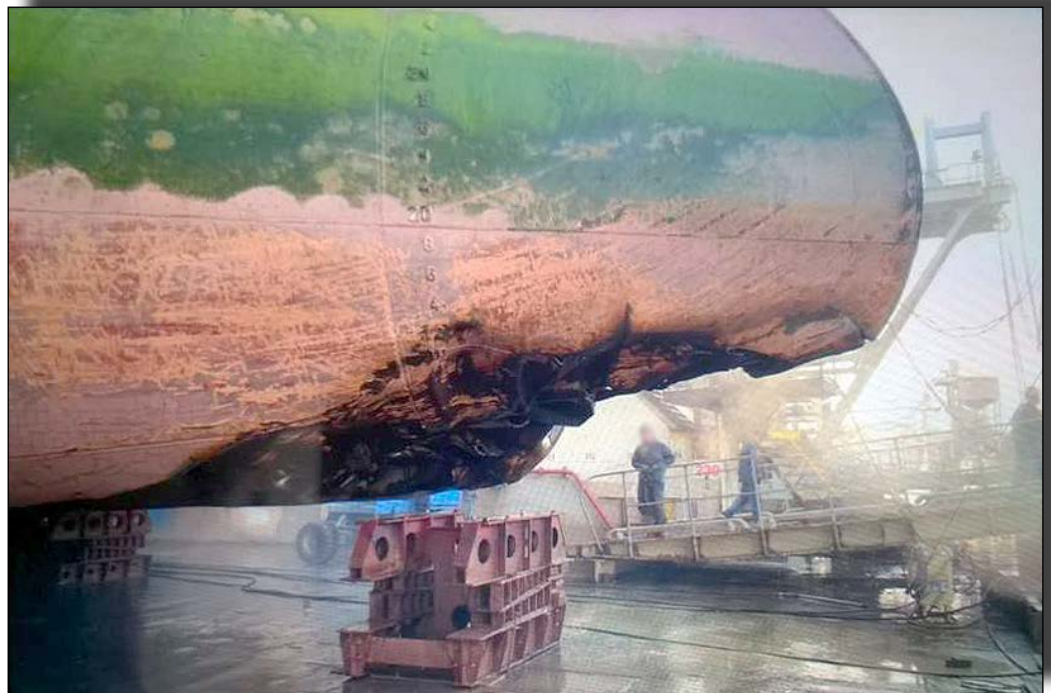Report on the investigation of

the grounding of the general cargo vessel

BBC Marmara

in the Little Minch, off the west coast of Scotland

on 25 July 2021

SERIOUS MARINE CASUALTY   REPORT NO 8/2023   NOVEMBER 2023

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

<u>NOTE</u>

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

All MAIB publications can be found on our website: www.gov.uk/maib

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

2/O	-	second officer
AB	-	able seaman
ALB	-	all-weather lifeboat
BNWAS	-	Bridge Navigational Watch Alarm System
BPG	-	International Chamber of Shipping Bridge Procedures Guide, Sixth Edition
Briese	-	Briese Schiffahrts GmbH & Co. KG
C/O	-	chief officer
CIP	-	Coastguard Information Portal
CRT	-	Coastguard Rescue Team
DCPSO	-	Duty Counter Pollution and Salvage Officer
ECDIS	-	Electronic Chart Display and Information System
ENC	-	electronic navigational chart
ETV	-	emergency towing vessel
HMCG	-	Her Majesty's Coastguard
IMO	-	International Maritime Organization
ISM Code	-	International Safety Management Code
JRCC	-	Joint Rescue Coordination Centre
m	-	metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MOO	-	maritime operations officer
MRCC	-	Maritime Rescue Coordination Centre
MSC	-	Maritime Safety Committee
MyRA	-	My Route Appraisal
OOW	-	officer of the watch
OS	-	ordinary seaman
RNLI	-	Royal National Lifeboat Institution
SAR	-	search and rescue
SMC	-	SAR mission coordinator

SMOO	-	senior maritime operations officer
SMS	-	safety management system
SOLAS	-	International Convention for the Safety of Life at Sea 1974, as amended
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended
TSS	-	traffic separation scheme
VDR	-	voyage data recorder
VHF	-	very high frequency
VTM	-	vessel traffic monitoring
XTD	-	cross-track distance

TIMES: all times used in this report are British Summer Time (UTC+1) unless otherwise stated.

Image courtesy of MarineTraffic.com (Peter aus Holtenau)

BBC Marmara

SYNOPSIS

At 0332 on 25 July 2021, the cargo vessel *BBC Marmara* ran aground on the island of Eilean Trodday while transiting the Little Minch, off the west coast of Scotland. The vessel was on passage from Foynes, Republic of Ireland to Scrabster, Scotland. It was refloated successfully and then proceeded to the port of Stornoway, where a dive inspection confirmed significant damage to the forward part of the vessel's hull that included penetration of the bow thruster space and forepeak tanks. A port state inspection granted permission for *BBC Marmara* to sail to Scrabster to offload cargo before proceeding to a dry dock in Poland for repairs.

The MAIB investigation found that:

- The officer of the watch was asleep when the vessel ran aground. He was alone on the bridge as there was no lookout, and the bridge watch alarm was disabled;

- The officer of the watch had been drinking alcohol both immediately before and at the start of his watch;

- The safety management system put in place by the owners and managers was ineffective in controlling the shipboard practices involved in this grounding;

- The owners and managers did not have the necessary assurance tools in place to understand whether the control measures implemented for alcohol and the use of both a lookout and a bridge watch alarm had been implemented successfully;

- The voyage plan in use differed from the approved voyage plan supplied by the authorised voyage planning service for the vessel;

- The watchkeepers at Stornoway Maritime Rescue Coordination Centre did not intervene before the grounding as they were distracted by an ongoing search and rescue incident.

Following this accident the owners and managers of *BBC Marmara*, Briese Schiffahrts GmbH & Co. KG, have taken action to improve the effectiveness of the company's safety management system in controlling shipboard practices, especially in relation to the consumption of alcohol and use of lookouts and watch alarms. The Maritime and Coastguard Agency has conducted a review of the accident and taken several steps to improve the level of vessel traffic monitoring across the national network.

Recommendations have been made to: Briese Schiffahrts GmbH & Co. KG to ensure that a lookout is on the bridge in times of darkness, and to implement management assurance tools that will provide accurate feedback on the effectiveness of its safety management system; and the Maritime and Coastguard Agency to increase organisational knowledge of cognitive performance and to plan accordingly.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *BBC MARMARA* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	*BBC Marmara*
Flag	Portugal
Classification society	Det Norske Veritas Germanischer Lloyd
IMO number/fishing numbers	9454228
Type	Multipurpose dry cargo vessel
Registered owner	Briese Schiffahrts GmbH & Co. KG
Manager(s)	Briese Schiffahrts GmbH & Co. KG
Construction	Steel
Year of build	2010
Length overall	115.54m
Gross tonnage	5344
Minimum safe manning	8
Authorised cargo	Dry bulk and containers, strengthened for heavy cargo

VOYAGE PARTICULARS	
Port of departure	Foynes, Republic of Ireland
Port of arrival	Scrabster, UK
Type of voyage	International
Cargo information	1407 metric tonnes of reinforced concrete beams
Manning	12

MARINE CASUALTY INFORMATION	
Date and time	25 July 2021 at 0332
Type of marine casualty or incident	Serious Marine Casualty
Location of incident	Eilean Trodday, the Little Minch
Place on board	The ship's hull
Injuries/fatalities	None
Damage/environmental impact	Breaches of the hull, no pollution
Ship operation	On passage
Voyage segment	Coastal
External/internal environment	Wind Beaufort force 3; night-time; moderate to very poor visibility, fog patches; smooth seas

1.2   NARRATIVE

1.2.1   Events on board *BBC Marmara*

At 1645 on 23 July 2021, the cargo vessel *BBC Marmara* departed from Foynes, on the west coast of the Republic of Ireland, with 1407 metric tonnes of reinforced concrete beams on board. The ship's passage through the Little Minch and North Minch to its destination port of Scrabster, on the north coast of Scotland, was planned to conform with the mandatory and recommended International Maritime Organization (IMO) ships' routeing **(Figure 1)**.

The next day an able seaman (AB) learned of the death of a family member. and invited three crew members back to his cabin for an informal wake. From about 2030, the AB, an ordinary seaman (OS), the second officer (2/O) and a cadet drank beer and Jägermeister[1] in the AB's cabin. At approximately 2330, the 2/O left the wake to take over the watch from the master, arriving on the bridge shortly before midnight.

The master left the bridge after a brief handover and conversation with the 2/O. At 0017, approximately 10 minutes later, the cadet and AB from the earlier gathering arrived on the bridge carrying three more cans of beer that the master had given to them. Following a lively conversation, the drinking of the beer, and some joking around between the three crew members, the 2/O talked the cadet through the process of making a very high frequency (VHF) radio call to Stornoway Maritime Rescue Coordination Centre (MRCC). This call was due at reporting point Echo, the northbound entrance of the Off Neist Point traffic separation scheme (TSS). At 0040, the VHF call to Stornoway MRCC was completed by the cadet and shortly afterwards an alteration of course to 006° was made in line with the passage plan.

The conversation continued between the three crew members, while music was played. By 0058, when an alteration of course was made to 025°, the 2/O was on the bridge alone.

At 0210, *BBC Marmara* overshot a planned alteration of course. At 0214, the Electronic Chart Display and Information System (ECDIS) alarm sounded to indicate that the vessel had exceeded the maximum planned cross-track distance (XTD) **(Figure 2)**. The alarm sounded 15 times until an incremental alteration of course to 070° was made, which placed the vessel on a convergent course with the IMO recommended route and planned track of 062° passing north of the island of Eilean Trodday **(Figure 2)**.

At 0243, *BBC Marmara* passed reporting point Foxtrot **(Figure 2)** where the next VHF radio report was due into Stornoway MRCC; however, no call was made. At 0248, loud snoring could be heard on the voyage data recorder (VDR)[2] that continued intermittently as the vessel crossed its planned track. At 0330, the ECDIS look ahead alarm sounded and, at 0332, *BBC Marmara* ran aground on Eilean Trodday at a speed of 11.2 knots **(Figure 3)**.

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[1]   Jägermeister is a German digestive made with 56 herbs and spices. It has alcohol by volume of 35%.

[2]   VDRs record and securely store information on the position, movement, physical status, command and control of the ship.

