on the 2021 bathymetric survey, and 2) a conservative case where material was removed from the entire S1 borrow area based on maximum feasible dredge depths (Figure 8-5). Seven years of wave conditions (2012 to 2019) were modeled to evaluate potential impacts.

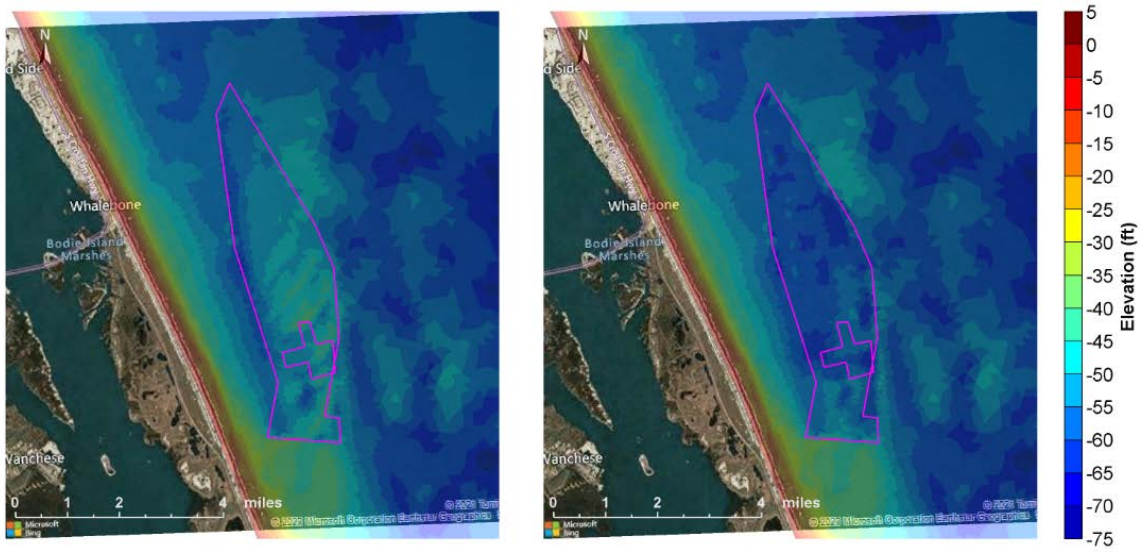


Figure 8-5: Updated model bathymetry around S1 borrow area without (left) and with (right) dredging

Comparison of median (50th percentile) wave-heights showed very little noticeable difference in the simulated wave-heights under the two conditions. Some differences were observed for larger storm events (at about the 90th percentile) mostly in the borrow area and shoreward of the southern limit of the borrow area. Differences elsewhere were found to be negligible under almost all simulated conditions. Amplification of wave heights appears to be mostly restricted to a limited area where the borrow area is closest to the coastline, and the magnitude of the wave-height amplification rarely exceeds 0.5 ft. Similar treatment of wave-period results showed very little noticeable change in expected wave-periods with the offshore borrow area dredging. Some slight changes in wave direction were observed due to the removal of material in the borrow area as well (Appendix A).

The nearshore wave conditions with and without dredging were also used along with the calibrated GenCade model described in Section 6.3 to evaluate the potential effect of dredging on shoreline changes within the Town of Nags Head. Table 8-1 shows the average shoreline change modeled in each reach over a 6-year period for the with- and without-dredging conditions. Slight increases in shoreline erosion were modeled with dredging effects in Reach 1 and Reach 3N; all other reaches had slightly less erosion under the dredged condition. In general, shoreline change differences modeled with and without borrow site dredging were relatively small.

