ACCIDENT REPORT

Report on the investigation of the

contact between the high-speed passenger craft

Seadogz

and a navigation buoy, resulting in one fatality

in Southampton Water, England

on 22 August 2020

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 10/2023 DECEMBER 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."

NOTE

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.

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GLOSSARY OF ABBREVIATIONS, ACRONYMS AND TERMS

°	-	degrees
°C	-	degrees Celsius
ABP	-	Associated British Ports
A&E	-	accident and emergency
AIS	-	automatic identification system
BPA	-	British Ports Association
BS	-	British Standard
COLREGs	-	commonly used term for the International Regulations for Preventing Collisions at Sea, 1972 (see IRPCS)
CoP	-	Code of Practice
DfT	-	Department for Transport
DoC	-	Declaration of Conformity
EC	-	European Commission
ENG1	-	The standard medical fitness certificate for UK seafarers on seagoing vessels
GPS	-	global positioning system
GRP	-	glass-reinforced plastic
GTGP	-	*A Guide to Good Practice on Port Marine Operations* – issued to supplement the Port Marine Safety Code
hp	-	horsepower
HRO	-	Harbour Revision Order
HSC Code	-	International Code of Safety for High-Speed Craft, issued by the International Maritime Organization and applicable to high-speed craft engaged in international voyages with keels laid on or after 1 July 2008
HSPV	-	high-speed passenger vessel
HSPV Voluntary CoP	-	Commonly used short form descriptor for the *Passenger Safety on Small Commercial High Speed Craft & Experience Rides – A Voluntary Code of Practice*
IMO	-	International Maritime Organization
IRPCS	-	International Regulations for Preventing Collisions at Sea, 1972 (commonly referred to as the COLREGs)
ISM Code	-	International Safety Management Code
ISO	-	International Organization for Standardization

kg	-	kilogram
kts	-	knots
kW	-	kilowatt
m	-	metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MGN 280 (M)	-	Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards
MGN 436 (M+F)	-	Whole-Body Vibration: Guidance on Mitigating Against the Effects of Shocks and Impacts on Small Vessels
ML5	-	Seafarer medical report and certificate – an alternative to the ENG1 certificate, applicable for those employed on small commercial craft that operate no further than 60 miles from a safe haven
mm	-	millimetre
MSMS	-	Marine Safety Management System
MSN	-	Merchant Shipping Notice
MSN 1781		The Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations (1996)
nm	-	nautical mile
NtM No 57	-	Notice to Mariners No 57 of 2015 Port of Southampton – Safe Speed within the Port of Southampton Statutory Area
PBA	-	Passenger Boat Association
PCA	-	Professional Charter Association
PLA	-	Port of London Authority
PMSC	-	Port Marine Safety Code
RCD	-	Directive 2013/53/EU – Recreational Craft Directive
RIB	-	rigid inflatable boat
RNLI	-	Royal National Lifeboat Institution
RYA	-	Royal Yachting Association
SCC	-	Southampton City Council
SCV Code	-	Small Commercial Vessel and Pilot Boat Code, as annexed to MGN 280 (M)
SHA	-	Statutory Harbour Authority
SI	-	Statutory Instrument

SMS	-	safety management system
STR	-	STResearch Ltd
t	-	tonnes
the 1907 Act	-	Public Health Acts Amendment Act 1907
UKHMA	-	UK Harbour Masters' Association
UKMPG	-	UK Major Ports Group
UTC	-	universal time coordinated
VHF	-	very high frequency
VTS	-	vessel traffic services
WBV	-	whole-body vibration
YDSA	-	Yacht Designers and Surveyors Association Limited

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

Stock photograph, not taken on the day of the accident

Seadogz

FOREWORD

The tragic events that took place in Southampton Water on the morning of 22 August 2020 have had an unimaginable impact on all of those affected by the accident. The fact that a passenger excursion on a modern rigid inflatable boat being operated in favourable conditions by an appropriately qualified and highly experienced skipper could result in such terrible consequences is difficult to comprehend.

Two things are especially significant about this tragic accident in which 15-year-old Emily Lewis sadly died and the other passengers all sustained injuries, many of which were serious:

The first is that the accident would likely not have happened had the trip been conducted in line with industry good practice. All skippers of commercial high-speed craft are taught safe boat handling while gaining their qualifications, and there is no excuse for abandoning professional standards when undertaking a high-speed trip or experience ride.

The second is that passengers in small high-speed craft are very vulnerable to impact and vibration injuries. In the last 15 years, the MAIB has investigated numerous accidents involving high-speed passenger craft and made various recommendations to improve the safety of this sector. However, as yet, little has been done to provide proper protection to passengers and crew from these hazards that routinely result in life-changing injury and, occasionally, death.

I am therefore hoping that the maritime regulator, manufacturers and operators of small high-speed passenger craft will take the lessons from this report as a stimulus to action. As the report says, *this was an accident waiting to happen*. Let it be the last.

Captain Andrew Moll OBE
Chief Inspector of Marine Accidents

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SYNOPSIS

On 22 August 2020, the commercially operated rigid inflatable boat *Seadogz* hit a navigation buoy at high speed in Southampton Water, England. The skipper and the 11 passengers suffered impact injuries; two passengers were thrown into the water. Emily Lewis, a 15-year-old passenger who was sitting in the middle of the bench seat, was propelled forward into a handhold and sustained fatal injuries.

The passengers had booked a 60-minute rigid inflatable boat trip operating out of Ocean Village Marina, Southampton. After the accident the passengers were rescued by nearby recreational craft, taken back to the marina and transferred to hospital, where Emily sadly died that afternoon. The skipper drove the damaged rigid inflatable boat to a nearby boatyard and was later also taken to hospital.

The MAIB investigation concluded that the skipper did not see the buoy in sufficient time to take avoiding action as he had lost positional awareness, most likely due to the high mental workload associated with operating *Seadogz* alone at high speed near other marine assets. It also concluded that:

- The seating and handholds on *Seadogz* afforded little protection to the passengers in the event of the rapid deceleration.

- The boat's operator did not have a safety management system, while the risk assessments for the boat were cursory and generic.

- There were significant limitations in the regulations for small high-speed commercial passenger craft, with no specific requirements for factors such as crash protection, seat design, forward visibility and a safety management system. Further, the current regulations did not consider the intended operation or high-speed operations of a small commercial craft.

Recommendations have been made to the Maritime and Coastguard Agency to: conduct an anthropometric assessment of the design and operational requirements for the protection of passengers and crew on small commercial high-speed passenger craft; ensure the relevant outputs of the anthropometric assessment are, where appropriate, promulgated into guidance and incorporated as future requirements; and, to expedite the introduction of the Sport & Pleasure Vessel Code.

The British Standards Institution has been recommended to propose to the International Organization for Standardization that ISO 11591 is revised to include a field of vision requirement from the steering position of small craft. A recommendation has been made to The British Ports Association, UK Harbour Masters' Association, and the UK Major Ports Group to contribute to the development of guidance on the oversight of small commercial high-speed passenger craft operations in port areas. Associated British Ports Southampton has been recommended to ensure that its risk assessments consider the operation of small commercial high-speed craft within the port limits and agree the proper use of these craft with their operators. The manufacturer of *Seadogz*, Red Bay Boats Ltd, has been recommended to ensure that the design of the seats, handholds and restraints on its high-speed craft meet the latest relevant industry guidance and that the documentation provided to owners is accurate.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *SEADOGZ* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	*Seadogz*
Flag	UK
Certifying Authority	Yacht Designers and Surveyors Association Limited
IMO number/fishing numbers	Not applicable
Type	Rigid inflatable boat
Registered owner	Seadogz RIB Charter Limited
Manager(s)	Seadogz RIB Charter Limited
Construction	Glass-reinforced plastic hull with rubber inflatable tubes
Year of build	2012
Length overall	9.725m (9.5m recorded on Small Commercial Vessel certificate)
Minimum safe manning	1
Authorised number of passengers	12
VOYAGE PARTICULARS	
Port of departure	Southampton, England
Port of arrival	Southampton, England
Type of voyage	Passenger trip
Number of passengers	11
Manning	1 crew member
MARINE CASUALTY INFORMATION	
Date and time	22 August 2020 at 1011
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Southampton Water, England
Place on board	Deck
Injuries/fatalities	1 fatality, 11 other persons injured
Damage/environmental impact	Damage to hull, tubes, passenger seating and electrical system
Ship operation	On passage
Voyage segment	Mid-water
External/internal environment	Wind west-south-westerly force 4 to 5, with gusts of 25kts; rippled to slight seas; overcast with intermittent sunshine; good visibility
Persons on board	12

1.2 NARRATIVE

1.2.1 Pre-departure

At about 0645 on 22 August 2020, the skippers of the rigid inflatable boat (RIB) *Seadogz* and RIB *Jack Black* were at Ocean Village Marina, Southampton, England and began to prepare for the day's planned trips. The RIBs were commercially operated by Seadogz RIB Charter Limited.

After completing pre-departure routines, which included checking the engines, the engine trim and the pressure in the RIBs' buoyancy chambers, the skippers navigated the RIBs across Southampton Water to Hythe Marina Village **(Figure 1)**, arriving at about 0700, and refuelled their craft.

