Office of the Chief Investigator
Transport Safety

Marine Safety Investigation
Report No 2020/02

Breakaway from berth

MV *Florida Highway*

Webb Dock, Port of Melbourne

27 December 2020

Cover photo: Victorian Ports Corporation (Melbourne)

THE CHIEF INVESTIGATOR

The Chief Investigator, Transport Safety is a statutory position under Part 7 of the *Transport Integration Act 2010*. The objective of the position is to seek to improve transport safety by providing for the independent no-blame investigation of transport safety matters consistent with the vision statement and the transport system objectives.

The primary focus of an investigation is to determine what factors caused the incident, rather than apportion blame for the incident, and to identify issues that may require review, monitoring or further consideration.

The Chief Investigator is required to report the results of an investigation to the Minister for Public Transport or the Minister for Ports and Freight. However, before submitting the results of an investigation to the Minister, the Chief Investigator must consult in accordance with section 85A of the *Transport (Compliance and Miscellaneous) Act 1983*.

The Chief Investigator is not subject to the direction or control of the Minister in performing or exercising his or her functions or powers, but the Minister may direct the Chief Investigator to investigate a transport safety matter.

SAFETY SUMMARY

What happened

On 27 December 2020, the *MV Florida Highway* was working cargo via its stern ramp while berthed at Webb Dock West. A cold front had been forecast to pass through the port in the late afternoon. At about 1745, the wind began swinging from the northwest to southwest with gusts to more than 50 knots.

At about 1749, the bow of *Florida Highway* began to come away from the wharf. Six forward lines and two aft lines subsequently parted as the ship rotated to port. Both anchors were lowered and the rotation arrested with the stern held at the berth, and the ship positioned about 60^0 to the wharf. The ship berthed opposite *Florida Highway* moved forward to avoid a possible collision and tugs arrived on scene from about 1812, assisting *Florida Highway* back to its berth.

What the Chief Investigator found

It was found that the wind strength was higher than expected by the ship's crew, and without the assistance of tugs, the ship was vulnerable to the strength of the wind that blew off the Webb Dock West berth as the cold front passed.

Weather forecasting services used by the ship operator did not predict the strength of wind experienced during the passage of the weather front, and the ship was not monitoring local weather services. The Chief Investigator found that Marine Radio Victoria did not broadcast Australian Bureau of Meteorology (BoM) weather warnings as soon as possible after receipt; and while the port VTS repeated some BoM weather warnings, not all were re-broadcast and broadcasts that were made did not include the strength of potential squalls.

What has been done as a result

As a result of this occurrence, the operator of the *Florida Highway* advised that it will issue to its fleet additional guidance for obtaining local weather information and warnings. It has also developed a checklist to be used for monitoring the tension of mooring lines.

The Harbour Master for the port of Melbourne has issued an operational instruction that reiterates existing requirements, and adds new requirements, for ships at berth when marine wind warnings are issued by the Bureau of Meteorology.

Marine Radio Victoria advised that it has commenced further training of its operators to ensure that Bureau of Meteorology warnings are broadcast immediately after receipt.

Safety message

Weather conditions associated with a frontal system can be unpredictable and wind gusts can be significantly higher than average wind speed. Monitoring of weather requires ship's crew to use all available resources including local weather services.

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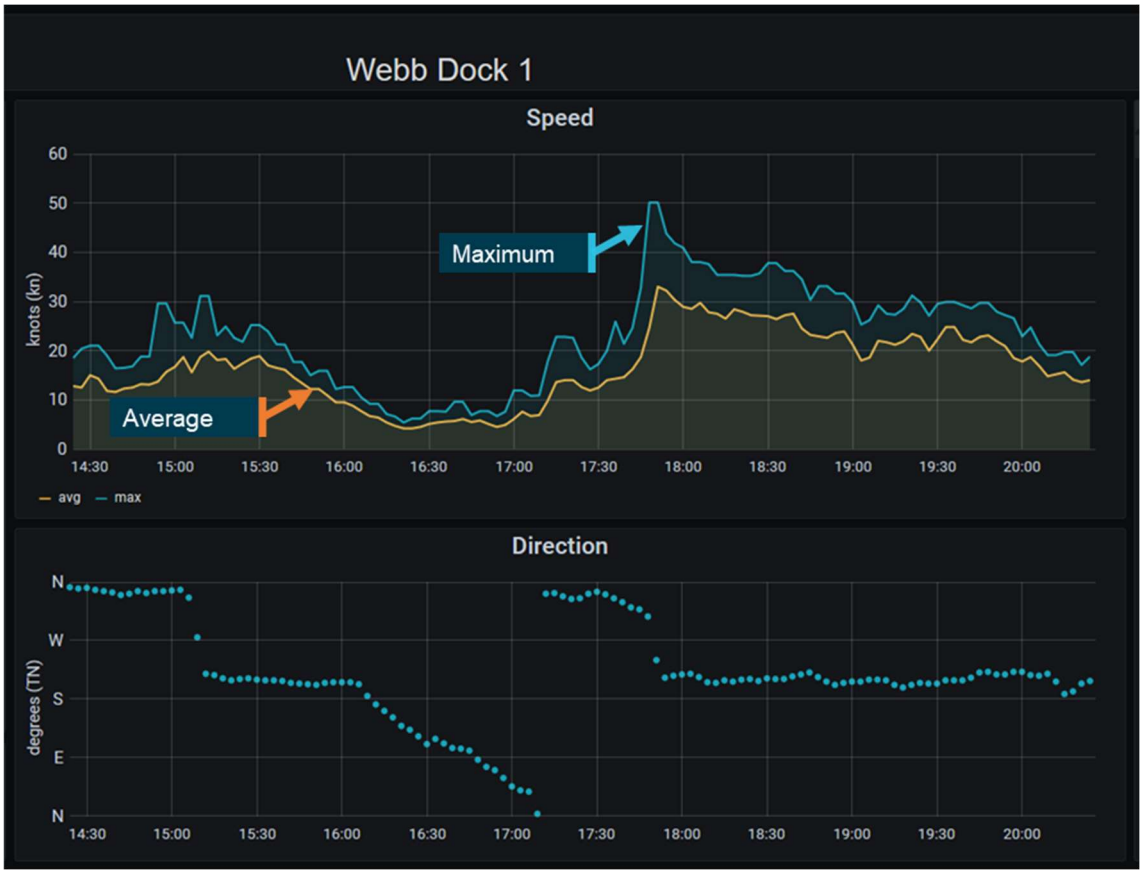
1. THE OCCURRENCE

On the evening of 24 December 2020, the Panamanian registered vehicles carrier[1] *MV Florida Highway* entered the port of Melbourne and berthed at 2-West Webb Dock with its starboard side to the wharf.

On 26 December, the ship's stern ramp was lowered onto the wharf and cargo work commenced at about 2345[2] that night. The ship was reported to be secured with a combination of head, spring and breast lines, with seven lines forward and eight lines aft. Breast lines were secured to wharf storm bollards while all other lines were secured to wharf edge bollards.

During the afternoon of 27 December, the wind at Webb Dock changed direction and strength on a number of occasions as a cold front approached and then passed over the port (Figure 1). At about 1430, the wind was from the north, averaging[3] about 15 knots[4] with gusts up to about 20 knots. From about 1450 there were wind gusts up to 30 knots and at about and 1510 a rapid change in wind direction to the southwest. The wind then eased while wind direction remained steady, settling in the south southwest.