Table 8-1: Average Shoreline Changes after 6 Years

Dredging	**Shoreline Change (ft)**				
	Reach 1	Reach 2	Reach 3N	Reach 3S	Reach 4
Without Dredging	-17.1	-61.0	-173.9	-162.8	-116.1
With Dredging	-19.7	-56.5	-182.0	-158.7	-103.5
Net Difference (ft)	-2.6	+4.5	-8.1	+4.1	+12.6
Percentage Difference	+15.2%	-7.4%	+4.7%	-2.5%	-10.9%

9.0 REGULATORY PATHWAYS AND PROJECT TIMELINES

The master plan approach is designed to make the regulatory process more efficient and predictable by developing volumetric requirements and evaluating borrow sources in advance of an imminent project. This section provides a brief overview of permitting requirements and timelines for regularly scheduled maintenance projects and post-storm recovery projects.

The required permitting process for a beach nourishment project includes both CAMA and USACE permits, as well as a State Water Quality Certification, along with coordination with multiple state and federal resource agencies. Construction moratoriums and avoidance and minimization measures are required to minimize environmental impacts of each project. Because of the coordination required as well as the time needed for project engineering design, bidding, and financing the project, it generally takes on the order of two years to complete a project from initiation to construction start.

9.1 Maintenance Projects

Ongoing beach profile surveys performed as part of the Town's Annual Beach Monitoring program are used to determine whether triggers are likely to be met within the next two years. If this occurs, the permitting, design, and construction process for the next project is initiated. The next project construction then generally occurs after May 1 of the second year after initiation. Figure 9-1 shows a typical timeline for maintenance projects addressing long-term background erosion.

9.2 Post-Storm Restoration Projects

If a storm occurs and results in a federally declared disaster, the permitting, design, and construction process are initiated immediately along with an application for FEMA post-disaster assistance under 44 CFR § 206.226(j)(2). FEMA then conducts a review of the application which typically takes on the order of six months. If the storm occurs before or in early fall and FEMA review occurs concurrently with the design and permitting of the project, a post-storm project then occurs after May 1 of the second year after initiation. Figure 9-2 shows a typical timeline for post-storm restoration. It is noted that if the storm occurs late in hurricane season and if FEMA review occurs prior to initiation of the permitting and design, the project may not be constructed until May 1 of the third year after storm occurrence.

