

Report on the investigation of the  
grounding of the roll-on/roll-off passenger ferry

***Alfred***

at Swona Island, Pentland Firth, Scotland

on 5 July 2022



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## GLOSSARY OF ABBREVIATIONS AND ACRONYMS

°	- degrees
ALB	- all-weather lifeboat
BNWAS	- Bridge Navigational Watch Alarm System
C/E	- chief engineer
C/O	- chief officer
CCTV	- closed-circuit television
Circ	- circular
CLIA	- Cruise Lines International Association
CoC	- certificate of competency
CSM	- Cargo Securing Manual
DOC	- Document of Compliance
DPA	- Designated Person Ashore
ECDIS	- Electronic Chart Display and Information System
ECPM	- Emergency Contingency Procedures Manual
ENC	- electronic navigational chart
ERT	- emergency response team
FPM	- Fleet Procedures Manual
GT	- gross tonnes
ICS	- International Chamber of Shipping
IMO	- International Maritime Organization
ISM	- International Safety Management Code
kts	- knots
m	- metre

MCA	- Maritime and Coastguard Agency
MGN	- Marine Guidance Note
MRCC	- Maritime Rescue Coordination Centre
MSC	- Maritime Safety Committee
nm	- nautical mile
OOW	- officer of the watch
PEC	- Pilotage Exemption Certificate
ro-ro	- roll-on/roll-off
SMCP	- IMO Standard Marine Communication Phrases
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)
t	- tonnes
UTC	- universal time coordinated
VDR	- voyage data recorder
VTS	- vessel traffic services
XTD	- cross-track distance

**TIMES:** all times used in this report are UTC +1 unless otherwise stated.

Image courtesy of the [RNLI](#)



*Alfred*

## SYNOPSIS

At 1400 on 5 July 2022, the UK registered roll-on roll-off passenger ferry *Alfred* grounded on the east coast of Swona Island, Pentland Firth, Scotland while on passage from Gills Bay, mainland Scotland, to St Margaret's Hope, South Ronaldsay, Scotland. The impact caused injuries to 41 passengers and crew, and damage to *Alfred's* port bulbous bow and almost all the vehicles being transported on board. The vessel subsequently refloated on the rising tide and continued to St Margaret's Hope under its own power later that afternoon; there was no pollution.

The investigation found that *Alfred* grounded because the master experienced a loss of awareness while helming the vessel close inshore, almost certainly as a result of falling asleep for approximately 70 seconds. During this period the master allowed *Alfred's* heading to swing towards the coast unchecked. When the master became aware of the vessel's predicament he was unable to prevent the ferry striking the rocks at 13 knots.

The investigation also identified that *Alfred's* passage plan was inadequate and that its Electronic Chart Display Information System, which was the ferry's primary means of navigation, was not being used effectively to support safe navigation and warn of danger. Despite the passage plan being in place since the vessel entered service in 2019, neither the Pentland Ferries' annual audits nor the Maritime and Coastguard Agency's surveys had detected this safety issue.

*Alfred* grounded in waters controlled by Orkney Islands Council Harbour Authority. However, the harbour's vessel traffic service was not monitoring the movement of the ferry and did not raise the alarm when it entered the guard zone around Swona Island. Once aground, *Alfred's* emergency response did not follow the safety video shown to passengers before departure from port. The investigation established that this was because the vessel's procedures and weekly drills had not adequately prepared the crew for the emergency. The investigation also found that the Pentland Ferries emergency response team ashore did not prompt the master to create a nominal list of those on board.

Pentland Ferries has taken significant action to enhance its procedures and ensure that they are followed; implemented a fatigue management plan; strengthened its emergency response procedures; and, enhanced the training provided to crew and shore staff.

The Orkney Islands Council Harbour Authority has taken action to improve its oversight of ferry operations in its waters.

Recommendations have been made to the Maritime and Coastguard Agency to: direct its surveyors to ensure that vessel passage plans are available; issue guidance to the UK domestic passenger fleet on the securing of heavy objects on board their vessels; and, to review the general exemption from the requirement for these vessels to be fitted with voyage data recorders. Pentland Ferries has been recommended to review its emergency response team procedures to ensure that it captures passenger details and injuries post-accident.

## SECTION 1 – FACTUAL INFORMATION

### 1.1 PARTICULARS OF ALFRED AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	<i>Alfred</i>
Flag	UK
Classification society	Lloyd's Register
IMO number	9823467
Type	Domestic roll-on/roll-off passenger ferry
Registered owner	Pentland Ferries
Manager	Pentland Ferries
Construction	Steel
Year of build	2019
Length overall	84.5m
Registered length	79.71m
Gross tonnage	2991
Minimum safe manning	Up to: 428 passengers – 13 crew; 230 passengers – 12 crew; and, 25 passengers – 8 crew
Authorised cargo	428 passengers and up to 98 vehicles
VOYAGE PARTICULARS	
Port of departure	Gills Bay, mainland Scotland
Port of arrival	St Margaret's Hope, South Ronaldsay, Scotland
Type of voyage	Coastal
Cargo information	84 passengers and 37 vehicles.
Manning	13 crew
MARINE CASUALTY INFORMATION	
Date and time	5 July 2022 at 1400
Type of marine casualty	Serious Marine Casualty
Location of incident	Swona Island, Pentland Firth, Scotland
Place on board	Port bow
Injuries/fatalities	Injuries to 36 passengers and 5 crew, 10 of whom were seriously injured
Damage/environmental impact	Hull and internal damage; no environmental impact
Ship operation	On passage
Voyage segment	Transit
External & internal environment	Wind westerly Beaufort force 2; sea state calm; visibility good. Tidal stream easterly at 6.7kts through outer sound of the Pentland Firth
Persons on board	97



## 1.2 BACKGROUND

*Alfred* was a roll-on roll-off (ro-ro) passenger ferry that operated three return trips per day between St Margaret's Hope, South Ronaldsay, the Orkney Islands, Scotland and Gills Bay on the north coast of mainland Scotland.

*Alfred's* master was due to return to the ship after 3 weeks of leave and had gone to bed at about 2230 on 4 July 2022, before getting up at about 0330 on 5 July, the day of the accident. He then made the hour-long journey by road from his home to St Margaret's Hope and rejoined the ferry at about 0500. *Alfred's* master completed his handover with the off-going master, and then settled in on board. At 0730, he took control of the ferry for its first crossing of the day from South Ronaldsay to mainland Scotland.

Having completed its first return trip, *Alfred* arrived in Gills Bay for the second time at 1255. The ferry then embarked 84 passengers<sup>1</sup> and 37 vehicles<sup>2</sup> for its next passage to St Margaret's Hope.

## 1.3 NARRATIVE

### 1.3.1 The grounding

At 1326 on 5 July 2022, *Alfred's* master manoeuvred the ferry clear of its berth at Gills Bay and started a 15 knots (kts) passage to St Margaret's Hope. Once clear of the harbour the master moved from the bridge wing console to the officer of the watch (OOW) seat at the front of the bridge. The chief engineer (C/E) was sitting behind the master at the engineering console (**Figure 1**). It was a bright sunny day with a light westerly breeze, slight sea state and good visibility. The tidal stream was setting east at about 6.7kts through the outer sound of the Pentland Firth and the time of high water at Bur Wick, 2.5 nautical miles (nm) east of Swona Island, was 1602.



**Figure 1:** View of the OOW's chair from the engineering console

<sup>1</sup> 69 adults and 15 children.

<sup>2</sup> 28 cars, 5 motorhomes, 3 vans and 1 lorry.

Approximately 3 minutes after getting underway *Alfred's* master changed from manual steering to autopilot (**Figure 2**) and navigated the ferry by eye across the inner sound and around the east coast of Stroma, remaining between 100m and 300m from the shore (**Figure 3**). Approximately 18 minutes later, when the Swilkie Point (Stroma) Lighthouse was abeam, the master altered course 90° to starboard to cross the outer sound towards Swona Island.

At 1356, the master changed from autopilot to manual steering as *Alfred* passed the southern end of Swona Island and through the tidal race. He then used the armrest-mounted tiller (see **Figure 2**) to con the vessel and navigate *Alfred* along the east coast of Swona Island, remaining about 250m from shore. Shortly afterwards, *Alfred* entered the Orkney Islands Council Harbour Authority's area of responsibility.

Approximately 2.5 minutes later, the master applied 6° of port rudder. The ferry began to swing towards the coast and, 70 seconds afterwards, the master gave a startled shout and applied 60° of starboard rudder.

At 1400, with *Alfred* only a few metres from shore and the ferry's bow slowly swinging to starboard, the master put the engine control levers to full astern and warned the chief engineer that the vessel was about to ground.

*Alfred* ran aground on the east coast of Swona Island 10 seconds later, at a speed of approximately 13kts<sup>3</sup>. Many of the ferry's passengers and crew were thrown to the deck when the vessel struck the rocks; this included the chief officer (C/O), who had rushed to the bridge when he heard the engines go astern.



**Figure 2:** Central OOW console, showing the layout of steering controls and navigational equipment

<sup>3</sup> Equivalent to 15 miles per hour.