Figure 1: Recorded wind speed and direction at Webb Dock (measured at 11 m above sea level)



Source: Melbourne Vessel Traffic Service (VTS) with annotations by Chief Investigator Transport Safety

[1] The ship was engaged in the carriage of motor vehicles, that are loaded and unloaded via a stern ramp.
[2] All times in this report are Australian Eastern Daylight-saving Time (EDT) (UTC + 11 hours).
[3] Wind speeds are 10-minute average wind speeds unless specifically labelled as gusts, in which case they are an almost instantaneous reading.
[4] Wind speeds in this report are given in knots. One knot or one nautical mile per hour equals 1.852 km/h.

At about 1610, the wind had dropped to less than 10 knots and started backing[5] through the east to north. At about 1710, the wind direction settled in the north northwest and its speed began to increase. The wind commenced slowly shifting towards the northwest from around 1730. By 1742, the wind was from direction 321º, with an average wind speed of 16 knots and gusts to 25 knots.

It was reported that at around this time, the master and chief officer went to the bridge to better monitor weather conditions. At about 1745, the ship made a radio call to the port seeking tug assistance on account of concern with the changing wind conditions. Cargo work was stopped, and crew were called to man the forward and aft mooring stations.

At the time of the request for assistance, the two port working tugs were assigned to a ship due to depart Swanson Dock. The VTS reassigned these two tugs and the pilot to assist Florida Highway.

Between 1745 and 1754, at Webb Dock wind gusts reached at least 50 knots and wind direction swung through about 105º to the south southwest. The most significant change occurred between 1748 and 1751 (Table 1).

Table 1: Changes in wind direction and strength between 1745 and 1754 at Webb Dock

Time	Wind direction	Average speed	Maximum gust
1745	318º	19 knots	33 knots
1748	307º	25 knots	50 knots
1751	240º	33 knots	50 knots
1754	213º	32 knots	44 knots

Source: Melbourne VTS

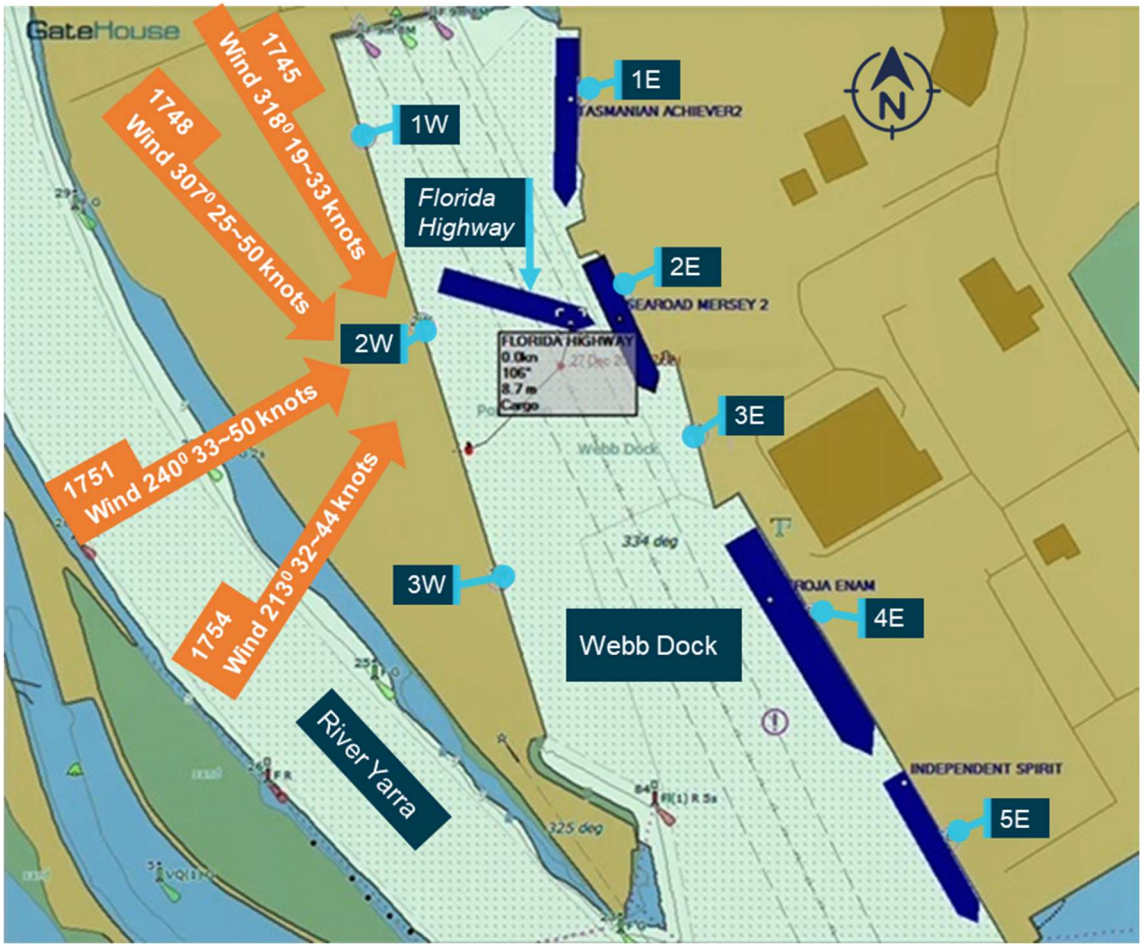
Webb Dock CCTV shows that at 1749, the bow of *Florida Highway* started coming off the wharf. Shortly after, *Florida Highway* reported to the port on VHF Channel 12 that the ship's headlines had parted. Six of the seven forward lines parted - the three headlines, the two forward breast lines and one forward spring line. The second forward spring line released from the ship's mooring bitt and did not break.

After the ship's bow broke away from the wharf, the bow swung towards the opposite side of the dock. One aft breast line and one aft spring line parted as the ship rotated. to port. The stern ramp became wedged on a shore bollard and the ship's stern was held to the wharf.

The master stated that about three minutes after the bow broke away, the bow thruster was engaged, thrusting to starboard at full power. Shortly after, on instruction from the VTS, *Florida Highway* dropped both anchors (port, then starboard) to arrest the swing to port. The ship had rotated to about 60º to the berth and its bow stopped swinging when about 20 m from *Searoad Mersey 2* that was berthed at 2-East Webb Dock (Figure 2).

[5] 'Backing' or 'backed' are terms used to describe the anti-clockwise shift in the wind direction.