Stornoway

Scrabster

Stornoway

Ullapool

Northbound IMO recommended route

Eilean Trodday

Off Neist Point TSS
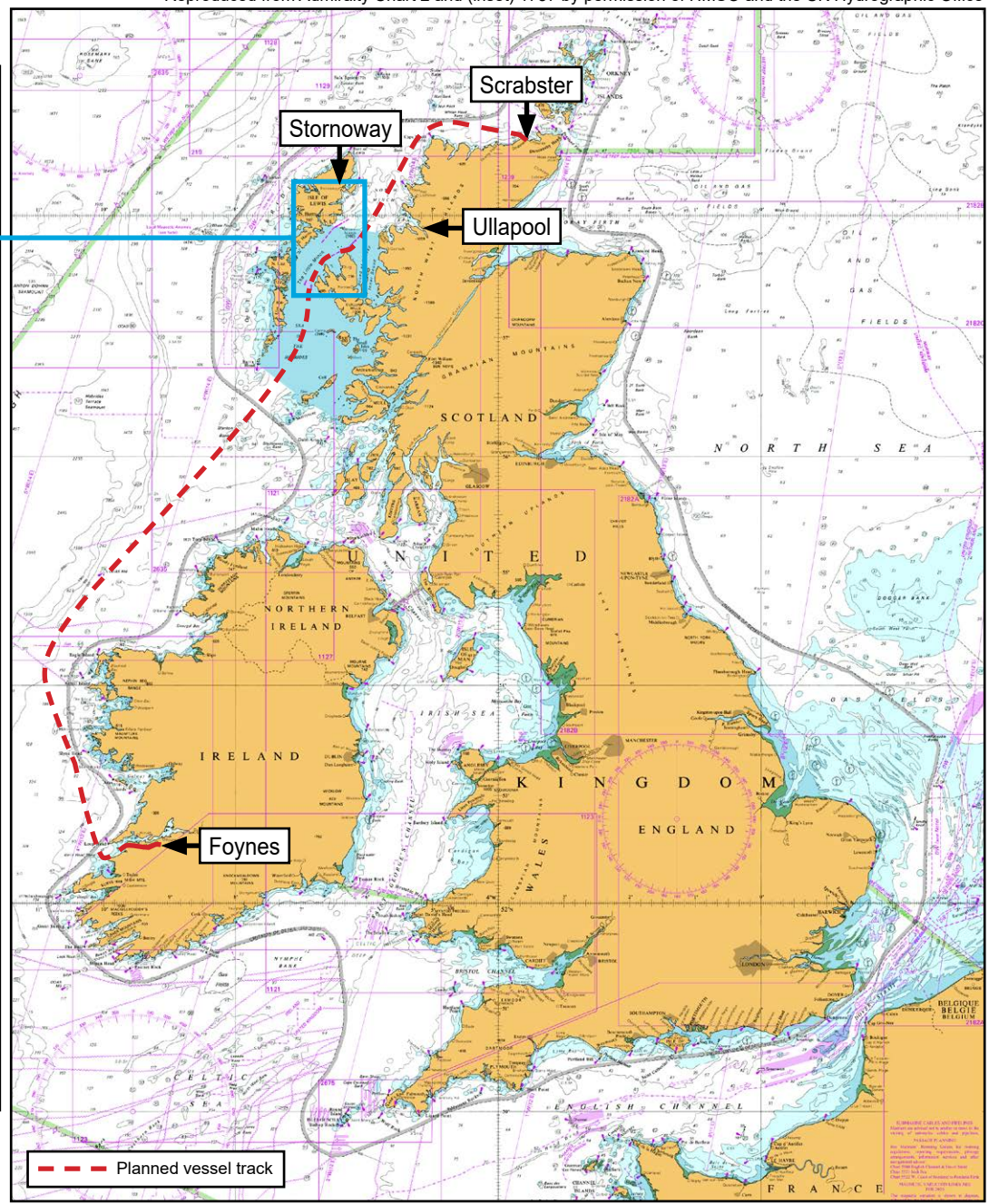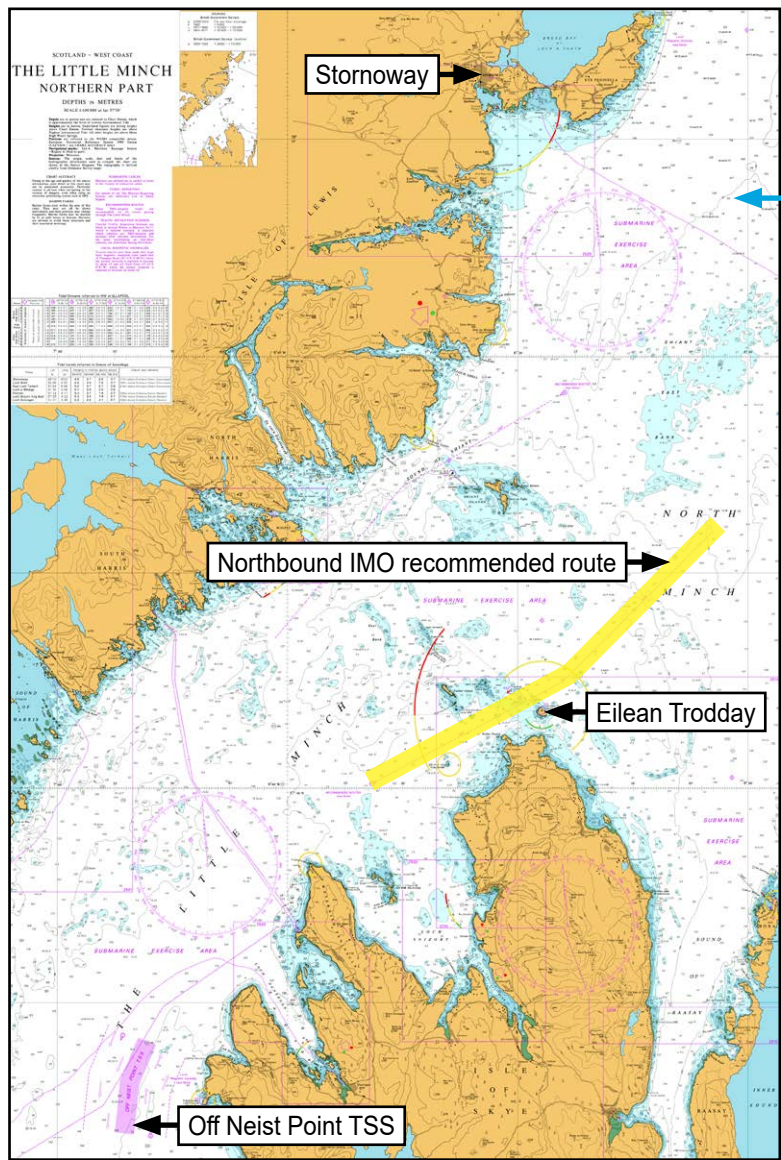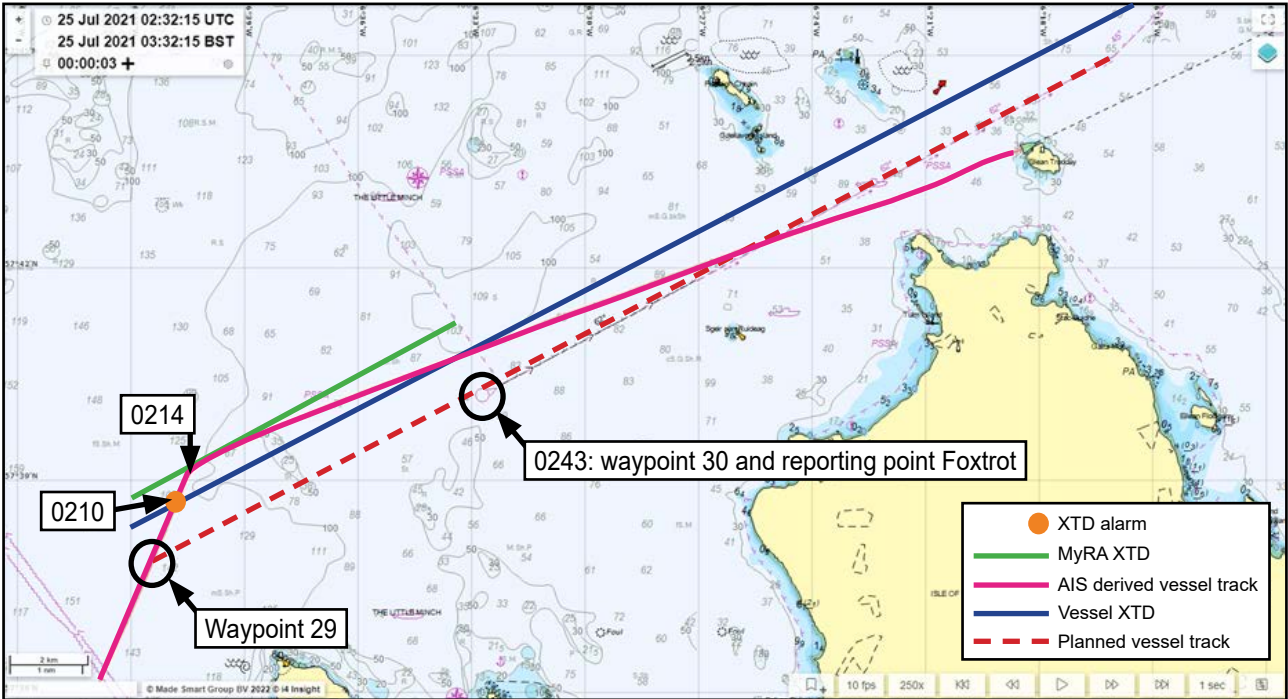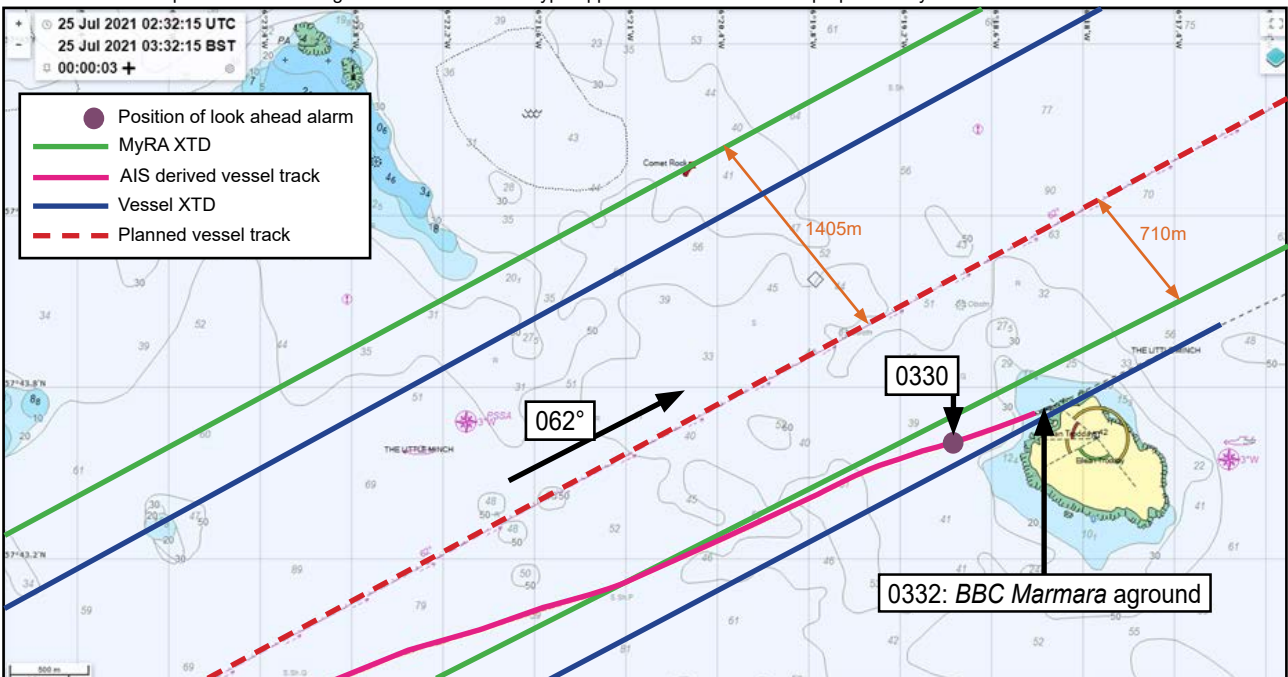
Foynes

- - - Planned vessel track

Figure 1: Overview of *BBC Marmara*'s planned track and points of interest

Figure 2: *BBC Marmara*'s AIS track, passage planning details and XTD alarm position

Figure 3: *BBC Marmara*'s AIS track to Eilean Trodday, passage planning details and the position of the look ahead alarm

1.2.2 Events at Stornoway Coastguard Operations Centre

At approximately 1945 on 24 July 2022, a senior maritime operations officer[3] (SMOO) started their shift, logging into the operator station and taking over ongoing search and rescue (SAR) tasks. The SMOO was assigned the role of SAR mission coordinator[4] (SMC) for the shift and, at 2000, the Stornoway team was completed by another SMOO and a maritime operations officer[5] (MOO).

The previous watch had been managing an incident that was resolved at 2048, by when another incident was already underway involving the coordination of a coastguard rescue helicopter. As both incidents were running concurrently and required SMC oversight the other SMOO stepped in to help coordinate the second incident, which concluded just before 2100.

The network tactical commander[6] cancelled the 2100 routine conference call and the SMC received a message that, in addition to Stornoway, they had been assigned remote SMC duties for Aberdeen MRCC due to the lack of a qualified SMC at that station.

At 0040, the MOO, who had been monitoring VHF channel 16 and undertaking the vessel traffic monitoring (VTM) role since the start of the watch, received, and responded to the call from *BBC Marmara* at reporting point Echo.

At 0130, the MOO handed the VHF channel 16 and VTM watchkeeping duties over to the SMC and the SMOO went on a break. At 0143, an incident was raised by Aberdeen MRCC and the SMOO returned from their break to help the SMC by updating the electronic log with information about the incident. The SMC passed the VHF channel 16 and VTM monitoring role to the SMOO during this period.

