CCRIF SPC
The Caribbean Catastrophe Risk Insurance Facility

Tropical Cyclone Imelda
28/09/2025 to 30/09/2025

Excess Rainfall
Wind and Storm Surge

Final Event Briefing

The Bahamas Water and Sewerage Corporation

09 October 2025

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1 SUMMARY

Tropical Cyclone Imelda was the ninth named storm of the 2025 Atlantic Hurricane Season. On 28 September, the tropical storm formed just east of Andros Island in The Bahamas and moved northward throughout that day and the next, passing close to New Providence before making landfall on the Abaco Islands on 29 September. Tropical-storm-force winds were primarily felt on the Abaco Islands on 29 September and during the early hours of 30 September, while moderate to locally heavy rainfall associated with the system affected portions of The Bahamas – particularly in the central and northern regions - from 27 September up to the late hours of 29 September.

The runs of the CCRIF CWUIC model produced losses greater than zero for The Bahamas National Water and Sewerage Authority (WSC-BHS) for two of the CWUIC policies of The Bahamas[1] due to Tropical Cyclone Imelda, specifically for The Bahamas – North and The Bahamas – Extreme North. The losses for WSC-BHS are below the Attachment Point of the respective CWUIC policies for The Bahamas – North and The Bahamas – Extreme North and therefore Imelda is designated as a Loss Event[2] for The Bahamas – North and The Bahamas – Extreme North. Therefore, no payout is due under the utility's policies

This event briefing is designed to review the modelled losses due to wind, storm surge and excess rainfall calculated by CCRIF's CWUIC model for affected CCRIF member water utilities. WSC-BHS was the only CCRIF water utility member for which the CCRIF CWUIC loss model for wind, storm surge and excess rainfall produced losses due to Tropical Cyclone Imelda.

2 INTRODUCTION

On 27 September at 1500 UTC, the National Hurricane Center (NHC) reported the formation of a tropical depression north of eastern Cuba, with its centre located at latitude 22.0°N and longitude 76.2°W. The system was initially designated as a Tropical Depression Nine (TD Nine). Satellite imagery showed a rather disorganized structure, with a small cluster of convective cells situated over the central Bahamas, to the northwest of Acklins Island (Figure 1a). From this point onward, and for the next 24 hours, scattered moderate to locally heavy rainfall affected the central part of The Bahamas, including Long Island, Great Exuma, Cat Island, and Eleuthera (Figure 1a). During this period, TD Nine gradually became better organized, as the convective activity began to align along a developing rainband, while the system moved slowly north-westward, with a forward speed of less than 6 mph (9 km/h).

[1] The Bahamas has four CCRIF CWUIC policies: The Bahamas - Southeast, The Bahamas - Central, The Bahamas – North and The Bahamas - ExtremeNorth

[2] Any CWUIC event which produces a modelled loss greater than zero but lower than the policy Attachment Point (AP) in one or more policyholder utility

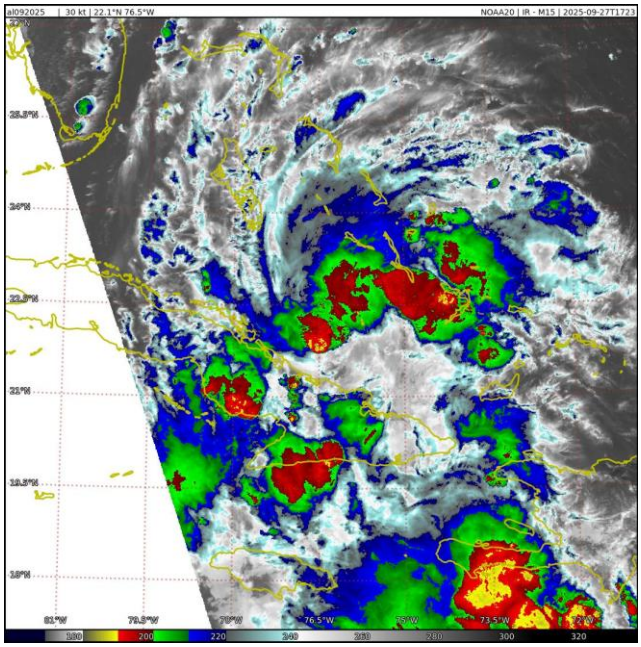
By 28 September at 1800 UTC, the NHC upgraded TD Nine to a tropical storm, officially naming it Imelda. At that time, the storm's centre was located at latitude 23.9°N and longitude 77.3°W, approximately 13 mi (20 km) east of the southern tip of Andros Island (Figure 2). Initial estimates placed maximum sustained winds near 40 mph (65 km/h), with higher gusts. Satellite imagery revealed that Imelda exhibited an asymmetric structure, with most convective activity concentrated in a rainband extending to the north and east of the centre, while little convection was observed near the inner core (Figure 1b). Although Imelda was still in its early stages, the rainband produced moderate to locally intense rainfall across the central and northwestern Bahamas, notably affecting New Providence, Eleuthera, eastern Andros, and Cat Island. Regarding the wind field, the wind analysis maps (Figure 3a) indicated that tropical-storm-force winds extended outward up to 30 mi (50 km) from the centre but were confined to the storm's eastern semicircle.