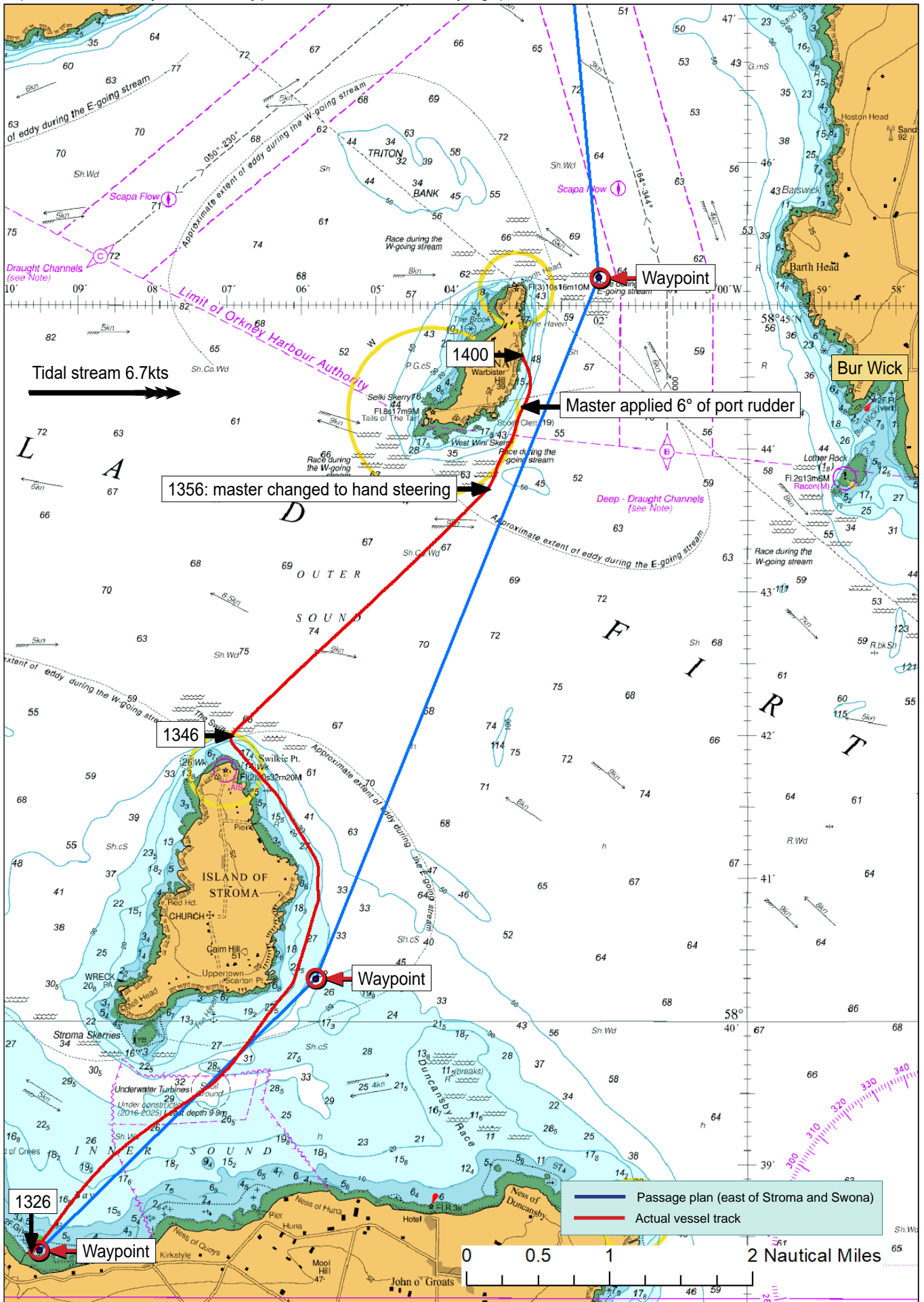


Figure 3: Alfred's navigational track before the grounding

### 1.3.2 The emergency response

Once aground, *Alfred's* master put the engine control levers to stop for a few seconds before putting them to full astern for approximately 4 minutes. At the same time, he called the HM<sup>4</sup> Coastguard Shetland Maritime Rescue Coordination Centre (MRCC) on very high frequency radio and said “*Shetland coastguard this is Alfred. We went ashore here on Swona, just on the east side of Swona. We went up on the rocks here*”.

MRCC Shetland replied, “*Alfred this is Shetland coastguard. Did you say you hit the rocks?*”, to which the master responded, “*Yes, that’s right. We’re ashore here, we’re up on the rocks. We need assistance here, it’s a “Mayday” situation*”. As the master was speaking to Shetland coastguard, the C/O left the bridge to conduct an internal inspection of the hull and assess the extent of the damage.

At 1407, *Alfred's* master made a passenger announcement: “*It’s the captain speaking here. We went ashore and we are getting assistance as soon as we can. We are looking for damage. Stay calm and we will keep you informed*”.

The C/O informed the master shortly afterwards that, other than a small amount of water in the port bow, just behind the collision bulkhead that had taken the impact of the grounding (**Figure 4**), he had found nothing else to indicate that the watertight integrity of the vessel had been breached. The C/E informed the master that the starboard outer engine had shut down and he was unable to restart it. The master informed the Pentland Ferries Designated Person Ashore (DPA) of the grounding. The DPA then cascaded this information to the other members of the Pentland Ferries emergency response team (ERT) ashore.

Between 1411 and 1438, Shetland MRCC requested the attendance to *Alfred* of the Longhope and Thurso all-weather lifeboats (ALB), the emergency towing vessel *Ievoli Black* and two Orkney harbour tugs, *Erland* and *Odin*. Meanwhile,

*Alfred's* crew mustered the passengers, helped them don their lifejackets and administered first aid to those who were injured. During this period the master could be heard on the VDR discussing that he believed he might have fallen asleep.

*Alfred's* master later updated the coastguard and informed them that some passengers and crew had sustained minor injuries during the grounding. The master was unsure how long it would take to refloat the ferry and so decided that passengers would be disembarked to the ALBs by the crew.



**Figure 4:** Post-grounding hull damage, showing slight water ingress behind the collision bulkhead

<sup>4</sup> Her Majesty's Coastguard (at the time of the accident).

At 1440, the Longhope ALB came alongside *Alfred's* starboard pilot door and the crew of both vessels started to transfer 42 passengers from the ferry to the lifeboat via the starboard pilot ladder (**Figure 5**). The Thurso ALB arrived at the scene shortly afterwards and held off while waiting to be called alongside by *Alfred's* master.

### 1.3.3 Refloating and return to harbour

At 1510, *Alfred's* master noticed that the ferry's stern had swung away from the rocks and assessed that the vessel was refloating on the rising tide. The master instructed both ALBs to hold off while he used *Alfred's* three remaining engines to pull the ferry off the rocks and into deep water.



**Figure 5:** Passengers transferring from *Alfred* to the Longhope all-weather lifeboat

The manoeuvre was successful. *Alfred's* master then used the misaligned but functioning tiller control and the vessel's engines to continue the passage to St Margaret's Hope, escorted by the two harbour tugs and the ALBs. Emergency services met the ferry when it berthed and the injured passengers and crew were disembarked and assessed on the jetty by paramedics and staff from the local medical practice. Those who needed further treatment were transferred to Balfour Hospital, Kirkwall, by waiting ambulances.

## 1.4 INJURIES AND DAMAGE

*Alfred's* closed-circuit television (CCTV) imagery showed that almost all of the passengers and crew who were standing at the time of the accident were thrown to the deck when the vessel grounded.

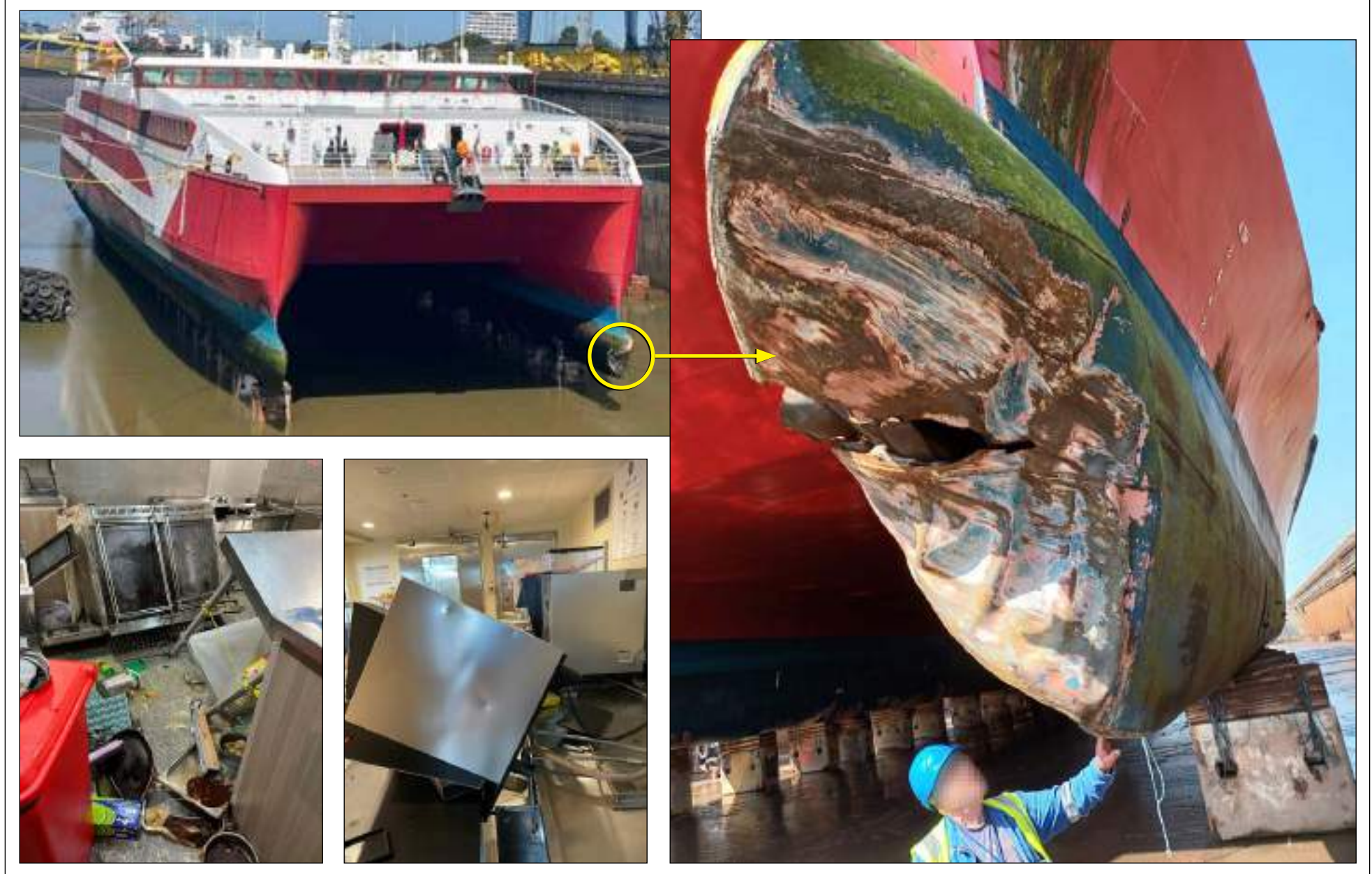
The investigation conducted a survey of *Alfred's* passengers and crew<sup>5</sup>, which established that 5 crew and 36 passengers were injured during the grounding. Of these, 10 people had sustained serious injuries and needed to be signed off work for 72 hours or more. The most serious injury was a compound arm fracture that required the patient to be flown to the mainland for treatment.

*Alfred* was taken out of service and entered dry-dock for four weeks, during which the port side bulbous bow, including the damage around the collision bulkhead, was cut out and replaced (**Figure 6**). Heavy items such as the galley range, catering equipment and vending machines were resecured to their mountings. A technical inspection of *Alfred's* steering system found no defects.

CCTV imagery of *Alfred's* vehicle deck showed cars and lorries rolling forward on impact (**Figure 7**) and 35 of the 37 vehicles on board were damaged due to striking either adjacent vehicles or the ferry's superstructure during the grounding.