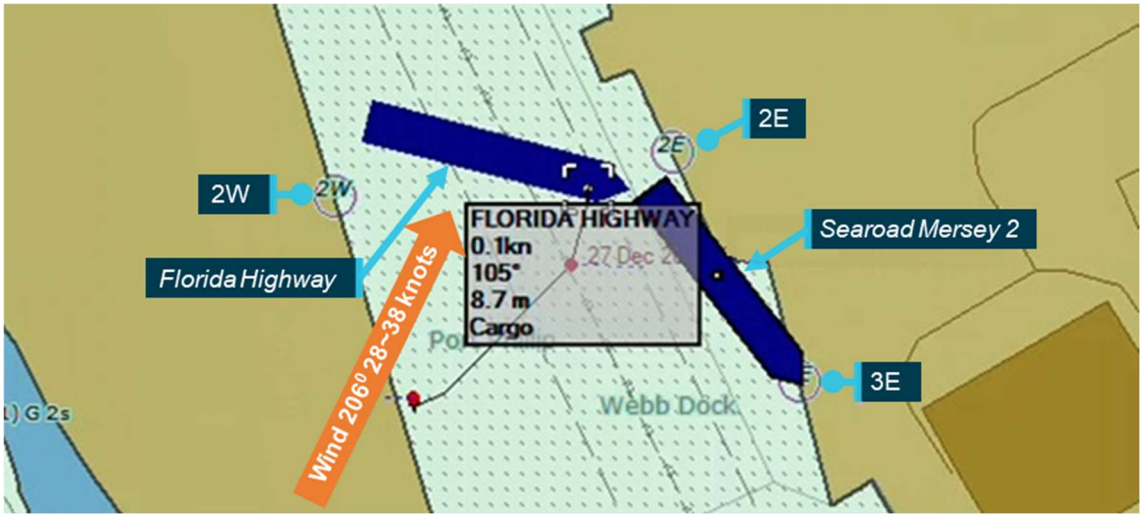
Figure 2: VTS AIS plot of *Florida Highway* orientation at about 1758



Source: Melbourne VTS with annotations by Chief Investigator Transport Safety

On the other side of the dock, *Searoad Mersey 2* had observed *Florida Highway*'s breakaway from the wharf and immediately started their engines. They then moved forward along the wharf until their stern was clear of *Florida Highway*'s bow (Figure 3).

Figure 3: VTS AIS plot of *Florida Highway* and *Searoad Mersey 2* orientation at about 1808



Source: Melbourne VTS with annotations by Chief Investigator Transport Safety

As a result of taking this evasive action, *Searoad Mersey 2*'s bow was overhanging the wharf 'knuckle' and its bow was blown onto the wharf at 3-East. The bow made contact with the wharf and suffered minor damage.

The first tug arrived on scene at about 1812, the second at about 1828 and with their assistance *Florida Highway* was returned to its berth by about 1845. One of the tugs remained assisting *Florida Highway* until about 0630 the next day.

At about the same time that *Florida Highway* broke away from its berth, a large tanker at Gellibrand was also having trouble maintaining lines and a tanker at Port Phillip anchorage started to drag anchor.

2. CONTEXT

2.1 Webb Dock

The port of Melbourne is located at the northern end of Port Phillip. The port is leased and operated by Port of Melbourne Operations Pty Ltd.

Webb Dock is located to the east of the mouth of River Yarra (Figure 4). Webb Dock West is on a bearing of 343^0-163^0 (True). It has three vehicle/car carrier berths, 1W, 2W and 3W, with a total length of 890 m and maintained depth of water of 12.4 m.

Figure 4: Aerial view of Webb Dock

Source: Google Earth, Imagery © 2021 with annotations by Chief Investigator Transport Safety

Webb Dock East has five berths. Berths 1E, 2E and 3E are Roll-on Roll-off (RoRo) berths of total length 510 m and maintained depth 7.0 m, and berths 4E and 5E are dedicated container berths of total length 660 m and maintained depth 14.6 m. The width of water between 2-West and the opposing eastern wharf is about 250 m.

Ships berthed at Webb Dock West are particularly affected by weather fronts moving over the port. Strong and gusting winds blowing from the southwest to west sector can potentially push ships off the berth. For this reason, ten storm bollards have been constructed along its length, located about 5.4 m back from the wharf edge. These bollards are recommended for use if the prevailing or forecast wind is from the west through to southwest failing which, a tug will be mandated to standby the ship.[6]

2.2 The ship

MV *Florida Highway* is a 59,493 gross ton dedicated vehicles carrier built in 2007 and registered in Panama (Figure 5). The ship is owned by Pedregal Maritime S.A., Panama and operated by Shoei Kisen Kaisha Ltd, based in Ehime, Japan. At the time of the incident the ship was on a scheduled liner service between South East Asia and Australia.

Figure 5: *MV Florida Highway*

Source: ShipSpotting.com Copyright © 2021 Photographer Paul Finnigan (used with permission)

The ship is 199.97 m in length and has a breadth of 32.26 m. Its depth at ship side is 34.48 m and the loaded draught 10 m. The ship is fitted with a Kobe Diesel Mitsubishi main engine, delivering 13,620 kW and a maximum ship speed of about 22 knots. The ship is also fitted with an 1800 kW bow thruster.[7]

[6] Harbour Master's Directions paragraph 3.17.9.
[7] A bow thruster was installed to provide transverse thrust at the bow to assist ship manoeuvrability during berthing.

2.3 Ship mooring

2.3.1 Ship's requirements

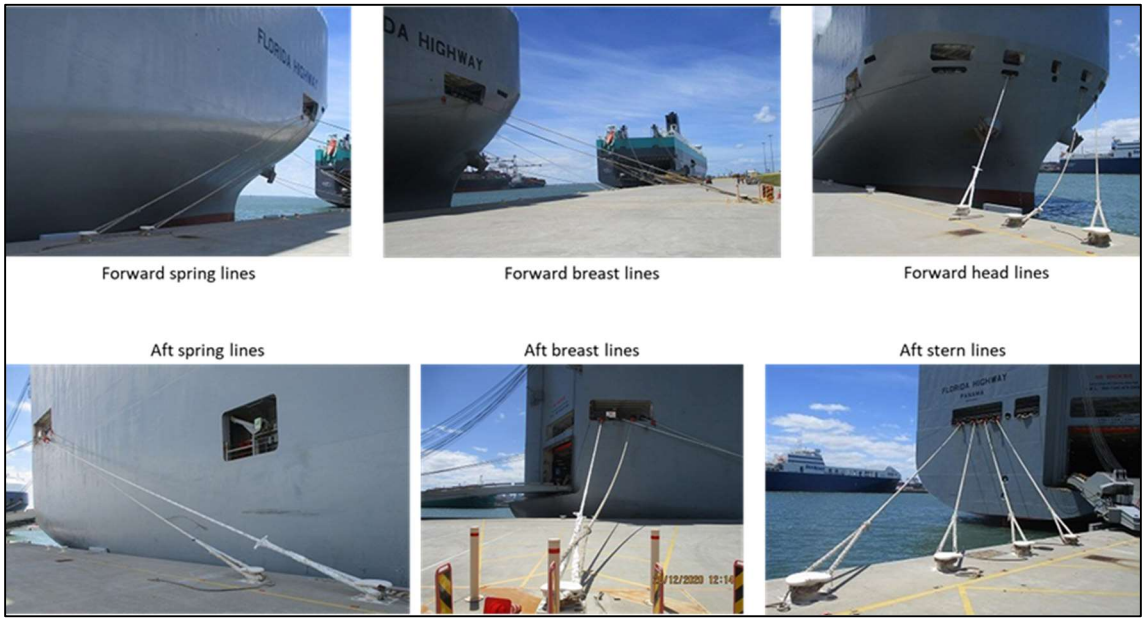
The ship's normal mooring arrangement was four headlines and two spring lines forward, and similarly four stern lines and two spring lines aft.

