

TOWN OF SOUTHERN SHORES, NC

BEACH NOURISHMENT PROJECT

2023 MONITORING UPDATE

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DECEMBER 5, 2023

COASTAL
PROTECTION
ENGINEERING

PRESENTATION OUTLINE

- *Recap of 2022/2023 Beach Nourishment Project*
- Beach Monitoring Basics
- 2023 Beach Monitoring Results
- Project Performance
- Next Steps

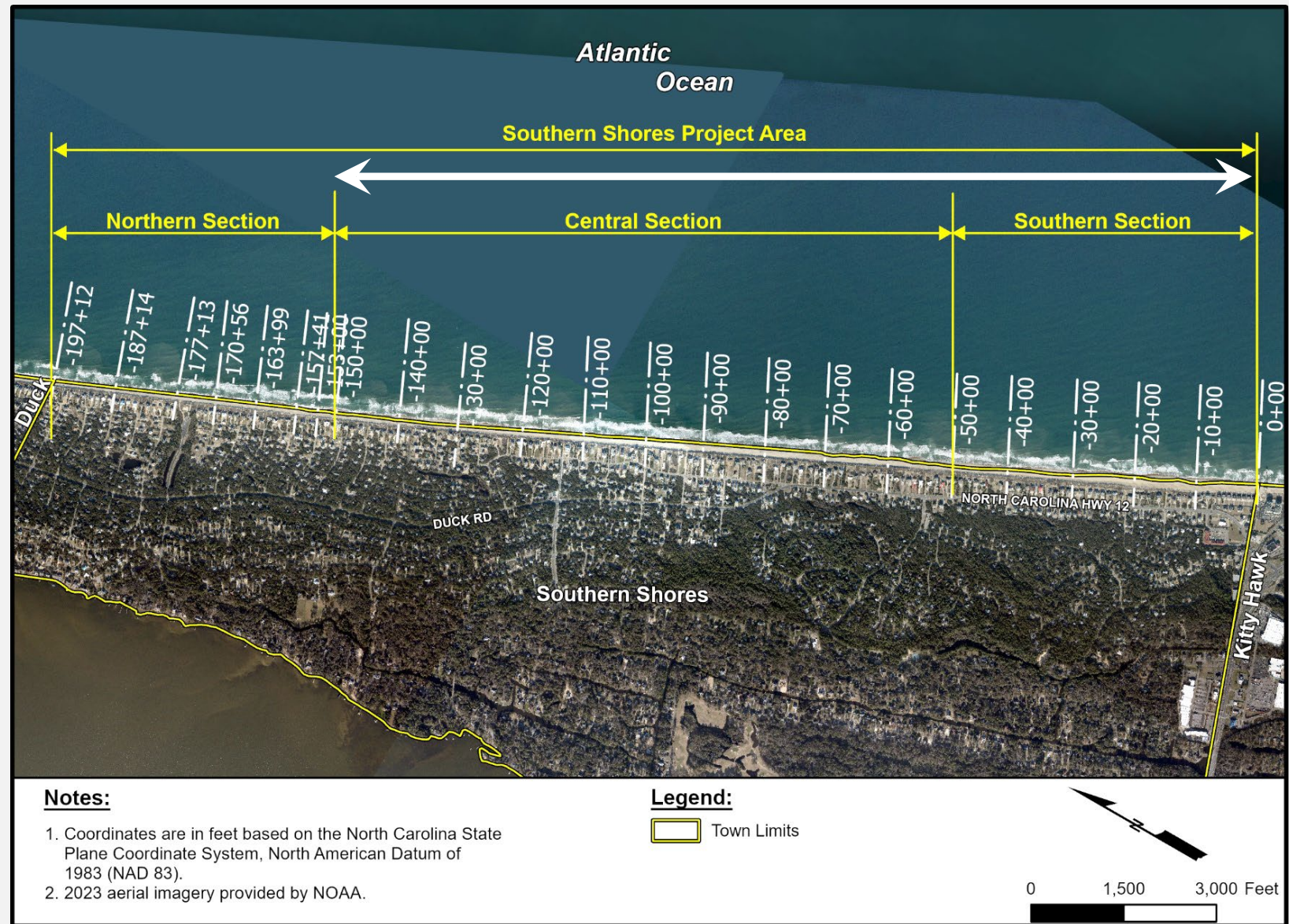
Project Goals:



1. Provides a reasonable level of storm damage reduction to public and private development
2. Mitigates long-term erosion that could threaten public and private development, recreational opportunities, and biological resources
3. Maintains a healthy beach that provides sufficient useable beach and supports valuable shorebird and sea turtle nesting habitat

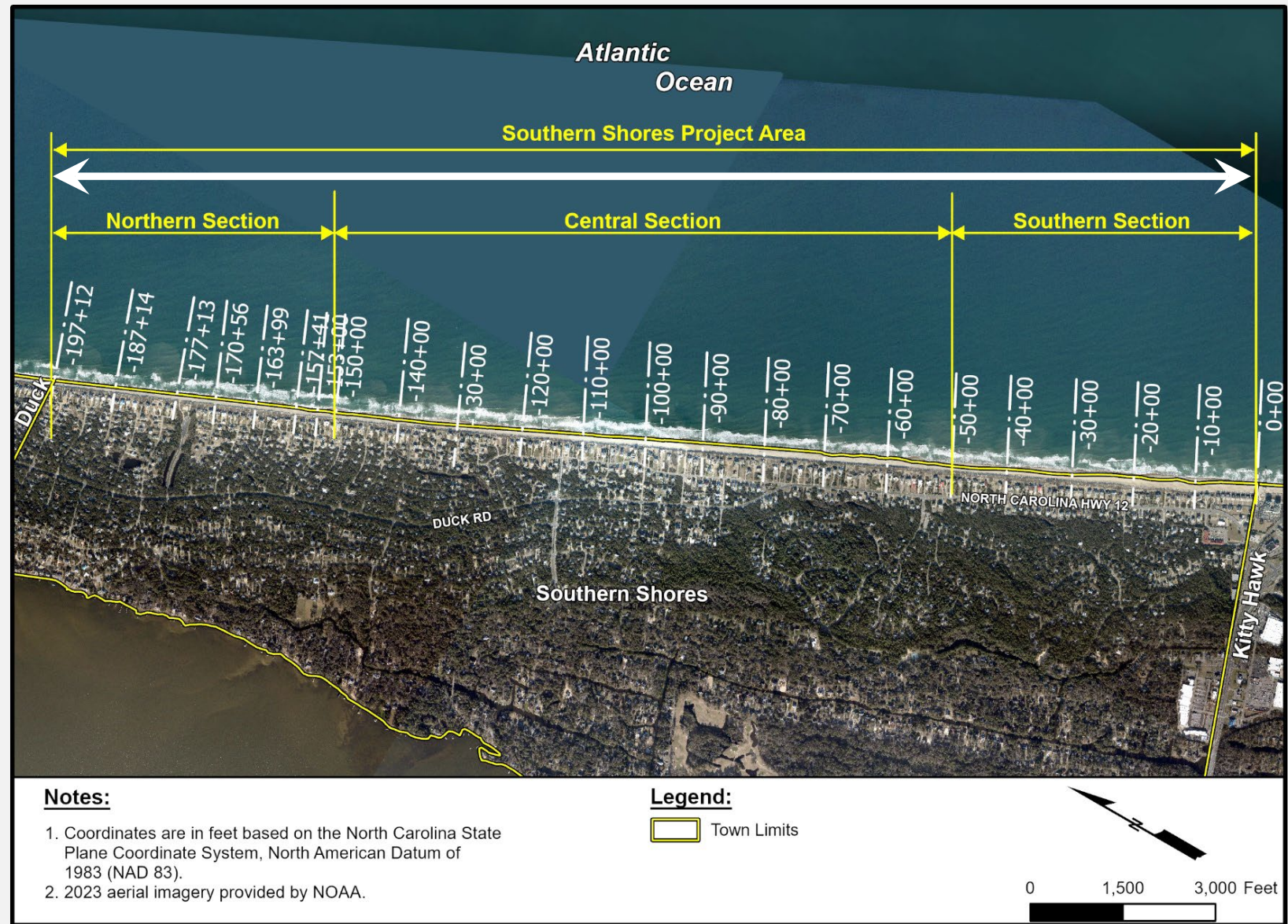
Project Goals:

1. Reasonable level of storm damage reduction



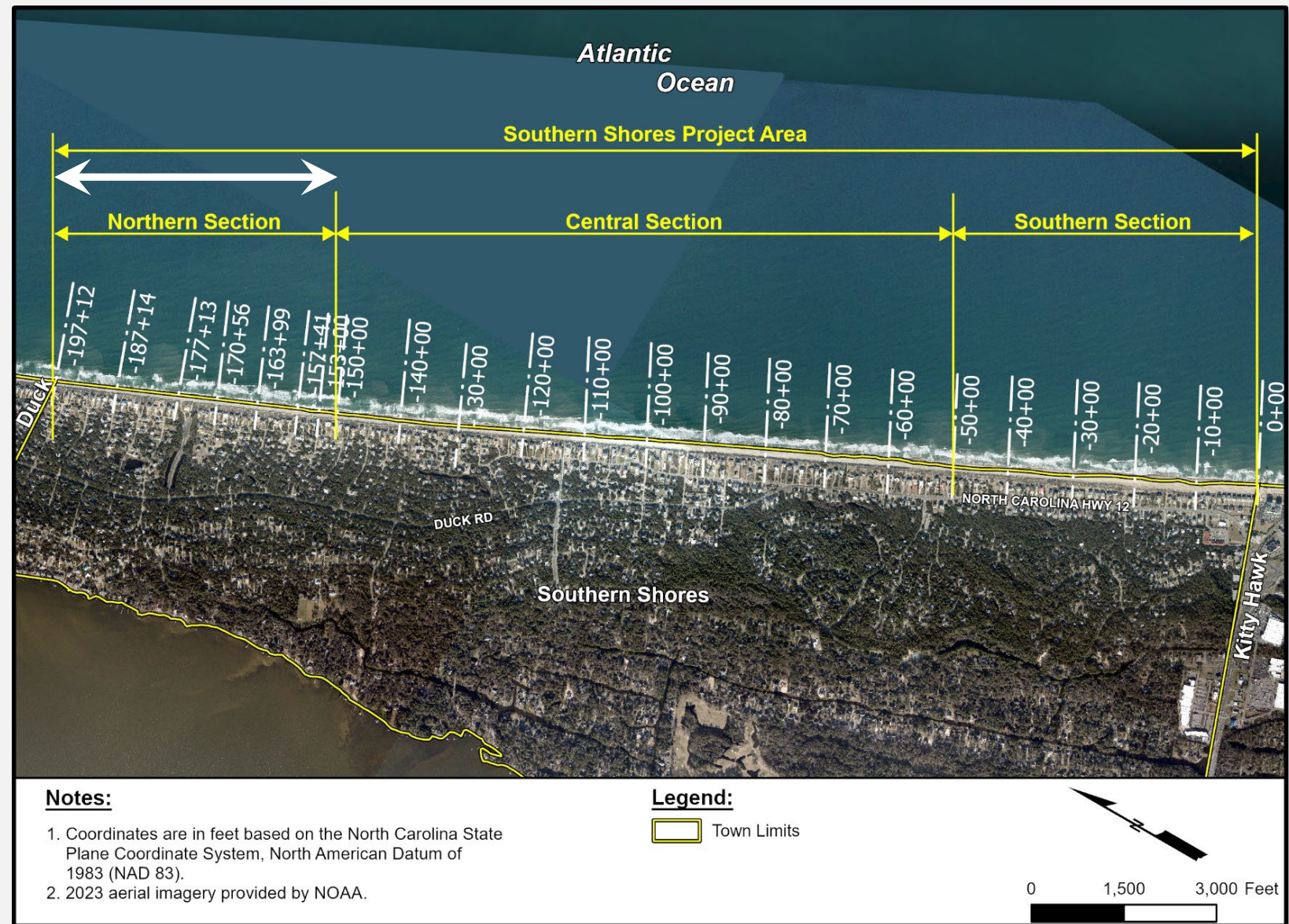
Project Goals:

1. Reasonable level of storm damage reduction
2. Mitigates long-term erosion

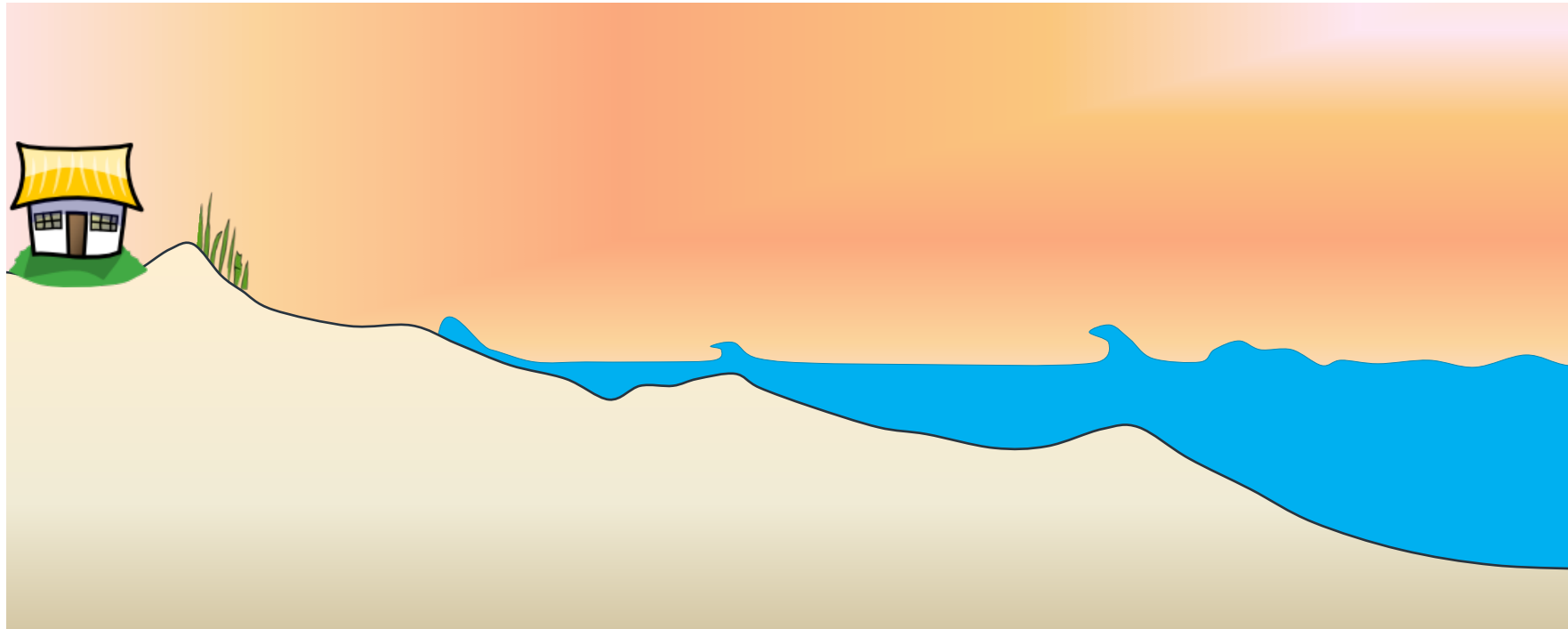


Project Goals:

1. Reasonable level of storm damage reduction
2. Mitigates long-term erosion
3. Maintains a beach that provides sufficient useable beach