Imelda continued moving slowly northward at about 7 mph (11 km/h), tracking along the western edge of a mid-level high-pressure system. Environmental conditions were marginally favourable for further development: warm sea surface temperatures and a moist atmosphere supported intensification, while moderate vertical wind shear acted as a limiting factor.

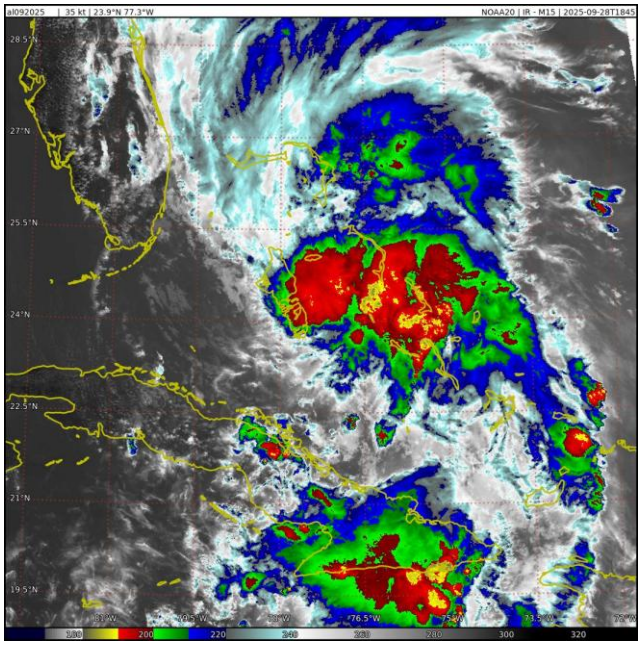
Over the following 24 hours, Imelda gradually strengthened. Convective activity began to consolidate closer to the centre, resulting in a more symmetric cloud pattern and wind field, and a broader area affected by tropical-storm-force winds. Tropical-storm-force winds or winds close to this intensity were observed over the Abaco Islands, Grand Bahama, Eleuthera, and New Providence starting approximately from 0000 UTC on 29 September (Figures 3a and 3b). Around 0300 UTC, the storm's core passed just east of New Providence (approximately 18 mi or 29 km offshore). At that time, the most intense convection was organized into a rainband wrapping around the storm's northern, eastern, and southern quadrants, bringing moderate to locally heavy rainfall over a wide area between the Abaco Islands and Long Island, as inferable from satellite imagery (Figure 1c).

Later that day, between 1200 and 1500 UTC, Imelda made landfall over the Abaco Islands. By then, the storm displayed a more symmetric structure with enhanced convection wrapping around the western side of the system and signs of a developing inner core (Figure 1d). From this point onward, and over the next 6 to 18 hours, Imelda underwent rapid intensification, aided by a reduction in wind shear. Satellite imagery indicated that the Abaco Islands and the eastern portion of Grand Bahama experienced heavy rainfall during this phase, primarily associated with the storm's inner core (Figure 1d), while the system progressed northward at a steady pace. Wind analysis (Figure 3c) indicated that the Abaco Islands continued to experience tropical-storm-force winds during this phase.

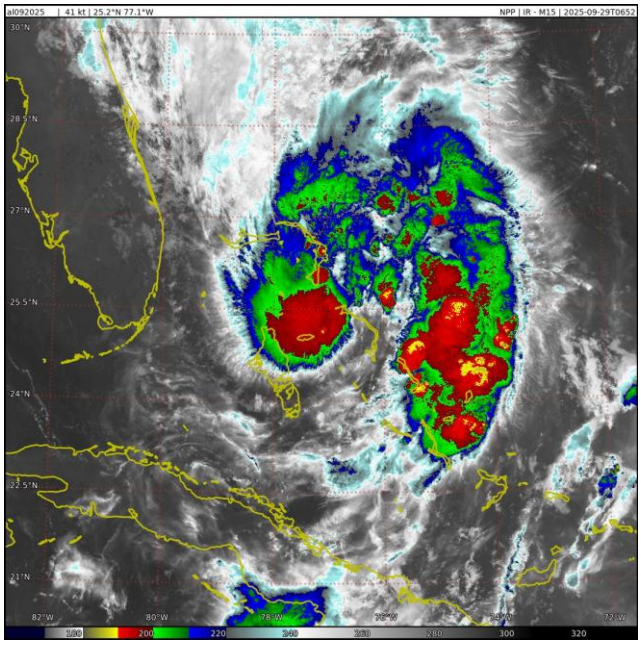
By 30 September at 0000 UTC, the centre of Imelda was located at latitude 28.1°N, longitude 77.3°W—approximately 120 mi (190 km) north of the Abaco Islands. Around this time, the heavy rainfall associated with the system ceased over the northern Bahamas, as the storm moved farther northward. Despite the increasing distance from the storm's centre, wind analysis (Figure 3d) indicated that the Abaco Islands continued to experience tropical-storm-force winds or winds close to this intensity until 0900UTC of 30 September, while ceased afterwards.