<sup>5</sup> 82 of the 97 (85%) passengers and crew on board *Alfred* responded to the MAIB's survey.

Images courtesy of [Pentland Ferries](#)



**Figure 6:** Post-grounding internal and external damage to *Alfred*



**Figure 7:** CCTV images, showing vehicle movement as *Alfred* grounds on Swona Island

## 1.5 **ALFRED**

### 1.5.1 **Vessel**

*Alfred* was a steel catamaran constructed in 2019. The ferry was purpose-built for its operating route and had entered service in November 2019, replacing the smaller *Pentalina*. The ferry was owned and managed by Pentland Ferries and was certified to carry up to 428 passengers and 98 vehicles. It was classed as a UK registered, EU Class B passenger ferry, authorised to operate up to 20nm from land. *Alfred's* domestic<sup>6</sup> classification meant that the master was required to report the total number of crew and passengers on board to Shetland MRCC before getting underway; there was no requirement for the crew to record the names of the passengers on board.

*Alfred's* propulsion consisted of four diesel engines, two in each hull, each driving a fixed pitch propeller. The engines were controlled from the bridge. The vessel also had four rudders controlled by either autopilot, an armrest-mounted tiller located on the right-hand side of the OOW's seat (see **Figure 2**) or bridge wing control modules. *Alfred* had a turning diameter of approximately 280m and a stopping distance of about 400m.

<sup>6</sup> Operating between ports within the same country rather than on international routes.

## 1.5.2 Crew

*Alfred's* crew of 13 comprised a master, C/O, C/E, four able seamen, a motorman, purser, cook and three stewards. All the crew held the appropriate professional qualifications for their role.

The master had worked for Pentland Ferries for over 20 years and held an International Convention on the Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW) II/2 Master less than 3,000 gross tonnes (GT), unlimited area certificate of competency (CoC). In 2004, he had been granted a Pilotage Exemption Certificate (PEC) for the Orkney harbours, which was valid at the time of the accident. He had served as master of both *Pentalina* and *Alfred* and worked a 3-weeks on, 3-weeks off duty cycle. He had completed generic and type-specific Electronic Chart Display and Information System (ECDIS) training. It was estimated that the master had completed over 20,000 crossings of the Pentland Firth during his employment. He was medically fit with no underlying health conditions.

The C/E had joined Pentland Ferries in 2022 and had completed 7 weeks at sea on board *Alfred*. He held an STCW Chief Engineer Unlimited III/2 CoC.

The C/O had joined Pentland Ferries in 2017. He held an STCW II/2 Master less than 3,000GT, near coastal CoC and had completed generic and type-specific ECDIS training. The C/O had been granted a PEC for the Orkney harbours, which was valid at the time of the accident.

## 1.5.3 Bridge equipment

*Alfred* was certified to navigate using electronic navigational charts (ENC) and was fitted with an ECDIS that could be viewed and operated from the OOW's chair. The system was loaded with up-to-date UK Hydrographic Office ENCs.

*Alfred* was fitted with two navigational radars, which were loaded with the same passage plan as the ECDIS. The ferry was also equipped with a Bridge Navigational Watch Alarm System (BNWAS) that was designed to ensure the OOW remained alert. When activated, the BNWAS required the watchkeeper to acknowledge an alert every 3 or 6 minutes to prevent an alarm going off in the master's cabin or crew mess. The BNWAS on board *Alfred* was rarely used by the crew.

## 1.6 SAFETY MANAGEMENT

### 1.6.1 Safety management

The Pentland Ferries' Document of Compliance (DOC) confirmed that the company's safety management system (SMS) complied with the International Ship Management (ISM) Code; the DOC had been renewed by the Maritime and Coastguard Agency (MCA) on 28 February 2022. The SMS comprised of five manuals:

1. The Safety Management Manual, which contained the company's overarching safety management document;
2. The Company Procedures Manual, which contained 22 company procedures for issues such as internal audit, risk assessment, accident and incident reporting and cyber security;



3. The Emergency Contingency Procedures Manual (ECPM), which contained emergency procedures, reporting requirements and emergency and fire drills. The ECPM required vessels to conduct weekly firefighting and lifesaving drills and included procedures for stranding (grounding) and abandon ship. It also contained details of shore-based contingency plans;
4. The Decision Support System, which listed who to inform in case of an emergency and guidance for accident reporting and safety meetings, etc; and
5. The Fleet Procedures Manual (FPM), which was designed to acquaint masters, officers and ratings with the operating policies of the company. The FPM included crew familiarisation and training, the responsibilities of specific crew members and the conduct of routine activities on board.

## 1.6.2 Audit and survey

Since entering service in 2019, *Alfred* had successfully completed annual EU Class B Domestic Passenger Ship renewal surveys and DOC audits undertaken by the MCA. The Pentland Ferries DPA had also conducted internal ISM audits of the vessel. These surveys and audits had inspected the vessel's nautical publications, procedures and hotel service functions; they did not examine the vessel's passage plans, bridge manning or whether equipment such as the vessel's ECDIS, radars and BNWAS were being used effectively.

A post-accident general inspection of the vessel by an MCA surveyor found that, at the time of the accident, the vessel's passage plan and bridge manning did not follow the documented SMS and the SMS provided no direction on the use of the BNWAS. The MCA surveyor subsequently issued *Alfred* with a major nonconformity.

## 1.7 PASSAGE PLANNING

### 1.7.1 The Pentland Firth

The Pentland Firth separates the mainland of Scotland and the Orkney Islands and is notorious for its extreme tidal and sea conditions. *Alfred* crossed the Pentland Firth six times a day. The Admiralty Sailing Directions (*North Coast of Scotland Pilot, NP52*) contained the following guidance on passage planning:

*Because of the very strong tidal streams, the eddies and races to which these give rise and the extraordinary violent and confused seas which occur at times, particularly in some of the races, navigation in the Pentland Firth requires careful preparation...<sup>7</sup> [sic]*

### 1.7.2 Passage planning guidance

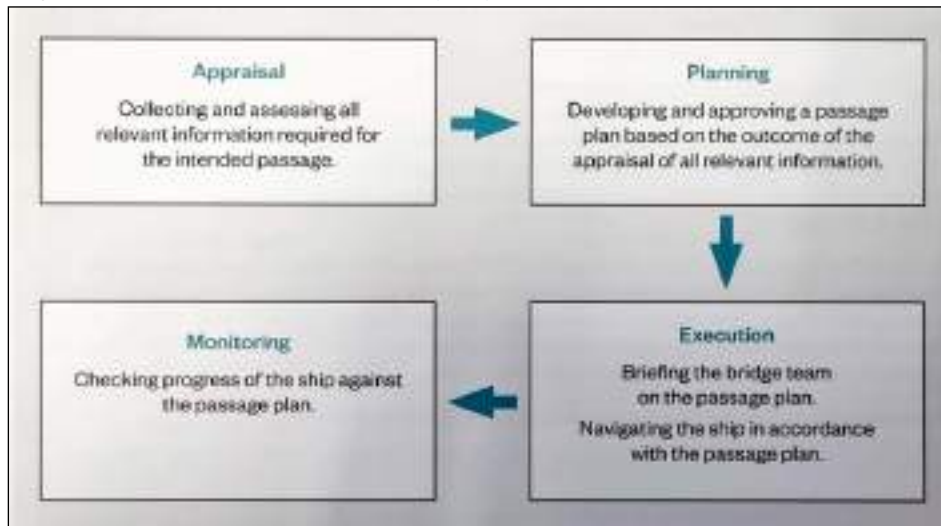
The International Maritime Organization (IMO) *Resolution A.893(21) Guidelines for Voyage Planning* was used to create the International Chamber of Shipping (ICS) *Bridge Procedures Guide*<sup>8</sup>. The guide described *Appraisal, Planning, Execution* and *Monitoring* as the four stages required to achieve a safe passage plan (**Figure 8**) and also defined the necessary information to be shown when plotting an ECDIS route (**Figure 9**), highlighting *the importance of passing charted features at a safe distance* when operating in coastal waters.

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<sup>7</sup> Section 3.1.18: Passage planning.

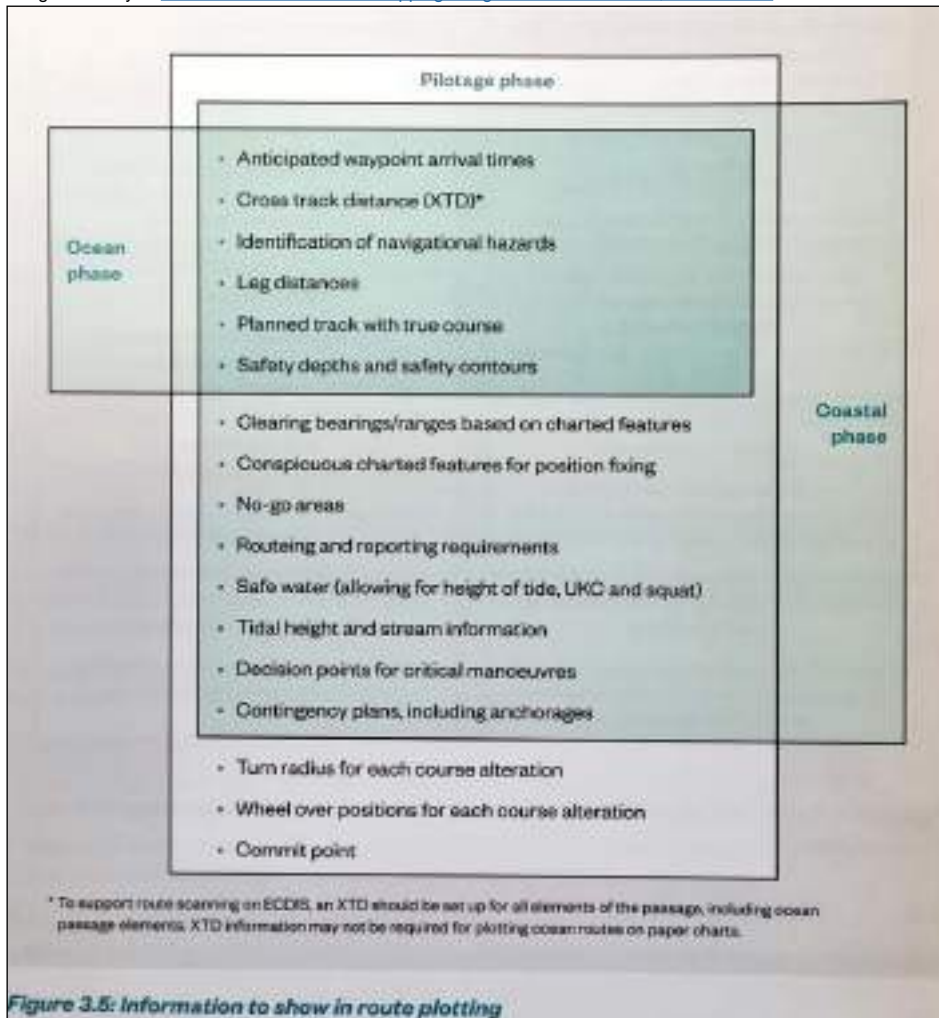
<sup>8</sup> Sixth Edition, published in 2022.

