

Storm Elin  
Marine Storm Report  
Marine Unit

Report Date: 02 October 2025

Report Time: 14:38 UTC

Marine Observations Summary

Data Sources

- Buoy 62091 (M2 Buoy): 53.47°N, 5.42°W
- Buoy 62092 (M3 Buoy): 53.48°N, 5.42°W
- Buoy 62093 (M4 Buoy): 51.22°N, 6.70°W
- Buoy 62094 (M5 Buoy): 51.69°N, 6.70°W
- Buoy 62095 (M6 Buoy): 53.06°N, 7.90°W

Peak Conditions Observed

Buoy (Location)	Sustained Wind Speeds	Gust Wind Speeds	Significant Wave Height	Individual Wave	MSLP (hPa)
M2 Buoy (in the Irish Sea)	61 km/h (33 knots or 17 mph) Thu 21 Dec 2023 13 UTC	76 km/h (41 knots or 21 mph) Thu 21 Dec 2023 13 UTC	3.1 m Thu 21 Dec 2023 07 UTC	4.8 m Thu 21 Dec 2023 08 UTC	1001.7 Sat 23 Dec 2023 23 UTC 13UTC

<b>M3 Buoy</b> (in the Irish Sea)	<b>60 km/h</b> (32 knots or 17 mph) Thu 21 Dec 2023 07 UTC	<b>79 km/h</b> (43 knots or 22 mph) Thu 21 Dec 2023 07 UTC	<b>7.7 m</b> Thu 21 Dec 2023 07 UTC	<b>12.8 m</b> Fri 22 Dec 2023 03 UTC	<b>1011.6</b> Sun 24 Dec 2023 00 UTC 13UTC
<b>M4 Buoy</b> (off the Cork coast)	<b>59 km/h</b> (32 knots or 16 mph) Thu 21 Dec 2023 01 UTC	<b>91 km/h</b> (49 knots or 25 mph) Thu 21 Dec 2023 06 UTC	<b>10.2 m</b> Thu 21 Dec 2023 08 UTC	<b>15.0 m</b> Thu 21 Dec 2023 16 UTC	<b>997.2</b> Sat 23 Dec 2023 23 UTC 13UTC
<b>M5 Buoy</b> (off the Donegal coast)	<b>54 km/h</b> (29 knots or 15 mph) Thu 21 Dec 2023 08 UTC	<b>74 km/h</b> (40 knots or 21 mph) Thu 21 Dec 2023 05 UTC	<b>3.6 m</b> Sat 23 Dec 2023 23 UTC	<b>6.2 m</b> Sun 24 Dec 2023 00 UTC	<b>1009.0</b> Sun 24 Dec 2023 00 UTC 13UTC
<b>M6 Buoy</b> (in the south Wexford coast)	<b>56 km/h</b> (30 knots or 16 mph) Thu 21 Dec 2023 05 UTC	<b>86 km/h</b> (47 knots or 24 mph) Thu 21 Dec 2023 05 UTC	<b>8.8 m</b> Thu 21 Dec 2023 11 UTC	<b>15.3 m</b> Thu 21 Dec 2023 06 UTC	<b>1002.4</b> Sun 24 Dec 2023 00 UTC 13UTC

## Station-by-Station Analysis

### Buoy 62091 - M2 Buoy

- **Location:** 53.47°N, 5.42°W
- **Peak Wind Speed:** 32.9 knots (61.0 km/h) on Thu 21 Dec 2023 13:00 UTC
- **Peak Significant Wave Height (Hm0):** 3.1 m on Thu 21 Dec 2023 07:00 UTC
- **Peak Maximum Wave Height (Hmax):** 4.8 m on Thu 21 Dec 2023 08:00 UTC
- **Minimum Pressure:** 1001.7 hPa on Sat 23 Dec 2023 23:00 UTC
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 92 records (QC good data only)

### Buoy 62092 - M3 Buoy

- **Location:** 53.48°N, 5.42°W
- **Peak Wind Speed:** 32.3 knots (59.9 km/h) on Thu 21 Dec 2023 07:00 UTC
- **Peak Significant Wave Height (Hm0):** 7.7 m on Thu 21 Dec 2023 07:00 UTC
- **Peak Maximum Wave Height (Hmax):** 12.8 m on Fri 22 Dec 2023 03:00 UTC
- **Minimum Pressure:** 1011.6 hPa on Sun 24 Dec 2023 00:00 UTC
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 97 records (QC good data only)