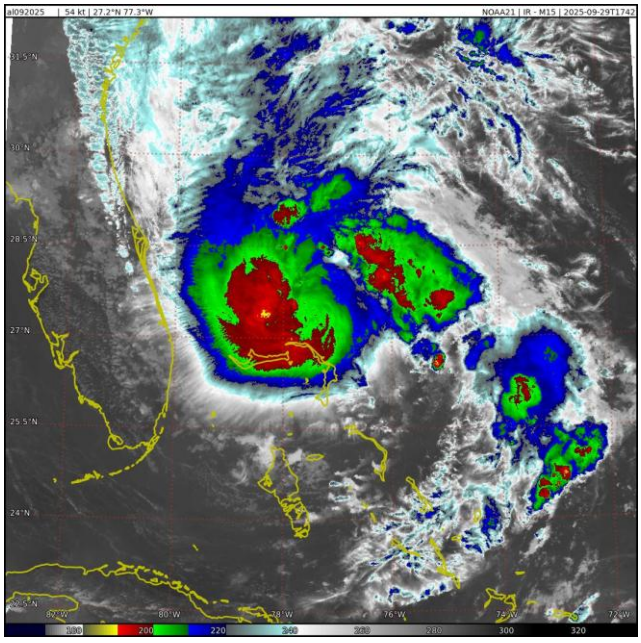
a) 27 September at 1700UTC



b) 28 September at 1800UTC



c) 29 September at 0650UTC



d) 29 September at 1800UTC

Figure 1 Satellite imagery on 27, 28 and 29 September, 2025 at different times as indicated by the labels from the thermal infrared channel enhanced with colour. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National

Environmental Satellite, Data and Information Service[3].