Company guidelines[8] on safe mooring arrangements indicated that masters should follow port and harbour master's recommendations and to arrange for tug assistance if the (offshore) wind speed was above 23.5 knots. The ship's master was not provided with a mooring program to assess the suitability of mooring arrangements for different wind conditions.[9]

2.3.2 Mooring rope configuration on 27 December 2020

As strong winds were expected during their port stay, the ship was secured with additional lines (Figure 6). The ship was made fast with seven lines forward that included three headlines, two breast lines and two spring lines. The ship was secured with eight lines aft that included four stern lines, two breast lines and two spring lines. The forward and aft breast lines were secured to the wharf storm bollards in accordance with Harbour Master's directions, and the remaining lines were secured to the wharf edge bollards.

Figure 6: Reported arrangement of mooring lines at the time of breakaway (photo taken day after).



Source: *Florida Highway*

Mooring lines were 8-strand synthetic fibre rope of 68 mm diameter and minimum breaking load of 98.1 tonnes (when new). The inboard end of each mooring line was secured to winch drums, each having a holding power of 441 kN (45 tonne-force), except one spring forward and one spring aft that were made fast to mooring bitts. The mooring winches were not auto-tensioning, and the state of tension of each line at the time of failure is not known.

[8] *Practical Guidelines To Be Observed When Implementing Additional Safety Measures Due To Worsening Weather Condition During Ship's Stay In Port* (Undated).
[9] Onboard computer programs are sometimes used to assess mooring requirements for different weather conditions.

2.3.3 Condition reports on mooring lines

The mooring lines were reported as being in a satisfactory condition at the time (Figure 7).

Figure 7: Photographs of damaged mooring lines.

Source: *Florida Highway*

2.4 Ship monitoring of weather

2.4.1 Weather subscriptions

The ship operator subscribed to Weathernews Inc[10] (WNI) weather routing services. This service provided the operator with regional weather forecasts at 12-hour intervals. Relevant forecasts were then forwarded by the operator to each ship in their fleet. The 12-hourly weather updates provided forecasts for the next five days and included predicted wind direction and speed at three-hour intervals. Wind speed were provided at 10 m and 50 m above surface. The operator also monitored the WNI website for specific port weather information and updated respective ships as appropriate.

The operator did not have any subscriptions with the Australian Bureau of Meteorology (BoM).

2.4.2 *Florida Highway* watchkeeping in port

The operator's safety management system (SMS) did not provide guidance to ships regarding accessing local weather information, at sea or in port.

Prior to their arrival, the ship agent had provided *Florida Highway* with a screen-shot of the BoM's Melbourne Forecast webpage for 24, 25 and 26 December. At that time there were no warnings for Victoria. On entry to the port, the marine pilot advised the master to expect strong winds and therefore suggested additional mooring lines be secured to the storm bollards. The ship's duty officers were informed by the master of the weather forecasts for strong winds during their port stay and were aware of the WNI weather reports.

[10] Weathernews Inc (WNI) is a Japan-based weather information and ship's routing service, contracted by a number of maritime companies to provide ships with weather and voyage routing information.

During the ship's stay in port, crew were not monitoring BoM weather information, either directly through a BoM provided service or via Marine Radio Victoria (MRV) broadcasts on VHF Channels 16 and 67.

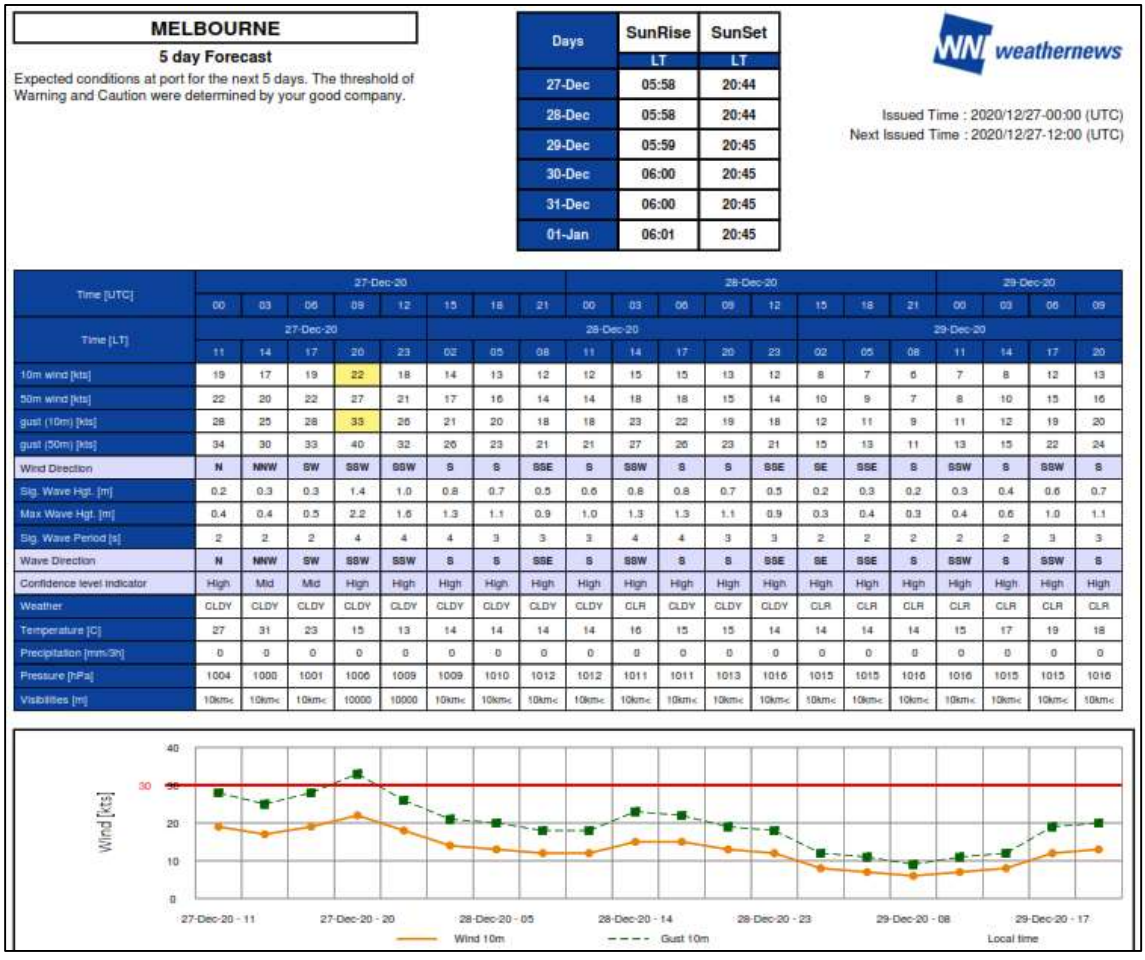
On 27 December, the ship's crew were logging the observed weather hourly and the ship's main engine and bow thruster were kept at 'stand-by', so that they could be utilised at short notice. It was reported that duty officers were maintaining a listening watch on the port working channel, VHF Channel 12.[11] However, crew did not recall hearing VTS weather-related messages.

2.5 Weathernews Inc weather services

2.5.1 Forecasts for Melbourne on 27 December 2020

The Weather News Inc (WNI) weather update at 2300 on 26 December indicated that wind intensity would gradually increase over the next day (27 December), reaching a maximum of about 21 knots (average) and 31 knots (gusting) at about 2000, then gradually reduce.[12] The next WNI update at 1100 on 27 December forecast a slight increase in predicted wind strength at 2000, forecasting an average wind of 22 knots and gusts to 33 knots (Figure 8).