At 0237, *BBC Marmara* triggered an alarm on the C-Scope[7] system as it entered an area known as the Eugenie Box[8] **(Figure 4)**, which the SMOO acknowledged but took no action on because the vessel was observed to be on a convergent course with the recommended route. At approximately 0243, at the same time as *BBC Marmara* was passing reporting point Foxtrot **(Figure 2)**, the SMC received a phone call from Aberdeen MRCC about the ongoing incident. At 0251, the SMOO observed *BBC Marmara* leaving the Eugenie Box. At 0254, having offered assistance to the SMC, the SMOO called Aberdeen MRCC.

At 0300, the MOO went for a meal break. The SMC and SMOO continued to manage the ongoing Aberdeen incident, which involved tasking a coast rescue team and making entries in the ViSION[9] system as well as performing other ancillary tasks.

At 0332, *BBC Marmara* triggered a low-speed alarm on C-Scope that was acknowledged by the SMOO who immediately called the vessel.

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[3] The role of a SMOO included station leadership, management and administrative duties as well as watchkeeping.

[4] The SMC was responsible for search and rescue (SAR) coordination and delivery. The role was one of oversight and guidance rather than direct involvement.

[5] A junior watchkeeper.

[6] The national coordinator responsible for managing the UK search and rescue network.

[7] The coastguard's primary VTM system, which used automatic identification system data to overlay shipping contacts on electronic chart information. Alert zones could be set around hazards, with visual and audible alarms triggered when vessels crossed an alert zone boundary.

[8] An alert zone set up on the C-Scope system following the grounding of the cargo vessel *Kaami* in March 2020 (see section 1.11.3). It alerted VTM watchkeepers to vessels not following the IMO recommended routes north or south through the Minches.

[9] The official coastguard software package.
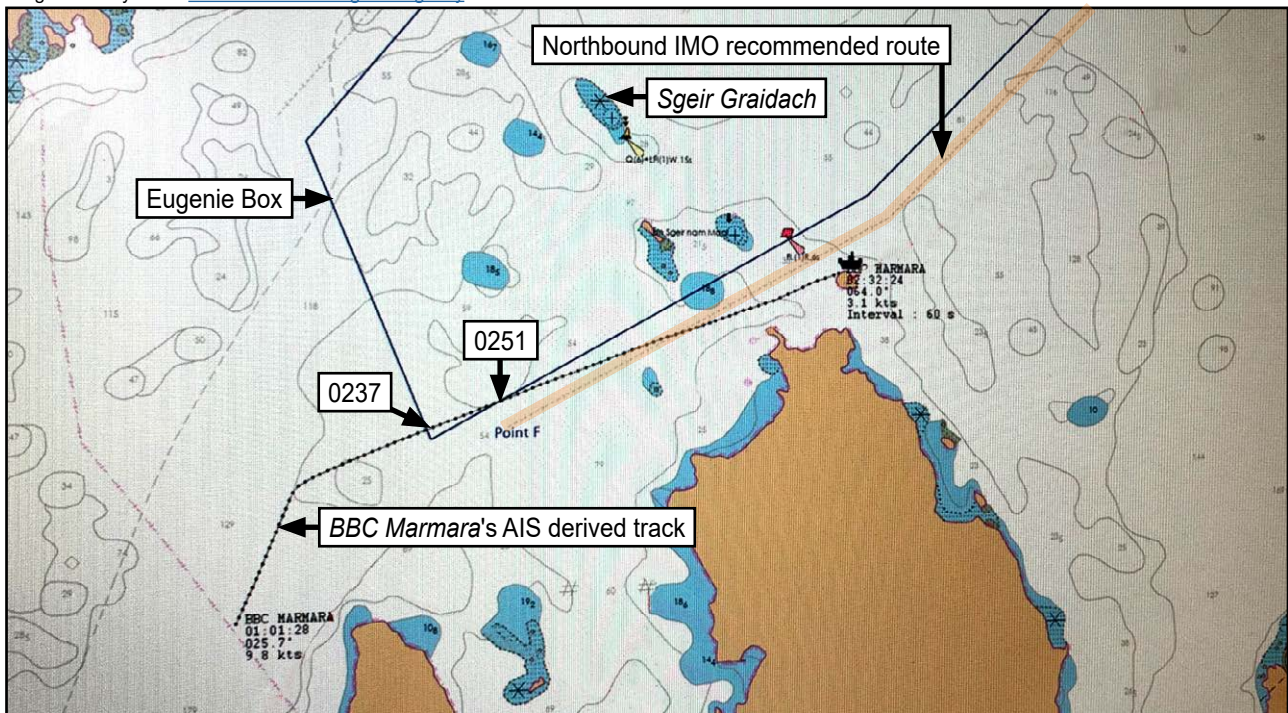
Figure 4: C-Scope image showing the Eugenie Box and *BBC Marmara*'s AIS track

1.2.3 Post-grounding events

The master of *BBC Marmara* went to the bridge immediately after the grounding and spoke with Stornoway MRCC on VHF radio to confirm that the vessel was aground. A set of soundings and a damage assessment were conducted that enabled the master to establish the vessel's stability and, with the rise of the tide, the vessel was refloated and proceeded on passage.

At 1343, *BBC Marmara* arrived in Stornoway to await the arrival of a dive team, the vessel's owner having agreed this destination in discussion with the Maritime and Coastguard Agency (MCA) duty surveyor and duty counter pollution and salvage officer (DCPSO).

The resulting dive survey identified that *BBC Marmara* had suffered significant hull plating damage **(Figure 5)**, including penetration of the forepeak tanks and bow thruster space. Following a classification society survey the vessel was permitted to continue to Scrabster to discharge its cargo before heading to Gdynia, Poland, for repairs.

1.3 *BBC MARMARA*

BBC Marmara was a multipurpose dry bulk cargo vessel reinforced for heavy cargoes and equipped to carry containers. It comprised two cargo holds and was fitted with two deck cranes.

The primary means of navigation on board *BBC Marmara* was a ChartWorld eGlobe G2 ECDIS, which ChartWorld had installed in line with the respective requirements of the International Electrotechnical Commission, the International Hydrographic Organization and SOLAS[10].

The primary ECDIS terminal was used for planning and monitoring and was located on the main bridge console directly in front of the starboard chair **(Figure 6)**. The back-up ECDIS terminal was in front of the port chair. A radar display was positioned next to each of the ECDIS terminals, but the two systems were not integrated.

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[10] The International Convention for the Safety of Life at Sea, 1974, as amended.

Figure 5: The extent of the hull damage
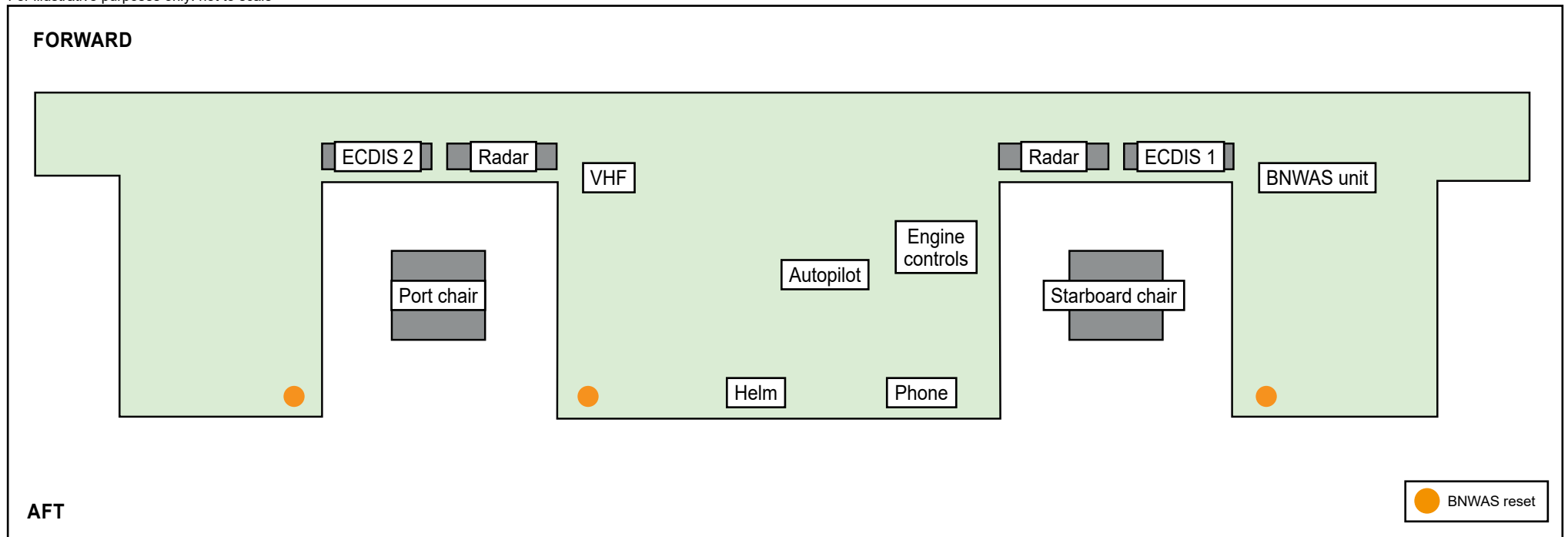
For illustrative purposes only: not to scale

Figure 6: *BBC Marmara*'s bridge layout and navigation equipment

BBC Marmara was fitted with an independent autopilot system that steered the vessel on a compass heading set by the officer of the watch (OOW). The vessel was also equipped with a Bridge Navigational Watch Alarm System (BNWAS), details of which are in section 1.5.4.

1.3.1 *BBC Marmara* crew

The crew of *BBC Marmara* comprised the master, chief officer (C/O), 2/O, bosun, AB, OS, chief engineer, junior engineer, wiper and cook. Two cadets were also on board. Eleven of the 12 crew were Russian or Ukrainian nationals[11], one was German. The minimum safe manning requirement for the vessel was eight and all qualified crew members held the requisite qualifications and certificates as required by the International Convention on the Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended (STCW). The navigating officers and master had all attended the required generic[12] and type-specific ECDIS training and familiarisation.

The master was a 42-year-old Russian national who had worked for Briese since 2005, starting as a cadet and progressing in line with Briese's standard crewing policy. This was his second trip as master, but his first on board *BBC Marmara*. He had joined the vessel 2 months before the accident.

The C/O was a 35-year-old Russian national who had worked for Briese in this rank since 2015. He had joined *BBC Marmara* 5 months before the accident.

The 2/O was a 37-year-old Ukrainian national who had worked for Briese since 2014, starting as an OOW. This was his first contract on board *BBC Marmara*, and he had joined the vessel 2 months before the accident. He was dealing with personal stress due to marital and financial issues.

The investigation noted that the crew operated within a flat management structure, with the master and C/O working at a similar level of authority. The master frequently deferred to the C/O, who was forceful in his interactions with both the master and crew. The crew had worked together on previous contracts and reported they were a sociable group and tolerant towards others.

1.4 MANAGEMENT

1.4.1 Vessel management

Briese Schiffahrts GmbH & Co. KG (Briese) was the ship management branch of the Briese Group shipping company based in Leer, Germany and co-located with the chartering, crew management and port logistics divisions of Briese. At the time of the accident, Briese owned and managed 129 cargo vessels, of which 36 were bulk dry cargo vessels such as *BBC Marmara*.

1.4.2 Safety management system

The Briese Document of Compliance, confirming that the company's safety management system (SMS) met the requirements of the International Safety Management Code (ISM Code), was issued by the Portuguese government on 15 July 2020 and was valid until 2 August 2025.

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[11] Approximately 75% of the crew serving on Briese vessels were Ukrainian or Russian nationals.

[12] Generic ECDIS training was based on IMO Model Course 1.27, which covered the minimum standards of competence for navigational officers specified in STCW Code Table A-II/I (Annex A).

Briese provided a generic fleetwide SMS in the form of an ISM Manual, which was available electronically and ships' crews could access it via their on board computers.

1.5 NAVIGATIONAL WATCHKEEPING PRACTICES AND RECORDS

1.5.1 Watch composition and lookout

The master, C/O and 2/O each performed two 4-hour bridge watches a day when *BBC Marmara* was at sea:

- 0800 to noon and 2000 to midnight (master);
- 0400 to 0800 and 1600 to 2000 (C/O); and
- midnight to 0400 and noon to 1600 (2/O)

The Briese SMS stated that: *During darkness, restricted visibility and upon request from the OOW, the lookout shall be mandatory.*

The SMS statement aligned with the requirements of the STCW Code section A-VIII/2.16 that the officer in charge of the navigational watch may be the sole lookout in daylight provided that certain conditions were met.