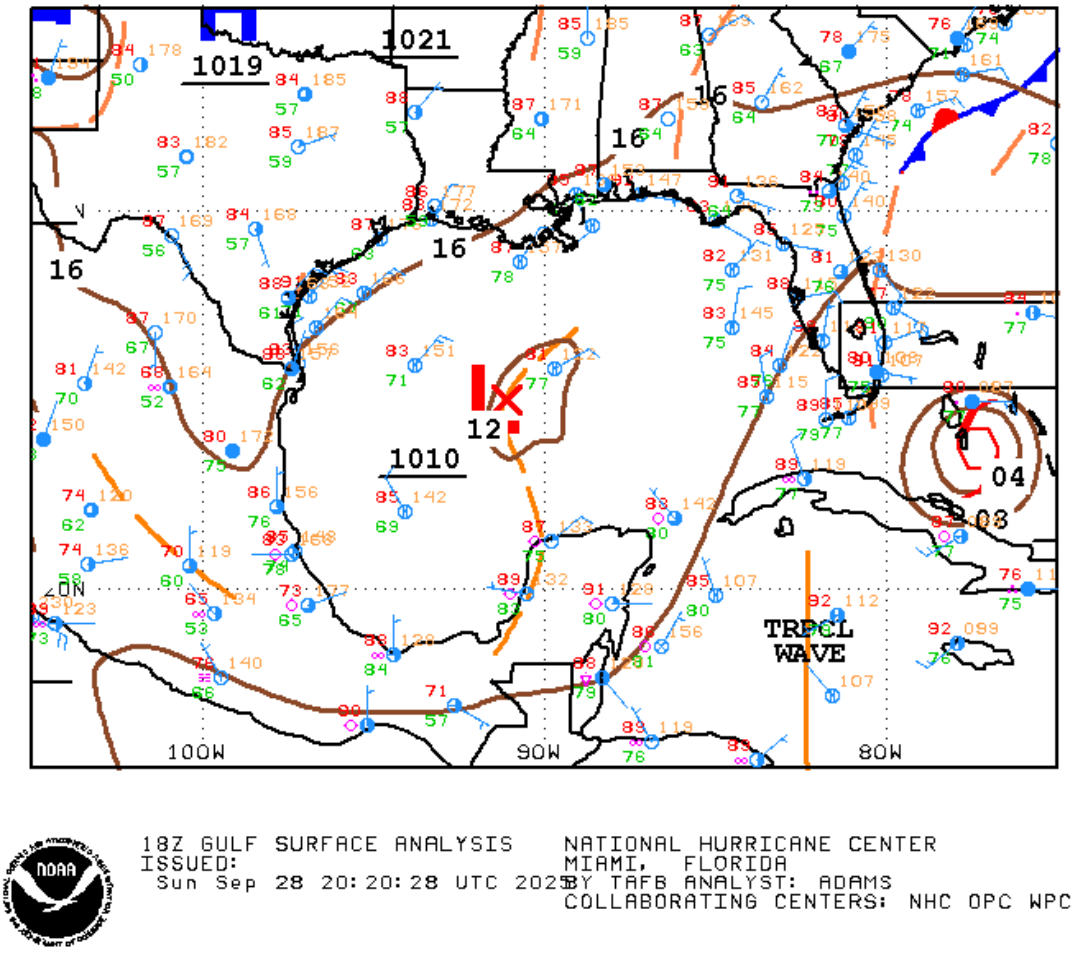


Figure 2 Surface analysis over the Gulf of Mexico area on 28 September at 1800UTC. Source: US National Hurricane centre[4]

[3] RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al092025

[4] National Oceanic and Atmospheric Administration - FTP, National Hurricane centre, review date: 28 September 2025, available at: *https://www.nhc.noaa.gov/tafb /GULF 18Z.gif*