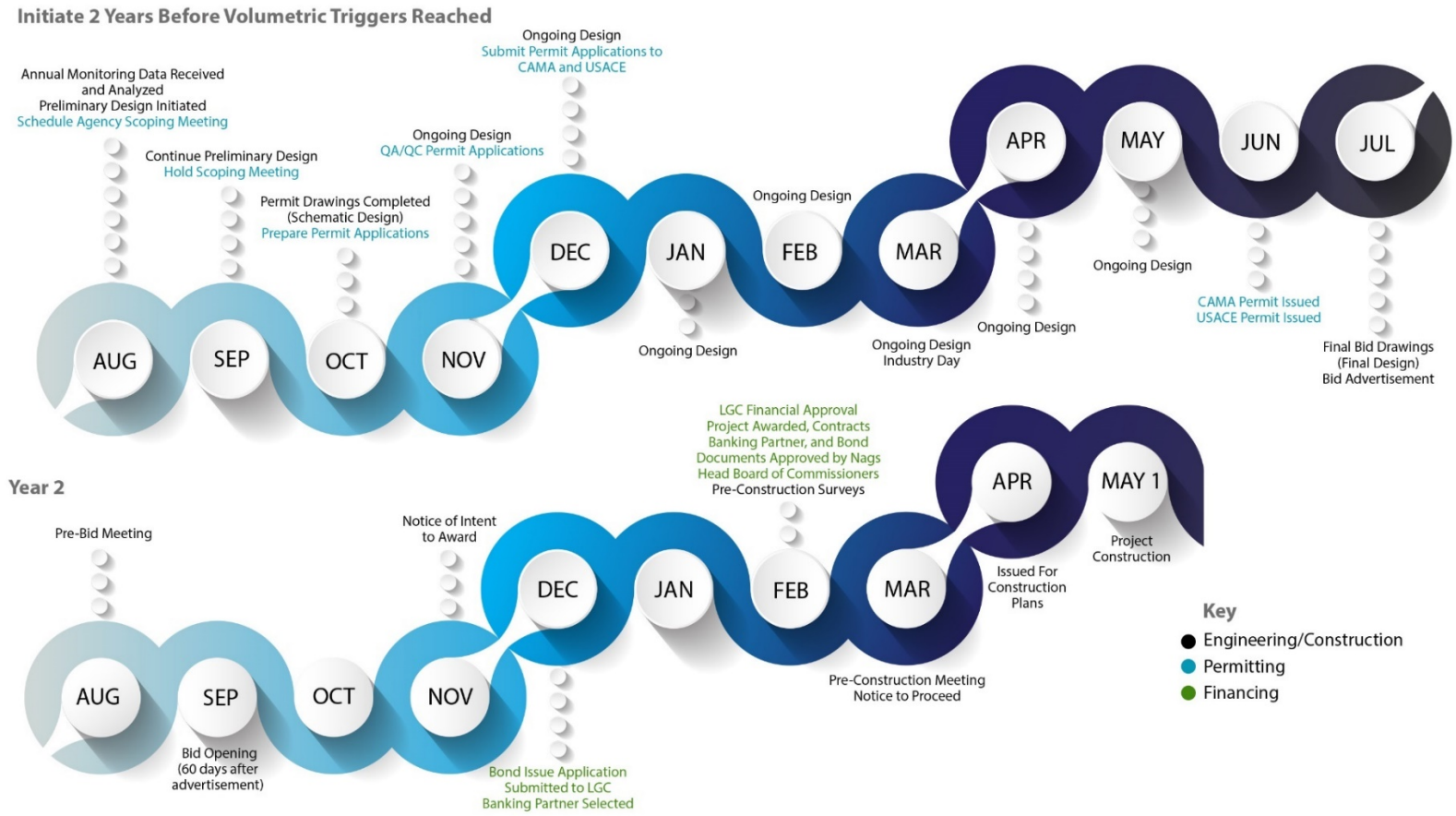


Figure 9-1: Maintenance Project Timeline

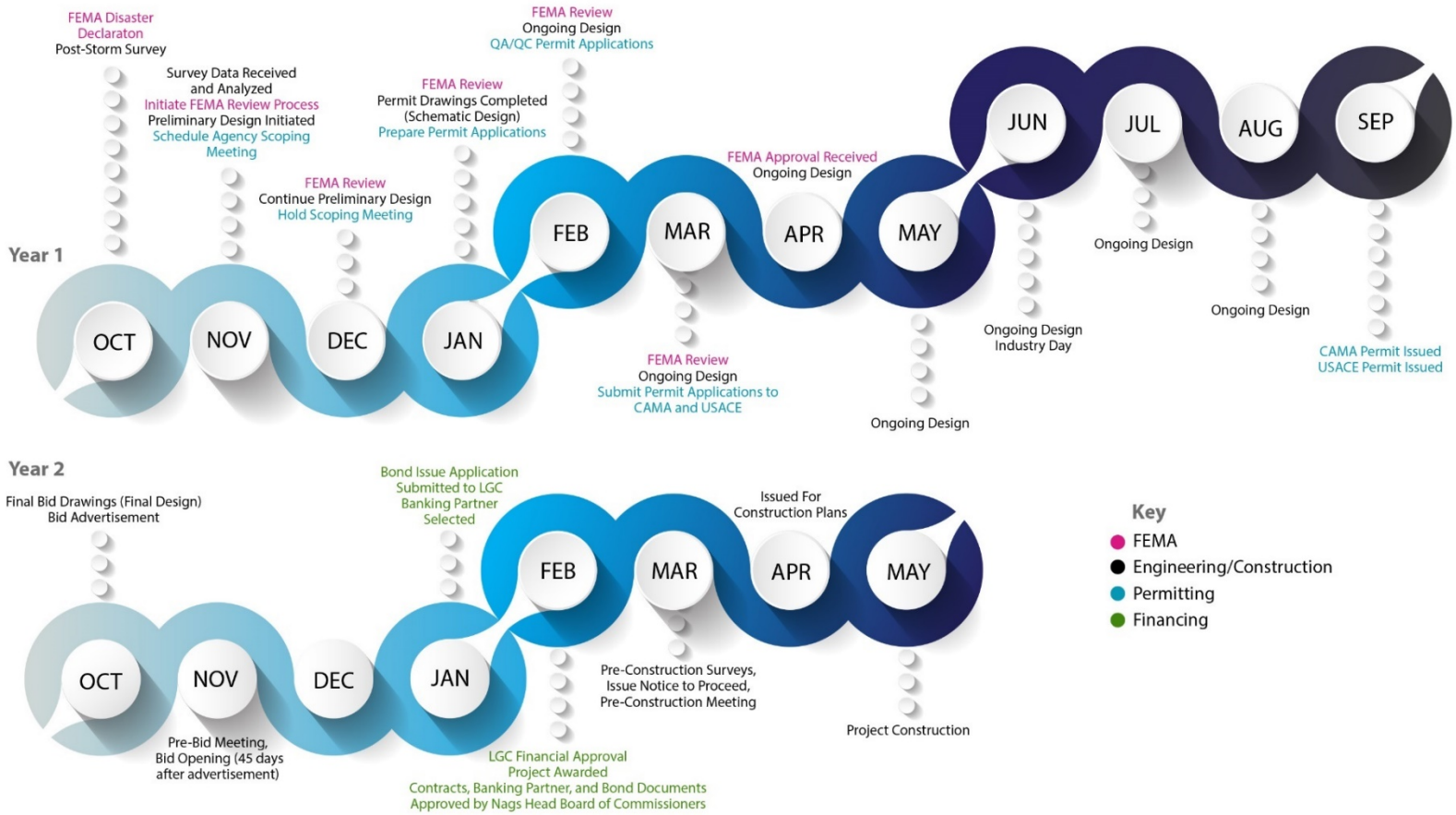


Figure 9-2: Post-Storm Project Timeline

10.0 CONCLUSIONS AND RECOMMENDATIONS

The key elements of the Nags Head Beach Nourishment Master Plan are summarized in this section. The framework developed here allows for proactive planning and execution of sustainable beach management over the 50-year planning horizon.

- The Town has conducted four beach and dune nourishment projects along the Nags Head oceanfront since 2004, with a total of approximately 9.5 Mcy placed.

- Equivalent 25-year LoP and nourishment triggers have been developed to guide planning for beach nourishment projects.

- The total sediment need estimated using Crystal Ball analysis for background erosion over the 50-year timeframe is 22.5 Mcy, and the need estimated due to potential additional storms is 21.5 Mcy.

- Anticipated SLR could require up to 4.7 Mcy of additional sand over the 50-year master plan timeframe under the intermediate high scenario.

- Total anticipated long term sediment need is estimated at approximately 48.8 Mcy including background erosion, storm impacts, and sea level rise.

- The approximately 8.5 square mile borrow area S1 has been determined to contain sufficient beach compatible sand to meet the anticipated 50-year nourishment need, with geophysical and geological data collected to meet state standards. Sub-areas within S1 have been developed to facilitate cost-effective dredging for beach nourishment projects. These sub-areas also facilitate permitting and tracking the use and sedimentation rates of the borrow area.

- If the Town ceased beach nourishment activities, there would be severe economic impacts, including over $800M in lost property value and up to $3.9M in annual property tax losses. Substantial losses to tourism revenues would also be anticipated.

- A planned 6-year beach nourishment interval (non-phased) allows for responsiveness to changing conditions and provides a lower total cost over the 50-year master plan timeframe than the 4-year and 5-year interval. Additionally, if volumetric triggers are not reached within 2 years of the 6-year planned interval, the Town could potentially extend the time between projects and reduce the total mobilization/demobilization costs. The typical time span for regulatory requirements and contractor procurement is 2 years. This is the Town’s preferred alternative.