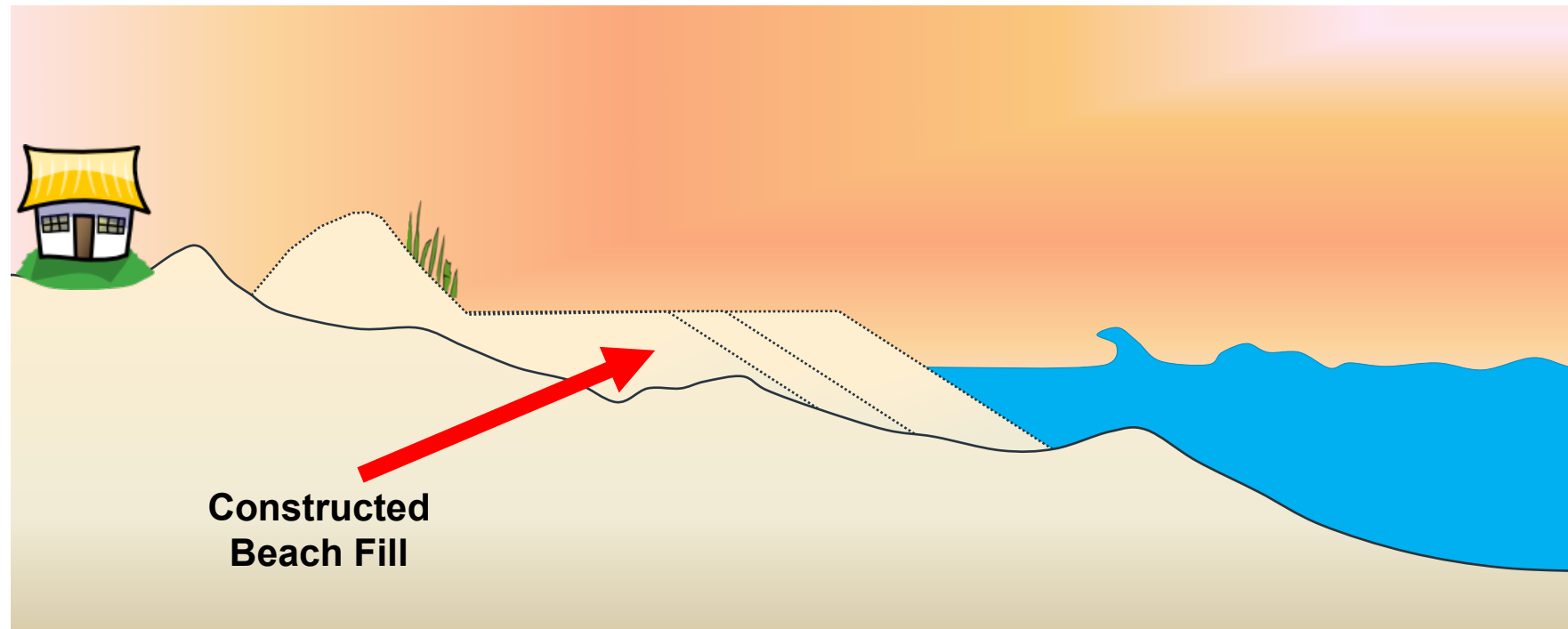
Storm Damage Reduction Project



Pre-Project Conditions



Storm Damage Reduction Project

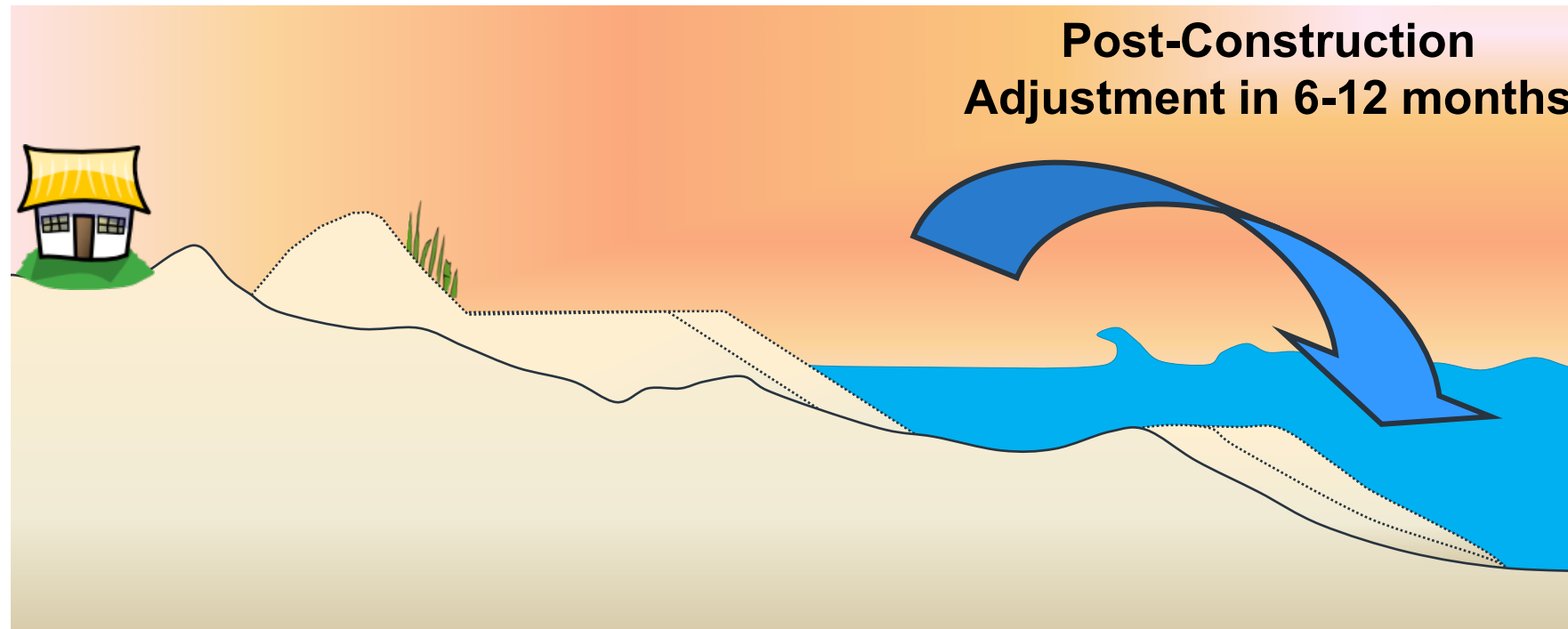


**Constructed
Beach Fill**

Initial Construction



Storm Damage Reduction Project