Figure 8: WNI weather forecast issued at 00:00 UTC (11:00 LT) on 27 December 2020



MELBOURNE

5 day Forecast

Expected conditions at port for the next 5 days. The threshold of Warning and Caution were determined by your good company.

Days	SunRise LT	SunSet LT
27-Dec	05:58	20:44
28-Dec	05:58	20:44
29-Dec	05:59	20:45
30-Dec	06:00	20:45
31-Dec	06:00	20:45
01-Jan	06:01	20:45

weathernews

Issued Time : 2020/12/27-00:00 (UTC)
Next Issued Time : 2020/12/27-12:00 (UTC)

Time [UTC]	27-Dec-20								28-Dec-20								29-Dec-20			
	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09
Time [LT]	27-Dec-20					28-Dec-20								29-Dec-20						
	11	14	17	20	23	02	05	08	11	14	17	20	23	02	05	08	11	14	17	20
10m wind [kts]	19	17	19	22	18	14	13	12	12	15	15	13	12	8	7	6	7	8	12	13
50m wind [kts]	22	20	22	27	21	17	16	14	14	18	18	15	14	10	9	7	8	10	15	16
gust (10m) [kts]	28	25	28	33	26	21	20	18	18	23	22	19	18	12	11	9	11	12	19	20
gust (50m) [kts]	34	30	33	40	32	26	23	21	21	27	26	23	21	15	13	11	13	15	22	24
Wind Direction	N	NNW	SW	SSW	SSW	S	S	SSE	S	SSW	S	S	SSE	SE	SSE	S	SSW	S	SSW	S
Sig. Wave Hgt. [m]	0.2	0.3	0.3	1.4	1.0	0.8	0.7	0.5	0.6	0.8	0.8	0.7	0.5	0.2	0.3	0.2	0.3	0.4	0.6	0.7
Max Wave Hgt. [m]	0.4	0.4	0.5	2.2	1.6	1.3	1.1	0.9	1.0	1.3	1.3	1.1	0.9	0.3	0.4	0.3	0.4	0.6	1.0	1.1
Sig. Wave Period [s]	2	2	2	4	4	4	3	3	3	4	4	3	3	2	2	2	2	2	3	3
Wave Direction	N	NNW	SW	SSW	SSW	S	S	SSE	S	SSW	S	S	SSE	SE	SSE	S	SSW	S	SSW	S
Confidence level indicator	High	Mid	Mid	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Weather	CLDY	CLDY	CLDY	CLDY	CLDY	CLDY	CLDY	CLDY	CLDY	CLR	CLDY	CLDY	CLDY	CLR	CLR	CLR	CLR	CLR	CLR	CLR
Temperature [C]	27	31	23	15	13	14	14	14	14	16	15	15	14	14	14	14	15	17	19	18
Precipitation [mm/3h]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pressure [hPa]	1004	1000	1001	1006	1009	1009	1010	1012	1012	1011	1011	1013	1016	1015	1015	1016	1016	1015	1015	1016
Visibilities [m]	10km<	10km<	10km<	10000	10000	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<	10km<

Source: *Florida Highway*

[11] VHF Channel 12 (156.000 MHz) is the port of Melbourne VHF radio working channel.
[12] Wind data at 10 m height above sea level.

2.6 Bureau of Meteorology weather services

2.6.1 Services and broadcasts

The Australian Bureau of Meteorology (BoM) provided weather forecasts, warnings and observations for marine users in coastal and local water areas and high seas off the coast of Australia. BoM marine forecasts and warnings were broadcast over high frequency (HF) radio and satellite services. Weather facsimile charts (synopsis and forecast) for relevant regions were also transmitted over a range of radio frequencies several times a day.[13]

Ships could also subscribe to web and email services. Local weather forecasts for wind speed and direction, and sea and swell height were routinely issued every 12 hours (at about 0500 and 1700 local time) on the BoM website. When a wind warning was in force, these forecasts were updated every six hours. However, if conditions developed rapidly, warnings were updated more frequently.

An email subscription service was available where customers could choose to receive the warnings and forecast products they required, and they were actively notified when a report was issued. In addition to email subscriptions, ships had access to warnings via FTP[14] and via RSS[15] that provided real time alerts when new reports were issued.

BoM wind forecasts, warning criteria and caveat

BoM marine wind predictions were a 10-minute average of wind strength at a height of 10 m above sea level. Wind warnings were issued whenever average wind speeds were expected to exceed the thresholds for the following categories: strong wind (26 to 33 knots), gale (34 to 47 knots), storm force (48 to 63 knots) and hurricane force (more than 64 knots).

The BoM forecasts included advice that wind gusts may be 40 per cent stronger than the forecast average wind speed, and stronger still in squalls and thunderstorms.

2.6.2 Marine Radio Victoria weather broadcasts

In Victoria, BoM local waters weather forecasts were broadcast by Marine Radio Victoria[16] (MRV) on VHF Channel 67[17] at 0648 and 1848. Weather warnings were advertised in the Port Information Guide (see 2.7.4) as being broadcast as soon as possible after their receipt from the BoM and repeated at 48 minutes past every even hour. Broadcasts were preceded by a SECURITE announcement on VHF Channel 16.[18]

[13] The frequencies and times are listed in the Admiralty List of Radio Signals (ALRS).
[14] FTP (File Transfer Protocol) allows you to transfer files from another computer anywhere in the world, to your own.
[15] RSS (Really Simple Syndication) is an alternative way to receive the latest information released on the Bureau of Meteorology website to your desktop without having to visit each web page individually.
[16] Details of these services are provided in the Port Information Guide, and referenced in Harbour Masters Directions
[17] VHF channel 67 (156.425 MHz) is the ITU recommended working channel for the exchange of important safety information.
[18] The International Telecommunications Union (ITU) has established VHF channel 16 (156.8 MHz) as a distress, safety and calling channel.

2.7 Victorian Ports Corporation (Melbourne)

2.7.1 Role

The Victorian Ports Corporation (Melbourne) (VPCM) is a statutory authority responsible for the management of commercial shipping in the port waters of the port of Melbourne. The VPCM appointed Harbour Master oversees these responsibilities. VPCM is also the authorised Vessel Traffic Services (VTS) Authority for the port waters of the port of Melbourne and coordinates maritime operations.[19]

2.7.2 Vessel Traffic Services (VTS)

Objectives of the VTS included assuring compliance with the Harbour Master's Directions, relevant laws and conventions, and improving the safety and efficiency of vessel navigation. Services provided included the provision of essential and timely information to ships in the port.

Communication between port VTS and ships was conducted on VHF radio, Channel 12 (the port working channel). Ships were required to monitor this channel during their stay in port.

Relevant to this event, VTS Standard Operational Procedures (SOP) provided for the monitoring of vessels transiting, manoeuvring and at anchor during periods of high winds. However, these procedures did not provide for monitoring berthed ships. In relation to Webb Dock West, the procedures stated that, when the winds were forecast to be 30 knots (steady) or above from the south-west through to west, the storm bollards provided at the berth must be used or a tug will be mandated to standby the vessel for the expected duration of strong winds.[20]

2.7.3 Harbour Master's Directions

In accordance with the *Marine Safety Act 2010* (Vic), VPCM was required to engage a licensed Harbour Master. The Harbour Master had a function to control and direct the position where and the manner in which any vessel may anchor or be secured in those waters; and to control and direct the securing or removal of any vessel in those waters.