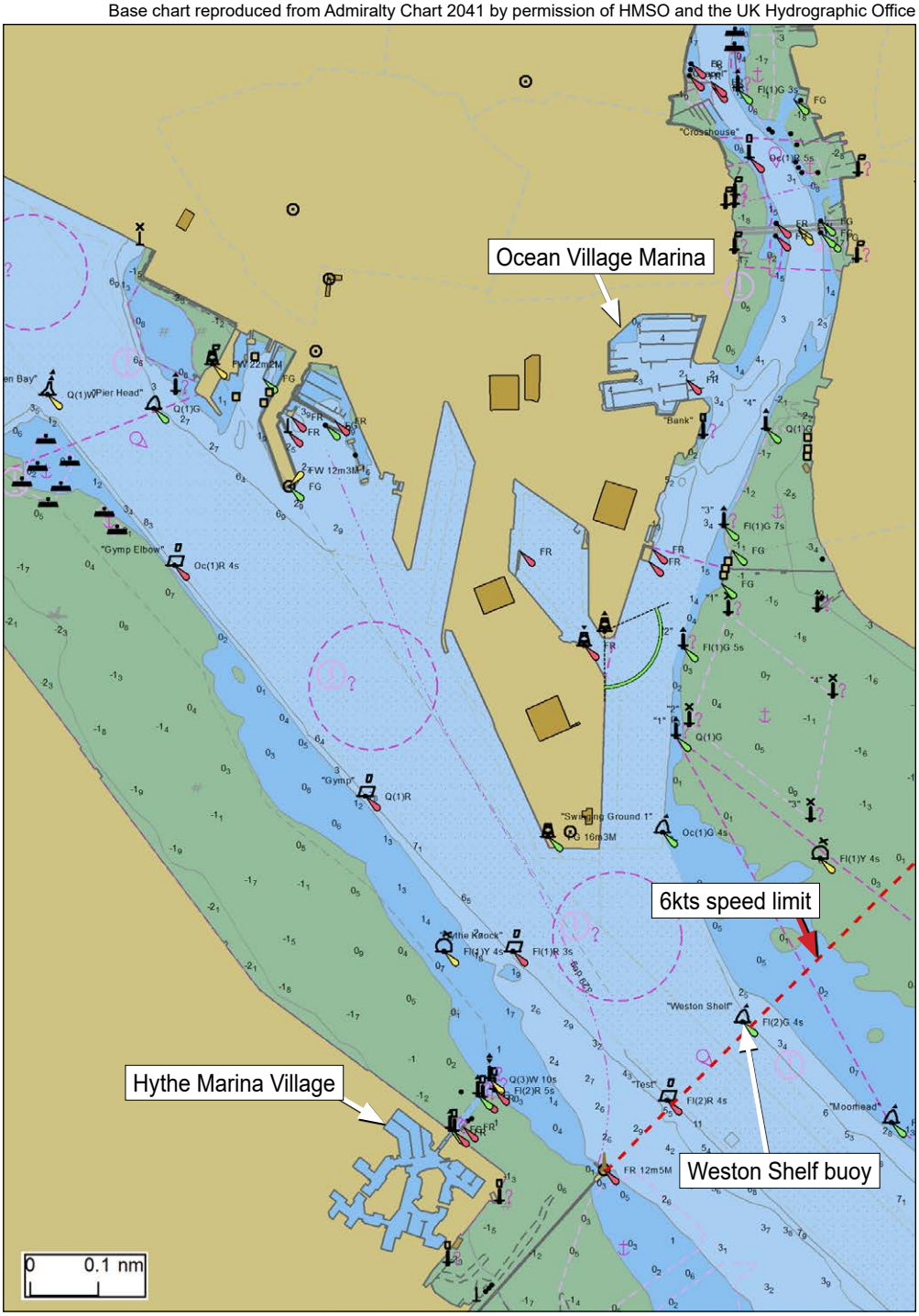

Figure 1: Chart extract showing locations of Ocean Village Marina and Hythe Marina Village

At about 0800, the RIBs returned to Ocean Village Marina, by which time two 'meet and greet' staff[1] had arrived at the Seadogz RIB Charter Limited meeting point in the car park to prepare the lifejackets in readiness for that day's customers.

By 0855, *Jack Black*'s passengers had arrived for their 90-minute excursion, which was scheduled to commence at 0900. As the skipper of *Seadogz* was about to start his first trip carrying passengers since the company's introduction of policies to minimise the risk of COVID-19 transmission, he watched the safety briefing delivered by *Jack Black*'s skipper. The first part of the briefing was conducted at the meeting point and during the briefing the customers began to arrive for the *Seadogz* trip, which was scheduled to begin at 0930 with a duration of 60 minutes; the next *Seadogz* trip was scheduled for 1030. Having completed the briefing, *Jack Black*'s skipper took his passengers, who were all now wearing lifejackets, down to the RIB at the pontoon.

By 0930, the 11 prebooked passengers for the *Seadogz* trip had all gathered at the meeting point. The group consisted of two families of four, a party of two and one individual passenger.

The skipper of *Seadogz* introduced himself to the group and talked briefly about the planned trip. He explained that the RIB would be limited to a speed of 6 knots (kts) until it passed the *second green buoy*, without elaborating on where this buoy was located, then the ride would be fast, with high-speed turns, reaching speeds of up to 40kts. The skipper also described the COVID-19 measures that were in place, including the availability of hand sanitisers, and that it was not mandatory to wear the available face masks.

The skipper of *Seadogz* then explained the features of the lifejackets, including that they would automatically inflate in water. He also demonstrated how to put the lifejackets on and how tight they needed to be, indicating that wearers needed to be able to get a fist between the chest strap and body. The passengers were then invited to sanitise their hands and put on a lifejacket. The COVID-19 social distancing policy implemented by Seadogz RIB Charter Limited meant that the skipper was unable to assist the passengers in donning the lifejackets unless he sanitised his hands and wore a face mask. He therefore visually inspected each passenger after they had donned their lifejacket. Finally, the skipper told the passengers that the RIB was *very fast* and that, if they felt uncomfortable during the trip, they should raise their hand and he would bring the craft to a stop.

The skipper then led the group to the pontoon where *Seadogz* was moored. The passenger seating comprised of nine cushioned jockey style seats[2] **(Figure 2a)** and one cushioned bench seat that could accommodate three passengers. After demonstrating how to sit astride the jockey seats **(Figure 2b)** and how legs were to be used to brace against any RIB motions, the skipper allocated the seating to the passengers, keeping the family groups together as far as possible. Three female passengers, comprising a mother and her two daughters, were assigned the bench seat, which the skipper deemed to be the safer seats as they were further back on the RIB and more sheltered. Once all the passengers were seated **(Figure 3)**, the skipper took a photograph[3] of the group on his company tablet.

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[1] Seadogz RIB Charter Limited 'meet and greet' staff welcomed the passengers on arrival and ensured that the required waiver had been completed.

[2] A saddle-shaped seat with a back rest commonly fitted on RIBs. The design is intended to enable a user to straddle the seat and use their legs to help support and steady their body.

[3] See **Figure 21**.

At 0946, the skipper started the engines, let go of all the lines, attached the engine kill cord[4] around his leg and manoeuvred *Seadogz* away from the berth. The RIB proceeded out of the marina and down the River Itchen into Southampton Water, mostly at speeds of between 6kts and 7kts.

Figure 2a: View of *Seadogz* looking aft

Image courtesy of T. Vining

Figure 2b: The cushioned seats on *Seadogz* and the skipper demonstrating how to sit on a jockey seat

[4] A device for stopping a boat's engine if the driver moves away from the controls.