Image courtesy of [International Chamber of Shipping Bridge Procedures Guide, Sixth Edition](#)



**Figure 8:** The four stages of a safe passage plan

Image courtesy of [International Chamber of Shipping Bridge Procedures Guide, Sixth Edition](#)



**Figure 9:** Plotting information for ECDIS navigational route planning

Although not a carriage requirement for merchant vessels, the Royal Navy's Admiralty Manual of Navigation: *The Principles of Navigation, Admiralty Manual of Navigation Volume 1*<sup>9</sup> advised that when the coast was 'steep-to', such as that on the east side of Swona Island, seafarers should plan to *pass at a distance of at least 1.5-2 nautical miles*. [sic]

<sup>9</sup> 11th Edition, published in 2019 by the Nautical Institute.

### 1.7.3 *Alfred's* passage plan

The Pentland Ferries FPM guidance on passage planning stated that:

*The Master is required to select the best route with due regard to prevailing weather and tidal conditions to ensure the safety of the vessel, passengers and crew and the comfort of all personnel on board.*

*Passage planning for longer voyages should be carried out in accordance with the ICS Bridge Procedures Guide. The plan should be made out by the Chief Officer and checked by the Master prior to sailing. [sic]*

To meet this direction *Alfred's* masters had created two passage plans between St Margaret's Hope and Gills Bay, based on those that had been previously used on board *Pentalina*. The routes offered masters the choice to pass east of Swona Island, as shown in **Figure 3**, or west of it, depending on the direction of the tidal stream in the Pentland Firth at the time. The vessel's passage plans included: waypoint positions; courses; distances; the cell number of the electronic chart; instructions to use parallel indices and echo sounder to navigate the vessel; and, that the vessel was to be fixed using terrestrial fixing or the global positioning system. The plans did not include cross-track distance (XTD) limits or safe distances to pass navigational hazards and no-go areas, all of which were recommended by the ICS Bridge Procedures Guide.

## 1.8 PASSAGE EXECUTION

### 1.8.1 Previous tracks

The investigation sampled *Alfred's* previous passage plans for June 2021 and 2022 (**Figure 10**). These tracks showed that *Alfred's* masters did not follow the declared passage plans and appeared instead to have adapted the vessel's route to pass east or west of the islands of Stroma and Swona on a voyage-by-voyage basis. Moreover, when attributed to specific masters, the tracks showed that the master on duty at the time of the accident regularly followed a route that passed closer to the coast of Swona Island than his off-watch counterpart.

### 1.8.2 Bridge manning

The Pentland Ferries FPM directed that:

*A seaman shall be on watch with the master or OOW at all times when the vessel is at sea or when the vessel is being berthed and unberthed. The seaman shall act as look out and back up man.<sup>10</sup> [sic]*

It had become common practice in daylight and good visibility to dispense with the requirement for a seaman to be on watch and assign them to maintenance tasks on deck instead. On the day of the accident only the master and C/E were on the bridge; the C/E's role was to monitor *Alfred's* machinery state, not to act as lookout.

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<sup>10</sup> FPM 6.1 – Bridge Watchkeeping.

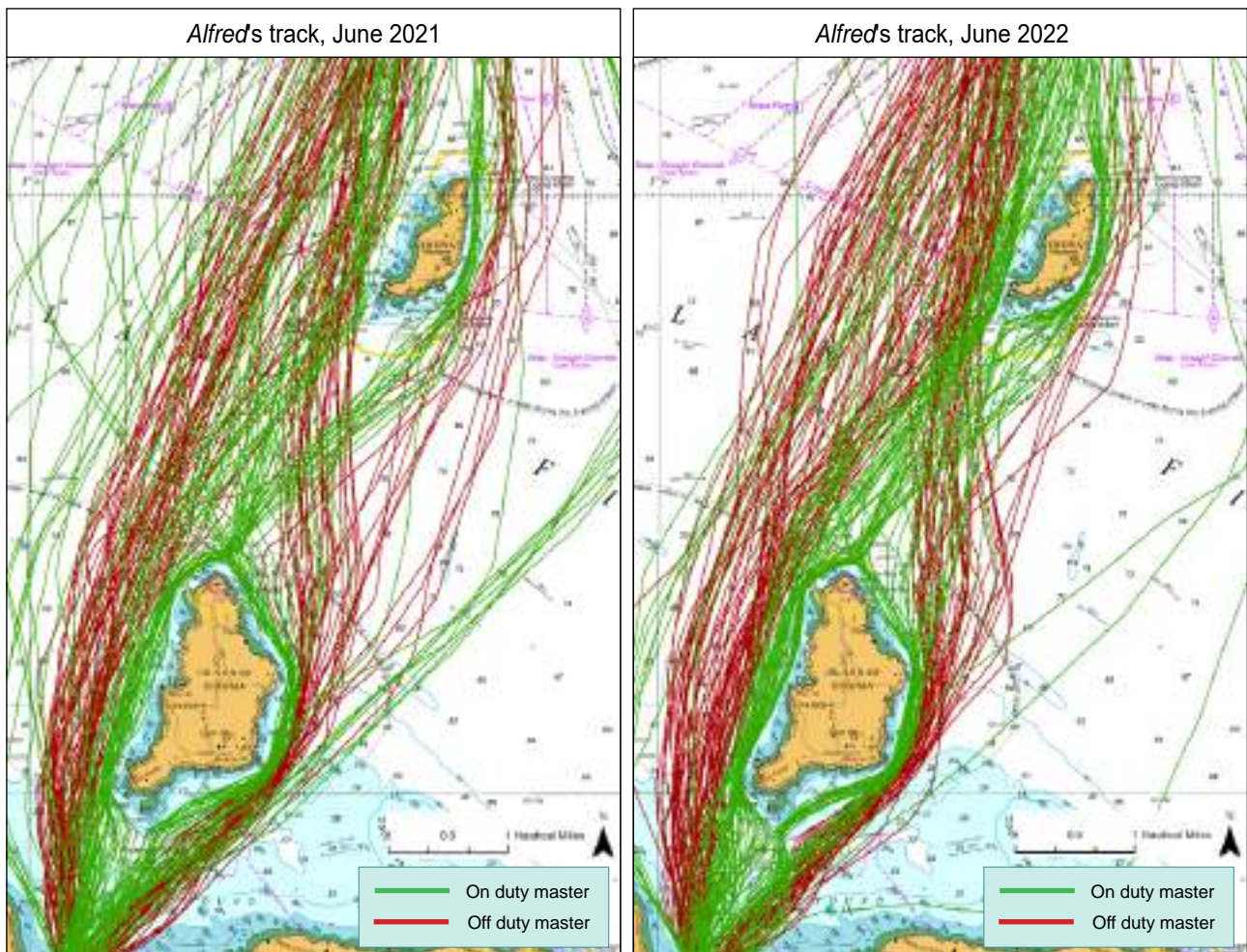


Figure 10: Alfred's June 2021 and June 2022 navigational tracks

### 1.8.3 Electronic Chart and Display Information System

The MCA had approved *Alfred's* ECDIS as the primary means of navigation when the ferry entered service. The master and C/O had completed the necessary generic type-specific ECDIS training.

At the time of the accident the passage plan was not displayed on *Alfred's* ECDIS or radars and the master was navigating by eye, using ECDIS to assist his situational awareness. The master had applied a similar approach on board *Pentalina*, navigating principally by eye and rarely referring to the Perspex covered paper charts.

## 1.9 EMERGENCY RESPONSE

### 1.9.1 Passenger safety video

A 95-second safety video was broadcast in *Alfred's* passenger spaces before the ferry departed Gills Bay. The emergency instruction video conformed with IMO guidance<sup>11</sup> in that:

- An emergency would be signalled by seven or more short blasts followed by one long blast on the ferry's whistle, followed by a similar signal on the alarm bells;

<sup>11</sup> IMO Maritime Safety Committee (MSC)/Circular (Circ).699, *Revised Guidelines for Passenger Safety Instructions*, Annex 2, dated 17 July 1995.

- The crew would issue passengers with and help them don their lifejackets at the port and starboard assembly stations in the passenger lounge; and
- Passengers were not permitted on the vehicle deck while the ferry was on passage.

### 1.9.2 Emergency procedures

The ICS Bridge Procedures Guide<sup>12</sup> provided industry guidance on the creation of vessel emergency procedures and included generic emergency checklists that could be adapted by companies to suit the specific needs of their vessels. The stranding/grounding checklist contained 29 generic actions, including the need to ensure that the general emergency alarm was sounded and to ensure that: *Appropriate manoeuvres made/engine(s) stopped until the situation is assessed*<sup>13</sup>.

The ICS checklists were adapted and expanded by many shipping companies to include preprepared passenger announcements and radio calls designed to enable potentially shocked crew to respond promptly and professionally in the aftermath of an accident.

Pentland Ferries had documented its procedures and actions for stranding in ECPM drill number 6, which listed a sequence of 32 actions to be completed by *Alfred's* master and crew. This drill included the need to *stop the engines* and *sound the emergency alarm* and an instruction that the seaman on watch would assist the master. The procedure did not require that the engines should be stopped until the situation had been assessed, nor did it contain prescribed passenger announcements or radio reports.

### 1.9.3 Emergency drills

The ECPM placed responsibility on the C/O to plan and conduct drills on a rotational basis that allowed every crew member to participate in each drill annually. It also required the abandon ship drill to be completed weekly.

It was normal routine for *Alfred's* crew to undertake emergency drill training while the ferry was alongside at St Margaret's Hope, between the hours of 1500 and 1630. In most cases, the drills consisted of a walk and talk through of the procedures rather than a practical exercise. Training records indicated the abandon ship drills had been completed monthly and that a stranding drill had last been conducted on 1 May 2022. There had been no external assessment or validation of these drills by the company.

### 1.9.4 Company emergency response

The Pentland Ferries ECPM described the responsibilities of the shore-based ERT, which comprised seven members<sup>14</sup>. The procedure required that the ERT, led by the managing director, would muster at the company's St Margaret's Hope office and establish communications with the vessel. The ERT would then provide technical support to the ferry's crew and interface with emergency services ashore. At the time of the accident not all of those involved had practised their ERT role. Mobile

<sup>12</sup> Appendix C3 – Emergencies Checklists.