Consistent with the Harbour Master's functions, the Harbour Master had powers to make written and/or oral directions with respect to ships entering or within port waters. Standing directions were published as Harbour Master's Directions (HMD). With regards Webb Dock West and consistent with the VTS SOP, the HMD also specified that a car carrier moored alongside any of these berths must make use of the storm bollards provided when winds were forecast to be 30 knots (steady) or above from the south-west through to west.[21]

The HMD required ships at all times to maintain a listening watch on VHF Channels 12.[22] It also stated that the master must ensure that the prevailing weather conditions were continuously monitored and that up-to-date weather forecasts were obtained from the Bureau of Meteorology, either by monitoring VHF Channel 16/67 for weather reports issued from Marine Radio Victoria or by any other available means.[23]

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[19] In April 2014, the Australian Maritime Safety Authority (AMSA) issued a vessel Traffic Services Instrument of Authority to VPCM under Marine Order 64 (Vessel Traffic Services Authority) 2013.
[20] Section 5.8 VTS Standard Operational Procedures, 5th Edition, June 2020, Table 02 – Wind Limits; and Table 3(I) of the Harbour Master's Directions for the port waters of the port of Melbourne.
[21] Section 3.17.9 of the Harbour Master's Directions for the port waters of the port of Melbourne, 11th Edition, May 2019.
[22] Section 3.12.1 of the Harbour Master's Directions for the port waters of the port of Melbourne, 11th Edition, May 2019.
[23] Section 2.10 of the Harbour Master's Directions for the port waters of the port of Melbourne, 11th Edition, May 2019.

The HMD advised that Melbourne VTS, contactable on VHF Channel 12, would provide weather information and weather forecast reports on request.

2.7.4 Port Information Guide

The *Port Information Guide for the port waters of the port of Melbourne* provided general information and guidance to port users on all aspects of port operations and the navigation of commercial vessels in port waters of the port of Melbourne.

Relevant to this occurrence, the Guide stated that Melbourne VTS would broadcast weather warnings affecting Port Philip Bay as soon as possible after receipt from the BoM. These warnings would be broadcast on VHF Channel 12 and be preceded by a SECURITE announcement also on Channel 12.

2.7.5 Promulgation of port information

VPCM publishes the HMD and Port Information Guide on its website.[24] The information in those documents is also reproduced in several shipboard port information manuals (*Admiralty List of Radio Signals,*[25] *Admiralty Sailing Directions*[26] *and Guide to Port Entry*[27]). Ships obtain port-specific information via these publications. Amendments to the VPCM documents are issued as a Notice to Mariners to port agents and the Australian Hydrographic Office (AHO), for further dissemination to ships.

2.7.6 Towage

Towage in the port of Melbourne was provided by four tugs of between 68 and 70 tonne bollard pull.[28] As per the VPCM *Towage Requirements Determination 1996,*[29] two tugs were continuously available for deployment, the third tug could be made available at 2-hours' notice and the fourth tug at 12-hours' notice. The port guidelines did not include this detail on tug availability.

2.7.7 Weather broadcasting by the port

On receipt of a BoM strong wind (or higher) warning, Melbourne VTS had a system to alert port users to the existence of the warning via a SECURITE call on VHF Channel 12, referring them to the BoM website for further information. Full details of the BoM warning were not included in VTS broadcasts.

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[24] www.vicports.vic.gov.au

[25] Admiralty List of Radio Signals (ALRS) Volume 6 (NP286) (Parts 1 - 8) by United Kingdom Hydrographic Office – provides information on individual ports' Pilot Services, Vessel Traffic Services and Port Operations. Part 4 includes Indian sub-continent, South East Asia and Australasia

[26] Admiralty Sailing Directions NP14 Australia Pilot Volume 2 (5th Edition) by United Kingdom Hydrographic Office provides information on navigational hazards, buoyage, meteorological data, details of pilotage, regulations, port facilities and guides to major port entry.

[27] Published by Shipping Guides Limited, UK, the *Guide to Port Entry* provides accurate and comprehensive information on over 14,700 global commercial ports and terminals. It ensures that a complete port overview can be obtained before arrival, including pre-arrival information, details of the documentation required by the port, maximum size of vessel permissible and cargo facilities.

[28] Bollard pull is a conventional measure of the pulling (or towing) power of a watercraft, comparable to the horsepower rating of conventional vehicle engines. It can be defined as the thrust that is developed by the propulsion systems of any vessel when it has a zero speed in the forward direction.

[29] The availability of the tugs for the port of Melbourne is detailed in the *Towage Requirements Determination*, gazetted by VPCM in 2016.

2.8 Local observations and forecasts on 27 December 2020

For 27 December, the BoM identified that a pre-frontal trough and strong cold front[30] was approaching Victoria from the southwest, with damaging southwesterly winds expected to cross Port Phillip Bay between 1700 and 1800. Strong northerly winds with damaging gusts were expected ahead of this change, from about 1600.

During 27 December, a number of observations and broadcasts were made by the BoM, MRV and the port VTS (Table 2). The BoM forecasts and warnings were posted on the BoM website and circulated by email to (BoM) subscribing agencies that included MRV and the port VTS.

Table 2: Key weather observations and broadcasts[31] by BoM, MRV and the port VTS on 27 December 2020 for Port Phillip and central Victoria.[32]

Time	Item	Station	Message
0452	Email & Web broadcast	BoM	*Severe Weather Warning for Damaging Winds for central Victoria* Winds averaging 27 to 32 knots with peak gusts to around 49 knots possible in the warning area during the day.
0510	Email & Web broadcast	BoM	*Strong Wind Warning for local waters of Port Phillip* Winds shifting southwesterly 20 to 30 knots with a cool change at about 1600. Squalls to 40 knots are possible on the change.
0512	VHF Ch 12 broadcast	VTS	*Strong wind warning* Weather information – a strong wind warning and severe weather warning has been issued for Port Phillip Bay for today. The next update will be issued at approximately 1700 this afternoon. Mariners are advised to closely monitor weather conditions and refer to the Bureau of Meteorology website for further information.
0648	VHF Ch 16/67 broadcast of BoM 0510 forecast	MRV	*Coastal waters and local waters wind warning* Strong wind warning – winds shifting southwesterly 20 to 30 knots, with a cool change at about 1600. Squalls to 40 knots are possible on the change.
1000	Email & Web broadcast	BoM	The 0510 forecast was repeated. The cool change was now forecast to occur an hour later, at about 1700.
1013	Observation	BoM	Due to cloud cover, the northerly winds were not as strong as the modelling had forecast, with the strongest observed wind gust of 53 knots recorded at Mt William (about 215 km west northwest of Melbourne).
1054	Email & Web broadcast	BoM	*Severe Weather Warning for Damaging Winds for central Victoria* Winds averaging 27 to 32 knots with peak gusts to around 49 knots possible in the warning area during the day. Winds will shift to a fresh southwesterly change as the front moves through, with showers developing behind

[30] A cold front is the leading edge of a relatively cold air mass moving into a region of warmer air. The passage of a front is usually accompanied by a severe change in wind direction and a large drop in temperature. Source: Bureau of Meteorology, media.bom.gov.au – *The big chill: what is a cold front?*

[31] The relevant excerpts from broadcasts are reproduced in the table.

[32] The BoM forecasts provide wind speed in km/h for land areas and in knots for marine areas. The equivalent speed in knots has been provided.