As well as performing the function of keeping a lookout for traffic and navigational hazards, the crew member performing the lookout role offers several benefits when integrated into the bridge team. The presence of a second member of the team can act as a barrier to inappropriate behaviours, such as falling asleep, and an alternative means to intervening or raising the alarm. Other barriers, often provided by technological solutions like BNWAS and ECDIS, can be disabled or silenced, but a second member of the bridge team helps eliminate the risks associated with the OOW becoming a single point of failure.

1.5.2 Records

In line with STCW and SMS requirements the ship's table of working arrangements **(Figure 7)** allocated a crew member to each watch as lookout. The OS had been scheduled as lookout during the midnight to 0400 and noon to 1600 watches at sea. The table of working arrangements had been updated with this information less than 2 months before the grounding and was signed and stamped by the master.

The hours of work and rest record[13] for the OS **(Figure 8)** indicated that he was on duty from midnight to 0400 every day in July, including the day of the grounding. The deck logbook also recorded the OS as being on lookout when the grounding happened **(Figure 9)**.

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[13] It was a requirement of the Maritime Labour Convention 2006, Regulation 2.3 that records of hours of rest were kept for all seafarers.

Figure 7: Table of working arrangements, showing the planned presence of a lookout on the bridge

Name of vessel: MV BBC MARMARA	IMO-Number: 9454228	Flag of ship: Portugal
Crewmember: ▮▮▮▮▮	Nationality: russian	Position/Rank: OS-1
Month July Year 2021		

Schedule

record in the blue cells: WORKING with "x", leave RESTTIME open

record in the blue cells: WORKING with "x", leave RESTTIME open

Weekday	Day	hours of rest	overtime hours	hours of work	Comments	Hours of rest in any 24-hour period	Hours of rest in any 7-day period	one Resttime block in 24 hrs (minimum 6 hrs)	enter "h" for Holiday
Thu	1.	12.5	3.5	11.5	At sea/ariiv antwerp	13	157	ok	
Fri	2.	14	2	10	At sea	11	146.5	ok	
Sat	3.	15	5	9	At sea	14	137.5	ok	
Sun	4.	15	9	9	At sea	15	128.5	ok	
Mon	5.	15	1	9	At sea	15	119.5	ok	
Tue	6.	15	1	9	At sea	15	110.5	ok	
Wed	7.	13	3	11	At sea/arriv Berlevaag	13.5	99.5	ok	
Thu	8.	16	0	8	Berlevaag/Sea/Batsfjord	13	99.5	ok	
Fri	9.	14.5	1.5	9.5	Batsfjord	15	103	ok	
Sat	10.	14.5	5.5	9.5	Batsfjord	14	103	ok	
Sun	11.	14.5	9.5	9.5	Batsfjord	12.5	102.5	ok	
Mon	12.	15	1	9	Batsfjord	14.5	102.5	ok	
Tue	13.	14.5	1.5	9.5	Batsfjrd / At sea	13.5	102	ok	
Wed	14.	14	2	10	At sea	12.5	100	ok	
Thu	15.	15	1	9	At sea	14	101	ok	
Fri	16.	15	1	9	At sea	15	101	ok	
Sat	17.	15	5	9	At sea	15	100.5	ok	
Sun	18.	15	9	9	At sea	15	102	ok	
Mon	19.	15	1	9	At sea	15	101.5	ok	
Tue	20.	13.5	2.5	10.5	At sea / arriv Foynes	13.5	102.5	ok	
Wed	21.	16	0	8	Foynes	13.5	102.5	ok	
Thu	22.	16	0	8	p. Foynes	16	104.5	ok	
Fri	23.	14	2	10	Foynes / at sea	14	104.5	ok	
Sat	24.	15	5	9	At sea	12	104.5	ok	
Sun	25.	10	14	14	At sea	10	99.5	ok	
Mon	26.	12	4	12	At sea	10	96.5	ok	
Tue	27.	12	4	12	At sea	12	92.5	ok	
Wed	28.	11	5	13	At sea / Scrabster	11	90	ok	
Thu	29.	12	4	12	Scrabster	11	86	ok	
Fri	30.	24		0		12.5	86.5	ok	
Sat	31.	24		0		24	96.5	ok	
	a total of	457	103	287					

Sun 25. X X X X X X X X

Figure 8: Record of the OS work and rest hours

Figure 9: Deck logbook entry, showing OS on lookout at the time of the accident

1.5.3 Applicable literature on work and rest hours

In November 2020, the World Maritime University (WMU) published a research paper[14] on the implementation of the work and rest hours regulatory framework. Its findings identified several issues, including:

> *an imbalance between the workload and the number of personnel available to complete the numerous and diverse range of tasks required in ship operation. This oftentimes leads to violations of work/rest hour requirements… [sic];*

> *… a "culture of adjustment" among seafarers; work hours are either underreported or work/rest hours are adjusted to facilitate compliance.*

And, that:

> *For seafarers, the sole objective of recording work/rest hours is to confirm compliance to avoid disruptions to vessel operations and not to confirm actual working time onboard. They seem unable to prioritise their allegiance: ship interests or regulations. They are trapped in cognitive dissonance[15], where deviance is normalised[16].*

1.5.4 Bridge Navigational Watch Alarm System

SOLAS regulation V/19.2.2.3 required the provision of a BNWAS, *which shall be in operation whenever the ship is underway at sea*, while SOLAS regulation V/18 required BNWAS to conform to the performance standards set out in MSC.128(75)[17].

In line with these performance standards, the purpose of BNWAS was to monitor bridge activity and detect any operator disability that could lead to marine accidents. This was achieved by a series of indications and alarms to alert first the OOW

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[14] World Maritime University (2020) – A culture of adjustment, evaluating the implementation of the current maritime regulatory framework on rest and work hours (EVREST). (Attributed authors: Baumler, R., De Klerk, Y., Manuel, M.E., and Carballo Piñeiro, L.).

[15] A feeling of mental discomfort because of a conflict between an individual's attitudes, beliefs or behaviours and the situation they find themselves in. For example, having to follow practices that contradict accepted rules.

[16] To become accustomed to something the more it happens and so treat it as normal or acceptable when in reality it is not.

[17] IMO Maritime Safety Committee (MSC) Resolution MSC.128(75), Performance Standards for a BNWAS.

and, if they did not respond, the master or another qualified OOW. The system was required to be switched on while the vessel was at sea, unless inhibited by the master.

The operational sequence of indications and alarms was:

4.1.2.1 Once operational, the alarm system should remain dormant for period of between 3 and 12 min.

4.1.2.2 At the end of this dormant period, the alarm system should initiate a visual indication on the bridge.

4.1.2.3 If not reset, the BNWAS should additionally sound a first stage audible alarm on the bridge 15 s after the visual indication is initiated.

4.1.2.4 If not reset, the BNWAS should additionally sound a second stage remote audible alarm in the back-up officer's and/or master's location 15 s after the first stage audible alarm is initiated.

4.1.2.5 If not reset, the BNWAS should additionally sound a third stage remote audible alarm at the locations of further crew members capable of taking corrective action 90 s after the second stage remote audible alarm is initiated. [sic]

The reset function on the system was designed to cancel the visual indication and audible alarms with a single operator action from the OOW on the bridge, initiating a further dormant period. The reset input was permitted to be generated either by push button reset devices *forming an integral part of the BNWAS* or *by external inputs from other equipment capable of registering the physical activity and mental alertness of the OOW*, typically by connection to the radar/ECDIS trackball or by infrared sensors.

The Briese SMS stated that use of the BNWAS was *mandatory at all times the vessel is underway*, which was reinforced with a company standing order issued in November 2000 **(Figure 10)** that was displayed on the aft bulkhead of *BBC Marmara*'s bridge. It was company policy for the master to decide whether the BNWAS system key was to be left on the bridge.

The BNWAS panel on board *BBC Marmara* was located on the starboard side on the main console and it was possible to reset the system either on the main panel or from three push buttons located next to the port and starboard navigators' chairs and next to the helm **(Figure 6)**. The BNWAS was found to be fully functional during post-grounding checks.

STANDING ORDER

USE OF DEAD MAN ALARM

Please be informed that the Dead Man Alarm always has to be switched on!

Neglect to this order will lead to a direct loss of employment.

(Circular Letter N 81, Nov. 24th, 2000)

Figure 10: Briese SMS BNWAS company standing order

1.6 MANAGEMENT ASSURANCE

1.6.1 Internal audits

ISM Code Part A, section 12.1 – Company Verification, Review and Evaluation required internal audits to be carried out at 12-month intervals. An audit is a process of systematic and independent verification, through the collection of objective evidence, to determine whether the SMS complies with the requirements of the ISM Code and whether the SMS is implemented effectively to achieve the Code's objectives.

Examples of objective evidence found on board may include:

- verification of certificates;
- interviews with officers and crew to verify their familiarisation with classification society and statutory requirements and rules;
- verification that procedures and instructions define the process to ensure compliance with mandatory international and national requirements; and
- results of port state inspections[18].

Briese conducted internal safety audits of its vessels at intervals not exceeding 12 months, in line with the ISM Code. *BBC Marmara*'s most recent internal audit, in October 2020, was undertaken remotely due to the COVID-19 pandemic. Briese used videoconference platforms for crew interviews, scanned copies of logbook entries and certificates, and photographs and film of various activities, such as fire drills and rescue boat engine tests, provided by the master.

The October 2020 audit followed the Briese internal audit checklist and recorded that the SMS was implemented correctly and that navigational processes had been reviewed. There were no documented nonconformities or observations.

1.6.2 Voyage data recorders

The IMO Resolution MSC.333(90), Performance Standards for Shipborne VDRs, required the capture of BNWAS stage alarms in VDRs installed from 2 December 2009 onwards. The VDR on board *BBC Marmara* was fitted at build but the exact date is unknown; the keel was laid in 2008 and the registered date of build was 2010. The BNWAS was not connected to the VDR.

Section 5.8.1 of the International Chamber of Shipping Bridge Procedures Guide (Sixth Edition) (BPG) stated, *VDRs also provide the company with information that can improve ship operation and management and offer the owner/operator a comprehensive record of events during a given period*.

1.7 DRUG AND ALCOHOL POLICY AND TESTING

The drug and alcohol policy contained within the Briese SMS instructed that any person responsible for performing watch duties must always be fit to do so. It also mandated that consumption of alcohol within 4 hours of starting a watch was prohibited and that those performing watchkeeping duties should have a *content of 0 per mill (0%)* if breathalysed at the beginning of their watch.

The policy provided guidance on the control of alcohol, including that it was prohibited to consume beverages with an alcohol content greater than 19% volume on board; any such alcohol bought as a gift was to be declared to the master, who would keep it until the seafarer went on leave. If a breach of policy was suspected

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[18] International Association of Classification Societies Rec. No 41, 1996 (revised 2019), Guidance for Auditors to the ISM Code.

the master was to perform a breath alcohol test and record the result in the logbook. There were no entries in either the deck or official ship's logbook to indicate that post-collision breath alcohol tests had been conducted.

Briese engaged an independent drug and alcohol testing company to carry out biannual tests across its organisation, whereby the drug and alcohol testing company would arrive unannounced at the Briese offices or to a vessel and undertake random testing. The fleet had recorded no positive drug and alcohol tests up to the grounding of *BBC Marmara*. The testing schedule had been paused during the COVID-19 pandemic.

1.8 ELECTRONIC NAVIGATION

1.8.1 Safety contours

On an ECDIS the safety contour was used to delineate between safe and unsafe navigation areas. The safety depth value was calculated based on the vessel's draught, squat[19], minimum acceptable under keel clearance and height of tide. ECDIS would automatically default to the next deeper depth contour if the calculated safety depth did not correspond to one of the preset contours on the electronic navigational chart (ENC) in use.