Base drawing courtesy of Red Bay Boats Ltd

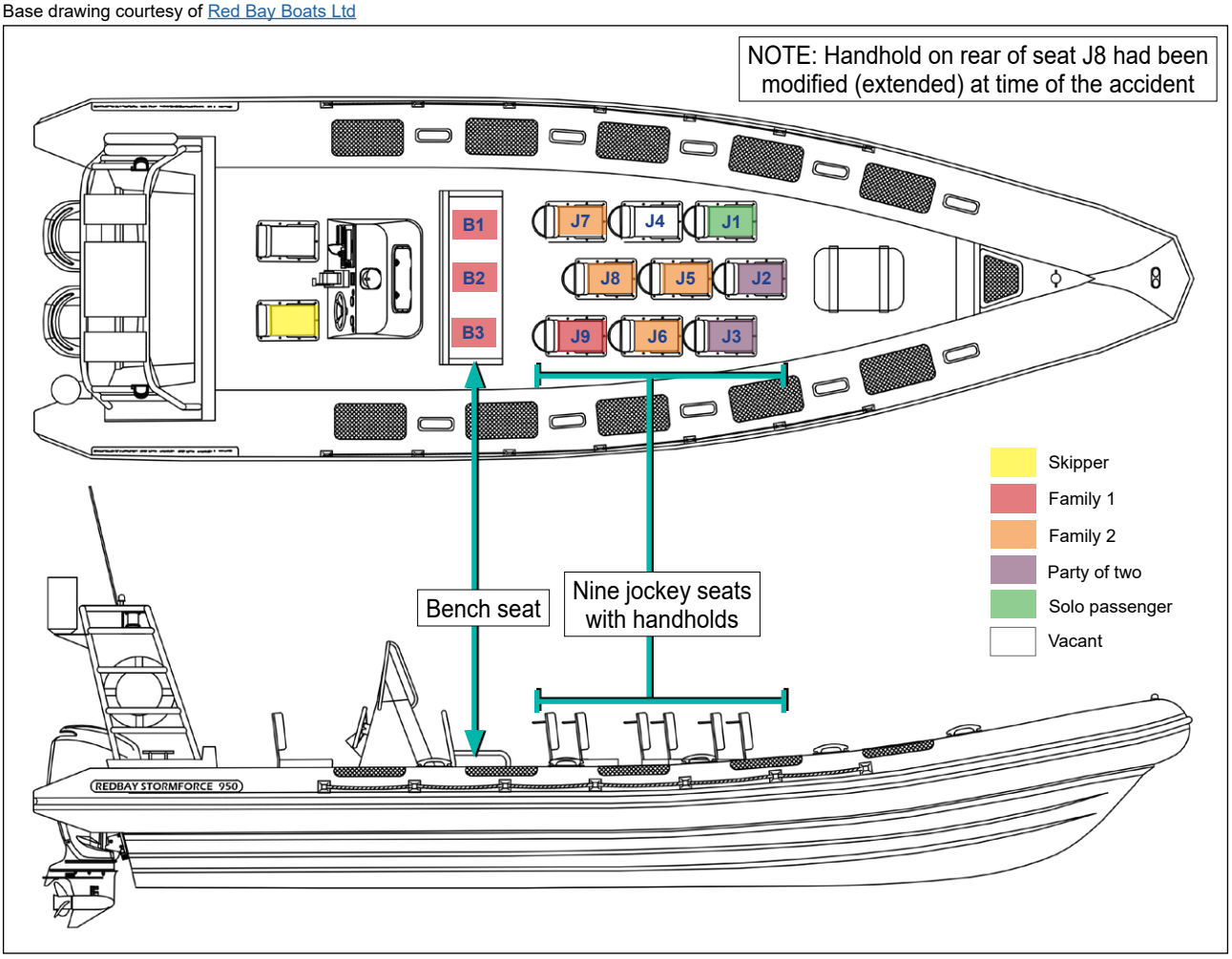

Figure 3: *Seadogz* general arrangement

1.2.2 The trip

As *Seadogz* approached the end of the 6kts speed limit area[5], the skipper accelerated the RIB and, at 0959, it passed the Weston Shelf buoy **(Figures 1** and **4)** at a speed of about 30kts. Once clear of the buoy, the skipper started playing loud music and maintained speeds of between 30kts and 40kts as he began conducting turns to port and starboard while generally proceeding in a south-easterly direction. At about 1000, the skipper initiated a turn to port of about 90° and passed within 15m of the North-West Netley buoy **(Figure 4)** at about 34kts. A short while later, the RIB passed the inbound *Jack Black* and the skipper of *Seadogz* made a tight turn to starboard then conducted a figure of eight turn, passing through its own wash. *Jack Black* continued towards the River Itchen to return to Ocean Village Marina, while *Seadogz* crossed to the western side of the channel at about 40kts and continued in a generally south-easterly direction down Southampton Water.

At 1002:27, *Seadogz* passed close to the Lains Lake buoy at a speed of about 44kts. After passing the buoy, the skipper entered a turn to port of about 70° at 39kts before turning back to starboard and continuing a south-easterly heading. *Seadogz* then crossed the channel to the east side at speeds of up to 47.8kts before, at 1004, entering a figure of eight turn at about 40kts, passing very close to the Greenland and Cadland buoys **(Figure 4)**. The RIB then headed in a north-westerly direction back towards Southampton, reaching speeds of up to about 44kts. On the track northwards, the skipper made close approaches to several buoys and zig-zagged across the main channel.

[5] As shown in **Figure 1**, this area was to the north of a line drawn from Hythe Pier through the Weston Shelf buoy to Weston Shore.

Base chart reproduced from Admiralty Chart 2041 by permission of HMSO and the UK Hydrographic Office

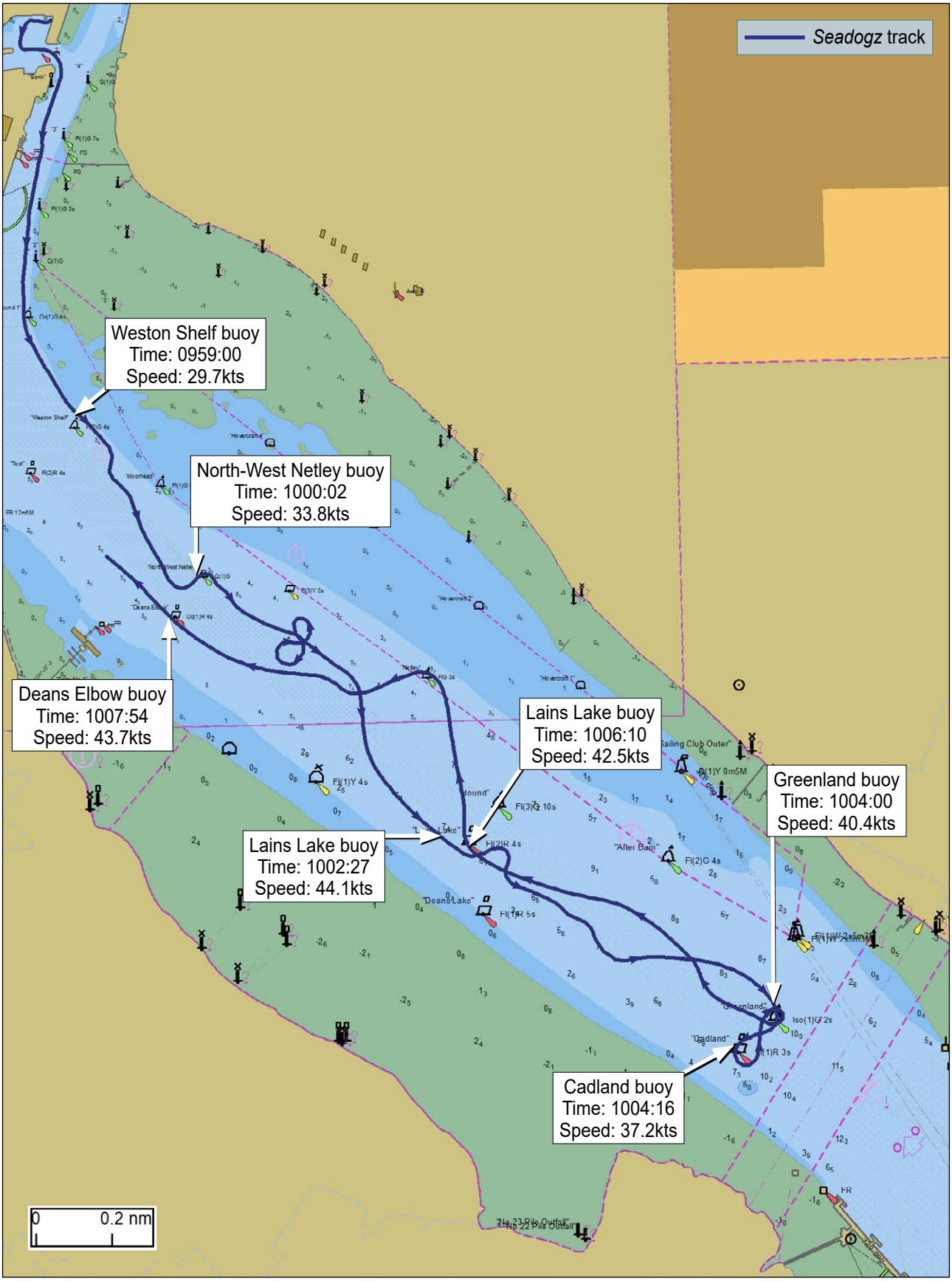

Figure 4: Plotted track of *Seadogz* in Southampton Water between 0959 and 1008

1.2.3 The impact

At 1008, *Seadogz* passed the roll-on/roll-off passenger ferry *Red Falcon*, which was proceeding on a south-easterly course down Southampton Water bound for Cowes, Isle of Wight. *Seadogz* crossed the ferry's wake four times at speeds of between 28kts and 37kts **(Figure 5)**, causing the RIB's bow to rise and fall in the wake occasionally slamming and creating spray. Before crossing the wake again, the skipper overtook *Red Falcon* on the ferry's starboard side and then, at 1010:37, turned away tightly to starboard. At 1010:55, *Seadogz* continued to exit the turn at a speed of 33.1kts and then steadied on course, with the North-West Netley buoy directly ahead. At 1010:59, *Seadogz* passed astern of *Red Falcon* for the fifth time **(Figure 6)** at a speed of 32.7kts. It then accelerated on an almost steady easterly heading with the bow rising and falling several times **(Figure 7)** until, at 1011:09, it made a heavy head-on contact with the North-West Netley buoy **(Figure 8)** at a speed of 38.4kts (44.2mph). The skipper pulled both engine throttles back to idle at around the time of the impact.

1.2.4 Post-impact

The force of the impact momentarily knocked the buoy over to an almost horizontal orientation **(**see **Figure 8**, stills 4 and 5**)** and briefly threw the bow of *Seadogz* upwards, while the starboard engine stopped. The deceleration forces caused all the passengers to be thrown violently forward from their seats and the skipper, who was standing, to be thrown forward into the steering console. Two of the passengers seated in the front row of jockey seats were thrown out of the RIB and into the water, where their lifejackets inflated automatically. One of the passengers in the water was a non-swimmer and quickly became distressed when her lifejacket, which had been poorly fitted, lifted over her head. The male passenger in the water went to her assistance.

The passengers of *Seadogz* suffered numerous injuries and it was immediately apparent that the passenger who had been sitting in the middle of the bench seat, 15-year-old Emily Lewis, had been seriously injured and was struggling to breathe.

The skipper had sustained a knee injury, and his safety helmet had struck the helmsman's console. The visor on the helmet detached at some point during the impact, and both the visor and helmet were scratched.