Time	Item	Station	Message
			it. The change … reaching the Melbourne area by around 1600.
1600	observation	BoM	The threat of damaging northerly winds had eased, and Numerical Weather Prediction guidance suggested the southwesterly winds would be below warning thresholds.
1633	Email & Web broadcast	BoM	*Cancellation Severe Weather Warning* The immediate threat of severe weather has passed, but the situation will continue to be monitored and further warnings will be issued if necessary.
1640	Email & Web broadcast	BoM	*Strong Wind Warning for local waters of Port Phillip* Strong wind warning for Port Phillip Bay was reinstated but the mention of squalls was removed from the forecast. Wind southwesterly 20 to 30 knots, decreasing to around 15 knots in the late evening ... The chance of a thunderstorm in the north early this evening.
1648	VHF Ch 16/67 broadcast of BoM 1640 forecast	MRV	*Coastal waters and local waters wind warning* Strong wind warning – wind southwesterly 20 to 30 knots, decreasing to around 15 knots in the late evening. ... The chance of a thunderstorm in the north early this evening.
1650	VHF Ch 12 broadcast	VTS	*Strong wind warning* Weather information – A strong wind warning has been issued for Port Phillip Bay for today. Mariners are advised to closely monitor weather conditions and refer to the Bureau of Meteorology website for further information.
1703	Observation	BoM	A wind gust of 50 knots was recorded at Aireys Inlet (about 100 km southwest of Melbourne indicated that the southwesterly wind change could be stronger than expected. At about that time the cloud cover cleared sufficiently to detect that the difference in temperature between the two converging masses of air at the front was greater than predicted
1711	Observation	BoM	Winds speeds at South Channel (about 53 km south southwest of Webb Dock) began gusting around 40 knots.
1717	Email & Web broadcast	BoM	*Strong Wind Warning for local waters of Port Phillip* The forecast for Port Philip Bay was updated to state winds southwesterly 20 to 30 knots. Squalls to 45 knots are possible on a southwesterly change until around 7pm.
1742	Observation	BoM	Wind gusts of 63 knots were observed at Fawkner Beacon (about 10 km south of Webb Dock).
1745	Observation	VTS	Wind recorded at Webb Dock Direction 318^0, gusting to 33 knots
1747	Email & Web broadcast	BoM	*Squall Warning* A squally change is moving through Port Phillip and Western Port in the next 60 minutes. Winds will shift southerly 30 to 35 knots with squalls up to 55 knots possible.
1748	Observation	VTS	Wind recorded at Webb Dock

Time	Item	Station	Message
			Direction 307^0, gusting to 50 knots
1749	Observation	BoM	Wind gusts of 61 knots were observed at St Kilda Harbour (about 6 km southeast of Webb Dock).
1751	Observation	VTS	Wind recorded at Webb Dock Direction 240^0, gusting to 50 knots
1754	Observation	VTS	Wind recorded at Webb Dock Direction 213^0, gusting to 44 knots
1755	Email & Web broadcast	BoM	*Severe Weather Warning for Damaging Winds* The BoM re-issued a Severe Weather Warning advising A cold front is moving across southern Victoria, with strong southwesterly winds developing in its wake. DAMAGING WINDS, averaging 27 to 32 knots with peak gusts of around 49 knots are likely … over the next couple of hours.
1755 - 1800	Observation	BoM	Melbourne's temperature dropped 10 ^{0}Cin five minutes just before 1800 as the change moved through.

Source: BoM = Bureau of Meteorology | VTS = Melbourne Vessel Traffic Service | MRV = Marine Radio Victoria

2.9 Other relevant occurrences

On 13 January 2016, the *Spirit of Tasmania II* broke away from its berth at Station Pier, Port Melbourne. An investigation[33] by the Australian Transport Safety Bureau (ATSB) found that the port of Melbourne vessel traffic service (VTS) procedures for adverse weather were not comprehensive and, hence, its response to the weather event was only partially effective. One important consequence was that VTS's advance warning of storm force winds did not reach all relevant parties.

In response to this finding, the VPCM issued Victorian Notices to Mariners number 032-2016 advising that Melbourne vessel traffic service will broadcast Bureau of Meteorology weather warnings on VHF Channel 12.

[33] Breakaway of *Spirit of Tasmania II*, ATSB marine occurrence investigation report 324-MO-2016-001, 11 May 2017.

3. SAFETY ANALYSIS

3.1 Breakaway from the berth

As the weather front passed over Webb Dock, the wind rapidly changed direction, swinging from northwest to the west and then to the southwest. At the same time, wind speed increased to an average of about 33 knots, with gusts to at least 50 knots.

The profile of a car carrier is large, making this type of ship more susceptible to high loads from beam winds. Forces are proportional to the square of wind velocity acting on the ship and as a result forces increase rapidly with increasing wind speed. In this instance, the mooring lines in place and as tensioned at the time of the changed wind conditions could not withstand the applied wind loading and the ship broke away from its berth. The headlines were reported as the first mooring lines to part, followed by the forward breast lines and a forward spring. Subsequently, two aft lines, parted.

On instruction from the VTS, *Florida Highway* lowered both its anchors, which stopped the bow swinging and almost certainly prevented a collision with *Searoad Mersey 2*.

3.2 Ship preparation

In preparation of potentially strong winds during their stay, additional mooring lines (to the storm bollards) were secured. Compared to its normal mooring configuration, four breast lines were secured to the wharf storm bollards, two forward and two aft, and one less bow line was used. The decision to secure mooring lines to the wharf storm bollards was consistent with the intent of the Harbour Masters Directions that required use of the storm bollards if winds in the southwest - west sector were to exceed 30 knots.

The ship's safety management system required tug assistance should offshore wind exceed 23.5 knots. Based on the weather expectations of the ship's crew, the decision not to pre-order tug support was probably within these guidelines.

However, the winds experienced at Webb Dock during the passing of the weather front exceeded the expectations of the ship's master, and the ship was subsequently not prepared for winds blowing off the wharf that exceeded 30 knots (average) and gusted to 50 knots. In response to the increasing strength of the wind, notice to start the bow thruster was given and tug assistance was sought. However, these actions were too late to prevent the breakaway.

3.3 Ship monitoring of local weather forecasts

The ship's crew was reliant on weather reports supplied by their parent company. Excepting that the ship agent had provided the ship with a screenshot of Bureau of Meteorology (BoM) weather forecasts for the first three days in port (24-26 December), the ship did not otherwise access BoM weather services. The ship's master stated that they were unaware of the Harbour Master Direction that weather updates were being broadcast by Marine Radio Victoria on VHF Ch 16/67.

At various times during the 27 December (the latest prior to the squall being at 1717), the BoM had issued warnings indicating the possibility of strong or damaging winds at the time of passage of the weather front (Table 2). Knowledge of these local forecasts may have altered the decision on whether to order tug assistance earlier. The 1747

Squall Warning for gusts to 55 knots would not have been in sufficient time to alter the ship's preparedness.

3.4 Marine Radio Victoria weather broadcast

Whereas the Port Information Guide indicated that Marine Radio Victoria (MRV) would issue new warnings soon after receipt, the updated 1717 BoM that indicated squalls to 45 knots was not broadcast by MRV. In this instance, the crew of *Florida Highway* were not monitoring MRV broadcasts.