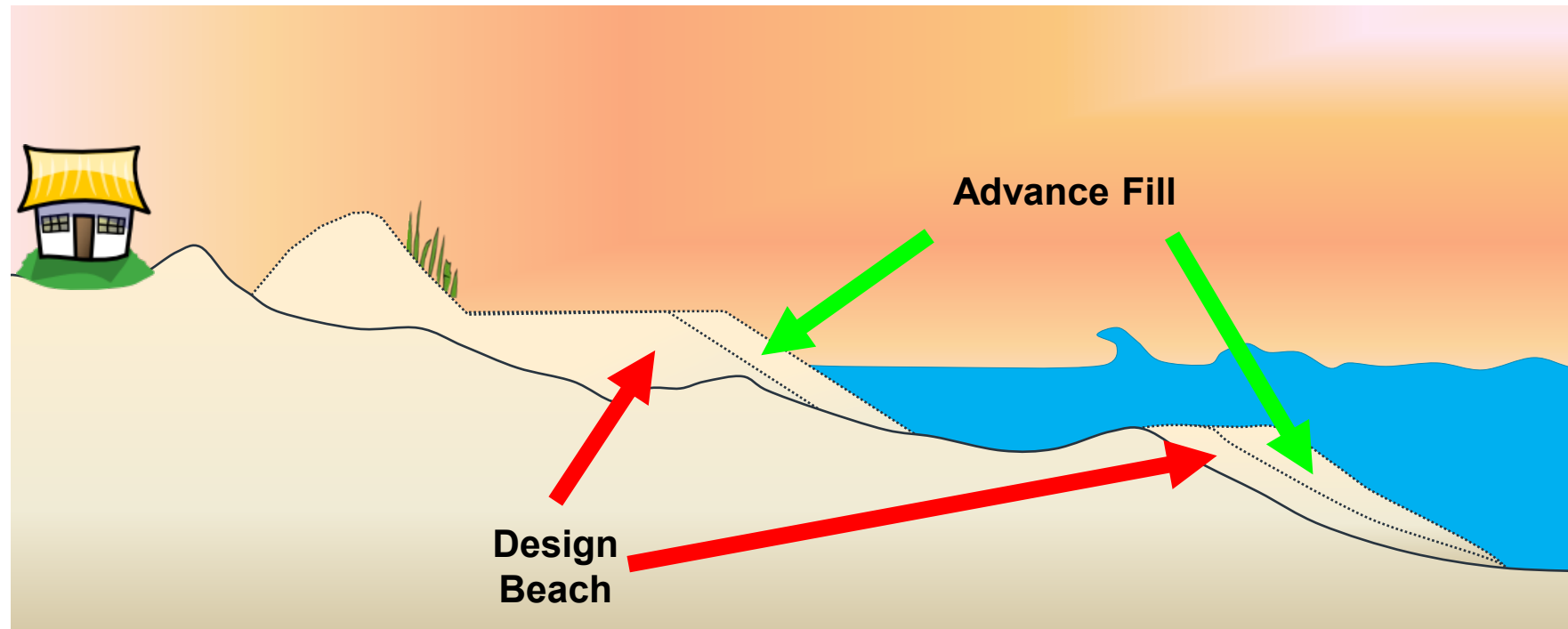


Equilibration of Beach Fill





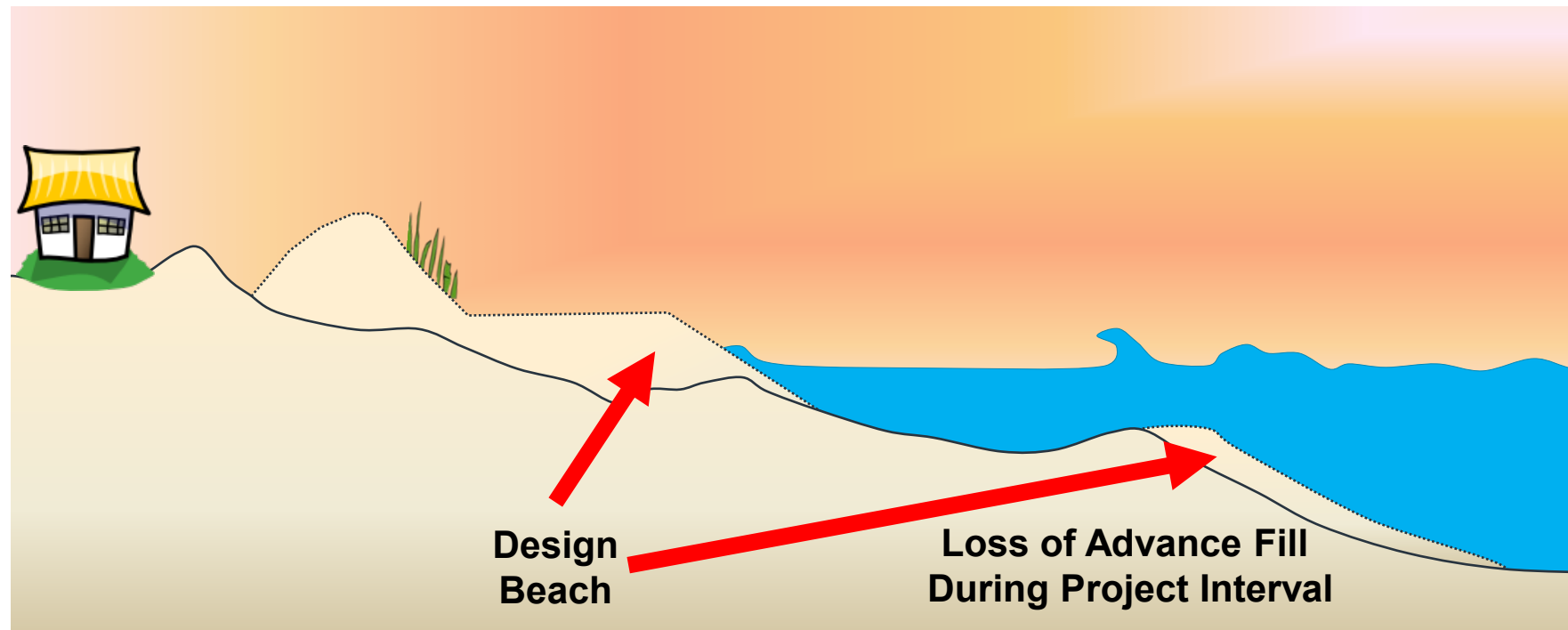
Storm Damage Reduction Project



Nourishment Interval



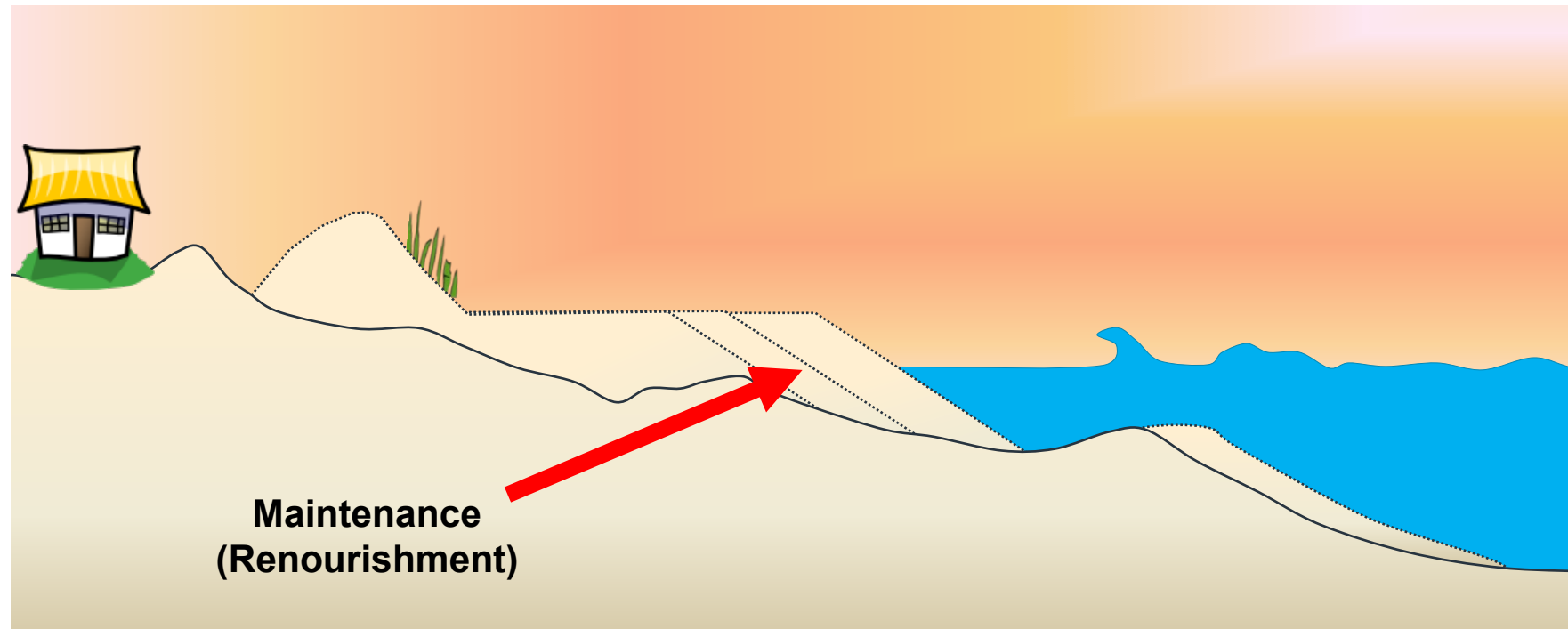
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Nourishment Interval



