

DORIAN-19: COMPREHENSIVE SATELLITE- DETECTED BUILDING DAMAGE OVERVIEW – NORTHERN BAHAMIAN ISLANDS

Version 1.0

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Overview

Hurricane DORIAN-19 originated as a tropical storm north of French Guiana on 24 August 2019 and gained strength as it moved west to the Caribbean. On August 27, 2019, it first made landfall in Barbados as a tropical storm and continued its path through several Caribbean Islands until August 28, 2019 when it hit Puerto Rico as a Hurricane of category 1 according to the National Geospatial-Intelligence Agency (NGA). Then, its path continued until September 1, 2019 when it reached the Great Abaco Island, north of the Bahamas, as a Hurricane of category 5. It then reached on September 2, 2019 the Grand Bahama Island further west, still as a Hurricane of category 5. DORIAN-19 severely affected those two islands with storm surges, intense rainfall and strong winds that reached 296 km/h. According to the Global Disaster Alert and Coordination System, over 60,000 people have been affected by the hurricane. The Caribbean disaster emergency management agency (CDEMA) in the last Hurricane DORIAN-Situation Reports (N° [14](#), [15](#), [16](#) and [17](#)) estimated that 53 people have been reported dead, over 1,300 people are still missing, over 5,000 people have been evacuated and 1,958 people are in shelters as of September 19, 2019.

Satellite-Detected Building Damage Assessment: Methodology and considerations

In response to the emergency caused by DORIAN-19, Copernicus EMS and OpenStreetMap performed building damage assessment analyses using pre- and post-event satellite data. In the present document, UNITAR-UNOSAT compiles the main results of these analyses in one map in order to present a comprehensive building damage overview covering the most affected areas. The table below provides satellite detected damage statistics for the Great Abaco Island, the Grand Bahama Island, the Grand Cay Island and the New Providence Island. Figures are based upon analysis of satellite imagery acquired from the 2nd to the 7th of September 2019, as well as pre baseline data from Humanitarian Open Street Map acquired on the 18th of September 2019. It is important to note that building damage estimates are based exclusively on satellite imagery analysis and it has not been validated in the field.

Table 1 – UNITAR-UNOSAT Preliminary Satellite-Detected Building Damage Assessment – DORIAN-19 as of 27 September 2019

Island/District/Area of Interest	Pre-event buildings	Damaged buildings	Damaged buildings (%)	Mapping Group
Grand Bahama Island	15,981	825	5	
<i>East Grand Bahama</i>	603	435	72	
East Grand Bahama	134	120	>90	COPERNICUS EMS
East of East Grand Bahama	104	43	41	OSM
High Rock	258	254	>90	COPERNICUS EMS
West of High Rock	107	18	17	OSM
<i>West Grand Bahama</i>	12,335	345	3	
West Grand Bahama	12,335	345	3	OSM
<i>City of Freeport</i>	3,043	45	1	
City of Freeport	3,043	45	1	OSM
Great Abaco Island	11,535	8,328	72	
<i>Central Abaco</i>	5,623	4,667	83	
Banyan Beach	1,214	1,040	86	COPERNICUS EMS
East of Marsh Harbour	55	18	33	OSM
Little Harbour	324	4	1	OSM
Marsh Harbour	3,656	3,514	>90	COPERNICUS EMS
South East of Banyan Beach	72	6	8	OSM
South of Marsh Harbour	286	82	29	OSM
West of Marsh Harbour	16	3	19	OSM
<i>Hope Town</i>	3,576	3,352	>90	
Great Guana Cay	996	1,071	>90	COPERNICUS EMS
Green Turtle Cay	799	626	78	COPERNICUS EMS
Hope Town	1,143	1,134	>90	COPERNICUS EMS
Man-O-War Cay	544	513	>90	COPERNICUS EMS
South of Hopetown	77	7	9	OSM
North West of Green Turtle Cay	17	1	6	OSM
<i>North Abaco</i>	2,336	309	13	
Banyan Beach	1,214	54	4	COPERNICUS EMS
Coopers Town	425	133	31	OSM
Fox Town	392	12	3	OSM
North West of Banyan Beach	305	110	36	OSM
Grand Cay	193	119	62	
<i>Grand Cay</i>	193	119	62	
Walker Cay	193	119	62	COPERNICUS EMS
New Providence	399	18	5	
<i>New Providence</i>	399	18	5	
Lyford Cay	399	18	5	COPERNICUS EMS
Total	28,108	9,290	33	

Note 1: Damaged buildings data from OSM was computed within defined areas of interest.

Note2: *Pre-event buildings provided by Humanitarian Open Street Map.

Disclaimers and considerations:

1. **Pre-event buildings** were provided by Humanitarian Open Street Map on 18 September 2019. The percentage of damaged buildings could be influenced by the completeness of this data. Please note that UNITAR-UNOSAT considered this baseline data, unless the specific number of buildings (pre-event) was provided by the agency or mapping group.

2. **Damaged buildings** refers to the results of satellite-derived analysis that used pre- and post-event data to identify the potentially affected structures. This analysis was performed within the extent of the satellite image. In the case where several mapping groups were working in the same area, the damaged buildings results were chosen based on the most complete dataset.
3. **Percentage of damaged buildings** refers to the number of damaged buildings in relation to the total number of pre-event buildings, while taking in account the following consideration:
 - **Area of Interest.** If the extent of areas of interest were defined, the percentage of damaged buildings was computed with the total number of pre-event buildings within the area of interest. On the contrary, additional areas of interest were defined directly by UNITAR-UNOSAT in order to compute the percentage of damaged buildings within the additional areas of interest.

$$\frac{\text{Damaged buildings}}{\text{Pre event buildings}} * 100$$

For further information on the building damage assessment analysis, please contact directly the related mapping groups: [Copernicus EMS](#) and [OSM](#). This document is part of an on-going satellite monitoring program of UNITAR-UNOSAT for the DORIAN-19 Tropical cyclone in support of international humanitarian assistance and created to respond to the needs of UN agencies and their partners. Please send feedback to UNITAR-UNOSAT at the contact information below.

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