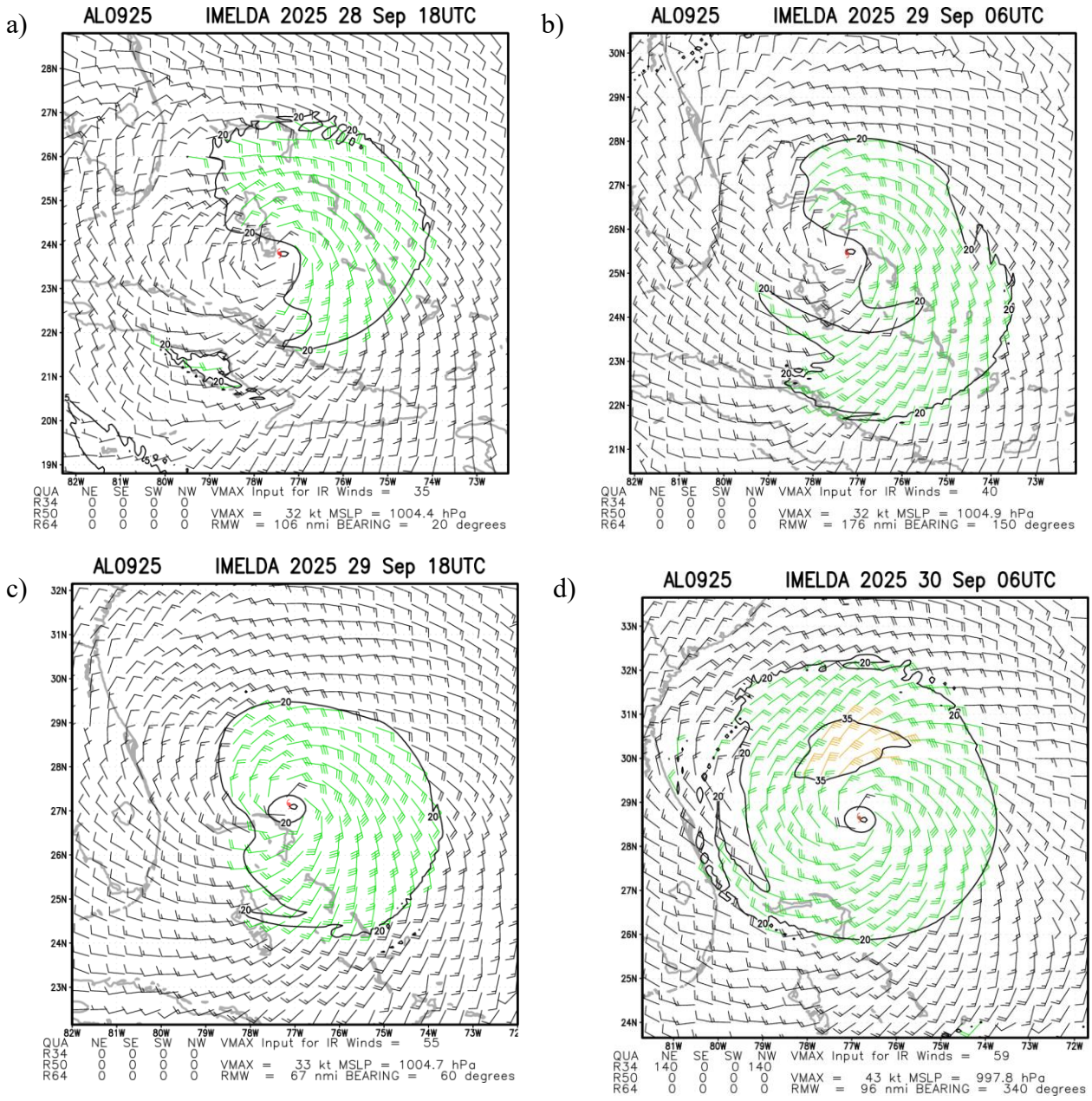


Figure 3 Multi-platform satellite based tropical cyclone surface wind analysis estimated on 28, 29 and 30 September, 2025 at different times as indicated by the labels. Contouring indicates wind intensity at 20 kn (23 mph, 37 km/h), and 35 kn (40 mph, 65 km/h). Source: NOAA, National Environmental Satellite, Data and Information Service[5]

[5] RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al092025

3 CCRIF SPC MODEL OUTPUTS

The CWUIC model is made up of two components: the tropical cyclone (TC) component, accounting for the losses produced by wind and storm surge, and the excess rainfall (XSR) component, accounting for losses associated with excess rainfall. Each of the two model components estimates a loss value specifically related to the hazard for which it is designed. When both a tropical cyclone and a Covered Area Rainfall Event (CARE) occur at the same time, the outputs of the two model components are added together to determine the CWUIC modelled losses. In the following description, the model output for each component is described separately.

TC Component

The wind footprint shown in the following figure is one of the components of the SPHERA CWUICmodel used for the estimation of Tropical Cyclone (TC) losses for water utilities. This wind footprint for TC Imelda shows the wind speeds over The Bahamas Islands.

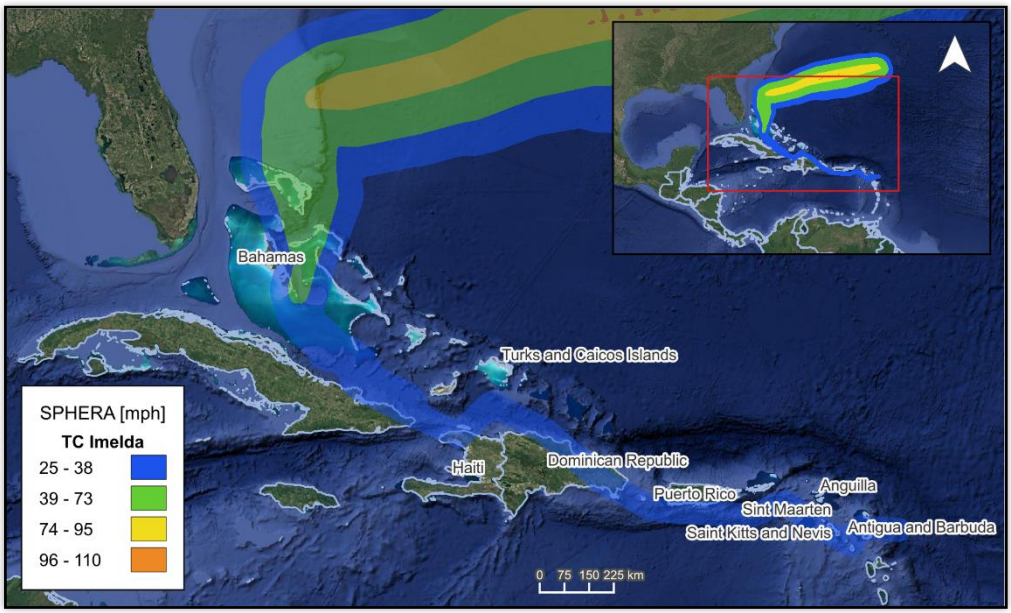


Figure 4 Map showing the wind field associated with Tropical Cyclone Imelda around The Bahamas.
Source: NHC & CCRIF/SPHERA (input data downloaded: 09 October 2025)

XSR Component

All data sources used by the XSR 3.1 model, CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15[6], detected the occurrence of precipitation over The Bahamas and the surrounding waters