- Initial estimated costs for each alternative are developed based on the volume requirements and can be used to develop a long-term funding plan, including requests for funding from Dare County and the State of North Carolina.

- Structural alternatives, such as breakwaters or groins, to reduce erosion rates in South Nags Head (Reach 3S and Reach 4) are not recommended for several reasons:

    - Nearshore breakwaters added significant costs because the reduction in erosion provided by the breakwaters was not enough to substantially reduce the nourishment requirements.

    - While a groin alternative was shown to significantly reduce the erosion rates in Reaches 3S and 4, and corresponding nourishment costs, adverse downdrift effects were modeled within the Cape Hatteras National Seashore. These downdrift effects would likely add significant costs for required mitigation/downdrift sand placement.

    - Oceanfront erosion control structures are currently not allowed under North Carolina G.S. § 113A-115.1, with the exception of terminal groins constructed at the terminus of an island or on the side of an inlet.

- Additional considerations for beach nourishment project design include project funding sources, feasibility of construction, and tourism and recreation. These factors can influence design and construction and can be evaluated on a project-by-project basis.

- Future project costs can vary due to timing of bidding, beach conditions, and utilization of available dredge plant at the time of construction.

- Dune planting along with installation of sand fencing is a proven method of stabilizing dunes and capturing sand, contributing towards dune growth. To create a robust vegetation system, seasonal inspections and planting are performed to allow for planting of multiple species of dune vegetation throughout the year.

- Ongoing beach profile surveys performed as part of the Annual Beach Monitoring program are used to determine whether triggers are likely to be met within the next two years. If this occurs, the permitting, design, and construction process for the next project is initiated. The next project construction then occurs starting May 1 of the second year after initiation.

- If a storm occurs and results in a federally-declared disaster, the permitting, design, and construction process are initiated immediately along with FEMA review. If the storm occurs in early fall and FEMA review occurs concurrently with the design and permitting of the project, a post-storm project then occurs starting May 1 of the second year after initiation. If the storm occurs later in the season and if FEMA review occurs prior to initiation of the permitting and design, the project may not be constructed until May 1 of the third year after storm occurrence.

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moffatt & nichol

Contact:
Moffatt & Nichol
4700 Falls of Neuse Road, Suite 300
Raleigh, NC 27609
P: (919) 781-4626

101 W. Main Street, Suite 3000
Norfolk, VA 23510
P: (757) 628-8222

moffattnichol.com



Agenda Item Summary Sheet

Item No: **I-1**
Meeting Date: **July 3, 2024**

Item Title: Committee Reports

Item Summary:

At the July 3rd Board of Commissioners meeting, Board members will provide reports from meetings they have attended on behalf of the Town.

Number of Attachments: 0

Specific Action Requested:

Provided for Board information and update.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

N/A

Signature: Andy Garman Date: June 26, 2024

Agenda Item Summary Sheet

Item No: **I-2**
Meeting Date: **July 3, 2024**

Item Title: Consideration of amendment to Traffic Control Map – No Parking – Tow Away Zone on the south side of Bonnett Street

Item Summary:

Please find attached a memo from Police Chief Perry Hale requesting to amend the Traffic Control Map to designate the south side of Bonnett Street from its intersection with Wrightsville Avenue to NC 12 as "No Parking - Tow Away Zone". (The north side of Bonnett Street was previously designated as a "No Parking – Tow Away Zone".) Parking from the Farmer's Market and other Dowdy Park events is making it difficult to see other vehicles, cyclists, and pedestrians traveling west on Bonnett Street.

Attached please find a map designating the area as well as an ordinance amending the Traffic Control Map for Board review and consideration.

Number of Attachments: 3

Specific Action Requested:

Ordinance amending the Traffic Control Map provided for Board consideration.

