



**NORTH CAROLINA**  
Department of Transportation

# Disaster Response Preparation on NC 12

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***NCDOT Location and Surveys Unit***

July 25, 2023

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

## Pre-Storm Event Surveys

NCDOT Division 1 asked for a way to be able to determine sand volumes after a storm event quickly along NC 12.

There are 5 areas of concern. These 5 HOT SPOTS were areas that historically have overwashed NC 12 along the Outer Banks. The dunes that protect the roadway are destroyed, with some of the sand washed out to sea and some layered over the roadway.

It is important for the Division to determine the amount of sand remaining so they can rebuild the dunes and know the volume of sand that will need to be trucked in. This information is needed within a day or two after the event so they can have an idea of how long it will take to open NC 12.



## Pre-Storm Event Survey 2022

August 10-12, 2022

Personnel from Division 1 , Aviation, and Location & Surveys performed UAS surveys on these 5 Hot Spots in August of 2022 in preparation of the 2022 Hurricane Season.

Control was set using a combination of existing points along NC 12 from previous surveys, traditional panel chevrons, and Aeropoints.

The aircraft used was a Wingtra Gen 2 VTOL fixed wing. It uses a Sony RX1R II camera.





## NC 12 Hot Spot Locations

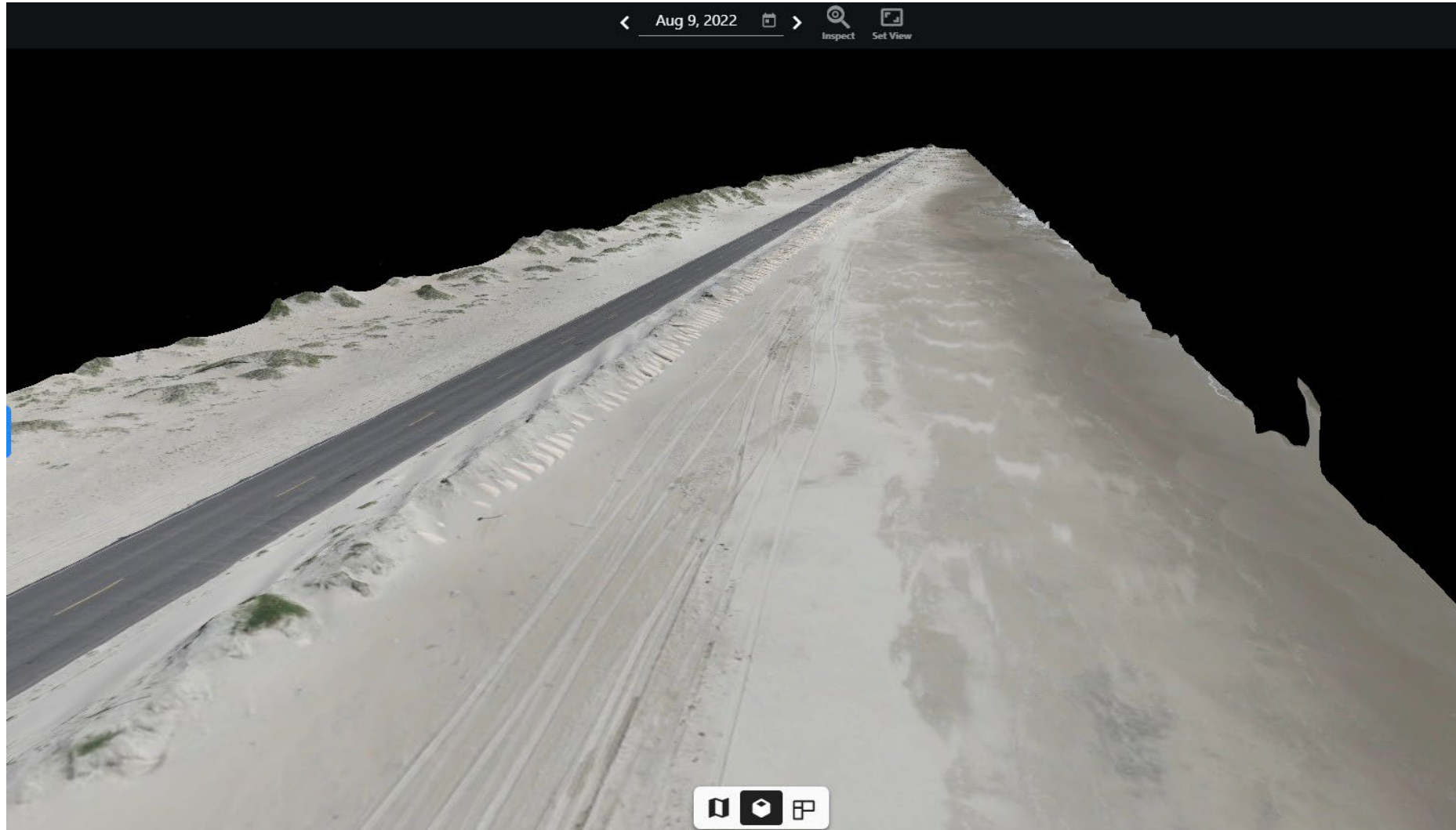