### Buoy 62093 - M4 Buoy

- **Location:** 51.22°N, 6.70°W
- **Peak Wind Speed:** 31.8 knots (58.9 km/h) on Thu 21 Dec 2023 01:00 UTC
- **Peak Significant Wave Height (Hm0):** 10.2 m on Thu 21 Dec 2023 08:00 UTC
- **Peak Maximum Wave Height (Hmax):** 15.0 m on Thu 21 Dec 2023 16:00 UTC
- **Minimum Pressure:** 997.2 hPa on Sat 23 Dec 2023 23:00 UTC

- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 97 records (QC good data only)

## Buoy 62094 - M5 Buoy

- **Location:** 51.69°N, 6.70°W
- **Peak Wind Speed:** 29.4 knots (54.4 km/h) on Thu 21 Dec 2023 08:00 UTC
- **Peak Significant Wave Height (Hm0):** 3.6 m on Sat 23 Dec 2023 23:00 UTC
- **Peak Maximum Wave Height (Hmax):** 6.2 m on Sun 24 Dec 2023 00:00 UTC
- **Minimum Pressure:** 1009.0 hPa on Sun 24 Dec 2023 00:00 UTC
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 91 records (QC good data only)

## Buoy 62095 - M6 Buoy

- **Location:** 53.06°N, 7.90°W
- **Peak Wind Speed:** 30.4 knots (56.3 km/h) on Thu 21 Dec 2023 05:00 UTC
- **Peak Significant Wave Height (Hm0):** 8.8 m on Thu 21 Dec 2023 11:00 UTC
- **Peak Maximum Wave Height (Hmax):** 15.3 m on Thu 21 Dec 2023 06:00 UTC
- **Minimum Pressure:** 1002.4 hPa on Sun 24 Dec 2023 00:00 UTC
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 97 records (QC good data only)

# Meteorological Analysis

## Wind Analysis

The storm produced maximum sustained winds of **32.9 knots** (61.0 km/h).

### Wind Categories:

- Force 7 — Near gale: 28–33 kn (50–61 km/h)
- Force 8 — Gale: 34–40 kn (62–74 km/h)
- Force 9 — Severe gale (aka Strong gale): 41–47 kn (75–88 km/h)
- Force 10 — Storm: 48–55 kn (89–102 km/h)
- Force 11 — Violent storm: 56–63 kn (103–117 km/h)
- Force 12 — Hurricane force: ≥64 kn (≥118 km/h)

## Wave Analysis

**Significant Wave Heights (Hm0):** Peak values reached **10.2 m**, representing **very high**.

**Maximum Wave Heights (Hmax):** Individual wave heights peaked at **15.3 m**. Note: Hmax values represent individual wave heights and are not used for sea state classification.

**Wave Height Relationship:** The Hmax/Hm0 ratio was **1.50**, within normal range (1.3-1.8).

### Sea State Classification (Hm0):

- Rough: 2.5-4.0 m

- Very Rough: 4.0-6.0 m
- High: 6.0-9.0 m
- Very High: 9.0-14.0 m
- Phenomenal: >14.0 m

#### Wave Height Definitions:

- **Hm0 (Significant Wave Height):** Average height of the highest one-third of waves
- **Hmax (Maximum Wave Height):** Highest individual wave recorded during the period

## Quality Control Summary

**Total Records:** 474

#### QC Status Distribution:

- Good Data (QC=1): 474 records (100.0%)
- Adjusted Data (QC=5): 0 records (0.0%)
- Missing Data (QC=9): 0 records (0.0%)
- No QC (QC=0): 0 records (0.0%)

## Data Sources and Logger Information

### Active Logger Information During Storm Period

#### Buoy 62091 (M2 Buoy):

- Logger(s) used: 347\_Wavesense , 8704\_CR6

#### Buoy 62092 (M3 Buoy):

- Logger(s) used: 314\_Wavesense , 12146\_CR6

#### Buoy 62093 (M4 Buoy):

- Logger(s) used: 189\_Wavesense , 12144\_CR6

#### Buoy 62094 (M5 Buoy):

- Logger(s) used: 12142\_CR6 , 12143\_CR6

#### Buoy 62095 (M6 Buoy):

- Logger(s) used: 12145\_CR6 , 341\_Wavesense

**Note:** This report uses only quality-controlled data (QC indicators 1 and 5) for meteorological analysis. Logger information shows which data acquisition systems were active during the storm period.