Submitted By: Public Safety – Police Chief Hale Date: June 26, 2024

Finance Officer Comment:

Minimal fiscal impact to include the cost of signage.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I concur with staff's request and will participate in the discussion as necessary.

Signature: Andy Garman Date: June 26, 2024

Nags Head Police Department

5401 S. Croatan Hwy.
Post Office Box 99
Nags Head, North Carolina 27959
Telephone (252) 441-6386
Fax (252) 441-7335
www.nagsheadnc.gov
Service – Professionalism – Integrity – Strength

Perry Hale
Chief of Police

Chris Montgomery
Deputy Chief of Police

MEMORANDUM

TO: Andy Garman, Town Manager

FROM: P. Hale, Chief of Police

DATE: June 24, 2024

RE: Traffic Control Map Amendment; Bonnett St / Wrightsville Ave

Parking on E. Bonnett Street during events has increased over the years with the popularity of the markets and other events held at Dowdy Park throughout the year. Vehicles do use the overflow parking at NHES; however, they also park along the shoulder along Bonnett Street where it is not marked for no parking. Over the past few weeks, the department has noticed an increase in parking east of Wrightsville Ave. on the south side of Bonnett Street which is creating a hazard for motorists trying to maneuver through this intersection. The parking is making it difficult to see other vehicles, cyclists, and pedestrians traveling west on Bonnett St.

We are requesting to make the section from Wrightsville Ave. to NC 12 “No Parking - Tow Away Zone” to prevent future traffic issues in the area.

I will be available at the Board meeting to answer any questions.


NC 12
BONNETT ST
S MEMORIAL AVE
MEMORIAL AVE
BONNETT ST
S WRIGHTSVILLE AVE

Ordinance No. 24-07-015
NP-TAZ Bonnett Street
BOC Meeting July 3, 2024

ORDINANCE AMENDING THE NAGS HEAD TRAFFIC CONTROL MAP

BE IT ORDAINED by the Board of Commissioners of the Town of Nags Head, North Carolina, that the Nags Head Traffic Control Map is hereby amended as follows:

PART I. Designation of *No Parking – Tow Away Zone* at the following location:
- On the south side of E Bonnett Street from Wrightsville Avenue to NC12

PART II. All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

PART III. This ordinance shall become effective upon notation being made on the Nags Head Traffic Control Map and the erection of appropriate signage.

This the 3rd day of July 2024.

_____
Benjamin Cahoon, Mayor
Town of Nags Head

ATTEST:

_____
Carolyn F. Morris, Town Clerk

APPROVED AS TO FORM:

_____
John Leidy, Town Attorney

ADOPTED **July 3, 2024**

MOTION TO ADOPT BY: _____
SECONDED BY: _____
VOTE: _____ AYES _____ NOES

Agenda Item Summary Sheet

Item No: **K-1**
Meeting Date: **July 3, 2024**

Item Title: Town Manager Garman – Update on construction of the Public Services Facility

Item Summary:

Town Manager Andy Garman, along with Town Engineer David Ryan, will present an update on the construction progress of the new Public Services Facility at the July 3rd Board of Commissioners meeting.

Number of Attachments: 0

Specific Action Requested:

Provided for Board information and update.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

I will respond to questions as necessary.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

Update provided for Board information.

Signature: Andy Garman Date: June 26, 2024

Agenda Item Summary Sheet

Item No: **K-2**
Meeting Date: **July 3, 2024**

Item Title: Town Manager Andy Garman – FY 2024 Project Review

Item Summary:

At the July 3rd Board of Commissioners meeting, Town Manager Andy Garman will provide a FY 2024 Town Project Review slideshow.

Number of Attachments: 0

Specific Action Requested:

Provided for Board information and update.

Submitted By: Town Engineer David Ryan Date: June 26, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

N/A

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

Presentation provided for Board information and update.