Shortly after the impact, and thinking that the starboard engine of *Seadogz* was damaged, the skipper used the port engine to manoeuvre the RIB back towards the people in the water adjacent to the North-West Netley buoy. The skipper incorrectly identified the buoy as the Hound buoy, a starboard hand channel marker, almost 1 nautical mile (nm) to the south-east.

1.2.5 Emergency response

Two recreational vessels, the RIB *Sail Force 1* and the yacht *Heartbeat*, had been a short distance away from North-West Netley buoy, and their crews had witnessed the accident and immediately proceeded to help. *Sail Force 1* reached the scene about 35 seconds after the impact **(Figure 9)**, followed shortly afterwards by *Heartbeat*. The crew on board *Sail Force 1* recovered both of the *Seadogz* passengers from the water. The female passenger remained on board *Sail Force 1*, while the male passenger was transferred back on board *Seadogz*. The crew of *Sail Force 1* and the male passenger who had been rescued from the water then began to assist the injured passengers on board *Seadogz*.

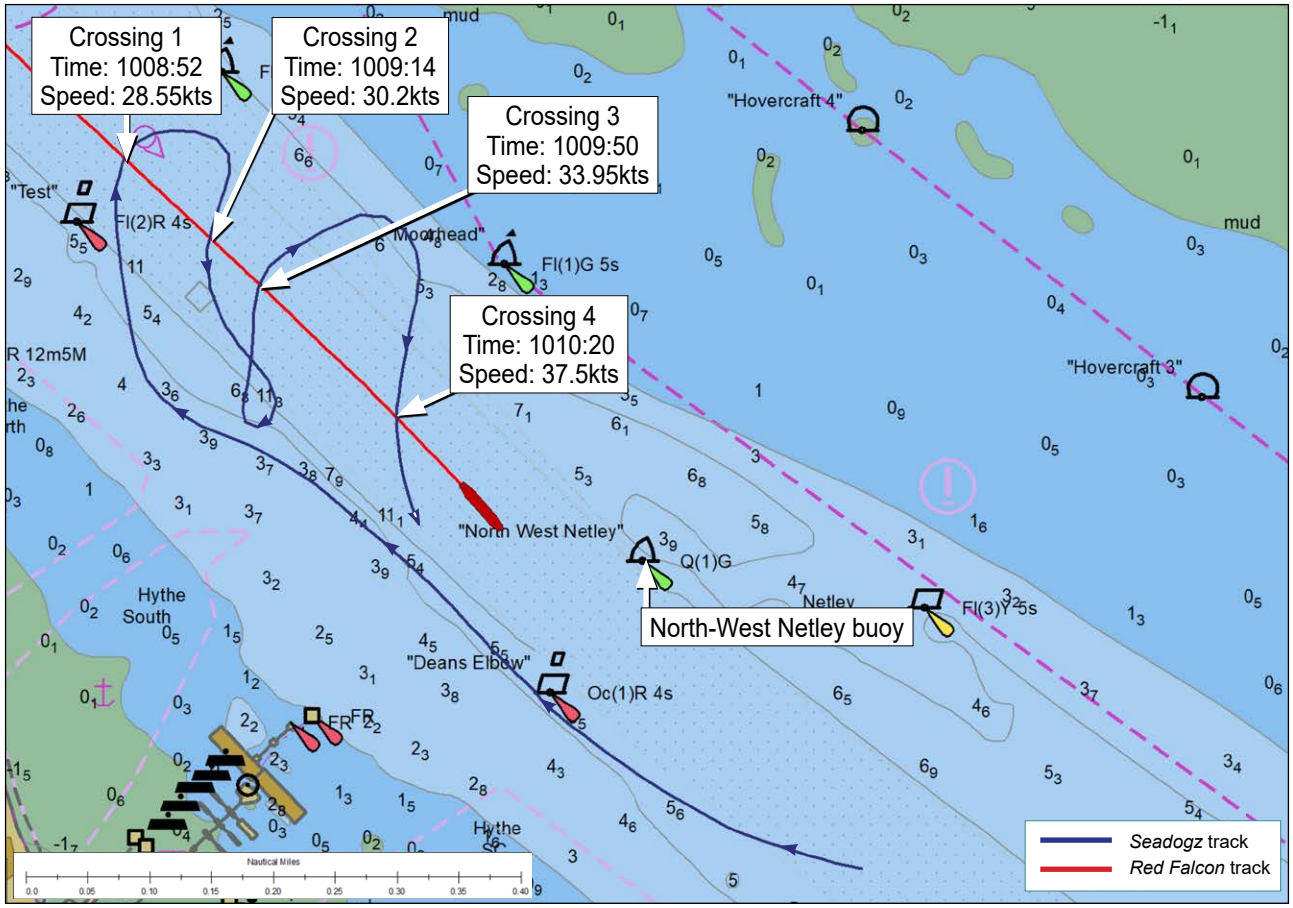

Figure 5: Track of *Seadogz* crossing the wake of *Red Falcon* the first four times

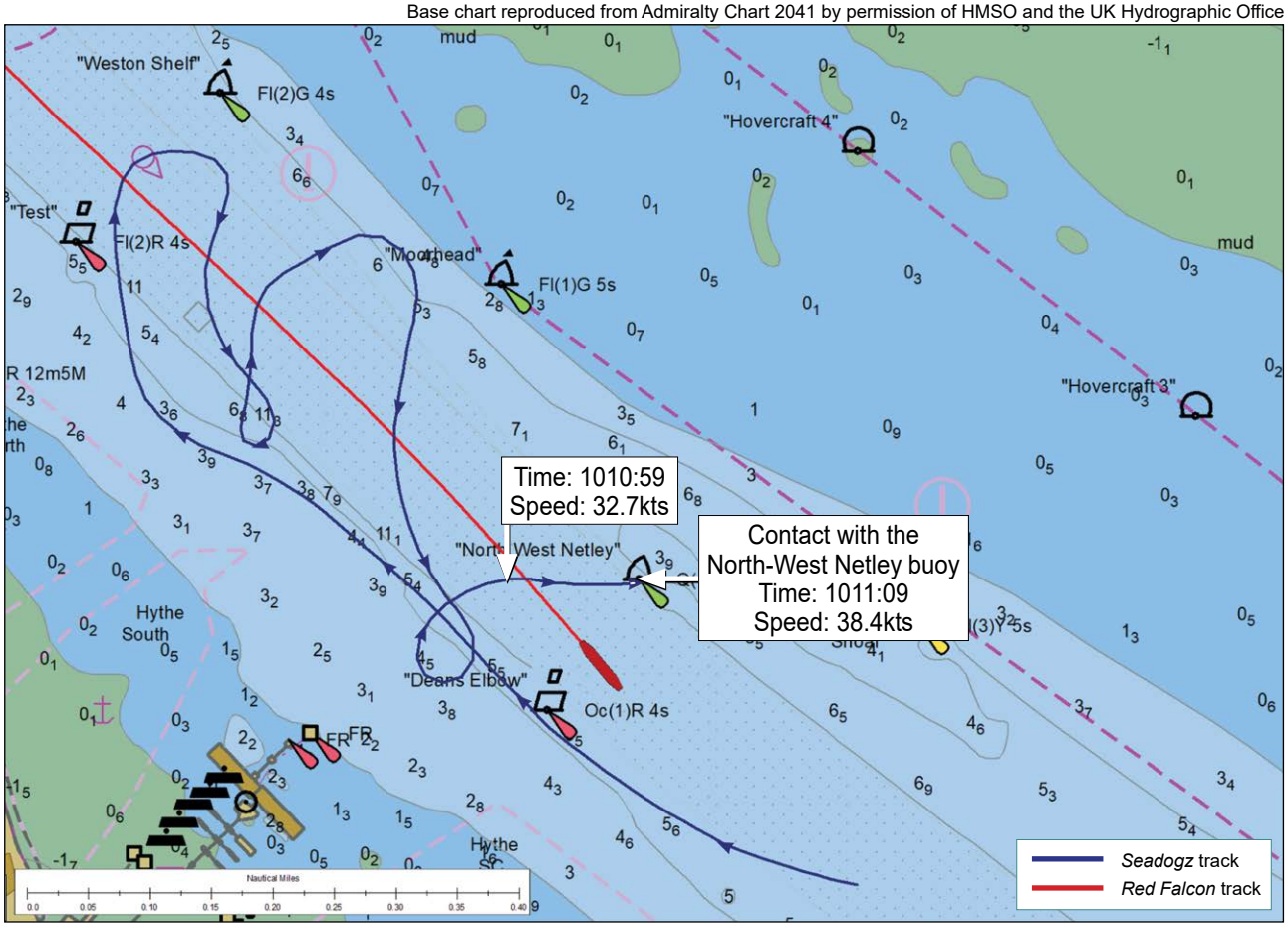

Figure 6: Track of *Seadogz*, showing the final turns before making contact with the North-West Netley buoy

Stills courtesy of Red Funnel CCTV footage

Figure 7: View from the starboard stern area on *Red Falcon* looking aft, showing *Seadogz* crossing *Red Falcon*'s wake for the fifth and final time and the bow motion of *Seadogz* during this period