Based on the survey data available and the extreme topographical nature of the coastline, the United Kingdom Hydrographic Office set the 10m contour around Eilean Trodday at the boundary of the drying area displayed on the ENC **(Figure 11)**.
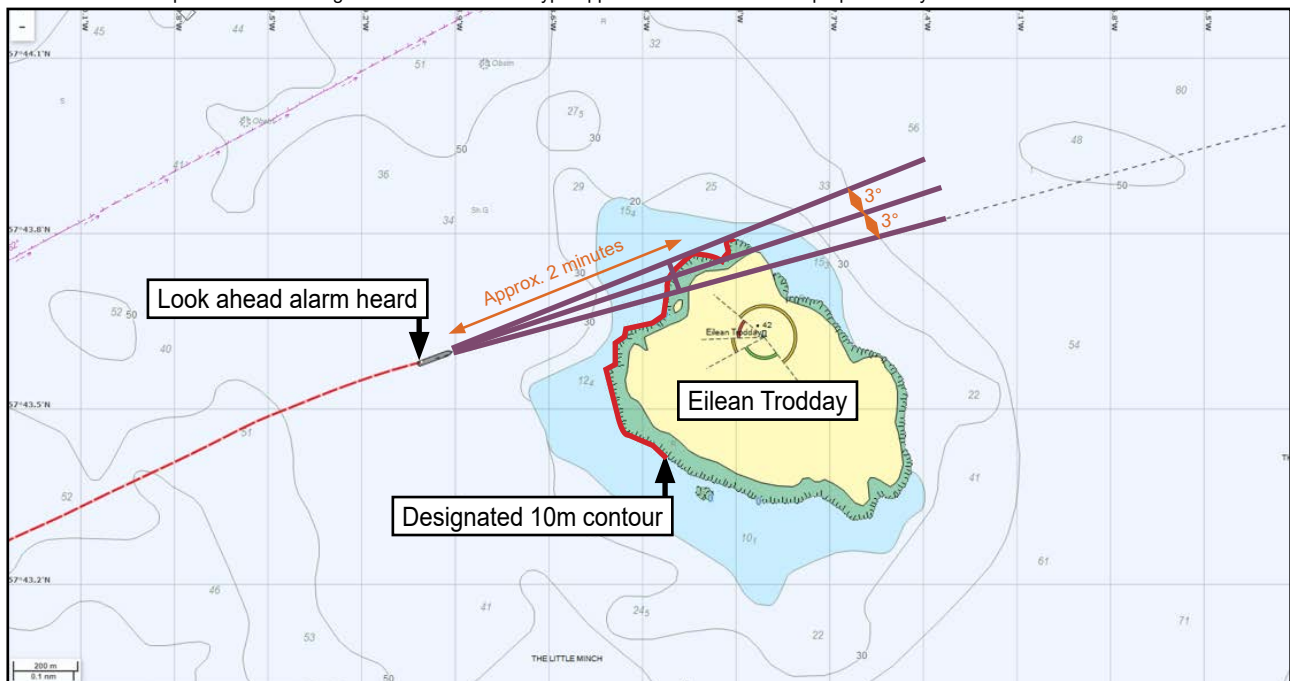
Figure 11: Location where the look ahead alarm was heard on the VDR and the 10m contour around Eilean Trodday

1.8.2 Look ahead

The ECDIS look ahead feature allowed the operator to set an alarm to warn of an impending grounding. The look ahead settings on the eGlobe G2 ECDIS were defined by minutes at the vessel's current speed (distance ahead) and number of degrees from right ahead to port and starboard (sector width).

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[19] Squat is a hydrodynamic phenomenon causing a ship on passage at speed through shallow water to be closer to the seabed than would otherwise be expected.

In line with the requirements of section 11.4.3 of the IMO Resolution MSC.232 (82), Performance Standards for ECDIS, a mandatory alarm should be sounded on the system *if, within a specified time set by the mariner, own ship will cross the safety contour.*

1.8.3 Cross track distances

The ECDIS XTD feature allowed the operator to define the maximum distance the vessel could deviate from the planned route before an alarm sounded. In line with the requirements of section 11.4.5 of MSC.232 (82) a mandatory alarm should be triggered when the vessel deviated from its XTD limits, which were calculated and set by the navigation officer when planning the voyage.

The ECDIS automatic route check function searched for navigational dangers, safety contour crossings, areas with special conditions, etc that existed within the XTD limits and displayed any findings to the system's operator.

1.8.4 *BBC Marmara* ECDIS Settings

Examination of the ECDIS on board *BBC Marmara* on 29 July 2021 established that the safety contour was set to 7.3m and the look ahead was active and set to 2 minutes (distance ahead) and 3° to port and starboard (sector width) **(Figure 12)**.

1.9 VOYAGE PLANNING

1.9.1 ChartWorld My Route Appraisal

Briese used the My Route Appraisal (MyRA) digital routeing service on board its bulk cargo vessels, including *BBC Marmara*, which provided the vessel and superintendent with a proposed ECDIS-ready voyage plan. The plan was based on route networks and databases held by ChartWorld, relevant ship models, ship-specific safety limits such as speed, under keel and vertical clearance, and rate of turn. The voyage plans contained maximum XTD values of 50m for berthing, 200m for confined waters and 2000m for coastal and open waters. These values would be reduced to the maximum safe water available, where necessary.

To create an ECDIS-ready voyage plan, the crew would send the departure port, deviation points and a destination port to ChartWorld. This information and ChartWorld data would then be used to calculate and provide a proposed voyage plan, which the master and crew would validate and update with any necessary changes. The reviewed voyage plan would be returned to ChartWorld for final approval and documentation checks, such as the need for additional ENCs to support the amended route. The approved voyage plan, including applicable ENC licences and relevant publications for the route, would then be supplied to the vessel via ChartWorld and uploaded to the ECDIS by its crew for passage monitoring.

1.9.2 Company requirements

The voyage planning section of the Briese SMS required that:

> *A detailed review of the passage plan route should always be carried out in conjunction with an automated route scan when using ECDIS.*

> *The voyage plan must be approved by the Master and signed by all navigational Officers (reference is made to IMO Res.A.893(21) Section 3.4)[20]. [sic]*

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[20] IMO Resolution A.893(21), Guidelines for Voyage Planning.
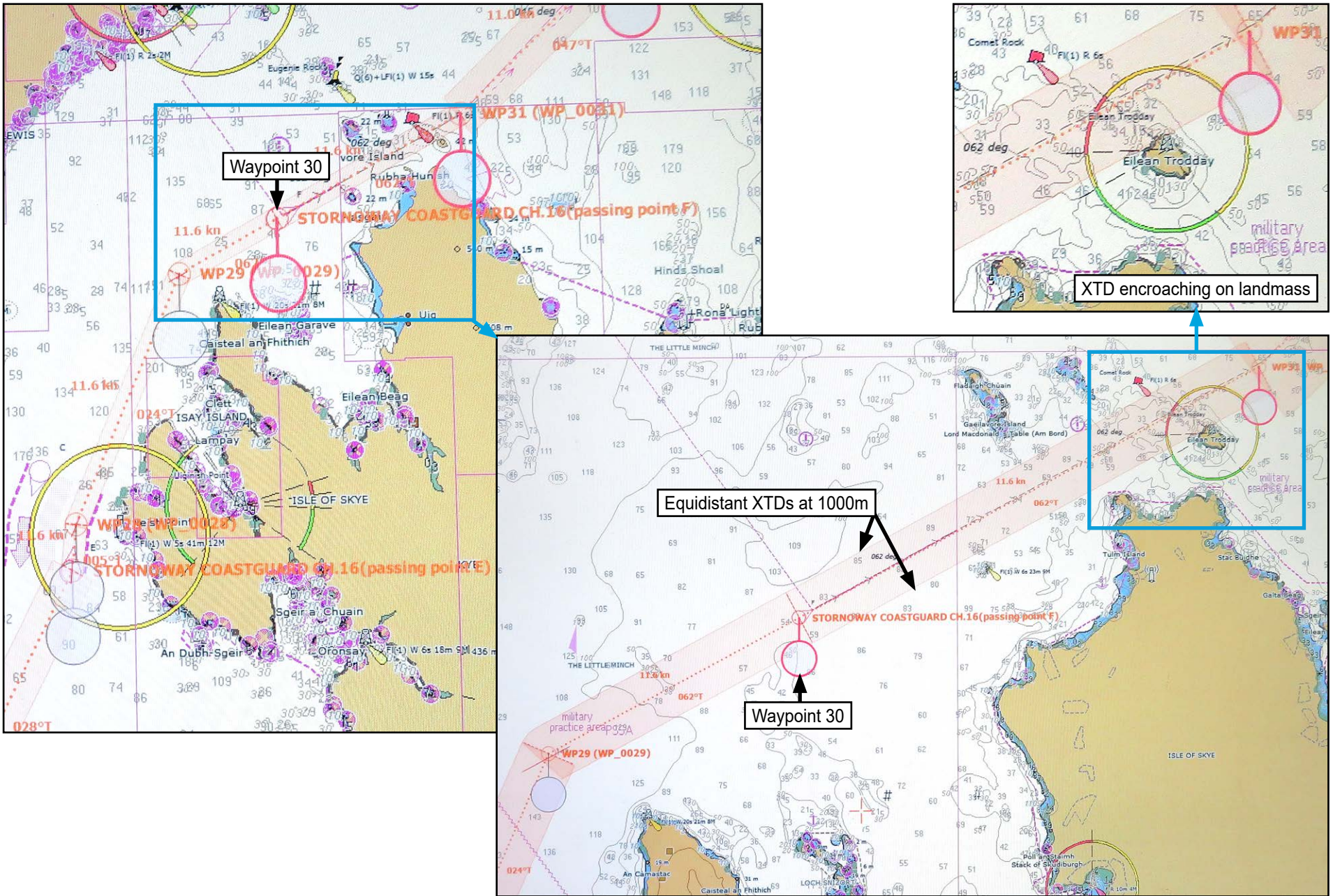
Figure 12: The voyage plan in use at the time of the grounding

1.9.3 Voyage plan in use

The 2/O, as *BBC Marmara*'s designated navigating officer, followed the ChartWorld process and accepted the original MyRA voyage plan without making any changes to the route. The approved final plan and supporting ENC licences were supplied to *BBC Marmara* on 22 July 2021, the day before the vessel's departure from Foynes.

The approved MyRA voyage plan and the one in use at the time of the grounding **(Figure 12)** are summarised in **Table 1** and show the courses and XTDs from waypoints 26, before the Off Neist Point TSS, along the northbound IMO recommended route to waypoint 32, beyond Eilean Trodday **(Figure 1)**.

Section 4.15.3 of the BPG stated that, *ECDIS is an effective tool for monitoring a passage as long as…The correct passage plan is loaded on both the primary and back-up ECDIS terminals.* [sic]

Waypoint		Course (°)		XTD (m)			
				MyRA		BBC Marmara	
From	To	MyRA	BBC Marmara	Port	Starboard	Port	Starboard
26	27	027	028	1045	1150	2000	2000
27	28	006	005	1000	1150	1000	1000
28	29	025	024	1005	1015	1000	1000
29	30	062	062	2000	2000	1000	1000
30	31	062	062	1405	710	1000	1000
31	32	044	047	2000	2000	2000	2000

Table 1: The MyRA and *BBC Marmara* courses and cross-track distances

1.10 HM COASTGUARD

1.10.1 National network and staffing levels

UK coastguard operations were managed by the Joint Rescue Coordination Centre (JRCC) in Fareham, England, and a national network of ten regional MRCCs. Each MRCC had responsibility for an area of coastline and adjoining sea area which was split into zones. These zones of responsibility were confirmed for each MRCC at the start of each period of duty. Zone flexing was a procedure that allowed responsibility for aspects of an area's operation to be passed between MRCCs to maintain even workloads across the network. When assigned an additional remote responsibility from the network, such as remote SMC, the MRCC could ask for that responsibility to be reassigned within the network if that station's resources could not perform the function satisfactorily.

The national network was overseen by a tactical commander during each 12-hour shift. The station commander at Belfast MRCC was tactical commander at the time of *BBC Marmara*'s grounding.

The minimum staffing levels for the national network were set annually and considered the minimum staff requirement for weekday, weekend and peak season day and night shifts based on historical activity. The minimum staffing level for the night of *BBC Marmara*'s grounding was 27 people and 37 staff were on duty across the network. Due to shortages of SMC qualified staff at Aberdeen MRCC, and in line with zone flexing, the tactical commander had instructed Stornoway MRCC to provide remote SMC support to Aberdeen MRCC.