## NC 12 Hot Spot Locations Ocracoke

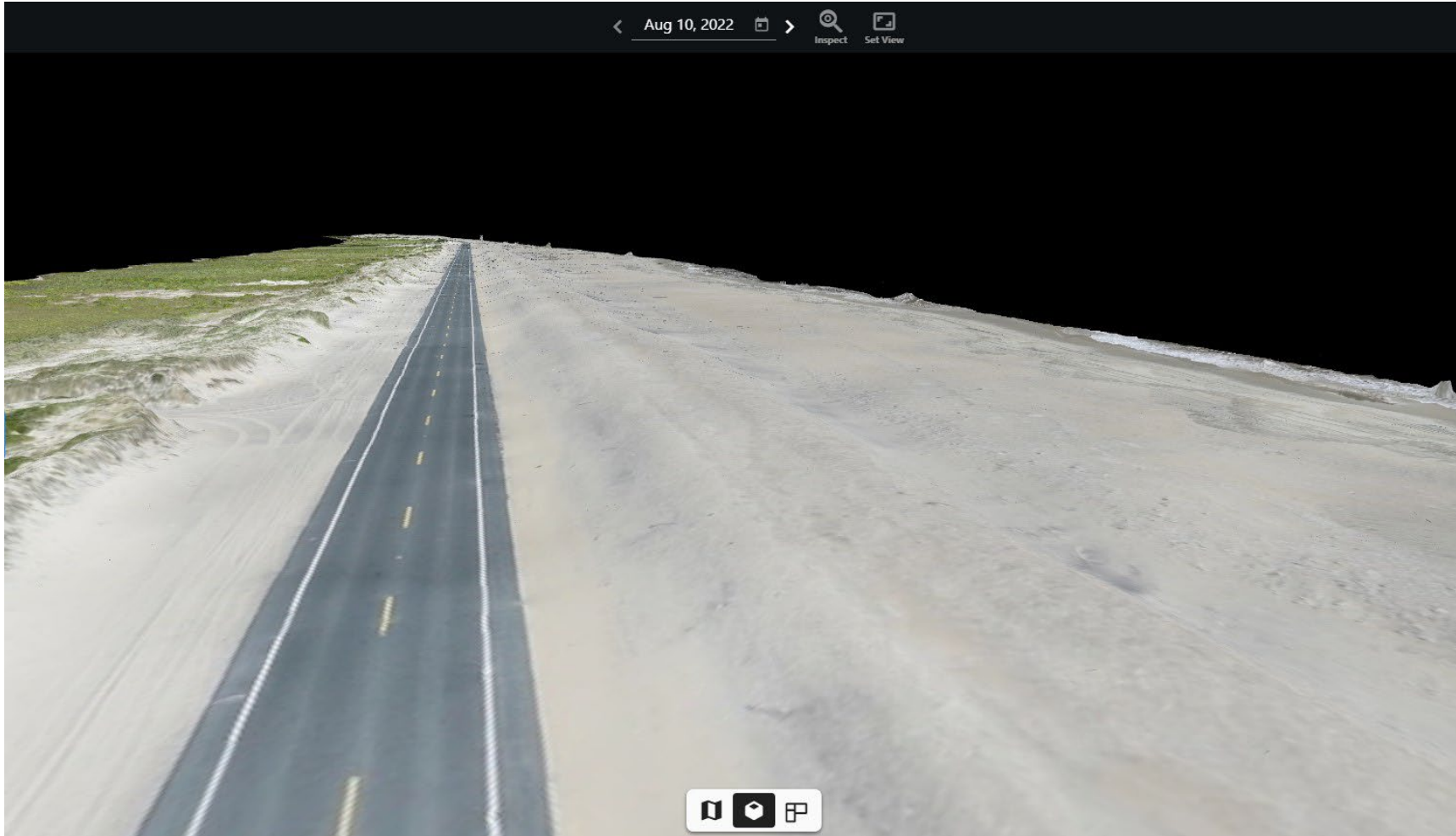


## August 9, 2022 Ocracoke Dunes 237 Photos

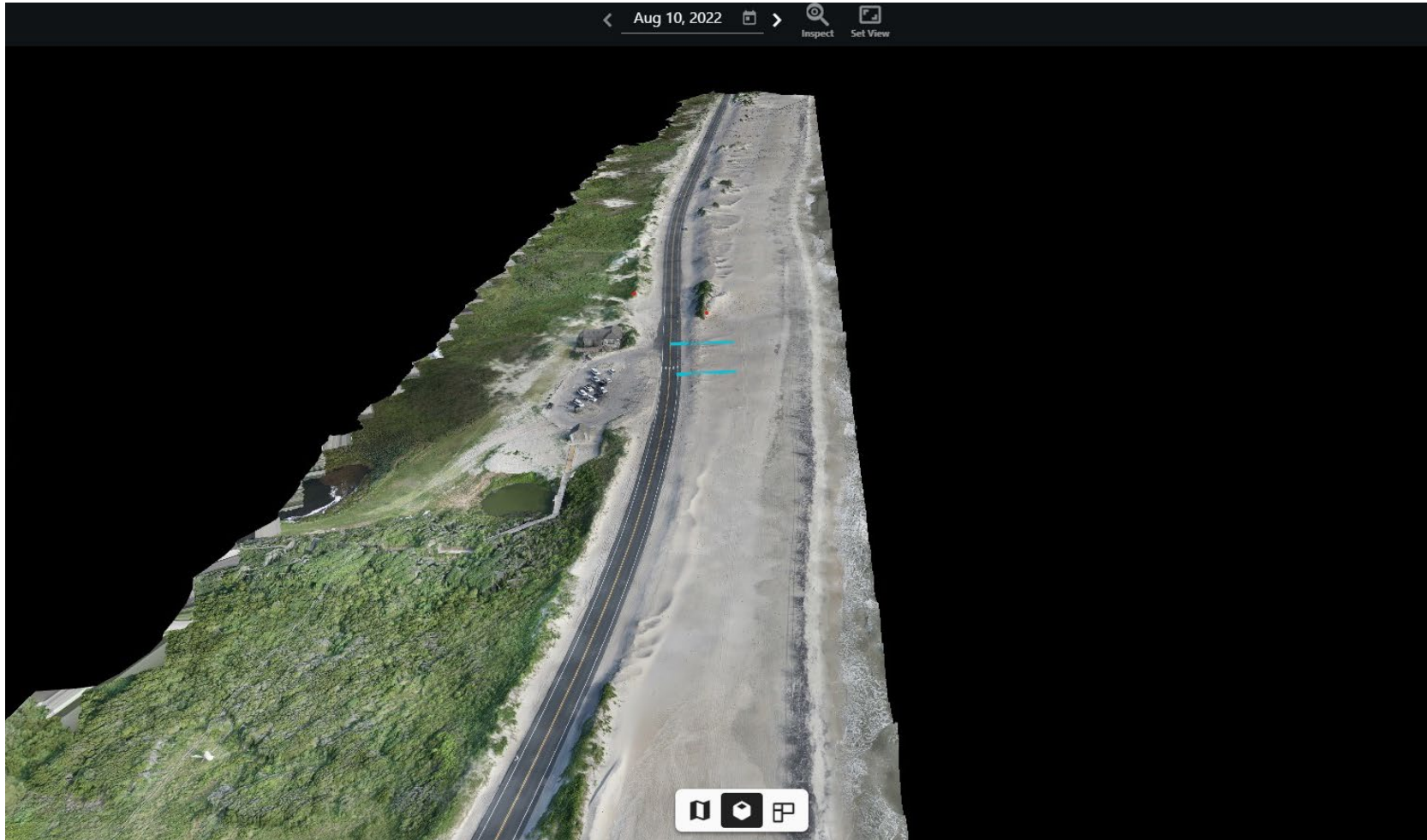




## August 10, 2022 Canal Zone 499 Photos



# August 10, 2022 Pea Island Bath House 404 Photos





## **The week of October 3rd after Hurricane Ian passed NC. NC 12 was closed at the Canal Zone area.**



## Oct 7, 2022 Canal Zone - Post Hurricane Ian 360 Photos





## Oct 6, 2022 Ocracoke Dunes - Post Hurricane Ian 824 Photos



# Future Surveys, Equipment, and Software

A test flight with the Quantum Trinity F90+ with a Lidar payload was done at the same time as the Canal Zone flight. The results were similar to the photo flight with the Wingtra.