Stills courtesy of H. Tuck phone footage

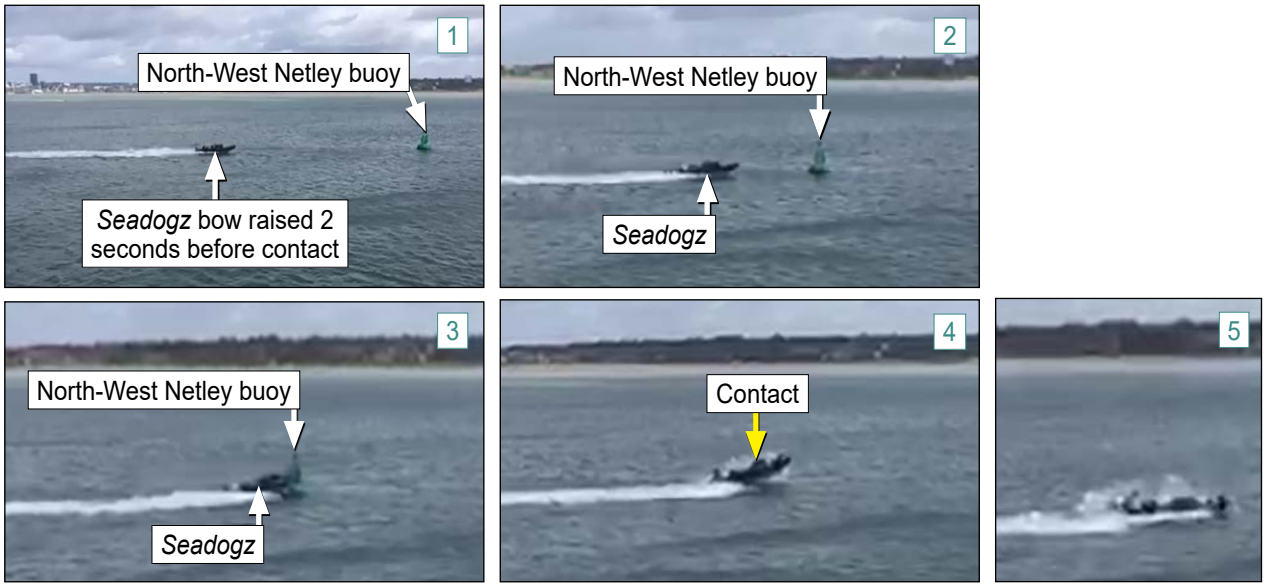

Figure 8: View from port side of *Red Falcon*, showing *Seadogz* running towards and making contact with North-West Netley buoy

Still courtesy of H. Tuck phone footage

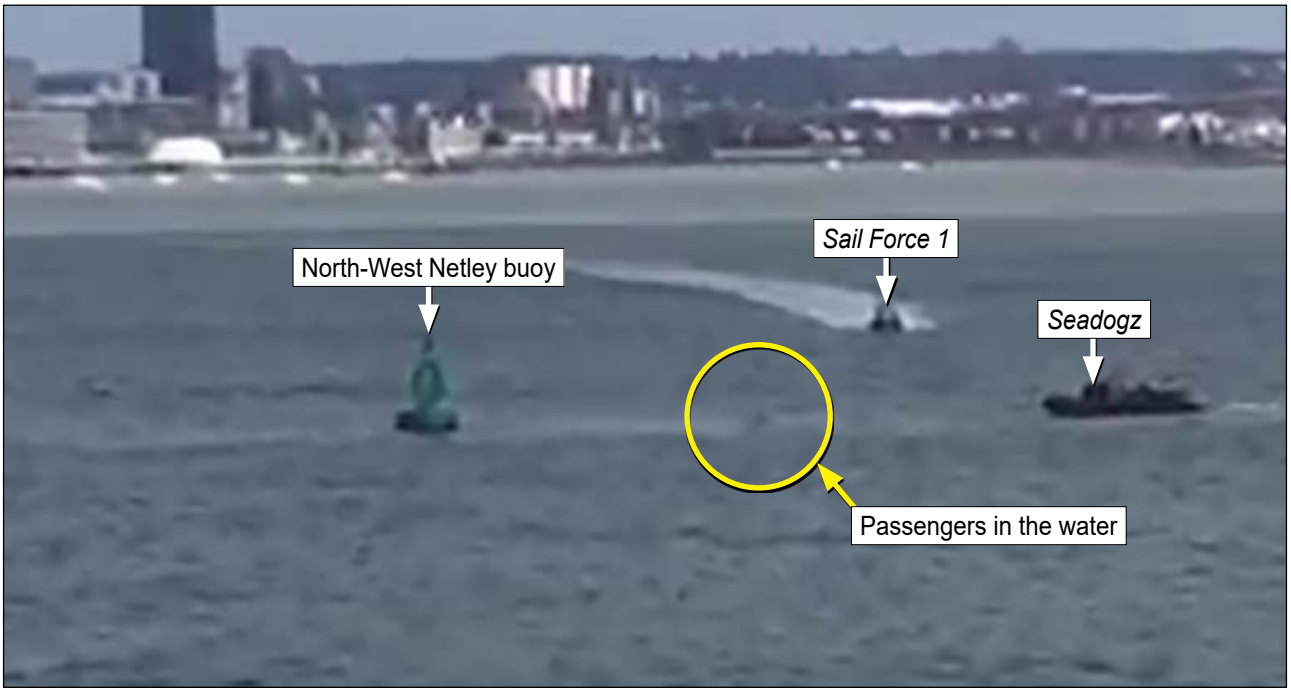

Figure 9: View from port side of *Red Falcon*, showing *Sail Force 1* arriving on scene and *Seadogz* returning to people in the water about 35 seconds after hitting the buoy

At 1012:31, the bridge team on board *Red Falcon* reported to Southampton vessel traffic services (VTS) on very high frequency (VHF) radio channel 12 that there were persons in the water. The crews of both *Sail Force 1* and *Heartbeat* made several calls to Solent Coastguard on VHF channel 16, which were answered at 1018:43.

Some of the electrical systems on *Seadogz* had failed due to the impact, including the VHF radio. At 1016:23, the skipper contacted the owner of Seadogz RIB Charter Limited on his mobile phone and spoke for 2 minutes, explaining that the RIB was badly damaged.

Seadogz was taking on water and, after discussion between the passengers and the skippers of *Seadogz*, *Sail Force 1* and *Heartbeat*, it was decided to take all the passengers ashore on the assisting RIB and the yacht. *Sail Force 1* took four people: Emily Lewis, her sister and mother, along with the female passenger who had been recovered from the water. The remaining passengers, including Emily's father, transferred to *Heartbeat*. The skipper of *Seadogz* remained on board the RIB and started a slow passage back to harbour.

At 1024:07, the skipper of *Sail Force 1* called Solent Coastguard to explain he was taking four casualties, including a girl with breathing difficulties, to Ocean Village Marina, and requested an ambulance to meet the boat on arrival. Two minutes later, the coastguard tasked the independent Hamble Lifeboat, which was already on the water with a paramedic on board, to attend and give assistance. At 1028, the skipper of *Seadogz* used his mobile phone to report the accident to Solent Coastguard. Shortly afterwards, at 1032, *Sail Force 1* reported to the coastguard that it had arrived at Ocean Village Marina. At 1035, the coastguard contacted the ambulance service and was informed that the nearest ambulance was 2 minutes away. The first ambulance was dispatched to the scene at 1036, arriving at 1040. Shortly after this, the Hamble Lifeboat arrived at Ocean Village Marina and its crew started to assist the ambulance service with triaging the casualties.

At about 1048, *Heartbeat* arrived at Ocean Village Marina. The Calshot Royal National Lifeboat Institution (RNLI) Atlantic 85 and D-class inshore lifeboats also subsequently arrived at Ocean Village Marina to help. At 1118, after the first

ambulance had taken Emily to hospital, a second ambulance arrived. Once the triage and initial treatment had been completed at the scene, all the passengers were transferred to hospital for further assessment and treatment.

Accompanied by a Port of Southampton patrol boat, the skipper of *Seadogz* took the RIB to a local boatyard, where the craft was lifted out of the water. The skipper was then transferred to Ocean Village Marina by the patrol boat, from where he was also taken to hospital.

At 1415, Emily Lewis was declared deceased at Southampton General Hospital.

1.3 ENVIRONMENTAL CONDITIONS

The accident occurred in daylight in good visibility. The weather was overcast with bright spells; at the time of the accident, the sun was at an altitude of about 35° and an azimuth[6] of about 118°. The wind was 17kts from the west-south-west, with gusts of 25kts, while the sea state was calm in the marina, increasing to between rippled and slight in Southampton Water. The air temperature was 18°C and the sea temperature was 16°C. The predicted high water was 4.76m at 1406, while the observed tidal height at the North-West Netley buoy at the time of the accident was 3.01m.

1.4 CREW AND PASSENGERS

1.4.1 The skipper

The skipper of *Seadogz* was 53 years old and had been employed by Seadogz RIB Charter Limited on a part-time basis for about 8 years. He had not undertaken any passenger trips on *Seadogz* during 2020, but had skippered it during a commercial charter in Cornwall a couple of weeks before the accident.

The skipper had previously worked as an RNLI mechanic and coxswain, and as a VTS operator at Southampton. He was also the principal of his own Royal Yachting Association (RYA) recognised training centre and held various RYA certificates appropriate for the operation of *Seadogz*, including:

- RYA Advanced Powerboat Course completion certificate
- RYA Yachtmaster Offshore Sail and Power certificates of competency (both commercially endorsed)
- RYA Professional Practices and Responsibilities

The skipper also held the following instructing qualifications:

- RYA Yachtmaster Instructor (Power)
- RYA Advanced Powerboat Instructor
- RYA Shorebased Navigation Instructor
- RYA First Aid Instructor

The skipper had obtained his RYA Advanced Power Boat course completion certificate prior to 2005 and was therefore eligible to have it commercially endorsed rather than having to undertake the Advanced Powerboat Certificate of Competency examination (see section 1.15).