1.10.2 Stornoway Coastguard Operations Centre

The number of staff originally planned for the night shift at Stornoway MRCC was five; however, illness and a personnel issue had reduced the team to three people. The suggested seasonal manning level for a peak season weekday night shift at Stornoway MRCC was three staff.

All three of the team at Stornoway MRCC had completed the required 5-day VTM course and were up-to-date with other relevant training. Both SMOO's were qualified SMCs, having completed the specialist training.

Stornoway MRCC was responsible for monitoring the deep-water route for laden tankers of over 10,000 gross tonnes to the west of the Hebrides, the Sound of Mull and the passage of vessels under the Skye bridge **(Figure 13)** in addition to the VTM Area I routeing schemes. Although it was the largest of the VTM areas to monitor, Stornoway MRCC had lower traffic and incident rates than other stations.

1.11 VESSEL ROUTEING AND MONITORING

1.11.1 Ship reporting systems

Ship reporting systems enhance the safety of life at sea, safe navigation and environmental protection by monitoring shipping traffic in designated areas of potential risk. Mandatory schemes were approved by the IMO and vessels were obliged to comply with the reporting requirement as set out in SOLAS Chapter V, Regulation 11. Coastal states were also permitted to promulgate voluntary reporting schemes that shared similar objectives, and vessels were strongly urged to participate.

VTM Area I **(Figure 14)** contained the Minches voluntary reporting scheme and included the Off Neist Point TSS and the IMO recommended routes for south and northbound vessels. The area was monitored by Stornoway MRCC as part of the UK national coastguard operations network.

1.11.2 Recommended routes

The Coastguard Information Portal (CIP) VTM guidance described a recommended route as *defined by the IMO, for the convenience of ships in transit through areas which are difficult to navigate. Areas with designated recommended routes may be difficult to navigate and most often are in the vicinity of hazardous areas; rocks, islands, converging traffic etc.*

It was the role of the VTM operator to maintain an overview of their allocated zones including the safe progression of vessels through a VTM area, especially where mandatory and recommended routeing systems existed. If the VTM operator was concerned about a vessel, or if it appeared to deviate from a recommended route, they were guided to create an incident in the ViSION log and contact the vessel.

The CIP VTM guidance further stated that:

> *While the use of IMO adopted routeing measures may be voluntary, they should be considered best practice and a vessel not following it or not following it correctly, should be contacted. If the IMO has seen it appropriate to adopt a routeing measure, it is the absolute entitlement of the shore authority to establish whether it is being followed; and if not, why not.*
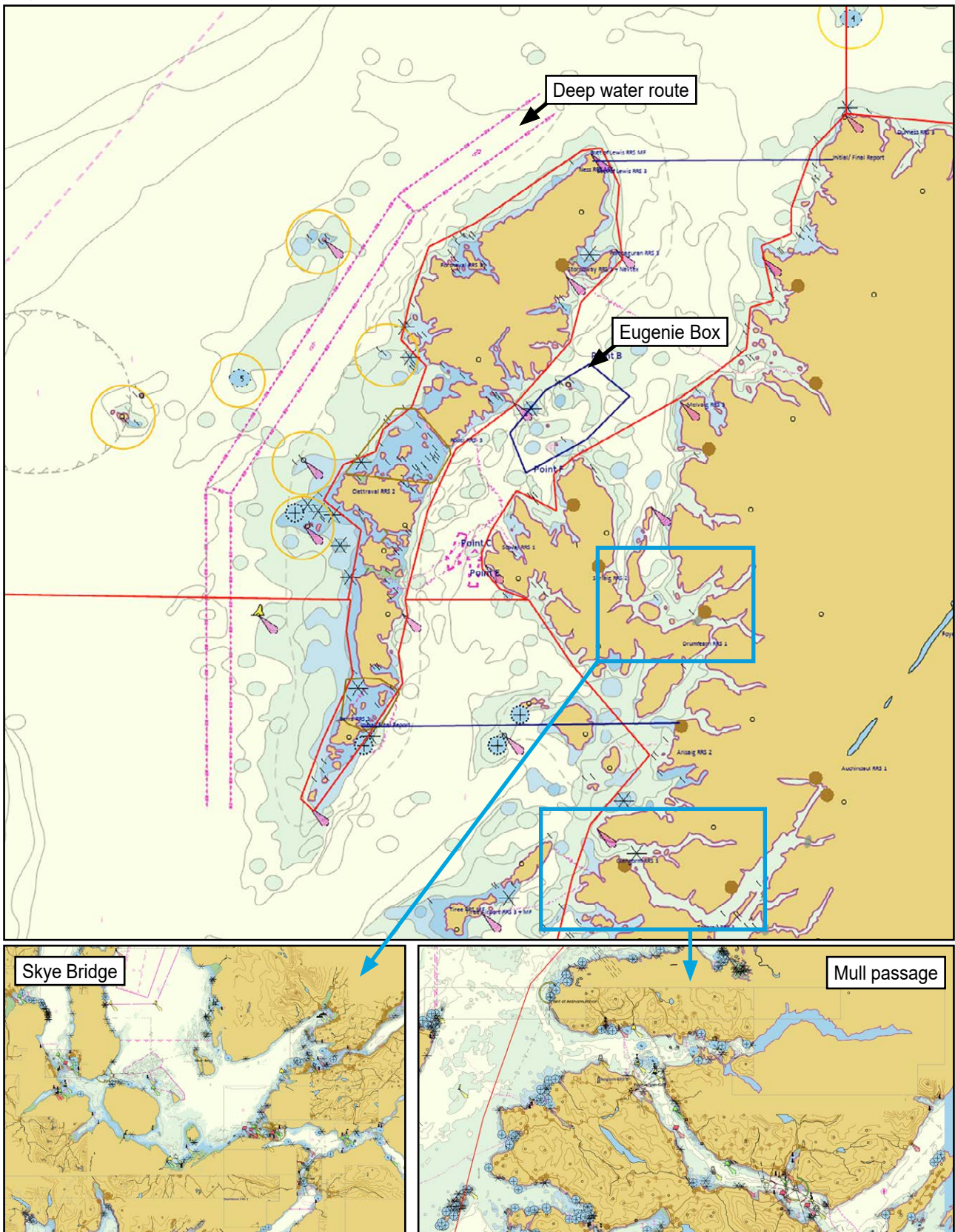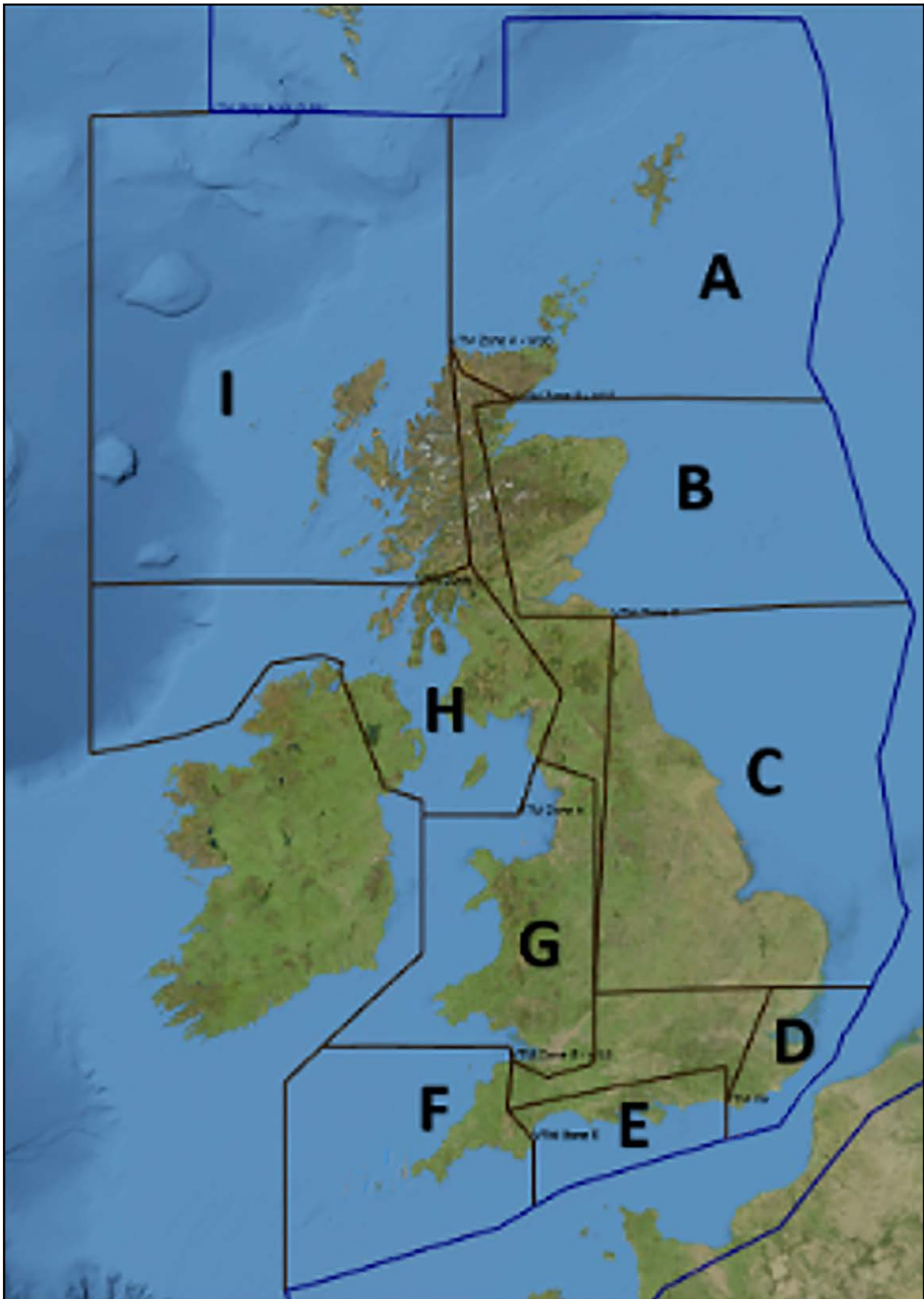
Figure 13: Stornoway MRCC VTM Area I

Figure 14: HM Coastguard VTM areas

1.11.3 Vessel traffic monitoring

Her Majesty's Coastguard (HMCG) had six functions[21], including VTM. According to the CIP VTM policy, the primary aim of VTM was *to enhance the safety and efficiency of maritime traffic by improving the response to incidents, accidents or potentially dangerous situations at sea (including search and rescue and maritime security) and contributing to better prevention and detection of pollution by ships.* [sic]

The duties and responsibilities of the VTM operator included, among others:

- *Keep a good overview as to what is going on in your VTM zones at all time*

- *Logging alerts, acknowledgements and actions taken within the radio log under 'VTM'*

- *Ensure all alerts are handled in a timely manner*

- *Ensure that any voluntary or mandatory reports are taken from all vessels within reporting areas*

- *Report any suspicious activity as soon as possible*

- *Remain inquisitive, when necessary, ensure a VTM ViSION incident is created. Report anything unusual to Staff Officer VTM* [sic]

The SMOO was responsible for ensuring that: at least one terminal was logged into C-Scope; alerts were monitored by a VTM operator; and a *full and proper* handover took place between operators when the watch changed (every 2 to 3 hours).

1.12   VIGILANCE TASKS

Staying alert during vigilance tasks such as traffic monitoring required effective support and an understanding of the human ability to sustain attention. The longer an operator needs to perform a vigilance task, the greater the likelihood that lapses will occur. Vigilance can decrease in as little as 5 minutes and is very likely after 20 minutes[22]. It is managed by a suitable rest/work pattern that should consider the influence on performance of night working.

1.13   SIMILAR INCIDENTS

1.13.1 *Priscilla* – grounding

At 0443 on 18 July 2018, the Netherlands registered general cargo vessel *Priscilla* ran aground on Pentland Skerries in the Pentland Firth, Scotland. The vessel was refloated after a partial removal of cargo. The grounding caused significant hull damage but there was no pollution or injury.

The investigation identified that the vessel was set to the south of its planned track, but this was not observed by the OOW as he was distracted and possibly asleep for a period of about 2 hours (MAIB report 12/2019[23]). No navigational alarms had been set and, although the accident happened at night, no additional lookout had

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[21] The six functions of HMCG were search and rescue, promulgation of maritime safety information, maritime security, VTM, pollution response and accident and disaster response.