8/11/22, 1:32 PM

Points To Surface Results

<b>Project File Data</b>		<b>Coordinate System</b>	
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Size:	21 MB	Zone:	18 North
Modified:	8/11/2022 12:40:35 PM (UTC:-4)	Datum:	WGS 1984
Time zone:	Eastern Standard Time	Global reference datum:	WGS 1984
Reference number:		Global reference epoch:	
Description:		Geoid:	EGM96 (Global)
Comment 1:		Vertical datum:	
Comment 2:		Calibrated site:	
Comment 3:			

Points To Surface Results

From	Northing (US survey foot)	Easting (US survey foot)	Point Elevation (US survey foot)	To	Surface Elevation (US survey foot)	Δ Elevation (US survey foot)
<a href="#">CZ1</a>	12977269.596	1490694.890	8.559	New Surface	8.692	0.133
<a href="#">CZ2</a>	12978259.201	1490282.608	6.459	New Surface	6.370	-0.089
<a href="#">CZ3</a>	12979040.673	1490033.840	3.494	New Surface	3.350	-0.144
<a href="#">CZ4</a>	12980093.309	1489512.116	2.763	New Surface	2.773	0.010
<a href="#">CZ5</a>	12981945.183	1488688.925	4.493	New Surface	4.572	0.079
<a href="#">CZ6</a>	12982755.777	1488206.133	4.516	New Surface	4.454	-0.062
<a href="#">P17</a>	12977678.446	1490587.454	4.203	New Surface	4.017	-0.186
<a href="#">P18</a>	12981184.706	1489101.618	4.791	New Surface	4.753	-0.038

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Project: C:\Users\miles.kelly\OneDrive - Duncan-Parnell Inc\Documents\Trimble Business Center\CANAL.ZONE.vce

Trimble Business Center



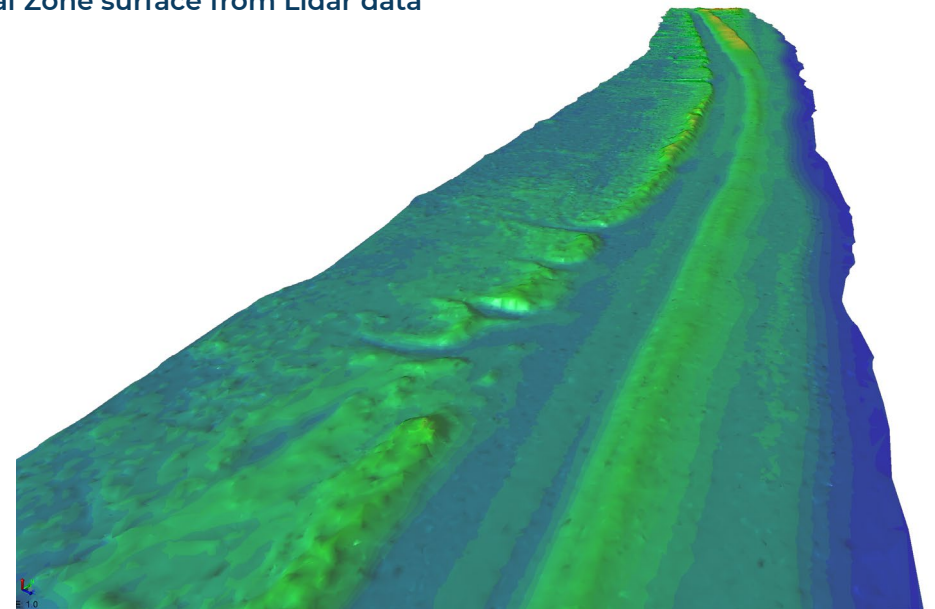


## Future Surveys, Equipment, and Software

The use of the F90+ with Lidar will allow us to create surfaces from Lidar Point cloud data within the same day as the flight. The data will be able to be processed on site and a surface can be created to determine volumes from the pre-storm surveys.

In addition, we will be able to operate under any light conditions and even at night.

Canal Zone surface from Lidar data



# Questions?

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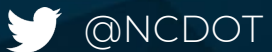
# Contact Us

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**Thank you!**