[6] The horizontal position of an object in the sky, expressed as an angular distance from the north.

The skipper held an ML5 fitness certificate[7]. He had amblyopia[8] in his left eye, which required spectacles to correct. The spectacles that he was wearing at the time of the accident had photochromic[9] lenses. He was 1.655m tall.

The skipper had risen at 0500 on the day of the accident, having gone to bed early at 2100 the previous evening, and felt well rested.

The skipper was wearing a lifejacket and a dry suit. Before *Seadogz* departed from the marina, he donned an open-faced marine safety helmet, similar to the helmets worn by RNLI crew. The helmet incorporated a liner, which could be inflated or deflated by the user through an oral valve to enable a good fit. A transparent polycarbonate visor was attached to the helmet by 'quick-release' studs. Before the accident, the visor was down and in use; it was free of scratches, marks or any surface accumulation obscuring visibility. The skipper was wearing a face mask in addition to his vision-correcting spectacles **(Figure 10)**.

Image courtesy of *Seadogz* skipper

Figure 10: The skipper wearing a mask, tinted spectacles and a helmet with a visor on the day of the accident

The skipper sustained a dislocated and broken patella during the impact. A blood test conducted on the skipper following the accident did not detect any trace of alcohol or recreational drugs. He was not taking any prescribed medication prior to the accident. Medical tests conducted following the accident did not identify any indication that the skipper had either experienced a sudden temporary loss of, or disturbance to, his vision, or a sudden temporary partial loss of consciousness prior to the accident.

1.4.2 The passengers

As indicated at section 1.2.1, the *Seadogz* passengers were comprised of four separate groups. Some of the passengers had completed a similar RIB trip before and the solo passenger had previously experienced a tour with Seadogz RIB Charter Limited.

All of the passengers suffered physical injuries as a result of the impact with the buoy, with varying degrees of severity. The three passengers seated on the bench seat were among the most severely injured. **Table 1** details the injuries sustained and the seating position of those on board *Seadogz*, using the seat references in **Figure 3**.

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[7] The ML5 fitness certificate follows similar criteria as the ENG1 medical fitness certificate for UK seafarers on seagoing vessels, but is applicable for service on non-seagoing vessels.

[8] Impaired or dim vision with no discernible damage to the eye or optic nerve.

[9] Changing colour with intensity of incident light, such as bright sunlight. The lenses darken on exposure to this light to protect the eyes. In the absence of activating light, the lenses return to their clear state and are often referred to as light-reactive lenses.

Seat	Age	Gender	Height (cm)	Position of feet on deck	Position relative to seat	Injuries
J1	27	Male	186	Flat	Legs slightly bent with some weight being taken on the knees.	Cut inner mouth; severe bruising on the inside of the legs; minor cuts and bruises elsewhere. Experienced pains in the chest (caused by the lifejacket). Admitted to hospital later in the year due to suspected Costochondritis[10] caused by the lifejacket.
J4	Seat not occupied					
J7	17	Male	189	Flat	Sitting astride the seat with back against the back rest, braced for impact with the buoy.	Small cut to hand.
J2	56	Female	160	On balls of feet	Sitting astride the seat, facing forward.	Distal radius fracture and fracture of the ulnar styloid of left wrist; spinal Injury – fracture of T11 vertebra; fracture of proximal head of fibula – right leg; severe bruising of right thigh. Generalised bruising on arms, abdomen and left leg.
J5	53	Female	170	Flat	Standing astride the seat, back against backrest.	Closed fracture, right forearm (radius), left cuboid.
J8	49	Male	183	Flat	Standing astride the seat, clamped with thighs, back against backrest.	Ligament damage to right thumb; heavy bruising to thighs.
J3	54	Female	170	Flat	Sat astride the seat with some weight on the knees.	5 fractured ribs on the left side (2nd to 6th ribs) anteriorly; small to moderate volume pneumothorax and surgical emphysema in the chest wall; Bibasal atelectasis[11]; slight chipping of a tooth; bitten tongue; bruising on arms and to right hand; deep bruising on right-hand side of abdomen; very deep tissue bruising to the whole of right thigh; right knee damage; grazes to the back of right calf.
J6	13	Male	175	Not able to reach deck when sitting	Standing astride the seat with back against backrest.	Bruising to chest and chin; pains in chest and abdomen.

[10] Inflammation where the ribs join the breastbone, causing sharp chest pain when moving or breathing.

[11] Partial collapse of the lungs.

Seat	Age	Gender	Height (cm)	Position of feet on deck	Position relative to seat	Injuries
J9	47	Male	182	Flat	Sat astride the seat with some weight on the knees, holding on to the hoop.	Soft tissue damage to right knee and wrist; bruising and a lump on the left side of jawbone; lump on the left side of head, just above the hairline.
B1	52	Female	165	Unknown	Perched on the edge of the bench seat with some weight on the knees. Sat forward in order to reach the handhold hoop. Holding on to the extended handhold to the rear of J7 with left hand, right hand was on handhold to the rear of J8.	Displaced broken right wrist; compound fracture to left tibia; 10cm cut to shin; broken ribs on the left; bruising in many areas.
B2	15	Female	159	Unknown	On edge of seat, sitting forward. Holding onto the extended handhold to the rear of J8.	Fatal injuries associated with transection of the liver.
B3	18	Female	165	Flat	Sat towards the front of the bench seat to absorb the impacts with legs and to reach the handhold hoop. Holding on to the extended handhold to the rear of J9 with right hand, left hand was on handhold to the rear of J8.	Displaced break of the left humerus; fractured left wrist; multiple bruises.

Table 1: Postural positions and injuries sustained by the passengers on board *Seadogz*

After the accident, some of the passengers described the RIB's speed as having been very fast and some reported that they had felt on the edge of their comfort zone. Some passengers also stated that they had observed the North-West Netley buoy in the moments before the impact, but none were willing to let go of the handhold to indicate to the skipper that they were uncomfortable.

1.4.3 Emily Lewis

Emily Lewis was 15 years old and it was her first time on board a RIB. Her parents had previously experienced a RIB ride and had booked the *Seadogz* trip as a surprise for their daughters.

Emily had been assigned the bench seat, along with her mother and sister, and had seated herself in the central position (B2). The postmortem report stated that the cause of her death was transection of her liver, and that the injury was not survivable.

1.5 SEADOGZ RIB CHARTER LIMITED

1.5.1 General

The owner of Seadogz RIB Charter Limited had founded the company in 2010. The company initially operated from the slipway at Calshot, Southampton but also undertook passenger trips out of Cowes, Isle of Wight. In 2012, the company moved to Ocean Village Marina and began operating in the Solent using two RIBs, *Seadogz* and *Jack Black* (see section 1.5.4).

The company's primary business was to offer a variety of high-speed excursions, with titles such as: *Extreme RIB Experiences*; *Treasure Hunts*; and *Corporate Team Building Events*. The RIBs were operated singularly, together, or with a motor cruiser hired in from another company. The 60-minute *RIB Taster Excursion* that had been booked by the passengers was the shortest tour offered.

1.5.2 Crewing

With the exception of the owner of Seadogz RIB Charter Limited, the skippers used by the company were employed on a part-time basis. New skippers were assessed for their boat handling skills before they were permitted to conduct trips, with the assessment made by either the owner or the lead skipper, who had assisted the owner in setting up the company. The company had initially conducted trips with a skipper and additional crew member but, some years before 2020, this practice had ceased due to a lack of available personnel.

1.5.3 Safety management

Seadogz RIB Charter Limited did not have a safety management system (SMS), a written health and safety policy or written operational procedures. In June 2010, Seadogz RIB Charter Limited had completed a method statement and risk assessment **(Annex A)** for its operations; this had last been revised in April 2020. The risk assessments neither considered the risk of an impact or collision during a RIB experience ride nor the appropriate manning of the RIBs.

The company had also developed *Safety Brief Notes* **(Annex B)** that detailed the safety briefing skippers were required to complete before commencing each trip. Skippers did not routinely consult the document and instead conducted the brief from memory.

A COVID-19 risk assessment document **(Annex C)** had been produced in April 2020, which required staff to don a face mask and sanitise their hands before assisting passengers. The COVID-19 risk assessment contained the following statement:

> ***Nb. It is important the fitting procedure is carried out correctly to avoid the added risk of improperly fitted jackets.*** [sic]

The *Safety Brief Notes* and risk assessments were not always made available to the skippers, and had not been made available to the skipper of *Seadogz* before the trip when the accident occurred.

1.5.4 *Jack Black*

Jack Black was a 9.0m PRO RIB designed and manufactured by Ribcraft Ltd in 2010. It featured a similar seating arrangement to *Seadogz*, with a rear helmsman's console. The two jockey style crew seats were located aft of the console and were fitted to a raised plinth[12], along with the console.

[12] See **Figure 29**.

1.6 *SEADOGZ*

1.6.1 Construction

Seadogz was designed and manufactured in the UK by Red Bay Boats Ltd in 2012. It was the fourth 9.725m Stormforce 950 RIB that the company had constructed based on the design and layout of its 10.5m RIB, and incorporated a high sheer bow, deep v-shaped glass-reinforced plastic (GRP) hull and inflatable Hypalon[13] rubber tubes with seven buoyancy chambers. The RIB had a maximum power rating of 750 horsepower (hp) and was equipped with twin 300hp Yamaha outboard engines that, when first fitted, could drive the craft at speeds of up to 55kts.