[22] Lee, J., Wickens, C., Liu, Y., & Boyle, L. (2017). *Designing for People: An Introduction to Human Factors Engineering*.

[23] https://www.gov.uk/maib-reports/grounding-of-general-cargo-vessel-priscilla

been posted. The BNWAS was also switched off. *Priscilla*'s OOW responded to two verbal warnings from shore authorities of danger ahead but took insufficient action to prevent grounding.

It was also identified that the duty officers at Shetland MRCC were unaware of the presence of *Priscilla* and the risk of grounding until prompted by the vessel traffic services officer at Kirkwall, Orkney. A contributory factor was that coastguard officers were not monitoring their C-Scope equipment. The subsequent VHF radio message issued by Shetland MRCC did not follow coastguard procedures.

A recommendation was made to *Priscilla*'s owner to improve watchkeeping standards. The MCA implemented several steps to improve the standard of VTM in the Pentland Firth, including: a detailed review of the accident, bespoke training at Shetland MRCC; reissuing the VTM policy; local training initiatives; VTM training needs analysis across the network; and modifications to the VTM training course.

1.13.2 *Kaami* – grounding

On 23 March 2020, the Bahamas registered general cargo vessel *Kaami* ran aground on the Sgeir Graidach shoal in the Minches, having deviated from the northbound IMO recommended route (MAIB report 7/2021[24]).

The MAIB investigation identified that:

- Neither a review of the voyage plan nor an automated route check was carried out and several errors, including two locations where *Kaami* would have run aground, were missed.

- The watchkeepers at Stornoway MRCC did not intervene as they were unaware of the developing situation.

Recommendations were made to the vessel's managers to improve the guidance given in its SMS on the effective use of ECDIS and bridge lookouts, and to enhance its ability to conduct navigational audits.

The MCA completed a detailed incident review and took several actions, including: a nationwide review of C-Scope; the implementation of additional alert zones (such as the Eugenie Box); extending the VTM course from 2 days to 5 days; and conducting operator behaviour training at Stornoway MRCC.

1.13.3 *Emma Janneke* – navigational near miss

In the hours before midnight on 24 March 2022, the Gibraltar registered and Briese managed general cargo vessel *Emma Janneke* unintentionally left a TSS in the Dover Strait when the master fell asleep while on watch, thereby allowing it to cross the South Falls bank and pass within three cables of the South Goodwin lightship. It was estimated that the master was asleep for a minimum of 1.5 hours before the third officer arrived on the bridge for the watch handover.

The MAIB conducted a preliminary assessment of the incident at the vessel's next port and identified that:

- Lookouts were not used on board as the maintenance of the vessel was prioritised and there was no lookout on the bridge at the time of the accident.

- Although fully operational, the BNWAS was inactive at the time of the accident.

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[24] https://www.gov.uk/maib-reports/grounding-of-general-cargo-vessel-kaami

- The BNWAS was set up in such a way that it was highly unlikely the third stage alarm would have woken another crew member, even if it had been switched on.

- The watchkeeper at HMCG Dover Vessel Traffic Services identified *Emma Janneke* leaving the TSS and made several attempts to contact the vessel. Although not specifically designed to wake a sleeping watchkeeper, neither the VHF radio transmissions nor digital selective calling alerts were successful in waking the master.

Following this incident Briese took action to verify the BNWAS set up on all its vessels. Briese also carried out a review of its SMS requirements for BNWAS and the use of a lookout. Full details of these actions are in Section 4 of this report.

SECTION 2 – ANALYSIS

2.1 AIM AND SCOPE

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

The scope of this analysis focused on the factors leading to the 2/O falling asleep and why he remained asleep until the vessel grounded.

2.2 OVERVIEW

BBC Marmara ran aground on Eilean Trodday because the vessel diverged from the planned track, which followed the recommended route safely to the north of the island. The vessel diverged from its planned track because the 2/O, who was OOW at the time, fell asleep and the barriers preventing him from staying asleep had been removed or disabled. This section of the report analyses the circumstances that led to the 2/O falling asleep and the effectiveness of the SMS in controlling onboard procedures, namely the consumption of alcohol, presence of a lookout, use of the BNWAS and voyage planning, and the management assurance of these practices. The lack of intervention from Stornoway MRCC is also assessed.

2.3 MANAGEMENT OF ONBOARD SAFETY PROCEDURES

2.3.1 Alcohol

It is unknown how much alcohol the 2/O consumed before going on watch; however, even before drinking the beer given to him on the bridge, he would likely have been significantly influenced by the effects of the alcohol he consumed during the 3 hours in the AB's cabin. The consumption of alcohol would have increased the 2/O's proneness to sleep during a period of circadian low[25].

At 35% the alcohol content of Jägermeister significantly exceeded the 19% permitted in the Briese SMS, which prohibited on board consumption of beverages with a higher content and required any purchased as a gift to be handed to the master for secure storage until signing off the vessel. The consumption of a prohibited alcoholic beverage before starting watch shows that the level of control expected by the company was absent on board *BBC Marmara*. *BBC Marmara*'s senior officers tolerated alcohol abuse and the 2/O's further consumption of beer while on watch, courtesy of the master, was indicative of the lack of responsibility at every level of management on board the vessel. The master was ultimately accountable for the enforcement of the alcohol policy, which was not followed as a direct result of his actions and inadequate leadership.

2.3.2 Lookout

The Briese SMS required a lookout to be on the bridge during darkness, when this accident occurred, and in restricted visibility or when requested. However, none was present. The watch schedule indicated that the use of a lookout had been expected and planned for and the hours of work and rest entries and deck logbook records indicated that a lookout was present. However, the 2/O was alone on the bridge from 0050 onwards.

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[25] Independent of other factors, fatigue is most likely and, when present, most severe, in the early hours of the morning, coinciding with the strongest drive for sleep. This period typically occurs between the hours of 3 and 5am and is commonly referred to as the window of circadian low (International Maritime Organization Maritime Safety Committee Circ. 1598 Section 20.27, Page 9). Further information can be found at https://www.sleepfoundation.org/circadian-rhythm

It had become accepted practice on board to falsify documentation to satisfy the requirements of port state, flag state and internal audits and inspections. This was partly due to the crew being unable to both meet operational obligations, such as maintenance and fulfil the lookout role, which was a finding in the *Emma Janneke* near miss (see section 1.13.3) and highlighted by the November 2020 WMU research paper (see section 1.5.3).

BBC Marmara was crewed to more than the requisite minimum manning level. However, there was a belief on board that resources remained insufficient to achieve an acceptable level of maintenance and provide a mandatory lookout on the bridge when required. With the BNWAS disabled and an inappropriate XTD limit on the ECDIS, the absence of the lookout removed any remaining chance of intervention when the 2/O fell asleep and the vessel converged on Eilean Trodday.

2.3.3 Bridge Navigational Watch Alarm System

The purpose of BNWAS was to monitor bridge activity and detect any operator disability that could lead to marine accidents. The Briese SMS clearly instructed that, in line with SOLAS V/19.2.2.3, the BNWAS was to be switched on while the vessel was at sea. However, it was usual practice to leave it disabled on board *BBC Marmara*. The watchkeepers and master considered the need to reset the BNWAS an inconvenience and the master's decision to leave the system key on the bridge created an opportunity to deactivate it and remove the perceived nuisance.

The issue of company oversight is discussed in section 2.2.3, but the IMO performance standards for a BNWAS did allow for the reset function of the alarm to be triggered by other equipment on the bridge, such as the roller ball/mouse of the ECDIS or radar or sensors that registered physical activity on the bridge.

Technological options, such as movement sensors, to mitigate the nuisance element of having to reset the BNWAS also existed, removing the temptation of keeping the system key on the bridge to disable the system while at sea.

Had the BNWAS been active, the alarm should have roused the 2/O after the specified dormant period had expired and the system not been reset. Even if it had not, the second stage alarm would have alerted the master to the 2/O's incapacitation and the grounding might have been averted.

2.4 ELECTRONIC NAVIGATION AND VOYAGE PLANNING

The Chartworld MyRA service provided *BBC Marmara*'s voyage plan between Foynes and Scrabster, which was accepted by the 2/O without changes. However, the voyage plan uploaded into the ECDIS at the time of the grounding showed three key differences when analysed alongside the ECDIS alarms heard on the VDR:

- The XTD alarm sounded when *BBC Marmara* was just over 1000m from the planned track to port, after missing the alternation of course to 062° at waypoint 29. The MyRA voyage plan showed an XTD of 2000m for this leg **(Figure 2)**.

- No XTD alarm was heard as the vessel passed more than 710m to starboard of the planned track, which was the XTD value set in the MyRA voyage plan between waypoints 30 and 31 **(Figure 3)**.

- No XTD alarm was heard before *BBC Marmara* ran aground. This is consistent with the 1000m XTD value set in the ship's voyage plan, which encroached onto the land mass of Eilean Trodday **(Figure 12)**.

Furthermore:

- The alarm heard before grounding was the look ahead alarm sounding at a position where the vessel was 2 minutes (distance ahead) from the designated 10m contour adjacent to the drying height of Eilean Trodday **(Figure 11)**.

It was evident from the identified XTD and planned course differences **(Table 1)** that the passage plan in use on board *BBC Marmara* at the time of the grounding was not the passage plan supplied by the Chartworld MyRA service.

The 1000m starboard XTD value selected on the leg between waypoints 30 and 31 crossed the land mass of Eilean Trodday, making it highly unlikely that either a detailed review of the voyage plan had been performed or an automated route scan had been completed. It is likely that multiple versions of the Foynes to Scrabster route existed in *BBC Marmara*'s ECDIS and before leaving port the wrong passage plan was unintentionally uploaded to the ECDIS. It is unknown why this happened but, in doing so, a voyage plan was used that was constructed with inappropriate XTD values at a critical point in the voyage and without the necessary checks and reviews.

XTD limits and the associated alarms are designed to alert a conscious watchkeeper, not wake a sleeping one. However, there was a chance that, had the Chartworld MyRA passage plan been uploaded, the XTD alarm sounding could have woken the 2/O, as it had after the missed course alteration at waypoint 29.

2.5 MANAGEMENT ASSURANCE

Management oversight of *BBC Marmara* was primarily achieved through internal audits and inspections, with feedback from the master and crew on an ad hoc basis, and findings identified in flag and port state inspections and survey reports. Internal audits and inspections were usually conducted on board, in line with the company's internal audit checklist, but had been substituted with remote audits during the COVID pandemic.

The October 2020 audit undertaken before this accident was completed remotely and the objective evidence needed to verify compliance was provided by crew interviews, scans of certificates and logbooks and videos of various shipboard tasks. Regardless of the remote nature of the audit it is unlikely that the navigational issues present in this accident would have been identified even if the superintendent had been on board, as:

- The BNWAS status was not recorded by the VDR, and the vessel was rarely at sea during an audit, so verification was only gained through interview.

- The use of a lookout was falsified across the documents usually reviewed in audits to show that lookouts were being used. This practice was in line with the findings of the WMU research paper (see section 1.5.3).

While internal audits are useful for providing a snapshot of the vessel's compliance with the ISM Code at the time of audit, they do not offer the opportunity to verify many shipboard practices usually conducted at sea and so a shipping company will struggle to gain assurance that its SMS risk control measures are being effectively implemented. Targeted learning via periodic VDR audits can demonstrate how navigational practices such as presence of a lookout, BNWAS status and monitoring of assured voyage plans are routinely conducted on board.

Verifying the control of alcohol on board was not easily achievable. The Briese drug and alcohol policy permitted random bag checks for boarding crew members but there was no provision for cabin checks, either random or because of suspicion.

2.6 COASTGUARD INTERVENTION

2.6.1 Previous actions taken on vessel traffic monitoring

The grounding of *BBC Marmara* was the third grounding of a general cargo vessel within a UK coastguard monitored area in a 3-year period. In response to the previous groundings (see sections 1.13.1 and 1.13.2) the MCA undertook several actions to improve the performance of VTM, both locally and across the national network. As a result of the actions taken the MAIB made no recommendations to the MCA.

Improvements in C-Scope use, VTM course content and length, immediate local training and policy changes were all immediately achievable, but the effect of those changes, especially in context of the wider national network, will take time.