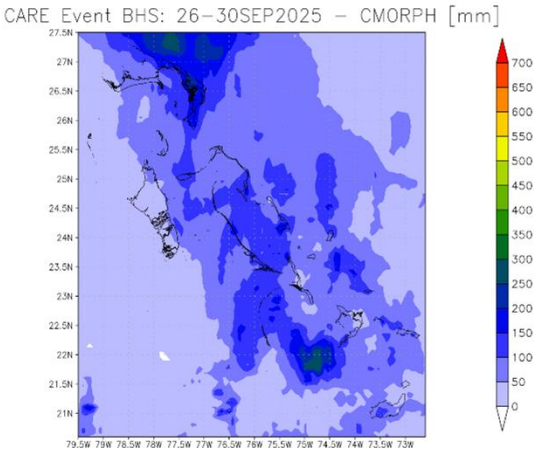
[6] CMORPH Model: the satellite-based rainfall precipitation estimates provided by the NOAA Climate Prediction Center (CPC) using the so-called Morphing Technique

during the period 26 to 30 September 2025. Each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 4. Two CAREs for The Bahamas were activated on 28 September and lasted to 30 September. The CAREs were activated for The Bahamas - North and The Bahamas - Extreme North. The CAREs were activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[7] and thus the period considered by the XSR 3.1 model for the loss estimate based on the accumulated precipitation in two areas in The Bahamas was 26 to 30 September 2025.

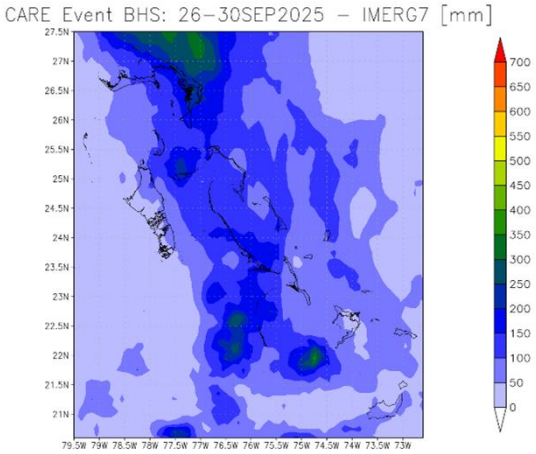
CMORPH	CMORPH reported total accumulated precipitation values below 200 mm across most of The Bahamas, except for a small area in the Abaco Islands where values ranged between 200 mm and 250 mm.
IMERG	IMERG showed an intensity and spatial distribution of total accumulated precipitation values similar to that of CMORPH, but with maximum values, between 200 mm and 250 mm, located over the eastern part of New Providence and the northern portion of the Abaco Islands.
WRF5	WRF5 reported total precipitation accumulations below 200 mm over most of The Bahamas, with peak values between 300 mm and 400 mm concentrated over the Abaco Islands.
WRF7	WRF7 indicated total accumulated precipitation values exceeding 300 mm across much of The Bahamas. The highest values, between 550 mm and 700 mm, were observed in two small areas: one in Great Inagua and the other in Great Exuma.
WRF11	WRF11 showed total accumulated values of precipitation below 200 mm across most of The Bahamas, except for the far northern area—specifically over the Abaco Islands and eastern Grand Bahama—where values ranged between 300 mm and 750 mm. Additional small areas in the central Bahamas recorded values between 250 mm and 350 mm.
WRF15	WRF15 reported accumulated values of precipitation with patterns similar in intensity and distribution to those of WRF11, though with slightly lower maximum values—between 450 mm and 550 mm—over smaller areas in the far

http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html.
Further details are provided in the Definitions section of this report
IMERG Model: The satellite-based rainfall estimation model developed by NASA, expressed in mm, derived by aggregating the IMERG 30-minute Rainfall Data at 10km spatial resolution and available at *https://jsimpsonhttps.pps.eosdis.nasa.gov/imerg/late*. Further details in the Definitions section of this reportWRF5,WRF7, WRF11 and WRF15 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data *https://www.mmm.ucar.edu/weather-research-and-forecasting-model*. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [*http://rda.ucar.edu/datasets/ds083.2/*]). Further details are provided in the Definitions section of this report.
[7]The two aggregation periods correspond to the Rainfall Aggregation Period #1 and Rainfall Aggregation Period #2, as indicated in the Schedule. Further details in the Definitions section of this report.

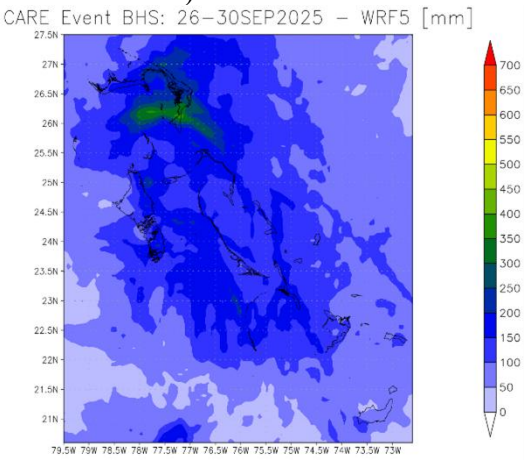
northern region, particularly in eastern Grand Bahama and the northwestern portion of the Abaco Islands.