## Data Visualization

!Storm Overview

*Figure 1: Marine meteorological analysis showing wind speed, wave height, atmospheric pressure, air temperature, wind direction, and wave period during Storm Elin.*

## Technical Notes

### QC Methods Applied

- **Manual QC:** Visual inspection and expert validation
- **Automatic QC:** Range checks, spike detection, and flat-line identification

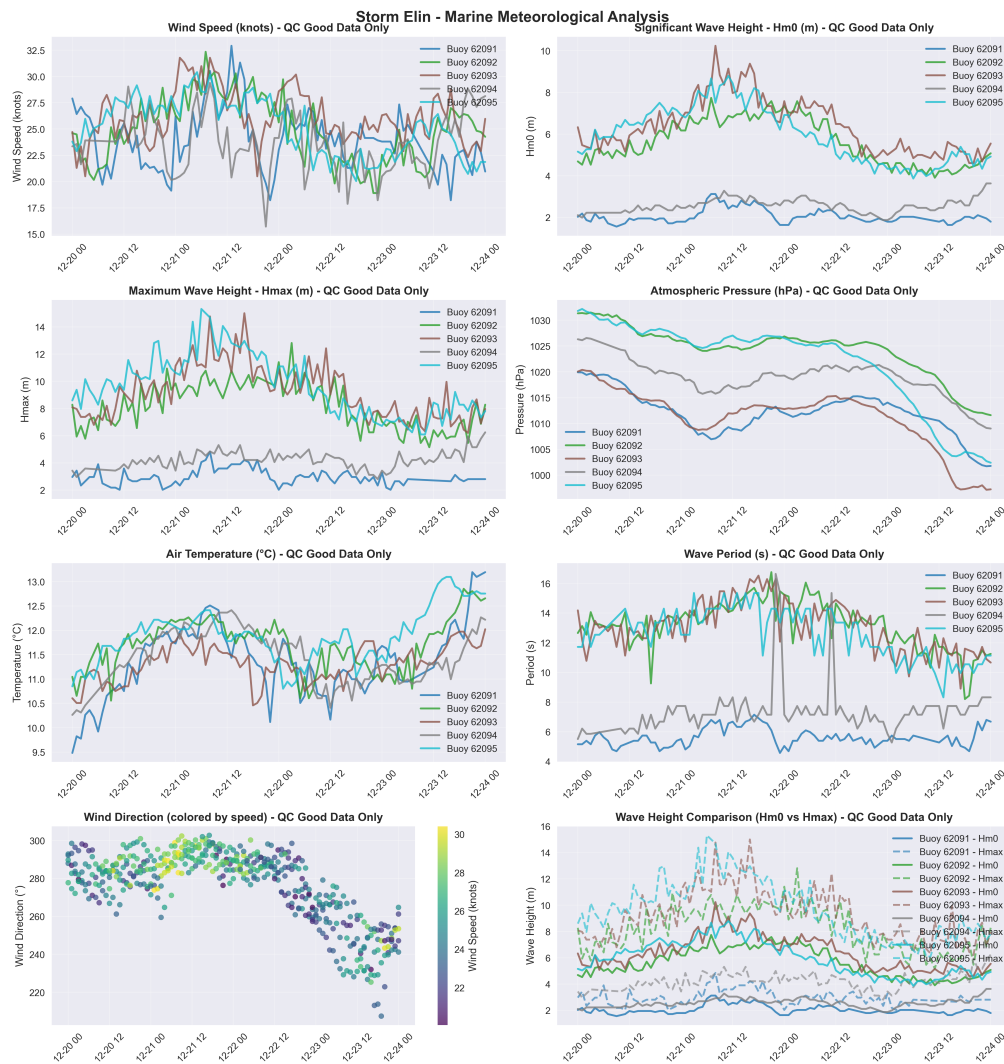
### Data Quality Indicators

- 0: No QC performed
- 1: QC performed, data OK
- 4: QC performed, raw data not OK and not adjusted
- 5: QC performed, raw data not OK but value adjusted/interpolated
- 6: QC performed, data OK (Datawell Hmax sensor specific)
- 9: Data missing

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*Report generated by Marine Storm Analysis System Data source: Irish Marine Data Buoy Network Quality controlled data from Met Éireann marine observations*

## Marine Meteorological Analysis



**Figure 1:** Marine meteorological observations during Storm Elin. Eight-panel analysis showing wind speed, significant wave height (Hm0), maximum wave height (Hmax), atmospheric pressure, air temperature, wave period, wind direction patterns, and comparative wave heights across the Irish Marine Data Buoy Network. Quality-controlled data only.