The nine jockey-style passenger seats, with back rests, on board *Seadogz* **(Figures 2a, 2b** and **3)** were positioned in a staggered format in front of a bench seat **(Figures 2b** and **11)** that was capable of accommodating three passengers. The cushioned seats all acted as covers for storage lockers **(Figure 2a)**; these were secured in place and closed at the time of the accident. The bench seat was positioned immediately forward of the helmsman's console and its cushioned seat and back rest also had shallow moulded contours to indicate the seated positions for three people. Two further jockey style seats were located aft of the console for the skipper and a further crew member. All of the seats and the console were fixed to the single level platform deck.

A semicircular handhold was connected to the back of the seat directly in front of each passenger seat, apart from the handholds for the front row of jockey seats that each had a handhold fitted to the front of the seat itself **(Figure 12)**. Although not shown in the seating arrangement drawing provided by the manufacturers **(Figure 3)**, the handhold in front of the central position (B2) on the bench seat was extended due to the staggered arrangement of the jockey seats **(Figure 13)**. All of the handholds were constructed from stainless steel tube with a round profile. Tape had been wrapped around the handholds to facilitate an individual gripping them. No cushioning or padding was fitted to the handholds or the rear of any of the seats.

Stainless steel handholds were located either side of the helmsman's console for the two crew seats behind the console. No tape or padding was fitted to these handholds. The console had a curved transparent plastic windscreen fitted to its front. The outer curved sections of the windscreen were missing at the time of the accident **(Figures 2b** and **14)**, having previously been removed after they became damaged. The remaining section of the console windscreen was reported to be free of scratches, marks or any surface accumulation obscuring visibility.

The steering wheel was fitted on the starboard side of the console **(Figure 14)** with the twin engine throttles in the middle. The console also housed a global positioning system (GPS) chart plotter; magnetic compass; engine start/stop buttons; kill cord connection; bilge pump control; and a Digital Selective Calling VHF radio. An aide-memoire was posted beneath the VHF radio providing generic instructions on how to carry out emergency communications such as make a "Mayday" distress call. The aide-memoire had not been completed with specific details, such as the RIB's name and callsign. *Seadogz* did not have an automatic identification system (AIS)[14] receiver or transmitter.

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[13] A brand name created by DuPont Performance Elastomers for chlorosulfonated polyethylene. The material is used extensively in the manufacture of RIBs due to its mechanical strength and resistance to ultraviolet light.

[14] An automated system that enables the exchange of navigational information such as vessel speed and track between AIS-equipped terminals.

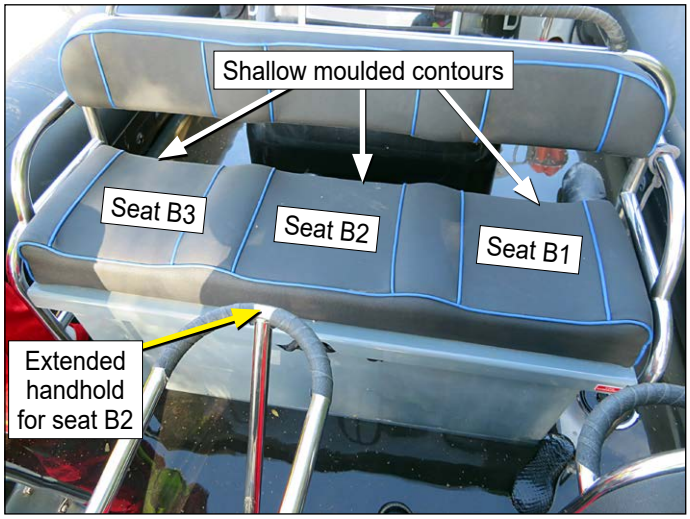

Figure 11: The bench seat on *Seadogz*

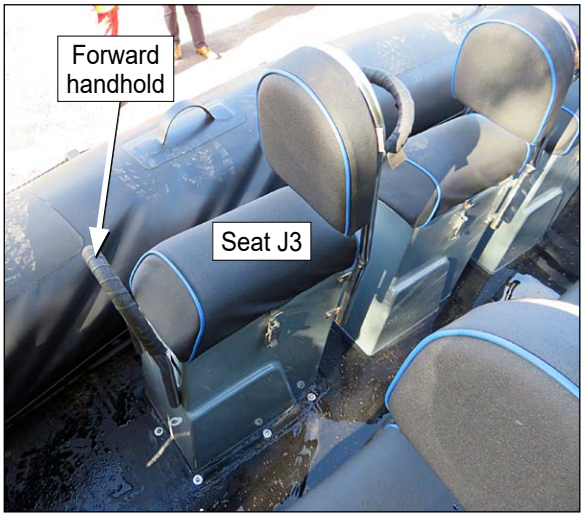

Figure 12: Jockey seat J3, showing the forward handhold

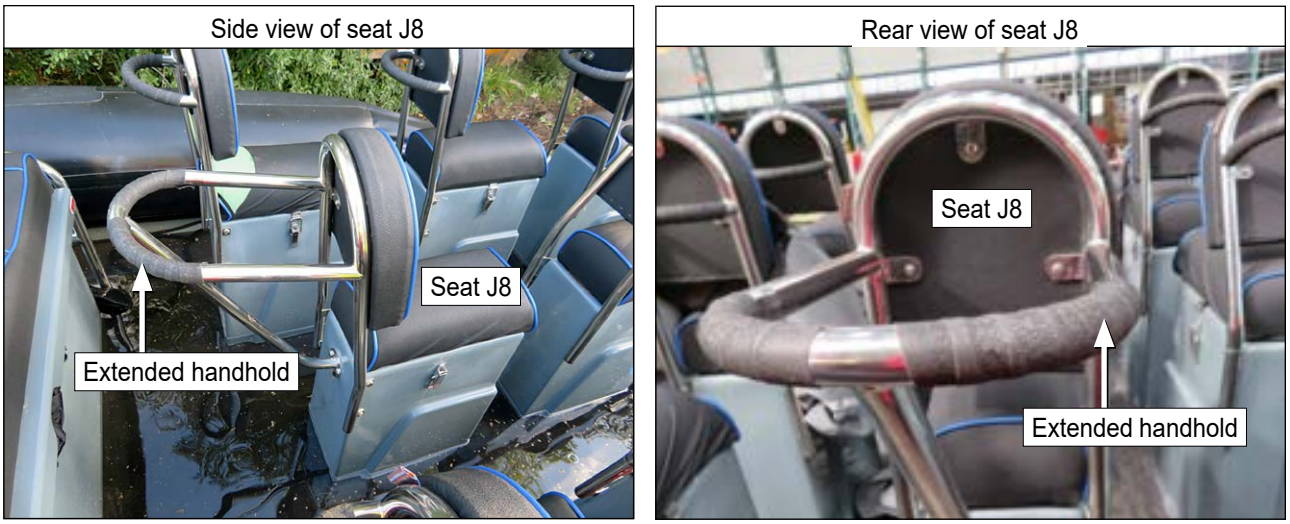

Figure 13: The extended handhold for seat B2 fitted to the rear of seat J8

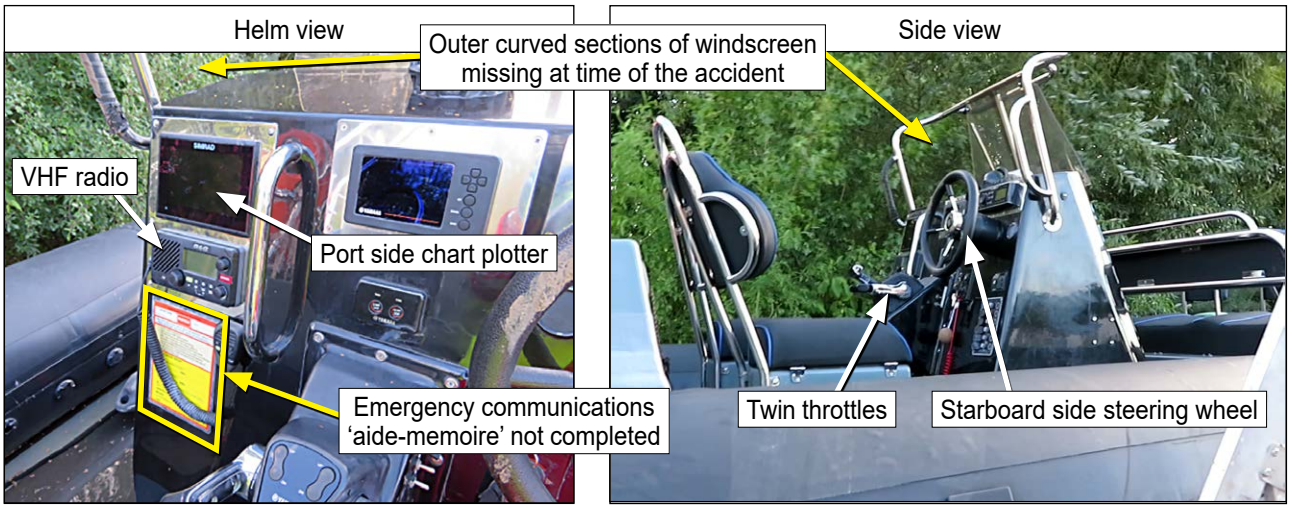

Figure 14: Helm and side view of the console on board *Seadogz*

1.6.2 Safety equipment

The skipper and passengers on board *Seadogz* were wearing 150N buoyancy auto-inflation lifejackets that met with International Organization for Standardization (ISO) performance standard ISO 12402-3:2020[15]. The lifejackets had an attached whistle and were originally fitted with a crotch strap. The latter had been removed from the lifejackets when *Seadogz* was chartered for commercial filming purposes in Cornwall, England a couple of weeks before the accident.