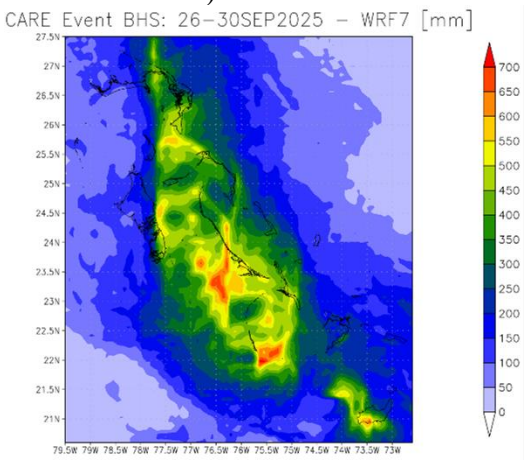
a) CMORPH



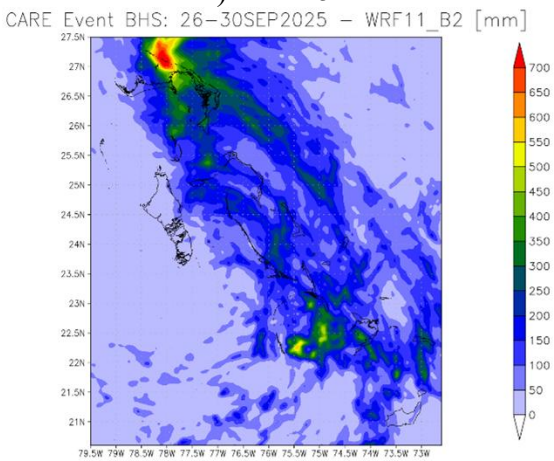
b) IMERG

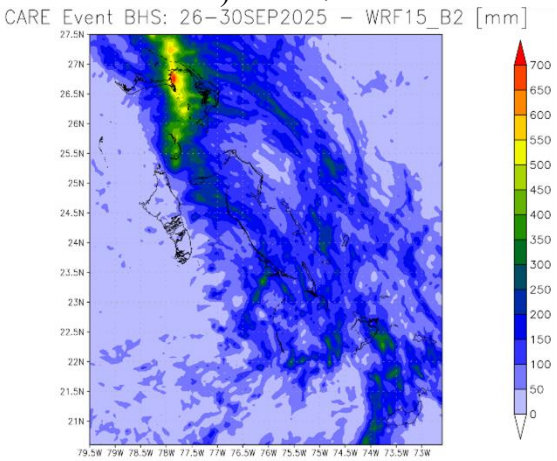


c) WRF5



d) WRF7





e) WRF11 f) WRF15

Figure 4 Total accumulated precipitation during the period 26 to 30 September, 2025 estimated by CMORPH (a), IMERG (b), WRF5 (c), WRF7 (d), WRF11 (e), WRF15 (f). Source: CCRIF SPC

Daily rainfall maps by CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15 over the exposure map of CWUIC are not included here and they can be downloaded for all the three areas at the following links for 12- hour aggregation and 48-hour aggregation respectively:

BHS_N

https://wemap.ccrif.org/OUTPUT/CCRIF/CWUICXSR/Events/BHS/BHS_N/CARE_2_2025/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/CWUICXSR/Events/BHS/BHS_N/CARE_2_2025/daily_prec_long.mp4

BHS_EN

https://wemap.ccrif.org/OUTPUT/CCRIF/CWUICXSR/Events/BHS/BHS_EN/CARE_2_2025/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/CWUICXSR/Events/BHS/BHS_EN/CARE_2_2025/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for The Bahamas - North for all the six data sources used by XSR3.1: CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15. The RIL was the highest for WRF7.

The Rainfall Index Loss (RIL) was above the loss threshold for The Bahamas - Extreme North for all the data sources used by XSR3.1: CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15. The RIL was the highest for WRF7.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs above the loss threshold. In the case of The Bahamas – North and The Bahamas – Extreme North, the RIL_{FINAL} was calculated from CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15.

The RIL_{FINAL} were below the attachment point of the Excess Rainfall component of WSC's CWUIC policies and therefore the policies were not triggered, thus no payouts are due to the WSC under its CWUIC policies.