<sup>13</sup> Appendix C3.5 – Stranding or grounding.

<sup>14</sup> The managing director, DPA, chief security officer, superintendent, general manager, accounts clerk and a customer service representative.

phone communications with the master had been quickly established but details of the passengers on board, the nature and severity of their injuries and whether they remained on board *Alfred* or had disembarked to the ALB were not exchanged before the vessel berthed.

### 1.9.5 Passenger assessment of the shipboard emergency response

The investigation survey of passenger reactions asked questions about the shipboard emergency response, with the following results:

- 55% of the respondents felt the master's announcement was unclear and that the procedures described in the passenger safety video were not followed.
- Over 40% of the respondents reported that they were injured by the grounding and several commented that they were not warned of the impending impact before the vessel struck the island.
- Some passengers with babies reported that the crew were unsure how the infant lifejacket they had provided should be worn (**Figure 11**).

Image courtesy of the [RNLI](#)



**Figure 11:** Baby on board the Longhope all-weather lifeboat, wearing an incorrectly fitted infant lifejacket

## 1.10 ORKNEY ISLANDS COUNCIL HARBOUR AUTHORITY

### 1.10.1 Overview

The Orkney Islands Council Harbour Authority was the Competent Harbour Authority and operated under the principles set out in the Port Marine Safety Code. It was responsible for the safe and efficient operation of the harbour area, the southern limit of which was marked by a line from Brough Ness, South Ronaldsay, to the southernmost point of Swona Island (see **Figure 3**).

The harbourmaster managed the safe operations of the area using vessel traffic services (VTS) to monitor marine traffic. Merchant vessels were required to employ either a qualified marine pilot or a shipboard PEC holder to oversee inbound and outbound harbour manoeuvres (**Figure 12**).

Image courtesy of [Orkney Islands Council Harbour Authority](#)



**Figure 12:** Extract from the *Ports Handbook for Orkney* (6th Edition), showing suggested tracks

### 1.10.2 Pilotage Exemption Certificate

*Alfred's* master and C/O both held valid PECs. This meant that they had completed 12 inbound and 12 outbound pilotage acts under the supervision of a harbour authority pilot or PEC holder before passing a practical assessment conducted by a licensed harbour authority pilot. A PEC remained valid as long as the holder completed at least six inbound and six outbound pilotage acts per year. PEC holders were required to revalidate their certificate every 5 years from the date of issue, by completing and passing a practical assessment conducted by a licensed harbour authority pilot. The Orkney Harbour PEC assessment process neither examined the PEC holder's passage plan nor their previous navigational tracks.

The master of *Alfred* had held a PEC since 2004 and his most recent practical revalidation assessment by an authorised pilot had been completed and passed in 2019. The master's PEC was suspended by Orkney's harbourmaster following the accident.

### 1.10.3 Vessel traffic services

IMO Resolution A.1158(32), Guidelines for Vessel Traffic Services, stated that:

*The purpose of a VTS is to contribute to the safety of life at sea, improve the safety and efficiency of navigation and support the protection of the environment within a VTS area by mitigating the development of unsafe situations through:*

- 1. providing timely and relevant information on factors that may influence ship movements and assist onboard decision-making.*
- 2. monitoring and managing ship traffic to ensure the safety and efficiency of ship movements.*
- 3. responding to developing unsafe situations.*

IMO MSC/Circ.794, Standard Marine Communication Phrases (SMCP), advised that eight standard maritime communication message markers may be used to prefix VTS messages: *Instruction, Advice, Warning, Information, Question, Answer, Request or Intention.*

Orkney Islands Council Harbour Authority had created VTS guard zones approximately 1000m from the coast around the islands of Stroma and Swona (**Figure 13**). The VTS system automatically alerted the VTS operator if either a vessel or its heading vector entered the guard zone. This provided the VTS operator with the opportunity to warn the vessel's crew of the *development of unsafe situations*. These guard zones were not marked on navigational charts. *Alfred's* track routinely triggered the VTS guard zones around the islands of Stroma and Swona, as it did on this occasion; the VTS operators did not call the ferry.

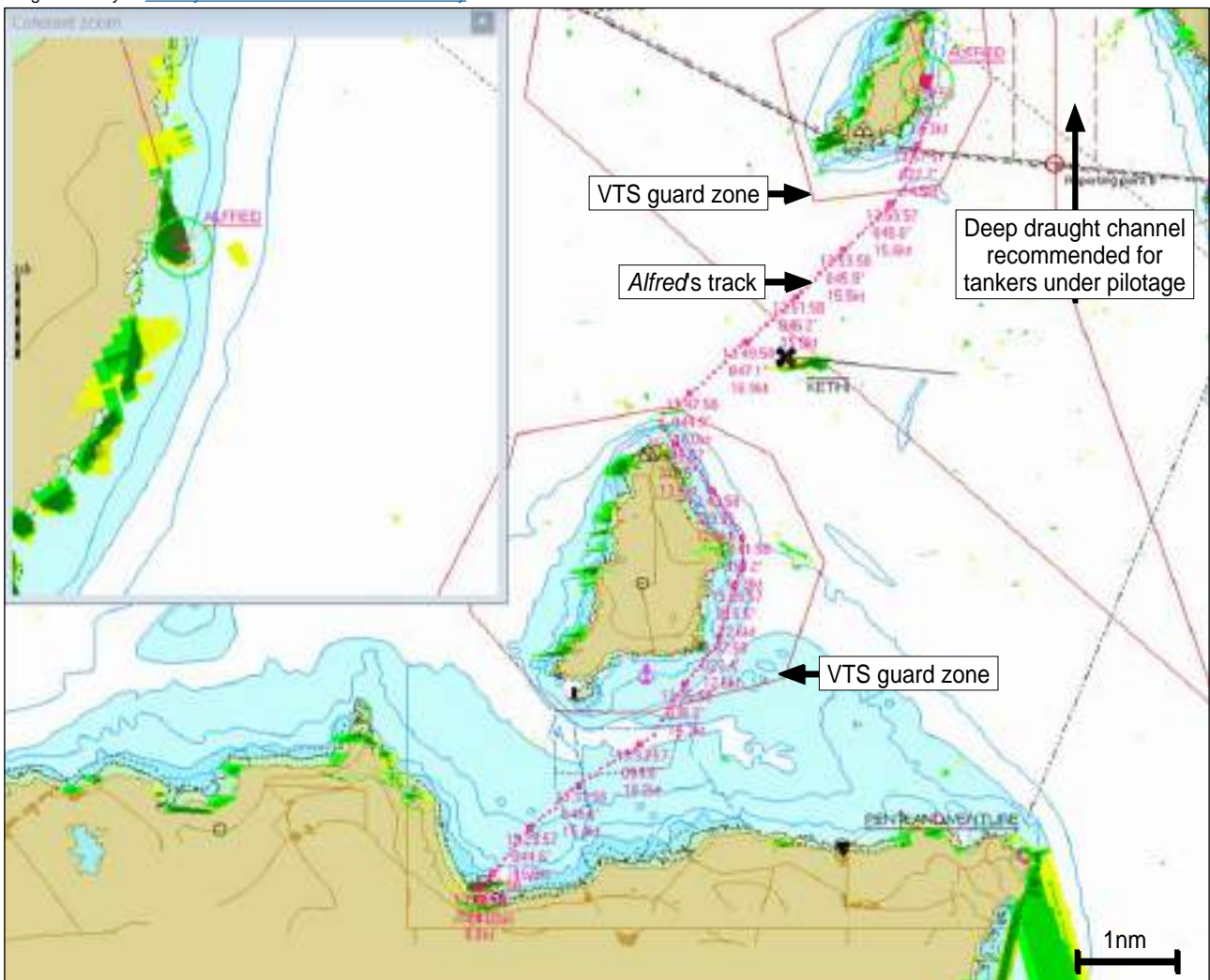


Figure 13: VTS replay of Alfred's track, showing the recommended route and the guard zones

## 1.11 FATIGUE

### 1.11.1 International guidelines

In 2001, the IMO recognised fatigue as a hazard that might affect a seafarer's ability to do their job effectively and safely. Issued in 2019, *MSC.1/Circ.1598, Guidelines on Fatigue* used the following definition for fatigue:

*A state of physical and/or mental impairment resulting from factors such as inadequate sleep, extended wakefulness, work/rest requirements out of sync with circadian rhythms and physical, mental or emotional exertion that can impair alertness and the ability to safely operate a ship or perform safety-related duties.*<sup>15</sup>

The circular also introduced the concept of *low workload*, noting that:

*monotonous tasks...can result in loss of interest and boredom, which also increases the effects of fatigue.*<sup>16</sup> [sic]

<sup>15</sup> MSC.1/Circ, 1598 Annex, page 1.

<sup>16</sup> MSC.1/Circ. 1598 Annex, page 11.



It further recognised the hazard posed by short periods of *microsleep* that could last for approximately 10 seconds, during which:

*the brain disengages from the environment (it stops processing visual information and sounds). Sleep deprivation, which is caused by cumulative sleep debt, can make people more susceptible to microsleeps. The likelihood of microsleeps is even greater if the individual is on duty during a circadian low.*<sup>17</sup>

### 1.11.2 National regulation

Regulation 6 of Merchant Shipping Notice 1877 (M) Amendment 2 Maritime Labour Convention 2006 – hours of work and entitlement to leave, application of the hours of work regulations 2018 – required that a seafarer’s minimum hours of rest shall not be less than *10 hours in any 24-hour period; and 77 hours in any seven-day period.*

It also required that hours of rest must not be divided into more than two periods, one of which was to be at least 6 hours in length, with the interval between consecutive periods of rest not exceeding 14 hours. These regulations were reflected in the Pentland Ferries SMS. *Alfred’s* records indicated that the master routinely had 13 hours of rest each day. These regulations did not apply when the seafarer was on leave and not on duty.