3.5 Port (VTS) re-broadcasting of wind warnings

Following a ship breakaway on 13 January 2016, the port undertook to broadcast Bureau of Meteorology weather warnings on VHF Channel 12. On this day, the VTS alerted ships to the BoM weather warnings on two occasions, although not after the BoM 1717 warning of potentials squalls to 45 knots.

The port VTS broadcasts were also limited to advising that a warning had been issued by the BoM and that ships should refer to the BoM website for further information. There was no mention of the strength of possible gusts or squalls. Such detail may have improved the effectiveness of broadcasts.

In this instance, the ship's crew advised that they did not recall hearing the two weather broadcasts by the port VTS on Channel 12 at 0512 and 1650 on that day.

4. FINDINGS

4.1 Context

The following findings are made with respect to the MV *Florida Highway* breakaway from berth at Webb Dock, Melbourne on 27 December 2020. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

A safety issue is an event or condition that increases safety risk and: (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations; and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

4.2 Contributing factors

- The mooring arrangements were not sufficient to hold *Florida Highway* to the Webb Dock West wharf during the passage of the weather front on 27 December 2020. Winds changed rapidly, shifting to be blowing off the berth and gusting to at least 50 knots.

- MV *Florida Highway* was not prepared for the strength of the winds that occurred during the passage of the weather front across the port.

4.3 Other factors that increased risk

- MV *Florida Highway* did not access local weather reporting services. It relied on forecasts that were not as responsive to changes in local weather conditions. [Safety Issue].

- Marine Radio Victoria broadcast the wind warnings on 27 December 2020 at the scheduled broadcast times and not immediately after receipt. The 1717 Bureau of Meteorology warning of squalls to 45 knots was not broadcast by MRV.

- Melbourne VTS did not re-broadcast all BoM weather warnings on 27 December 2020. The VTS did not initiate a broadcast following the 1717 BoM updated warning of squalls.

4.4 Other findings

- MV *Florida Highway* was not aware of the port of Melbourne Harbour Master's requirements to monitor Bureau of Meteorology weather updates.

5. SAFETY ISSUES AND ACTIONS

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The Chief Investigator, Transport Safety expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the Chief Investigator prefers to encourage relevant organisation(s) to proactively initiate safety action.

All of the directly involved parties are provided with a draft report and invited to provide submissions. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out or are planning to carry out in relation to each safety issue, relevant to their organisation.

5.1 Access to local weather information

Number:	2020-02-001
Issue owner:	Shoei Kisen Kaisha

Safety issue description

MV Florida Highway did not access local weather reporting services. It relied on forecasts that were not as responsive to changes in local weather conditions.

Response to safety issue, by Shoei Kisen Kaisha

Shoei Kisen Kaisha has advised that it plans to issue to its fleet additional guidance for obtaining local weather information and warnings. This guidance includes that masters should access local weather information from the local agent, through marine radio services and by checking NAVTEX messages.[34]

5.2 Additional safety actions

1. Shoei Kisen Kaisha has developed a check sheet to record the *Tension Monitoring of Mooring Ropes*, that ships must maintain when alongside a berth.
2. The Harbour Master issued *Operational Instruction 01/2021*[35] for ships at berth when marine wind warnings are issued by the Bureau of Meteorology (see Appendix 1).
3. Marine Radio Victoria advised that it has commenced further training of its operators to ensure that Bureau of Meteorology warnings will be broadcast immediately after receipt.

[34] NAVTEX or Navigational Telex is an international medium frequency direct-printing system which delivers meteorological and navigational warnings as well as maritime safety information (MSI) to ships. **Note:** Australia does not provide NAVTEX services.

[35] Operational Instruction 01/2021 – Instructions to Vessels and Service Providers when a Strong Wind, Gale Force or Squall Warnings are Issued, issued 28 May 2021.

6. APPENDIX 1

Operational Instruction No. 01 / 2021

INSTRUCTIONS TO VESSELS AND SERVICE PROVIDERS WHEN A STRONG WIND, GALE FORCE OR SQUALL WARNINGS ARE ISSUED

Date: 28 May 2021

Following successful trials of revised protocols for vessels berthed in Port Melbourne during high wind conditions, this Operational Instruction (OI) applies to vessels in the port when Marine Wind Warnings are issued by the Bureau of Meteorology for Port Phillip waters.

STRONG WIND WARNING:

Station Pier

When the wind is forecast from a direction which would potentially cause vessel movement "off the berth"

- Listening watch on VHF Ch 12 maintained
- Thrusters to be operational for immediate use
- Mooring lines are to be tended to ensure equal weight on all lines
- Outboard anchor is to be lowered to the seabed with no weight on the anchor cable (for Spirit of Tasmania, this is not mandatory but should be considered/ risk assessed by the Master)

Webb Dock

For Car carriers at Webb Dock West when the wind is forecast from the South to the North West Quadrant:

- Listening watch on VHF Ch 12 maintained
- Thrusters to be operational for immediate use
- Mooring lines are to be tended to ensure equal weight on all lines, and additional mooring lines as required, including running lines to the storm bollards
- Stern Ramp is to be lowered and kept on the wharf
- Outboard anchor is to be lowered to the seabed with no weight on the anchor cable

For Container vessels and other vessels at Webb Dock East when the wind is forecast from the North to the South East Quadrant:

- Listening watch on VHF Ch 12 maintained
- Additional mooring lines as required
- Master to consider lowering the outboard anchor to the seabed, with no weight on the anchor cable and for Thrusters to be ready for immediate use

Swanson Dock

When the wind is forecast from a direction which would potentially cause vessel movement "off the berth" (i.e. Westerly wind quadrant for vessels at SDW, and Easterly wind quadrant when vessels at SDE)

- Listening watch on VHF Ch 12 maintained
- Additional mooring lines as required
- Master to consider lowering the outboard anchor to the seabed, with no weight on the anchor cable and for Thrusters to be ready for immediate use

Gellibrand Pier

When the strong winds are forecast from the South Westerly to Northly quadrant, and more than 50% of the cargo has been discharged:

- Listening watch on VHF Ch 12 maintained
- Mooring lines are to be tended to ensure equal weight on all lines, and additional mooring lines as required
- Manifold is to be manned and ready to stop pumping as per the terminal guidelines or disconnected as required

GALE/ STORM/ SEVERE WEATHER WARNINGS:

- As above for the berths and directions detailed above
- Station Pier, Webb Dock East 4 and 5: Vessels with wind "off the berth" - anchor is to be lowered to the seabed with no weight on the anchor cable (for Spirit of Tasmania, this is not mandatory but should be considered/ risk assessed by the Master)
- All berths: Masters to consider risk mitigations for their vessels, which may include extra lines, bow thrusters available, anchor lowered to seabed or having engines on standby and ready for immediate manoeuvring

OTHER:

Masters must ensure that arrangements are made with port service providers (Agents, Pilots, Towage, Line handlers) to provide additional services for the duration of the warnings in an emergency if required. Such arrangements should be made with as much advance notice as possible.

If anchors are deployed, Masters must ensure the anchor is recovered prior to vessel departure and inform VTS (and attending Pilot if applicable).

If a Master is in any doubt, or if the Harbour Master requires, a tug shall be ordered to stand by the vessel for the duration of high wind/ storm conditions.

This Operational Instruction is a Direction made under Section 232 (1c) of the Marine Safety Act 2010 (Vic).