4 REPORTED IMPACTS

At the time of writing this report, WSC has not reported any significant, long-term damage to its infrastructure from the associated storm surge due to TC Imelda.

5 CCRIF LOSS MODEL

The final run of the CCRIF´s CWUIC tropical cyclone and excess rainfall loss model for The Bahamas Water and Sewerage Corporation produced losses below the Attachment Point of its CWUIC policy and therefore no payout under this policy is due.

For additional information, please contact CCRIF SPC at: pr@ccrif.org

DEFINITIONS

Active Exposure Cell Percentage Threshold	The percentage of the total number of XSR Exposure Grid Cellswithin the Covered Area of the Insured, that must be exceeded to trigger a Covered Area Rainfall Event.
Active Exposure Grid Cells	The XSR Exposure Grid Cells for which in the same single daythe Aggregate Rainfall #1 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #1 or the Aggregate Rainfall #2 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #2.
Aggregate Rainfall #1	The rainfall amount accumulated over the Rainfall Aggregation Period #1 (as defined in the Schedule) measured in millimeters(mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall AggregationPeriod#1 of n hours, the Aggregate Rainfall #1 is the maximumamount of rainfall accumulated over any of the n-hour windowsthat intersect the day itself considering a time interval of 3 hours.
Aggregate Rainfall #2	The rainfall amount accumulated over the Rainfall Aggregation Period #2 (as defined in the Schedule) measured in millimeters(mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall AggregationPeriod#2 of n hours, the Aggregate Rainfall #2 is the maximumamount of rainfall accumulated over any of the n-hour windowsthat intersect the day itself considering a time interval of 3 hours.
Calculation Agent	Entity charged with undertaking the primary calculation ofthe Rainfall Index Loss.
CMORPH-based Maximum Aggregate Rainfall #1	The maximum value during the Covered Area Rainfall Event ofthe Aggregate Rainfall #1 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.
CMORPH-based Maximum Aggregate Rainfall #2	The maximum value during the Covered Area Rainfall Event ofthe Aggregate Rainfall #2 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.

CMORPH-based Covered Area Rainfall Parameters	The CMORPH Model information provided on a continuousbasis by the XSR Model Data Reporting Agency used bythe Calculation Agent to obtain the CMORPH-based Rainfall Estimates using the XSR Rainfall Model. Parameters are drawn from XSR Exposure Grid Cells within the Covered Area of the Insured, by their respective latitude and longitude. Measurementunits and precision of data ingested by the XSR Rainfall Modelare identical to those provided by the XSR Model Data Reporting Agency and are further elaborated in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment
CMORPH Model	The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.
Covered Area	The territory of the Insured as represented in the XSR Rainfall Model.
Covered Area Rainfall Event	Any period of days, with an interruption less than or equals to the Event Tolerance Period, during which the number of Active Exposure Grid Cells is greater than or equal to the product of (a) Active Exposure Cell Percentage Threshold multiplied by (b) the total number of XSR Exposure Grid Cells within the Covered Area.
Country Disaster Alert	An official disaster alert issued by Relief Web (http://reliefweb.int/) for the country in question for one of the following types of events: tropical cyclone, flood, flash flood and severe local storm. Any disaster alert issued later than seven (7) days after the completion of the Covered Area Rainfall Event (CARE) event will not be considered. The Disaster Alert description issued by Relief Web and/or its attached documentation must include specific reference to the CARE dates with a tolerance period of 2 calendar days.

Maximum Aggregate Rainfall #1	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #1 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Maximum Aggregate Rainfall #2	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #2 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Rainfall Event Threshold #1	Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.
Rainfall Event Threshold #2	Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.
Rainfall Aggregation Period #1	The number of hours over which the Aggregate Rainfall #1 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Aggregation Period #2	The number of hours over which the Aggregate Rainfall #2 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Index Loss	For any Covered Area Rainfall Event affecting the Insured, the US Dollar loss calculated by the Calculation Agent using the XSR Rainfall Model, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'. The Rainfall Index Loss can only be calculated once the Covered Area Rainfall Event is completed.
WRF5 Model	The weather research and forecasting rainfall model by NOAA with Configuration #5 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.

WRF7 Model	The weather research and forecasting rainfall model by NOAA with Configuration #7 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.
XSR Rainfall Model	The computer model used to calculate the Rainfall Index Loss, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'.
XSR Exposure Grid Cells	The 30 arc-second by 30 arc-second grid of cells each of which is attributed with an XSR Grid Cell Exposure Value greater than zero.
XSR Grid Cell Exposure Value	The value, used to calculate the CMORPH-based Exposure Grid Cell Loss, the WRF5-based Exposure Grid Cell Loss, and the WRF7-based Exposure Grid Cell Loss.