### 1.11.3 National guidelines

MCA guidance on fatigue was detailed in Marine Guidance Note (MGN) 505 (M) Amendment 1, *Human Element Guidance – PART 1 Fatigue and Fitness for Duty: Statutory Duties, Causes of Fatigue and Guidance on Good Practice*, which advised companies to develop and use a company and/or vessel-specific fatigue management plan to:

- a) *Understand fatigue and other factors affecting fitness for duty, their causes, and effects*
- b) *Understand practices and principles that help mitigate the effects of fatigue and other factors leading to impairment of fitness for duty*
- c) *Know your duties and responsibilities under the law*
- d) *Implement fatigue preventing management policies and working practices*

MGN 505 (M) also outlined the potential hazards for seafarers resulting from the natural daily attention cycle, or circadian rhythm<sup>18</sup> (**Figure 14**), noting that seafarers were naturally more prone to falling asleep, making errors, making misjudgements and having accidents<sup>19</sup> during two danger periods: 0200 to 0600 and 1330 to 1800 (also known as the post-lunch dip),

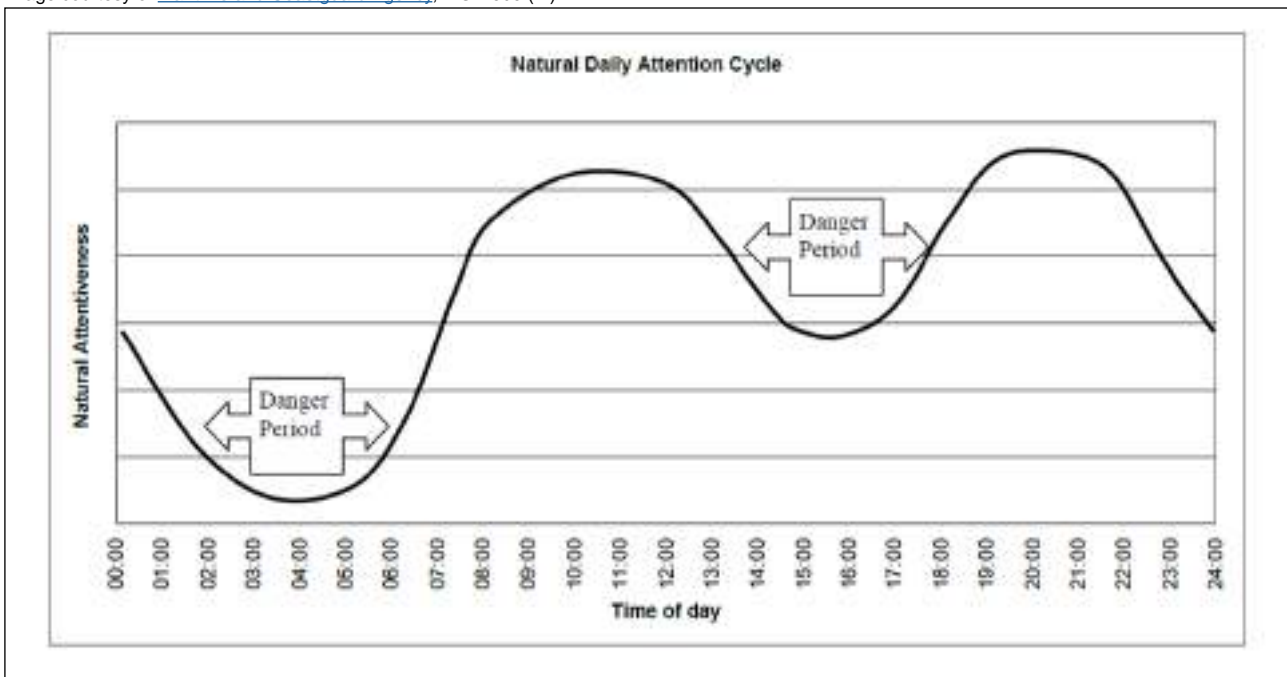
The Pentland Ferries SMS did not contain a fatigue management plan.

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<sup>17</sup> MSC.1/Circ. 1598 Annex, page 15.

<sup>18</sup> Further information can be found at <https://www.sleepfoundation.org/circadian-rhythm>

<sup>19</sup> MGN 505 (M), paragraph 3.2



**Figure 14:** Extract from MGN 505 (M), showing the natural daily attention cycle

## 1.12 CARGO SECURING ARRANGEMENTS

*Alfred's* Cargo Securing Manual (CSM) required vehicles to be parked as follows on the vehicle deck:

### Lorries

- *The lorry should be placed in a high gear.*
- *The parking brake should be applied and locked.*

### Cars

- *Apply the hand brake.*
- *Cars should be left in a high gear.*
- *If stowed athwartships, chock two wheels.*

### Autocampers and caravans

- *Apply the hand brake.*
- *Vehicles should be left in a high gear.*
- *Gas cylinders must be closed.*
- *The location of the gas cylinders must be clearly marked "Dangerous goods".*
- *If stowed athwartships, chock two wheels.<sup>20</sup>*

<sup>20</sup> CSM section 3.4.4

The CSM also required lorries of more than 3.5 tonnes (t), but less than 20t gross vehicle mass to be secured using two lashings on each side of the vehicle<sup>21</sup>. There were signs on the vehicle deck advising drivers to *STOP ENGINE* and *APPLY HAND BRAKE*, but the signs did not advise drivers to leave their vehicle in a high gear<sup>22</sup>.

On the day of the accident not all the vehicles were left with their handbrake on and in a high gear. Wheel chocks had not been used on the cars stowed athwartships and the single lorry on board, which exceeded 3.5t, was not lashed.

## 1.13 VOYAGE DATA RECORDER FOR DOMESTIC PASSENGER FERRIES

The IMO International Convention for the Safety of Life at Sea, 1974 (SOLAS), Chapter V, Regulation 20, required all passenger vessels engaged on international voyages, to be fitted with a voyage data recorder (VDR) by 1 January 2004. A 2011 European Union Directive broadened this requirement to include:

*Passenger ships, irrespective of size ... engaged on a non-international voyage shall be fitted with a voyage data recorder (VDR) which complies with the technical and performance standards developed in accordance with Chapter V of SOLAS.*<sup>23</sup> [sic]

In November 2013, the MCA issued a general exemption to the Merchant Shipping (Safety of Navigation) Regulations 2002 that exempted UK flagged domestic passenger ships not engaged on international voyages from the requirement to carry a VDR. The reason for this exemption was that VDRs were considered too costly for small operators at the time.

While exempted from the requirement to carry a VDR, Pentland Ferries had nevertheless fitted *Alfred* with an IMO compliant Kelvin Hughes VDR, which had completed its annual performance test. Investigators recovered data from the VDR as part of the investigation into the circumstances of the accident.

The UK's EU Class B passenger vessel fleet had a certified capacity of approximately 11,000 passengers at the time of the accident. Many of these vessels were fitted with a VDR and some EU Class B operators were using VDR data to remotely audit and assure the navigational safety of their vessels and crew performance.

## 1.14 SIMILAR ACCIDENTS

### 1.14.1 *Priscilla* – grounding

At 0443 on 18 July 2018, the Netherlands registered general cargo vessel *Priscilla* ran aground on Pentland Skerries in the eastern entrance of the Pentland Firth, Scotland. The investigation (MAIB report 12/2019<sup>24</sup>) found that the OOW, who was operating alone on the bridge, did not monitor the vessel's progress for about 2 hours and concluded that it was possible he fell asleep. The BNWAS was switched off.

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<sup>21</sup> CSM section 3.4.6

<sup>22</sup> By requiring cars to apply the handbrake and leave the vehicle in a high gear, for most cars meant that front and rear wheels were immobilised.

<sup>23</sup> EU Directive 2011/15/EU, Annex II, III.2 Voyage data recorder (VDR) systems.

<sup>24</sup> <https://www.gov.uk/maib-reports/grounding-of-general-cargo-vessel-priscilla>

### 1.14.2 *Commodore Clipper* – grounding

At 1515 on 14 July 2014, the Bahamas registered ro-ro passenger ferry *Commodore Clipper* grounded on a charted, rocky shoal in the approaches to St Peter Port, Guernsey. The investigation (MAIB report 18/2015<sup>25</sup>) found there had been insufficient passage planning for the voyage, which resulted in the OOW being unaware of the limits of safe water available. It also found that the vessel's ECDIS was not used effectively because key safety features were either disabled or ignored. It was also established that Guernsey Harbours did not have an effective safety management system for the conduct of pilotage within its statutory area.

### 1.14.3 *Stena Voyager* – shift of unsecured articulated road tanker

On 28 January 2009, an articulated road tanker crashed through a stern door of the ro-ro high-speed sea service vessel *Stena Voyager* shortly after the cargo ferry had started a crossing from Stranraer, Scotland to Belfast, Northern Ireland. The investigation (MAIB report 21/2009<sup>26</sup>) found the road tanker had not been secured in accordance with the vessel's CSM and that the driver had left it out of gear and not applied the vehicle parking brakes.

### 1.14.4 *Pacific Sun* – unsecured equipment

During the evening of 30 July 2008, the cruise ship *Pacific Sun* rolled heavily in gale force winds and high seas while returning to Auckland on the final leg of an 8-day cruise of the South Pacific. Of the 1730 passengers and 671 crew on board, 77 were injured, with seven sustaining major injuries. The investigation (MAIB report 14/2009<sup>27</sup>) found that many of the passenger and crew injuries were caused by falls and contact with unsecured furnishings and loose objects in the busy public rooms, including those designated as passenger emergency muster stations. In response to a recommendation made in the report, the Cruise Lines International Association (CLIA) and the Passenger Ship Association developed guidance for best practice when assessing the need for securing heavy furnishings.

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<sup>25</sup> <https://www.gov.uk/maib-reports/grounding-and-flooding-of-ro-ro-ferry-commodore-clipper>

<sup>26</sup> <https://www.gov.uk/maib-reports/shift-of-articulated-road-tanker-on-high-speed-ro-ro-cargo-ferry-stena-voyager-in-loch-ryan-scotland>

<sup>27</sup> <https://www.gov.uk/maib-reports/heavy-weather-encountered-by-passenger-cruise-ship-pacific-sun-200-miles-off-north-north-east-of-north-cape-new-zealand-with-77-people-injured>

## SECTION 2 – ANALYSIS

### 2.1 AIM

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.

### 2.2 OVERVIEW

*Alfred* grounded on the east coast of Swona Island because, while helming it close inshore, the master allowed the ferry's heading to swing towards the coast unchecked.

This section of the report will discuss the grounding, the reason for the master's loss of awareness, the passage planning for and execution of the voyage, the effectiveness of the audit and inspection regime, the vessel's emergency response, the oversight of the vessel's movements by the harbour authority, the injuries to the crew and passengers and damage to the vehicles and vessel.

### 2.3 THE GROUNDING

The VDR showed that *Alfred's* master was using the armrest-mounted tiller to guide the vessel along the east coast of Swona Island immediately before the accident, maintaining a distance of approximately 250m from the shore. About 90 seconds before *Alfred* grounded, the master applied 6° of port rudder and the ferry's heading began to swing towards the coast. However, he only became aware that a dangerous situation had developed approximately 70 seconds later, when he gave a startled shout and applied 60° of starboard rudder. The master later went astern on all four engines in an attempt to prevent the ferry grounding.