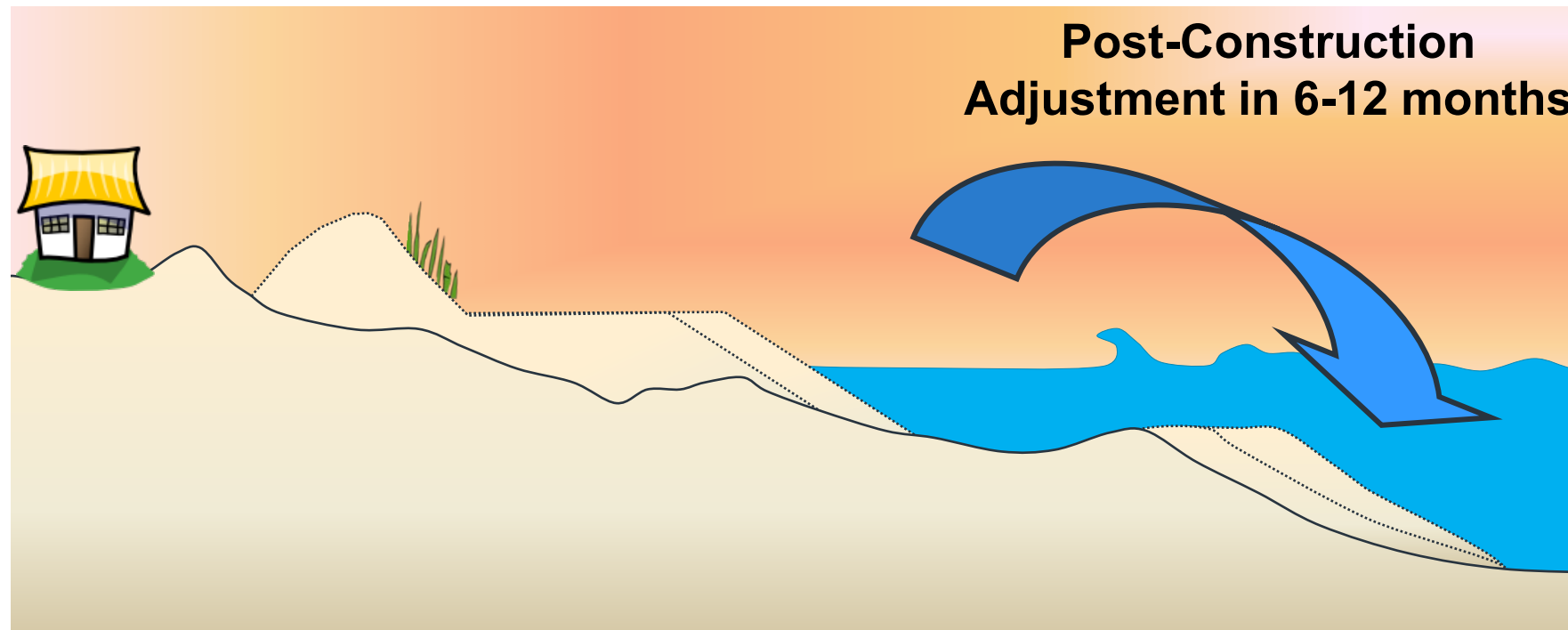
Storm Damage Reduction Project



Maintenance = Beach Renourishment



Storm Damage Reduction Project



Nourishment Interval















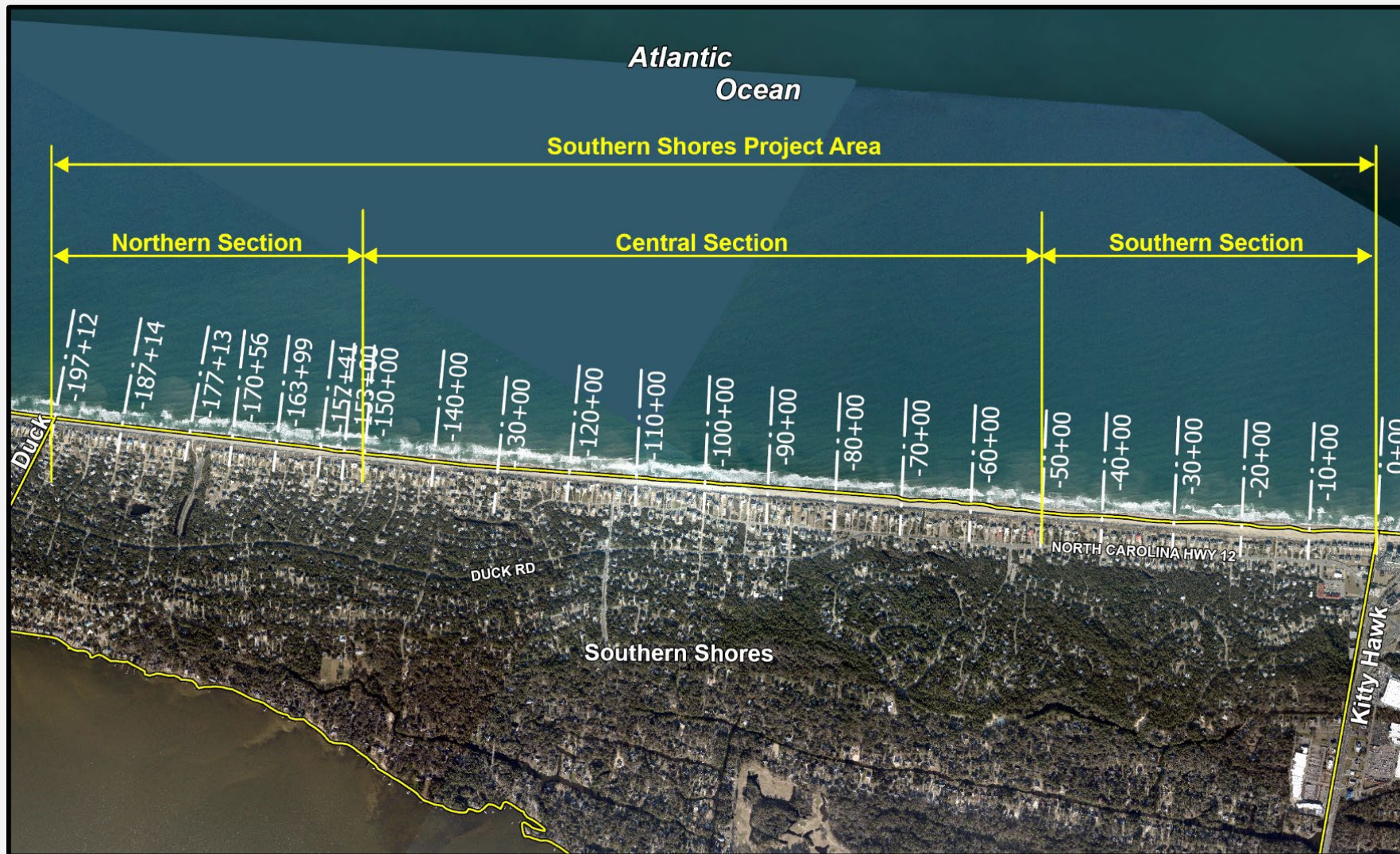


2022-2023 CONSTRUCTION TIMELINE

- Oct. 7 – Nov. 21, 2022: 990,400 cy of sand placed along the beach
 - South of 4th Avenue – Average Fill Density = 60.7 cy/ft.
 - North of 4th Avenue – Average Fill Density = 13.6 cy/ft.
- Nov. 22 – Dec. 30, 2022: Negotiations with Contractor to place additional fill material north of 7th Avenue
 - North of 4th Avenue – Average Fill Density = 13.6 cy/ft.
 - Natural accretion of fill North of 4th Avenue = 9 cy/ft.
 - Target Volume = 22 cy/ft.
 - Target Volume achieved on average, but fill density was not uniform
 - Negotiations to place additional fill north of 8th Avenue
- May 9 – May 11, 2023: Placement of 58,100 cy north of 7th Avenue, resulted in an average fill density of 25.3 cy/ft. north of 4th Avenue

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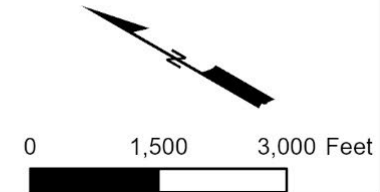


Notes:

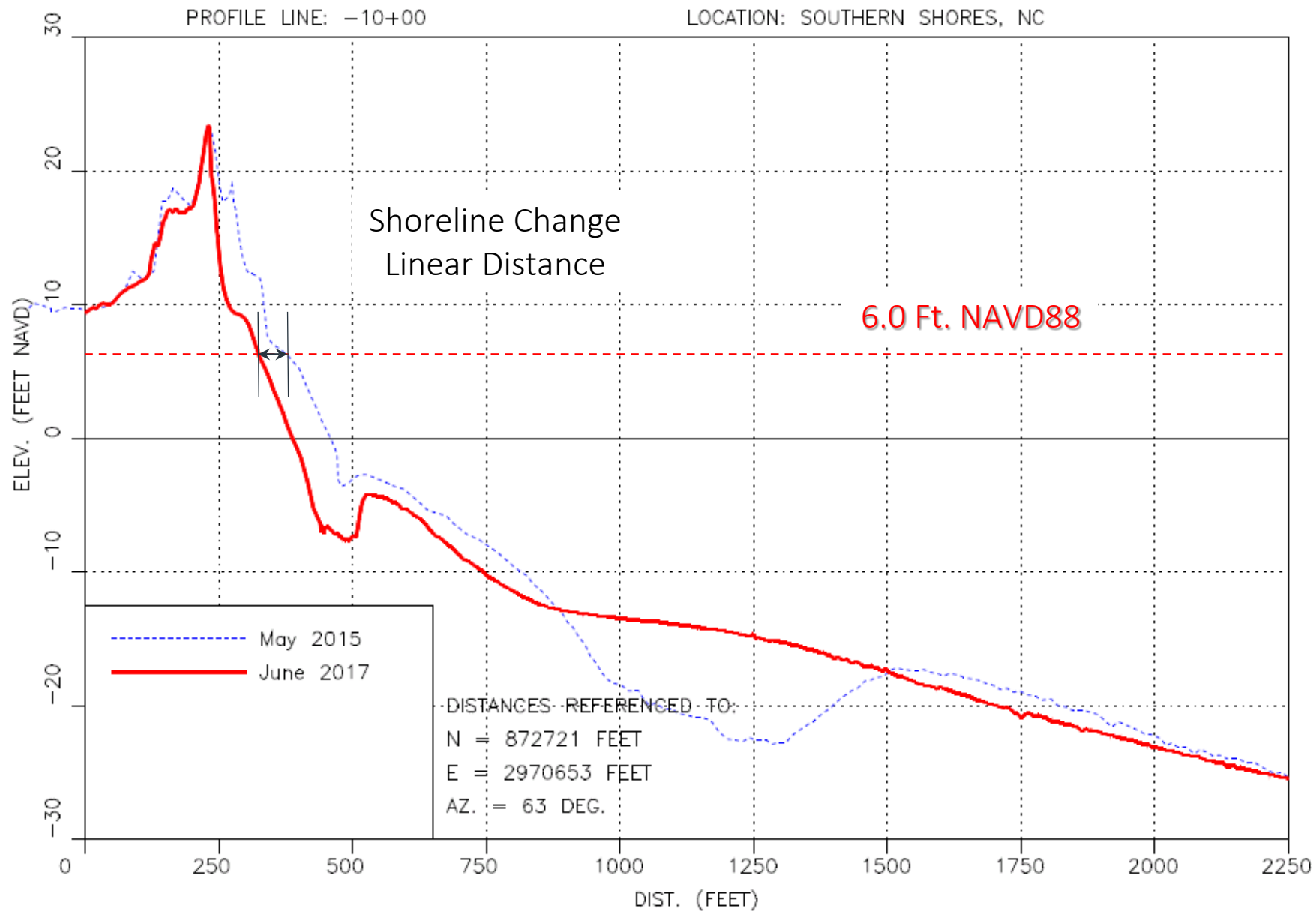
1. Coordinates are in feet based on the North Carolina State Plane Coordinate System, North American Datum of 1983 (NAD 83).
2. 2023 aerial imagery provided by NOAA.

Legend:

 Town Limits

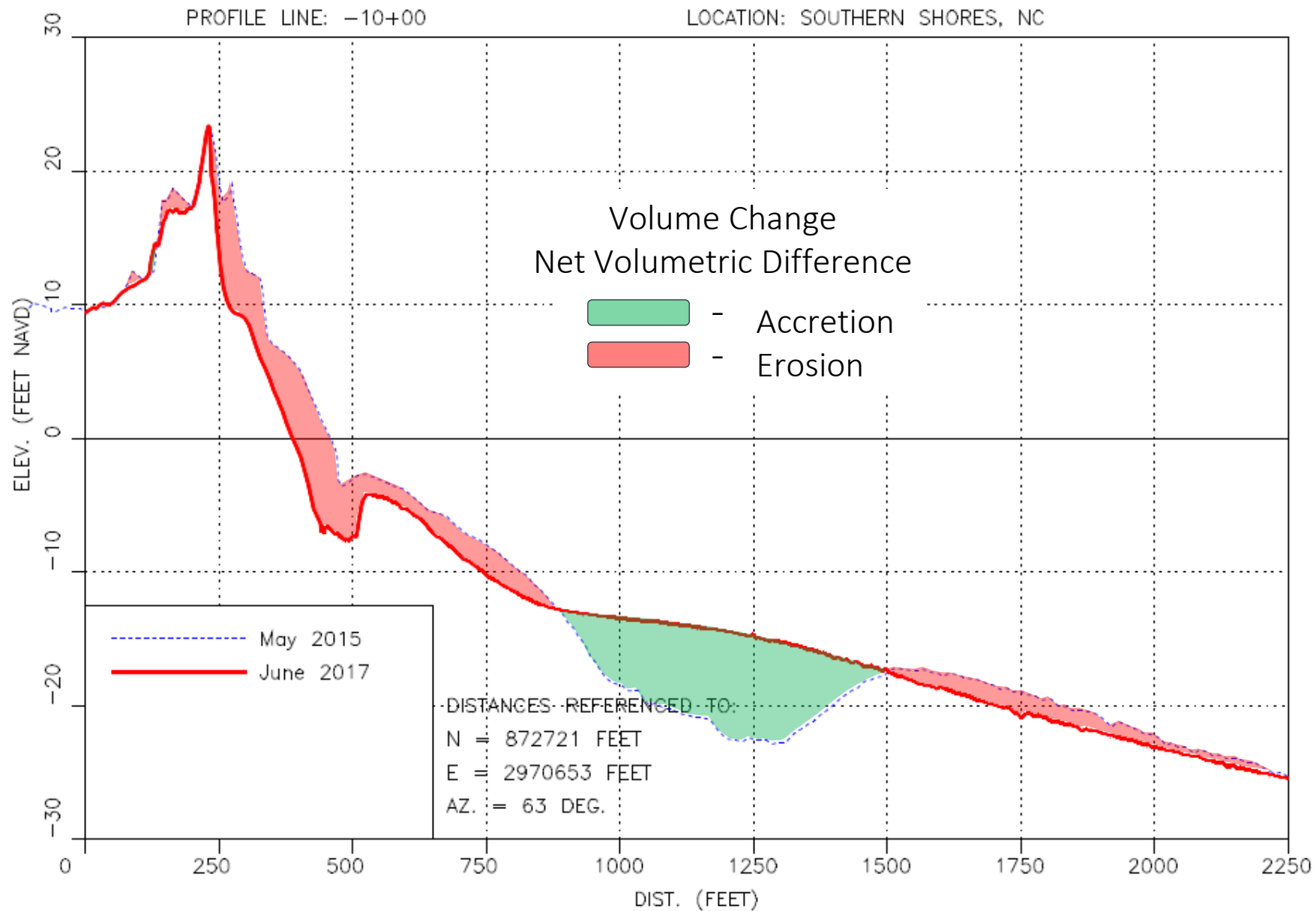


TYPES OF ASSESSMENT: SHORELINE CHANGE



SHORELINE CHANGE ANALYSIS

TYPES OF ASSESSMENT: VOLUME CHANGE



VOLUME CHANGE ANALYSIS

Annual Monitoring Analysis Update:

- Data: Beach Profile Surveys (June 2023, November 2022 (Post-Construction), August 2022 (Pre-Construction), and December 2017)
- 23 Beach Profiles Along Southern Shores Oceanfront
- **Shoreline Change Analysis:** Recent changes (November 2022 to June 2023) and Pre-Construction Rates (December 2017 to August 2022)
- **Volume Change Analysis:** Recent changes (November 2022 to June 2023) and Pre-Construction Rates (December 2017 to August 2022)