Although these changes all had, and have, their place in the improvement of VTM performance none of them deal with the ability of the MRCC personnel to carry out the task of VTM with respect to cognitive performance, sustained vigilance and the effect the task had on the teams.

2.6.2 Attention management

Of the six HMCG functions, VTM was the only one that required the operator to be proactive. The expectation of the VTM role was that the watchkeeper performed an uninterrupted task with a high level of attention and vigilance, sometimes over a period of up to 3 hours or more, although 20 to 40 minutes was ideal. The VTM watchkeeper at Stornoway MRCC covered the largest maritime region in the national network and areas such as the IMO recommended routes in the Minches demanded their close attention. However, the volume of traffic was light compared to other MRCCs and the expectation of the Stornoway team was that merchant vessels followed the recommended route and needed little or no supervision. This led to low levels of stimulation and periods of low mental workload in comparison with the SAR activity at Aberdeen MRCC.

On seeing that *BBC Marmara* had triggered the Eugenie Box alert, part of the CIP guidance was to create an incident in the ViSION log and contact the vessel. This did not happen, despite the SMOO having both seen and acknowledged the alarm, nor did the SMOO intervene when the vessel passed reporting point Foxtrot without calling in. The SMOO was fully focused on helping the SMC with the SAR incident in Aberdeen at the time and was therefore distracted from taking steps to intervene in line with the expectations of the VTM role.

The role of SMC, including if being conducted remotely, was one of oversight and guidance rather than direct involvement, with the incident being managed from the local MRCC. Although attempting to help a team member, the intervention of the SMOO in the incident in Aberdeen was unnecessary and distracted them from the VTM role. The team were unaware of the hazards of distraction to vigilance monitoring tasks such as VTM, as there was no training or guidance provided within CIP, and so none of the team fully understood the developing situation until it was too late.

2.6.3 Staffing levels

A team of five officers had been scheduled for duty at Stornoway MRCC when *BBC Marmara* grounded. Various circumstances had reduced this to three, which was the suggested seasonal manning level at the time. It was a regular occurrence for Stornoway MRCC to be assigned the role of remote SMC for another MRCC; and while this was considered acceptable within the station staffing target and how that affected the ability of the national network to perform all its functions, it did not consider how this would impact the VTM role in terms of operator vigilance and the reduction in team resource. While zone flexing enabled MRCCs to pass certain functions to another station, they could also ask to have any remote duties already being performed taken back and redistributed elsewhere in the network.

Measures were not in place to prevent the team at Stornoway MRCC experiencing interference between the VTM and remote SMC tasks and becoming distracted from their duties. Further, the expected performance levels for VTM operators demonstrated a lack of understanding around effective management of their attentional capacities and mitigating distraction. The team were operating at a minimum staffing level, which increased the likelihood of something being missed.

SECTION 3 – CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. *BBC Marmara* ran aground because the vessel diverged from the planned track. This happened because the OOW fell asleep and remained asleep and each of the required safeguards in place to prevent this happening, including BNWAS, the presence of a lookout and intervention of the coastguard, had either been removed or were ineffective. [2.2]

2. Abuse of alcohol was tolerated by senior officers and the events leading up to the grounding were indicative of a lack of responsibility at every level of management on board. The master was ultimately accountable for the enforcement of the alcohol policy, which was not followed as a direct result of his actions and inadequate leadership. [2.3.1]

3. The master and crew believed that manning was insufficient to achieve an acceptable level of maintenance and provide a mandatory lookout when required. With other safeguards removed, the absence of the lookout removed any remaining chance of an intervention when the 2/O fell asleep. [2.3.2]

4. Records and documentation were systematically falsified on board *BBC Marmara* to satisfy audit and inspection requirements and avoid sanction or delay. [2.3.2]

5. Had the BNWAS been active, the alarm should have roused the 2/O after the specified dormant period had expired and the system not been reset. Even if it had not, the second stage alarm could have alerted the master to the 2/O's incapacitation and the grounding might have been averted. [2.3.3]

6. Although a successful tool when effectively integrated into bridge systems the BNWAS on *BBC Marmara* was perceived as an inconvenient distraction; it was usual practice to switch it off if the system key was left on the bridge, thereby disabling a key safety barrier that could have averted the grounding. [2.3.3]

7. The perceived nuisance of a BNWAS alarm could have been resolved with the automation of the reset function, by integration into the bridge systems or with infrared sensors. This would have removed the need for the system key to remain on the bridge while the vessel was at sea. [2.3.3]

3.2 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The voyage plan in use at the time of the grounding was not the valid voyage plan supplied by the ChartWorld MyRA service. The voyage plan selected contained XTD values that were inappropriate to maintain vessel safety. It was highly unlikely it had been subject to a detailed review and automated checks as required by the company SMS. [2.4]

2. The management oversight tools that Briese had in place did not provide the company with sufficient information to validate that its SMS risk control measures were being effectively implemented. [2.5]

3. *BBC Marmara* was not challenged by Stornoway MRCC because the VTM operator had become distracted by another task. The team had not received training in, and there was no process in place to manage, the hazard of distraction interfering with a vigilance and monitoring task and successfully maintain the effectiveness of the VTM role. [2.6.2]

4. Although the staffing level at Stornoway MRCC was at the suggested seasonal manning level, it did not account for the impact on the required performance of the VTM operator alongside other functions of the coastguard. The team experienced interference between the VTM and SAR tasks while operating at its minimum staffing level, increasing the likelihood that something would be missed. [2.6.3]

SECTION 4 – ACTIONS TAKEN

4.1 MAIB ACTIONS

The **MAIB** has published a safety flyer to the shipping industry **(Annex A)**, highlighting common themes found in several recent accidents where navigational safeguards such as a lookout in hours of darkness and BNWAS had been disabled or removed. This safety flyer has been sent to the International Chamber of Shipping and UK Chamber of Shipping for promulgation to their members.

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

The **Maritime and Coastguard Agency** has:

- Conducted a review of its CIP information and guidance relating to recommended routes and voluntary ship reports in the Minches. VTM operators are now required to ask vessels entering the area whether they intend to follow the recommended routes and are then informed of the next reporting point. The intention is to provide VTM watchkeepers with an appreciation of the intended route of the vessel so that abnormal behaviour can be identified and challenged early.

- Reviewed all reporting points in the Minches and tested C-Scope alerts for viability.

- Delivered on-station briefings to all teams at Stornoway MRCC, including a presentation and distribution of an associated information pack on the vessel routeing and reporting schemes in the Minches.

- Carried out an optimisation of the screen set up at Stornoway MRCC, including all operational systems.

- Conducted a Tier 3 review and arbitration panel. The committee found that, while the team at Stornoway MRCC should have been able to conduct SAR and VTM operations with the resourcing levels available, the issues experienced could be replicated in other MRCC.

Briese Schiffahrts GmbH & Co. KG has:

- Amended its SMS to include a requirement that lookouts countersign the deck logbook after completing their watch.

- Started work with the Standard P&I Club to create training for the role of lookout and increase awareness of the benefits of the role within its fleet.

- Amended its SMS to include a requirement that the master must remove the BNWAS system key from the bridge or keep the password protected.

- Changed the specification of BNWAS on newbuild projects to include the requirement that it is connected to either the integrated bridge system or infrared sensors. Resource has been allocated retrospectively where this has not been possible during the construction stage.

- Implemented a program of retrofitting the above measures on existing ships in its fleet.

- Conducted a fleetwide investigation into BNWAS alarm stages and carried out reconfiguration where necessary in light of the deficiencies identified in the *Emma Janneke* near miss.

- Amended its SMS so that masters are required to breathalyse all crew involved in an incident.

- Restarted the independent alcohol and drug testing program that was suspended during the COVID-19 pandemic.

- Created a mental health risk assessment that has identified the need for a mental health support system.

SECTION 5 – RECOMMENDATIONS

The **Maritime and Coastguard Agency** is recommended to:

2023/112   Ensure that the hazards of distraction to vigilance-based roles such as VTM and the management of vigilance related hazards are captured in appropriate training packages, practices, and the Coastguard Information Portal pages.

2023/113   Carry out a study into the cognitive performance needed by coastguard teams to successfully maintain the VTM function throughout the national network and implement the findings of the study when considering the future management of the network.

Briese Schiffahrts GmbH & Co. KG is recommended to:

2023/114   Determine and implement the crew resource needed to avoid a conflict between safe navigation and operational tasks such as maintenance. This should include a link to safety management requirements to ensure STCW guidance is followed, and a lookout is on the bridge during hours of darkness and in restricted visibility.

2023/115   Review and implement the management assurance tools necessary to provide accurate feedback on the effectiveness of its SMS navigation practices, including, but not limited to, the presence of a lookout during hours of darkness or in restricted visibility, the use of the BNWAS while at sea and standards of passage monitoring.

Safety recommendations shall in no case create a presumption of blame or liability

MAIB safety flyer to the shipping industry
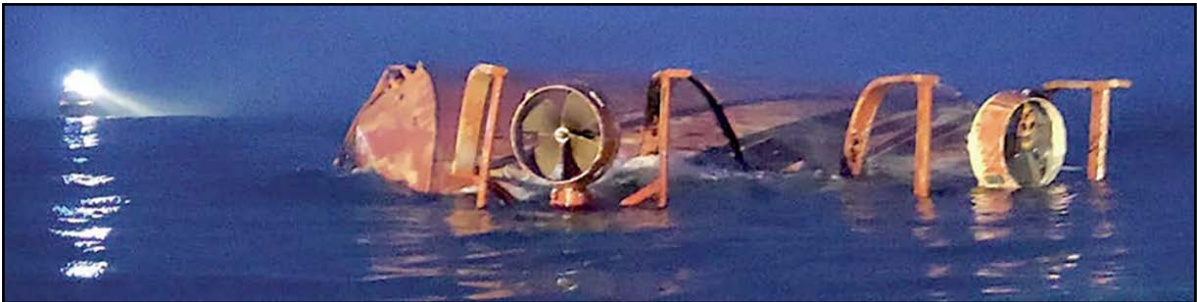
SAFETY FLYER TO THE SHIPPING INDUSTRY

Circumvention of navigational safeguards

Beaumont

Seagate and *Timor Stream*

Scot Carrier and *Karin Høj*

Narrative

This safety flyer highlights the continuing trends found in accidents investigated by the MAIB, where the officer of the watch (OOW) had been the sole watchkeeper during hours of darkness or in restricted visibility and/or the Bridge Navigational Watch Alarm System (BNWAS) had been disabled.

In June 2009, the BNWAS was first mandated with the aim of monitoring bridge activity and detecting any operator disability that could lead to marine accidents. The MAIB has since completed 81 investigations of collisions, groundings and contacts, of which 20 involved sole watchkeepers at night or in restricted visibility and/or the BNWAS being disabled. These cases shared similar contributory factors, including:

Lookout

- Prioritisation of day-to-day maintenance over provision of a dedicated lookout during hours of darkness;

- Minimum, or near minimum, crewing levels that did not cater for the full range of shipboard activities;

- Underappreciation and misunderstanding of the benefits of a lookout integrated into the bridge team; and

- Falsification of documentation, such as the deck logbook, records of hours of rest and watchkeeping schedules, to avoid company and port state sanctions.

BNWAS

- Perception of the system as an unnecessary nuisance instead of an important safety barrier;

- Continued use of retrofitted, standalone systems that required an operator action to reset them rather than an integrated reset function triggered by bridge equipment or movement sensors;

- Keeping the system key or code on the bridge, providing an opportunity for disablement; and

- Status of the BNWAS not recorded on the voyage data recorder (VDR), removing the opportunity to review BNWAS use during inspection and audit.

Other factors such as alcohol consumption, fatigue and use of ECDIS[1] were also identified; however, it is a cause for concern that these safety barriers were often circumvented despite the international requirements to post a dedicated lookout during the hours of darkness and to operate a BNWAS.

Ship owners and managers are urged to carry out detailed and accurate reviews of the use of a lookout and BNWAS on board their vessels and make provisions to support crew to comply with the mandatory requirements contained in the regulations.

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[1] Electronic Chart Display and Information System. In September 2021, the MAIB and Danish Maritime Accident Investigation Board published *Application and usability of ECIDS*, a collaborative study on ECDIS use from the perspective of practitioners: https://www.gov.uk/government/publications/application-and-usability-of-ecdis-safety-study

This flyer is posted on our website: www.gov.uk/maib

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