Although *Alfred* started to turn away from the island when the master applied 60° of starboard rudder, his actions were too late and the vessel's port bow struck the rocky coast at a speed of about 13kts. This resulted in significant damage to the vessel's port bulbous bow, almost all of the vehicles on board, and injuries to more than 40% of the crew and passengers.

It appears that *Alfred's* master experienced a temporary loss of awareness while helming the vessel close to Swona Island. When he became aware of the situation it was too late, and he was unable to prevent the accident.

### 2.4 LOSS OF AWARENESS

The master was very familiar with the route and had worked on *Alfred* and its predecessor *Pentalina* for over 20 years, completing more than 20,000 trips between the north coast of Scotland and the Orkney Islands. On the day of the accident, as he had done many times before, the master adjusted the vessel's track to take it close inshore along the east coast of Swona Island. However, with the chief engineer working independently behind him at the bridge engine console and without a lookout to observe or assist him, the master was effectively navigating the vessel alone. The cause of the master's temporary loss of awareness, which is consistent with his discussion captured on the VDR after the accident, was almost certainly that he fell asleep.

The master's routine hours of work and rest complied with the Merchant Shipping (Hours of Work) Regulations 2002. His routine allowed him to rest while the vessel was in port and provided him with an uninterrupted 11 to 13-hour off duty period overnight. However, these regulations only applied when the master was on board the vessel and did not prevent the master joining *Alfred*, from leave, after only 5 hours of sleep at home. Just over 10 hours later, on the passage north from Gills Bay and having only had an opportunity to leave the bridge and relax while in harbour, it is highly likely that he was experiencing some fatigue. This fatigue, occurring during the post-lunch danger period (mid-afternoon circadian low), combined with sitting on a bright, warm, sunlit bridge completing a familiar low workload task, made the master susceptible to experiencing a short sleep of approximately 70 seconds duration. This could explain his late detection of the rapidly approaching shoreline and why there was insufficient time for him to take action to prevent the vessel grounding.

*Alfred's* SMS required a seaman to be on the bridge whenever the vessel was underway; however, in practice a seaman was routinely used, with the master's permission, to conduct maintenance tasks on deck. Additionally, the vessel had been fitted with a BNWAS. Both measures had the potential to prevent a dangerous situation by either: the seaman making the OOW aware of the unusual swing to port and their potential loss of awareness; or the BNWAS alerting other crew members to the lack of watchkeeper activity. Given the short duration of the master's loss of awareness it is unlikely that the BNWAS would have helped prevent the grounding. However, *Alfred's* BNWAS was rarely used, no direction on its use was included in the SMS and the master was not supported by a seaman on the bridge. Consequently, the master's loss of awareness and the developing dangerous situation went unnoticed.

The Pentland Ferries SMS did not contain a fatigue management plan despite the guidance in MGN 505 (M) Amendment 1 to this effect. As a result, there was no information on board *Alfred* to help the crew understand and manage the effects of fatigue and recognise the importance of being fully rested before joining the vessel.

## 2.5 PASSAGE PLANNING

*Alfred's* passage plan between Gills Bay and St Margaret's Hope comprised a series of navigational waypoints that allowed the master to route the vessel either east or west of Swona Island dependent on the tidal stream. The guidance in the company's SMS required the master to *select the best route* but did not define any further parameters for the creation of an acceptable passage plan. The only exception to this was on *longer voyages*, where the SMS directed that the passage plan should be in accordance with the ICS Bridge Procedures Guide.

*Alfred's* master had completed the IMO and type-specific ECDIS training. However, rather than make full use of the system's capabilities it had become normal practice to adopt a similar approach to the one he had used on board *Pentalina*. This procedure relegated *Alfred's* ECDIS to a situational awareness tool that only displayed the vessel's position and heading vectors. As a result, *Alfred's* ECDIS was not displaying the planned navigational route on the day of the accident. Additionally, the ECDIS routes were incomplete and did not include XTD or identify navigational hazards and no-go areas, which were recommended by the ICS Bridge Procedures Guide and taught during training. This meant that, even if the navigational route had been displayed, *Alfred's* ECDIS was not set up to alert the master to either the risk of grounding or other navigational hazards.

The lack of detailed passage planning meant there had been no formal assessment of a safe distance to pass Swona Island. In many areas it was the depth of water that defined the navigational limits of a passage plan; however, in the Pentland Firth, where the seabed topography allowed vessels to navigate right up to the coast of an island such as Swona, mariners still needed to establish a no-go area around navigational obstacles to maintain safe passage.

The factors to consider in determining the size of a no-go area included the vessel's intended speed and manoeuvrability. Although compliant with the company's SMS, the master's plan to take the vessel just 250m from the shore in an area with plenty of sea room was unsafe given *Alfred's* 280m turning diameter and 400m stopping distance. In particular, the plan ignored the charted eddies to the east of Swona Island and offered inadequate sea room to allow the bridge team to respond to any mechanical defects or other emergencies. While following the advice of the Admiralty Manual of Navigation that vessels should pass *at least 1.5-2 nautical miles* from the *steep-to* coast might not be appropriate when transiting the Pentland Firth, it highlights the need for vessels to pass a safe distance from navigational danger, even when there is sufficient under keel clearance.

*Alfred* was on passage from Gills Bay to St Margaret's Hope and, with inadequate SMS guidance, the master was using an inadequate passage plan that did not conform to the standards prescribed in the ICS Bridge Procedures Guide. Specifically, the passage plan lacked XTD information and had not identified no-go areas to ensure that the vessel passed a safe distance from navigational hazards. Similar to the *Commodore Clipper* grounding, the master was not making effective use of the ECDIS equipment to monitor the safe execution of the voyage and warn him when things were going wrong.

## **2.6 PASSAGE EXECUTION**

On the day of the accident *Alfred's* master was navigating the ferry very close to the islands of Stroma and Swona by eye; a route that he had followed many times before.

It is unclear why the master was following these inshore routes. However, given that this deviation from the passage plan was not the most direct route to St Margaret's Hope, it is probable that he wanted to show the passengers the scenery. Further, having completed over 20,000 crossings of the Pentland Firth without serious incident, it is likely that he had become desensitised to the associated risks of passing so close to navigational danger; a significant area of nonconformity that had not been identified during the vessel's many surveys, audits and inspections.

## **2.7 SURVEY, AUDIT AND INSPECTION**

*Alfred* had undergone annual company ISM audits and MCA surveys since entering service in 2019. Although each of these inspections identified shortcomings in the vessel's material condition and its processes and procedures, they did not assess the effectiveness of the vessel's passage plan or its execution.

The focus of the company's annual ISM audit conducted by the DPA was to assess a sample of the vessel's documented records and interview some of the crew to evaluate their understanding of the SMS procedures. The DPA used an aide-memoire as a guide during the inspection but this did not require them to comment on bridge operation. This meant that, despite the audit being conducted

while the vessel was operating between St Margaret's Hope and Gills Bay, the DPA made no assessment of the master's passage planning and execution. This may have been because the DPA was reluctant to disturb the master while he was operating the vessel; however, the aide-memoire did not require the auditor to assess these areas and there was no programme to conduct a navigational audit of bridge performance.

*Alfred* had also undergone annual MCA EU Class B Passenger Ship renewal surveys, but it was not until the MCA's post-accident general inspection that the vessel's passage planning, bridge manning and use of BNWAS were found to be deficient. This was partly because the MCA inspections were conducted when the vessel was alongside; however, similar to the ISM audit, while the surveyor's aide-memoire required inspection of the vessel's charts and nautical publications, it did not require the surveyor to confirm that the vessel had a prepared passage plan.

Neither the Pentland Ferries ISM audits nor the MCA annual surveys identified any flaws in *Alfred's* passage planning, bridge manning and operation of BNWAS. To some extent this was because neither inspection had previously assessed these aspects of vessel operation; however, given that passage planning and the correct operation of bridge equipment are critical to the safe operation of every vessel, it is essential that these are subject to assurance during the survey and audit processes.

## **2.8 EMERGENCY RESPONSE**

### **2.8.1 Shipboard**

*Alfred's* master at first tried to refloat the vessel by going full astern on the engines before informing Shetland that his vessel was in a "Mayday" situation. Seven minutes later he received the C/O's report that, with the exception of a very small amount of water in the port hull, the vessel's watertight integrity appeared intact. This information was received after he had made a broadcast informing passengers of the situation.

Attempting to move the vessel before the damage had been assessed was counter to the ICS Bridge Procedures Guide checklist for grounding/stranding, which sensibly advised seafarers to make sure *Appropriate manoeuvres made/engine(s) stopped until the situation is assessed*. The aim of this advice was to ensure that the condition of the vessel was fully understood before any attempts were made to refloat it, given that pulling a vessel off an obstacle prematurely could cause flooding into any exposed hull breaches.

It is unclear why *Alfred's* master immediately attempted to refloat the vessel. The most likely explanation is that he was in shock and without the intervention of other crew members his instinct was to try to resume the voyage as quickly as possible. However, attempting to refloat without knowledge of the vessel's watertight integrity risked flooding and increased the danger posed to passengers, crew and the environment. At the time of the accident the tide was rising and the sea was calm, meaning there was little risk of further damage to *Alfred* if it remained aground.

Once aground, *Alfred's* master did not follow the procedure described in the passenger safety video to alert the passengers and crew to the emergency. As a result, some passengers were confused by what had happened until they heard the master's announcement 7 minutes later. Additionally, the master's "Mayday" call



to HM Coastguard did not follow the recognised format for such a communication. These deficiencies might be explained by the lack of practical emergency drills conducted on board; a *walk and talk through* approach having been taken to weekly drills rather than full rehearsal. The crew's practical emergency performance had therefore not been externally assessed nor had the onboard emergency procedures and actions, which did not match those in the ICS Bridge Procedures Guide, been fully evaluated.

*Alfred's* crew marshalled the passengers and helped them to don their lifejackets as the incident progressed. The passengers generally reported that this phase of the emergency response went well; however, some passengers reported that the crew were unsure how to correctly use the SOLAS approved infant lifejackets provided for their babies.

The master's decision to disembark the passengers to the ALBs was sensible and the subsequent evacuation of the 42 passengers from *Alfred* to the Longhope ALB was well controlled by the crew of both vessels. However, as EU Class B domestic passenger ferries were not required to record the names of those on board, there was no record of those passengers who had remained on board and those who had been evacuated to the lifeboat. Given that there was an hour between *Alfred's* grounding and the transfer of passengers there was probably time for the crew to gather the names and contact details of everyone on board. Consequently, there was no opportunity to provide the coastguard and emergency services with information to support the rescue or pass on details of associated injuries. Further, the lack of a passenger list removed the opportunity to track the movement of individuals onto lifeboats or other search and rescue assets.