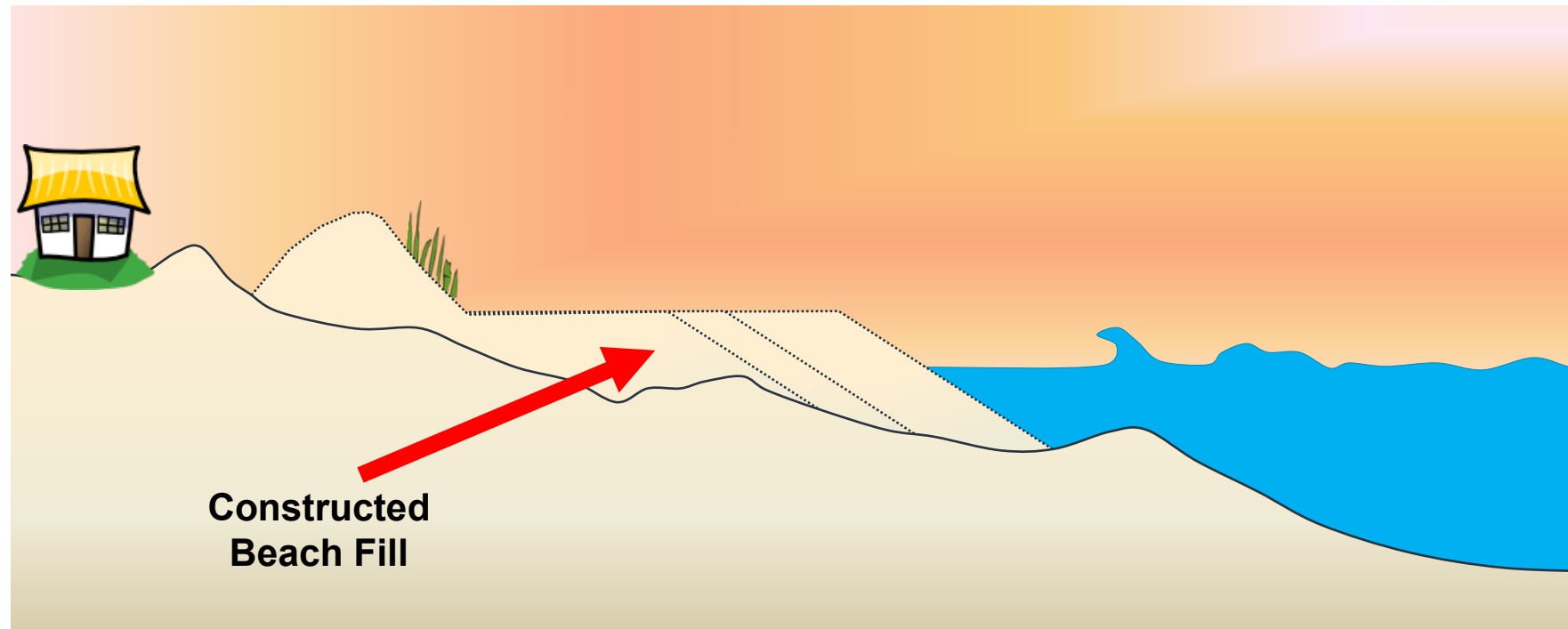
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Shoreline Change Analysis Results:

| MONITORING AREA | Shoreline Change (Ft.) Nov. 2022 (Post-Con) to June 2023 (Year-1 Monitoring) | Shoreline Change Rate (Ft./Yr.) Dec. 2017 (2017 Post-con) to August 2022 (Pre-con) |
|--|---|---|
| NORTHERN SECTION (-197+12 TO -153+00) | 11.8 | 0.8 |
| CENTRAL SECTION (-153+00 TO -50+00) | -45.5 | -4.0 |
| SOUTHERN SECTION (-50+00 TO 0+00) | -9.4 | -5.8 |
| TOTAL SOUTHERN SHORES (-197+12 TO 0+00) | -23.8 | -3.4 |

Storm Damage Reduction Project

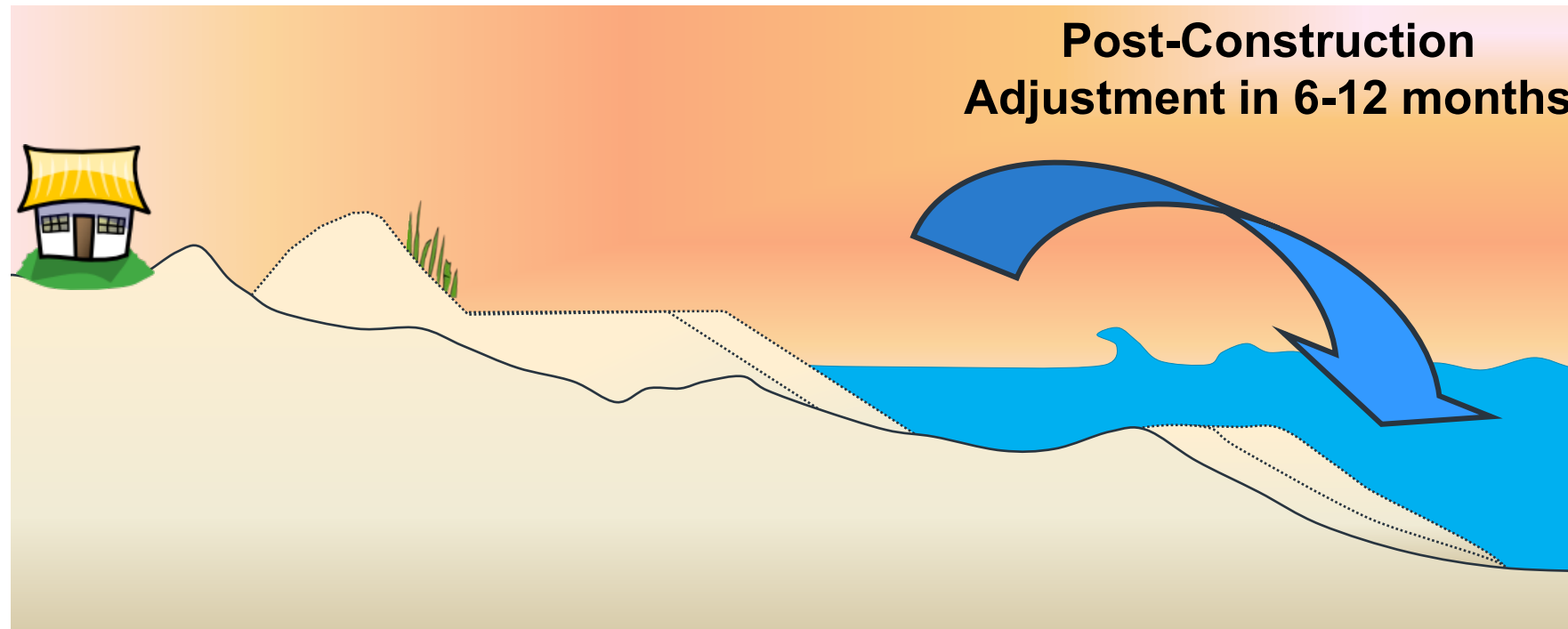


**Constructed
Beach Fill**

Initial Construction



Storm Damage Reduction Project



Equilibration of Beach Fill



Volume Change Analysis Results:

| MONITORING AREA | Project Volume Change (CY) | Volume Change (CY/Yr.) Nov. 2022 (Post-Con) to June 2023 (Year-1 Monitoring) |
|---|----------------------------|--|
| NORTHERN SECTION (-197+12 TO -153+00) | 124,000 | 161,400 |
| CENTRAL SECTION (-153+00 TO -50+00) | 580,800 | 140,600 |
| SOUTHERN SECTION (-50+00 TO 0+00) | 343,700 | 97,900 |
| TOTAL SOUTHERN SHORES (-197+12 TO 0+00) | 1,048,400 | 399,900 |