Signature: Andy Garman Date: June 26, 2024

Agenda Item Summary Sheet

Item No: **L-1**
Meeting Date: **July 3, 2024**

Item Title: Comr. Kevin Brinkley – Discussion of high-flying kites on the beach

Item Summary:

At the July 3rd Board of Commissioners meeting, Comr. Brinkley will discuss with Board members emails he has received re: kites being flown on the beach. The attached emails were received from local pilots: Dare MedFlight helicopter, OBX Airplanes Banner Company, and Coastal Helicopters sightseeing company - stating that safety could be an issue if the kites/string get into the path of a low-flying plane or helicopter.

Number of Attachments: 3

Specific Action Requested:

Provided for Board discussion.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

Insufficient information to determine fiscal impact.

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

Attorney Leidy will participate in the discussion as necessary.

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

I will participate in the discussion as necessary.

Signature: Andy Garman Date: June 26, 2024

June 18, 2024

Dear Mr. Brinkley,

I apologize for the delay in submitting this letter of concern. I spoke with Larry Ihle a few weeks ago and he asked me to write you about my concerns with kites that have been seen exceeding 600 feet this year vicinity of the Nags Heads beaches.

I am writing to bring to your attention the growing concerns regarding the presence of kites on the beach and the potential safety issues they pose to aircraft, specifically airplanes and helicopters.

As you are aware, kites have become popular recreational activities on beaches, attracting individuals of all ages. However, the unregulated and sometimes careless use of kites in close proximity to areas frequented by aircraft poses a significant risk to aviation safety. The unpredictable movements of kites, especially in windy conditions, can interfere with the flight paths of airplanes and helicopters operating in the vicinity, leading to potentially hazardous situations.

The risks associated with kites on the beach include entanglement with aircraft, obstructing the visibility of pilots, and causing distractions during critical take-off and landing maneuvers. These safety hazards not only jeopardize the well-being of those involved in aviation operations but also compromise the overall safety of beachgoers enjoying recreational activities along the coastline.

In order to mitigate these risks and ensure the safety of all individuals, I urge the relevant authorities to consider implementing appropriate measures to regulate the use of kites in areas close to airports, helipads,

and flight paths. Public awareness campaigns highlighting the dangers of flying kites near aircraft operations could also help educate beach visitors about responsible kite flying practices.

Collaborative efforts between aviation authorities, beach management agencies, and the public are essential in addressing these safety concerns and promoting a harmonious coexistence between recreational beach activities and aviation operations.

I kindly request your attention to this matter and welcome the opportunity to discuss potential solutions and initiatives to enhance safety measures and raise awareness about the risks associated with kites on the beach.

Thank you for your anticipated cooperation and commitment to ensuring the safety and well-being of all individuals involved.

Sincerely,

Mike

Mike Hill
EMS Helicopter Pilot
Mrhill64@gmail.com
(919) 215-0855

Carolyn Morris

From: Kevin Brinkley
Sent: Thursday, June 20, 2024 5:36 PM
To: All Mayor and Commissioners
Subject: Fwd: Kites along the coast

Letter 2 of 3

Begin forwarded message:

>
>
>> On Jun 4, 2024, at 4:21 PM, Jenny Hawk (OBX Airplanes) <obxairplanes@gmail.com> wrote:
>>
>> Hi Kevin,
>> Larry Ihle requested that I share my concerns about high flying kites along our coast. Many times it seems that kite fliers might tie 20 kite strings together and tie them to the railing of their vacation rental and leave for the day sending their kites soaring over our beaches at 1000 feet agl especially noticeable when the wind is out of the south/west as it often is in the summer. As you can imagine this causes quite an issue for our tour planes and more so for our banner planes. If a banner towing aircraft passes by a kite unknowingly the kite string will follow the lead line down to the D-ring on the banners and slice the line like a band saw. Interestingly enough the only part left attached to the plane is the part that floats. So the $4-8K customer's sign sinks to the bottom of the ocean. I've avoided this expensive experience with our company but only by luck. I've witnessed this happen to the other banner tow companies. Most of the time the sign does not get recovered. There was a funny story once years ago where a dolphin watch ad was cut by a kite and some dolphin lovers swam to the end of Kitty Hawk Pier and retrieved it to save the dolphins. Less funny though is the danger to helicopters not limited to Larry/Coastal Helicopters and Dare Medlfight. I am not a helicopter pilot but my understanding is that kite lines in a rotor blade can be very destructive and since they are impossible to see are an invisible hazard to the crew and passengers. I've heard many close calls over the radio and I understand there are ordinances and laws that may be able to be enforced.
>> Let me know if you would like any more information.
>> Jenny
>> OBX Airplanes LLC
>> jenny@obxairplanes.com
>> Office—252-473-2442
>> Direct—252-473-7467
>>
https://linkprotect.cudasvc.com/url?a=https%3a%2f%2fobxairplanes.com&c=E,1,LiibYXUljgD2oQu3OPqmgZi9CPpq1VqrsIp8SSLAoAOpBLLGKIsT2hXAxeBrwUdTaYJzLXcy7nDFq_klWi-PgUcU4m6PNITtB-w7kFhdxk_-rhP20_-Z&typo=1

Carolyn Morris

From: Kevin Brinkley
Sent: Thursday, June 20, 2024 5:37 PM
To: All Mayor and Commissioners
Subject: Fwd: Kites flying on the beach

Letter 3 of 3

Sent from my iPhone
Please excuse typos

Begin forwarded message:

From: obxhelicopters@gmail.com
Date: May 28, 2024 at 8:42:24 AM EDT
To: Kevin Brinkley <Kevin.Brinkley@nagsheadnc.gov>
Subject: Kites flying on the beach

Hi Kevin,
It was good talking with you the other day, just wanted to follow up on our conversation with an email.
As you know, we fly hundreds of flights along the beach every year at around 400' above the water, slightly offshore of the beach. I encounter kites flying at and above that altitude almost every week. When the wind is from a westerly direction, these kites naturally fly out over the ocean, in the flight path of any aircraft at low altitude, including and especially the banner tow planes, myself and Dare MedFlight. It's been a concern at the airport for some time among the low altitude flying pilots. In the past, kite strings have actually severed banner tow lines, causing the loss of the banner in flight, which could easily harm someone in the water or on the ground.
We understand that there is a federal aviation regulation that limits kites to an altitude of no higher than 500' above the ground, but respectfully request that the town consider creating an ordinance lower than that, to 300', due to the volume of aircraft flying along the beach year round. I have spoken to local law enforcement about the high flying kite issue in years past and they have all told me they really cannot enforce a federal regulation being they are not federal officers.
We all hope that the county can please consider adopting something that will make our skies safer along our beautiful beaches.
Thank you for your time,
Larry Ihle
252-928-8074

Agenda Item Summary Sheet

Item No: **N-1**
Meeting Date: **July 3, 2024**

Item Title: Request for Closed Session

Item Summary:

A Closed Session will be requested at the July 3rd Board of Commissioners meeting to confer with the Board re: matters related to attorney/client privilege, to include the use of the Town site located at 105 W Seachase Drive, and to preserve that privilege, pursuant to GS 143-318.11(a)(3) and to discuss the possible acquisition of real property located at 4222 S Croatan Hwy pursuant to GS 143-318.11(a)(5).

Attorney Leidy and Town Manager Garman will provide updated information for Board discussion.

Number of Attachments: 0

Specific Action Requested:

Provided for Board discussion.

Submitted By: Administration Date: June 26, 2024

Finance Officer Comment:

N/A

Signature: Amy Miller Date: June 26, 2024

Town Attorney Comment:

Attorney Leidy will participate in the discussion.

Signature: John Leidy Date: June 26, 2024

Town Manager Comment and/or Recommendation:

Town Manager Garman will participate in the discussion.

Signature: Andy Garman Date: June 26, 2024