In summary, the initial emergency response by *Alfred's* master once the ferry was aground did not follow the procedures outlined on the passenger safety video or the actions listed in the vessel's SMS and initially led to some passenger confusion.

Further, the master's attempt to immediately pull the ferry off the rocks after grounding rather than waiting for the C/O to report the results of the hull inspection had the potential to place the ferry's passengers, its crew and the environment at further risk. Moreover, the need to keep the vessel in place until a full damage assessment had been completed was not reflected in the ferry's grounding/stranding checklist.

### **2.8.2 Company**

Some members of Pentland Ferries ERT ashore were new and unpractised in their roles. Although the ERT quickly contacted and offered support to *Alfred's* master, it did not instruct the crew to obtain passenger names, their contact details, the exact nature of any injuries, or whether they had been transferred to the lifeboat before the vessel berthed at St Margaret's Hope.

## **2.9 HARBOUR AUTHORITY OVERSIGHT**

*Alfred* entered Orkney Islands Council Harbour Authority's waters 2 minutes before it went aground. To assist the VTS operators monitoring the safe navigation of marine traffic within their area, the harbour authority had established a guard zone around Swona Island that would automatically alarm if a vessel was about to enter it. The VTS operators were aware that *Alfred's* master routinely entered this guard zone; however, they viewed the frequent transits of the ferry as low risk and did not monitor the navigational safety of the ferry's passage through their area.

It is therefore unsurprising that the VTS operators did not warn *Alfred's* master that he was entering the Swona guard zone on the day of the accident. Given that this guard zone is not marked on the navigational chart or referred to within the port's passage plan, it is possible the master was unaware he had entered the zone. However, if the VTS operators had challenged *Alfred's* master using the appropriate SMCP message marker, they may have alerted him to the risk he was taking, and possibly prevented the vessel grounding.

*Alfred's* master had held a PEC since 2004, thereafter completing a practical revalidation assessment every 5 years. However, while the 2019 revalidation involved a licensed harbour pilot observing the master's performance, it did not include an assessment of the master's passage plan or review his past navigational tracks. The opportunity to remind the master to keep *Alfred* clear of the Swona guard zone was therefore missed.

## **2.10 INJURIES AND DAMAGE**

### **2.10.1 Crew and passenger injuries**

Many of *Alfred's* crew and passengers were unexpectedly thrown to the deck when the ferry grounded at a speed of 13kts and over 40%<sup>28</sup> of those on board were injured, with 10 people sustaining serious injuries that meant they were unable to work for 72 hours or more. CCTV imagery showed passengers and crew being violently thrown to the deck and others somersaulting over benches.

*Alfred's* master became aware that the vessel was about to ground approximately 20 seconds before the ferry struck Swona Island. There was no opportunity to instruct everyone on board to brace for impact due to the master focusing on manoeuvring the vessel to prevent the grounding and the absence of a lookout on the bridge to assist him. Had such a warning been broadcast, it may have reduced the number and severity of the injuries sustained.

### **2.10.2 Vessel damage**

The grounding caused extensive external damage to *Alfred's* port bulbous bow. The impact also caused interior items such as part of the galley range, catering equipment and vending machines to break free from their welded mountings, which posed a risk of serious injury to the passengers and crew.

This damage revealed a need for Pentland Ferries to critically survey *Alfred's* internal fixtures, similar to the best practice promulgated by CLIA after the *Pacific Sun* incident, to ensure that heavy items were properly secured for sea.

### **2.10.3 Vehicle damage**

*Alfred's* CCTV imagery showed significant vehicle movement when the ferry grounded. This indicated that the crew had not ensured that vehicles were secured in accordance with the CSM, probably because the weather conditions were perceived as benign and little motion was expected. The CSM required crew to ensure that drivers left their vehicles in a high gear with the handbrake on. Further, the CSM also required lorries over 3.5 tonnes, like the one in **Figure 7**, to be secured using two lashings on each side of the vehicle. Additionally, the vehicle

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<sup>28</sup> The MAIB crew and passenger survey recorded that 41 of the 97 people on board reported being injured by the accident.

deck signs only directed drivers to apply the handbrake but did not advise them to leave their vehicles in a high gear. Consequently, although the ferry's structure was intact, in a similar manner to the *Stena Voyager* incident, almost all vehicles were damaged.

## 2.11 VOYAGE DATA RECORDER

*Alfred* carried a VDR despite the MCA exempting domestic passenger vessels from the EU requirement. This meant that investigators were able to access the data recorded to establish what had happened.

The evidence obtained from the VDR was fundamental to the investigation. Although VDRs do not prevent accidents the information recorded can be essential to enable accident investigators to understand the causes and circumstances in the event of one. The EU extended the international requirement for VDR carriage to all domestically operated passenger vessels in recognition of this<sup>29</sup>; however, this is not the case in the UK, where the 2013 MCA exemption for domestic passenger vessels remains in place.

Given the significant population potentially at risk while travelling on board UK domestic passenger vessels and the reduced cost of this technology, the MCA's 2013 dispensation allowing UK domestic passenger vessels to not carry VDRs deserves review.

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<sup>29</sup> EU Directive 2002/59/EC, as amended by 2011/15/EU (the Vessel Traffic Monitoring Directive), which included the proviso that Class B, C and D vessels can be exempted.

## SECTION 3 – CONCLUSIONS

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

1. *Alfred* grounded on Swona Island because the master experienced a temporary loss of awareness while helming the ship very close to shore and allowed the vessel's heading to swing towards the coast unchecked. When the master became aware of the vessel's predicament, he was unable to prevent the vessel striking the rocks at 13kts. [2.3]
2. It is almost certain that *Alfred's* master went to sleep for approximately 70 seconds immediately before the vessel grounded. This short sleep went unnoticed, and the master was neither awoken nor alerted because there was no bridge lookout and the BNWAS was switched off. [2.4]
3. The direction provided in the Pentland Ferries SMS on the construction of *Alfred's* passage plan between Gills Bay and St Margaret's Hope was inadequate and did not prevent the master navigating the vessel by eye, without the limits of safe navigable water being defined. As a result, ECDIS, which was *Alfred's* primary means of navigation, was not being used to support safe navigation and warn of danger. [2.5]
4. The master's significant experience on the route and the highly repetitive nature of *Alfred's* schedule between Gills Bay and St Margaret's Hope had probably desensitised him to the risks of transiting close to the shore. [2.6]
5. Despite the inadequate passage plan having been in place since *Alfred* entered service in 2019, this significant safety issue went undetected by annual company audits and MCA surveys. [2.7]
6. Orkney Islands Council Harbour Authority VTS operators did not raise the alarm when *Alfred* entered the harbour's warning area around Swona Island because they were used to the vessel following a variety of inshore routes and viewed the ferry as low risk. [2.9]
7. *Alfred's* master had held a PEC since 2004; however, Orkney Islands Council Harbour Authority's 5-yearly revalidation process did not assess the effectiveness of his passage plan nor review his previous navigational tracks. [2.9]

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

1. Once aground, the initial emergency response by *Alfred's* master did not follow the procedures outlined on the passenger safety video or the actions listed in the vessel's SMS leading to passenger confusion. [2.8.1]
2. The master attempted to manoeuvre the vessel off the rocks immediately after grounding, rather than waiting for the C/O to report the results of the hull inspection. The need to keep the vessel in place until a full damage assessment had been completed was not reflected in the grounding/stranding checklist. [2.8.1]

3. Despite the vessel being aground for over an hour neither the crew nor the Pentland Ferries ERT sought to obtain a nominal list of people on board, their injuries, or whether they had been evacuated to the lifeboat. [2.8.1, 2.8.2]
4. The number and severity of injuries suffered by *Alfred's* passengers and crew was almost certainly increased because they were not warned to brace for impact before the vessel grounded at a speed of 13kts. [2.10.1]
5. The impact of the grounding caused part of the galley range, catering equipment and other heavy items to break free of their mountings, risking injury to those on board. [2.10.2]
6. Almost all the vehicles on board *Alfred* were probably damaged by the impact of the grounding because they had not been secured in accordance with the vessel's cargo securing manual. [2.10.3]
7. The data from *Alfred's* VDR provided critical evidence that underpinned the investigation into this accident. [2.11]

## SECTION 4 – ACTIONS TAKEN

### 4.1 ACTIONS TAKEN BY OTHER ORGANISATIONS

The **Maritime and Coastguard Agency** has:

- In the immediate aftermath of the accident, conducted a Safety Management Certificate inspection of the vessel that resulted in it issuing a major nonconformity because the Pentland Ferries safety management procedures for bridge manning and passage planning were not being followed. This inspection also found that the SMS did not describe the use of the BNWAS.
- In light of its post-accident inspection, conducted an incognito inspection of another Pentland Ferries vessel while it was underway.

The **Orkney Islands Council Harbour Authority** has:

- suspended the master's PEC;
- updated its Pilotage Directions;
- reviewed its vessel traffic services;
- required ferry companies to implement approved pilotage plans for harbour waters; and,
- introduced a monthly audit of ferry movements within its waters.

**Pentland Ferries** has:

- Amended the company's SMS to improve: passage planning procedures; bridge manning; the use of the BNWAS; the quality and detail of emergency drills and exercises and the emergency response check-off cards; vehicle deck securing; the securing of interior heavy objects; and, the identification of passenger muster points.
- Fitted CCTV to *Alfred's* bridge to allow the external audit of bridge operations.
- Trained crew members in bridge resource management and the correct fitting of infant lifejackets.
- Created and implemented a fatigue management plan for its vessels.
- Introduced a programme of third party audits to ensure conformance with the safety management system.
- Amended the pre-sailing safety video to advise passengers to remain seated while the vessel is manoeuvring or operating close to land.
- Introduced emergency response bridge check off cards that include preplanned announcements.

## SECTION 5 – RECOMMENDATIONS

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

- 2024/107** Direct its surveyors to ensure that vessel passage plans have been loaded into ECDIS or drawn on to paper charts (as appropriate) in accordance with the vessel's safety management system.
- 2024/108** In a similar manner to the Cruise Lines International Association, issue guidance to the UK domestic passenger fleet on the need to secure heavy objects on board their vessels.
- 2024/109** Review the general exemption issued to UK domestic passenger vessels that removes the requirement for them to carry voyage data recorders.

**Pentland Ferries** is recommended to:

- 2024/110** Review its emergency response team procedures to ensure that it captures passenger details and injuries post-accident.

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