Volume Change Analysis Results:

| MONITORING AREA | Volume Change (CY/Ft.) Nov. 2022 (Post-Con) to June 2023 (Year-1 Monitoring) | Volume Change Rate (CY/Ft./Yr.) Dec. 2017 (2017 Post-con) to August 2022 (Pre-con) |
|--|--|---|
| NORTHERN SECTION (-197+12 TO -153+00) | 35.5 | 5.3 |
| CENTRAL SECTION (-153+00 TO -50+00) | 12.8 | 0.4 |
| SOUTHERN SECTION (-50+00 TO 0+00) | 17.6 | 0.1 |
| TOTAL SOUTHERN SHORES (-197+12 TO 0+00) | 20.9 | 1.8 |

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Hilton Garden Inn Pier Looking North

October 7, 2020



October 18, 2022



October 21, 2022



December 5, 2023



Dolphin Run Looking South

March 15, 2021



October 20, 2022



May 16, 2023



December 5 2023



Hillcrest Avenue Looking South

March 15, 2021



May 16, 2023



December 5, 2023



Project Performance Update – South of 4th Avenue:

- 924,500 cy added by the Project
- Advanced Fill Design = 286,200 cy
- Between November 2022 and June 2023, gain of 238,200 cy measured
- Project is performing well

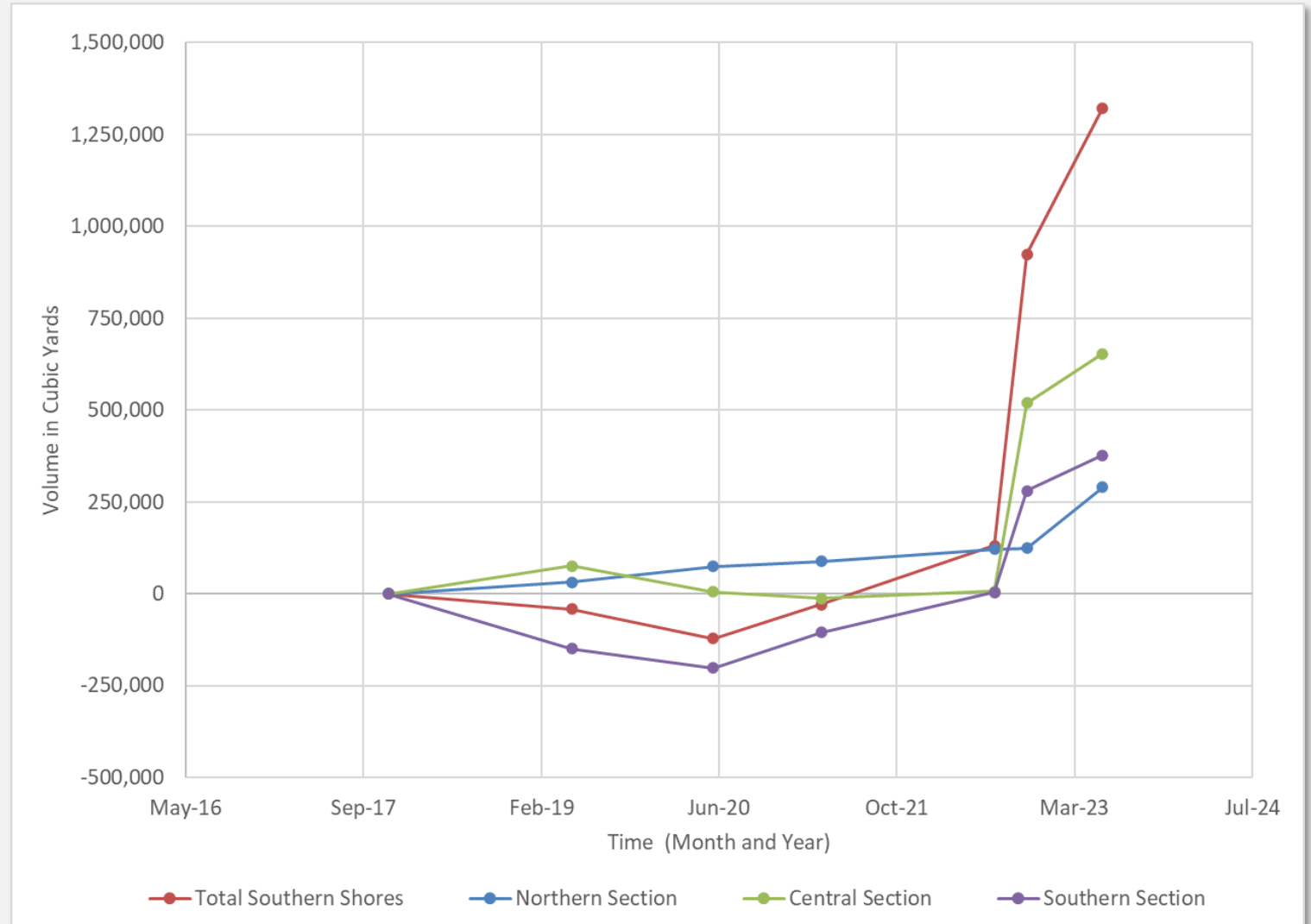
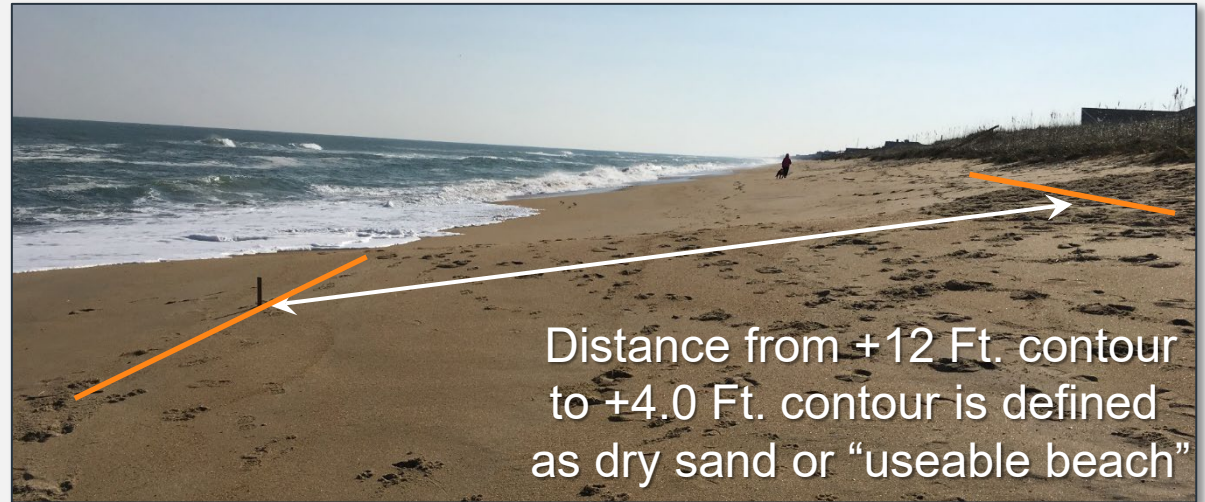


Figure 5. Graph showing Cumulative Volume Changes along Southern Shores since December 2017 as Calculated using Profile-Based Volume Changes

Project Performance Update – North of 4th Avenue:

- 124,500 cy added by the Project
- Advanced Fill Design = 0 cy
- Between November 2022 and June 2023, gain of 161,400 cy measured
- 58,100 cy of this volume was placed during the May operation
- November 2022: Average Useable Beach = 84 feet
- June 2023: Average Useable Beach = 82 feet.



| Beach Section | Profile Stations | Average Useable Beach Width |
|--|--------------------|-----------------------------|
| Town of Southern Shores from 3rd Avenue South to Southern Town Limit | -150+00 to 0+00 | 84 |
| 2017 Sand Placement Area (Skyline Road to Asheville Street) | -20+00 to 320+05 | 103 |
| Northern Section of Southern Shores from 5th Avenue North to Northern Town Limit | -197+12 to -157+41 | 57 |

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Next Steps:

- Town is installing additional sand fence
- 2024 Annual Monitoring: May/June 2024
- Project Optimization – Evaluate design performance & evaluate longer nourishment interval
- Regional Sand Resource Investigation