There were two liferafts on board *Seadogz*: a ten-person liferaft contained in a hard case container stored in the bow and a four-person liferaft contained in a soft case stowed under the bench seat.

Seadogz carried two packs of pyrotechnic flares. The first contained two orange handheld flares, two red parachute flares and two orange smoke floats, all with an expiry date of December 2020. The second flare pack contained two red parachute flares and two orange smoke floats, all with an expiry date of January 2019. A single orange smoke float was also carried on board, with an expiry date of April 2023.

In addition, *Seadogz* carried 14 thermal protective aid blankets, a sea anchor and an IMRAY C3 paper chart of the Isle of Wight.

1.6.3 Post-accident inspection

Seadogz was initially examined by MAIB inspectors at a local boatyard on the day of the accident. It was then later inspected at the Hampshire & Isle of Wight Constabulary's vehicle holding area, before being removed to an indoor storage facility.

A further thorough visual inspection was made of the hull, seating arrangement, engine, propeller and steering system. Some damage was observed to both batteries and the starboard engine, consistent with the RIB's rapid deceleration following the impact with the buoy, and there was no indication of any defects before the accident. Marks were also visible on the steering system, which was tested and found to be fully operational with all oil levels appropriate for routine operation.

Data was recovered from the engine management system with the assistance of Yamaha, but no discrete engine data was available for the period before and during the accident[16]. Positional data relevant to the accident was obtained from the RIB's chart plotter.

During the inspection, the following was noted:

- the port forward section of the hull had sustained extensive damage, including a significant breach **(Figure 15)**;
- three of the seven buoyancy chambers had been breached;
- several of the jockey seat backs had been displaced forward **(Figure 16)**;
- the extended handhold in front of the centre of the bench seat (B2) had been displaced slightly to port **(Figures 11** and **13)**; and
- the handhold for the forward port jockey seat (J1) had become detached on its starboard side **(Figure 17)**.

[15] Personal flotation devices – Part 3: Lifejackets, performance level 150 – Safety requirements.

[16] Aggregated historic data covering the total run time of each of the engines since new was able to be downloaded, as well as discrete engine data for the final 19 minutes that the engines had been run, which covered the period while the RIB was driven to a local boatyard after the accident.

Figure 15: Damage to the bow of *Seadogz*

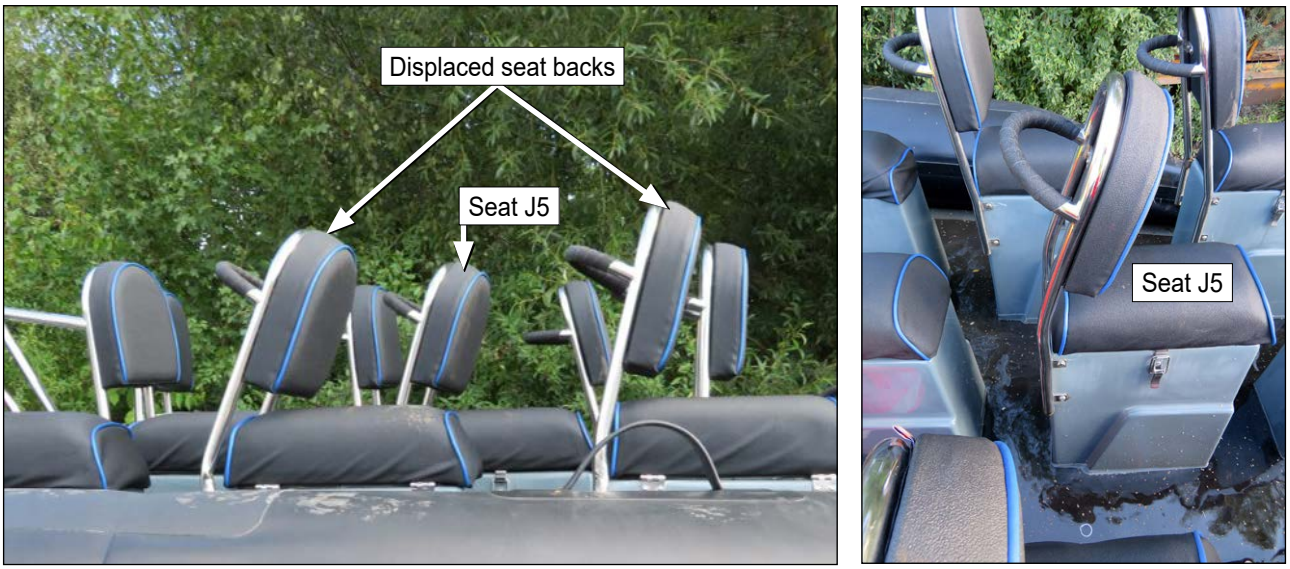

Figure 16: Damage to the backs of the jockey seats on board *Seadogz* following the accident

Figure 17: Jockey seat J1 handhold detachment

1.7 SMALL COMMERCIAL VESSEL AND PILOT BOAT CODE

1.7.1 Overview of the 'harmonised' Small Commercial Vessel Code

In 2004, The Small Commercial Vessel and Pilot Boat (SCV) Code was issued as an annex to Marine Guidance Note (MGN) 280 (M) *Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards*. Vessels complying with the SCV Code were issued with an SCV Certificate and the purpose of the Code was to set standards for the construction and safe operation of craft of up to 24m Load Line Length being operated to sea[17] on a commercial basis. Commonly referred to as the 'harmonised' SCV Code, it was intended to rationalise and harmonise the existing four 'coloured' Codes of Practice for various types of small commercial craft, which included, among others, *The Safety of Small Commercial Motor Vessels – A Code of Practice* (Yellow Code) and *The Safety of Small Workboats and Pilot Boats – A Code of Practice* (Brown Code).

Regulation 6 of The Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) Regulations 1998 enabled the alternative standards in the SCV Code to be applied to craft already certified or in the process of being certified to the existing four 'coloured' codes in order to fulfil the requirements of the Regulations.

The SCV Code was to be enabled by the proposed Merchant Shipping (Small Commercial Vessel and Pilot Boats) Regulations and replaced by two new codes: a Workboat Code[18] and a Recreational Craft Code for the other types of craft covered by the SCV Code. The Recreational Craft Code is now entitled The Sport & Pleasure Vessel Code and is due to be enabled by The Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) Regulations 2024 in 2024.

1.7.2 Survey and certification of *Seadogz*

Seadogz was designed and constructed for commercial use and was approved in accordance with the SCV Code. *Seadogz* had been surveyed by a Yacht Designers and Surveyors Association Limited (YDSA) surveyor at the start of a 5-year *Self-Certification (with Mid-Term)* survey regime; this cycle allowed for annual owner/operator declarations and required a further survey to be conducted by the nominated surveyor during the mid-term year. The annual SCV Certificate was issued by YDSA on 20 February 2020 **(Annex D)**. This was valid until 19 February 2021 and allowed the RIB to operate in up to and including Category 4 areas. The certificate indicated that a maximum of 14 people (of which no more than 12 should be passengers) could be carried, but incorrectly recorded the design of the vessel as a Stormforce 1050 RIB and the overall length as 9.50m. The SCV Certificate did not provide any detail on the intended function of *Seadogz* to provide high-speed experience rides, nor was there any space on the standard certificate to record this.

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[17] Section 3.2 of the SCV Code defined six operational areas that a vessel issued with an SCV Certificate could be allowed to operate in at sea. The areas increased in range as the number reduced:

- Category 6 – within 3 miles from a named nominated departure point(s) and never more than 3 miles from land, in favourable weather and in daylight;
- Category 4 – up to 20 miles from a safe haven, in favourable weather and in daylight.
- Category 0 – unrestricted service.

The Code also defined *to sea* as meaning beyond category D waters, or category C waters if there are no category D waters. The definitions of category C and D water were provided in MSN 1837 (M) – *Categorisation of Waters* Amendment 2, which determined four categories of water not regarded as *sea* for the purposes of Merchant Shipping legislation. MSN 1837 (M) confirmed that, in Southampton, Category C waters were contained within a line from Calshot Castle to Hook Beacon, with Category D waters inside the Isle of Wight within an area bounded by lines drawn between the church spire, West Wittering, and Trinity Church, Bembridge, to the eastward and the Needles and Hurst Point to the westward.

[18] This took effect with the issue of The Workboat Code Edition 2 (see section 1.9).

1.7.3 Seating arrangements

The SCV Code made no reference to the number of seats required on a RIB nor any specific considerations relating to the crash protection characteristics of the seating arrangement in the event of a high-speed impact. Section 22.2.6 stated that:

> *In an inflatable boat or a rigid inflatable boat, handgrips, toeholds and handrails should be provided as necessary to ensure safety of all persons on board during transit and the worst weather conditions likely to be encountered in the intended area of operation.* [sic]

On *Requirements Specific to the Use of the Vessel*, Section 25 of the SCV Code made no reference to high-speed vessels carrying passengers. The Code also made no general references to what constitutes suitable seating but Section 25.6.3, applicable to pilot boats, included:

> *…individual shock absorbent seating with headrests, footrests and moveable armrests should be provided for all members of the crew and the pilots to be carried. Seat belts should be provided for the safety of seated passengers and crew.* [sic]

1.7.4 Crewing

Section 26 of the SCV Code covered the topic of *Manning* and required vessels to be safely manned and that a vessel's skipper should ensure that each person on board was briefed on safety in accordance with Annex 7 of the Code **(Annex E)**. This included the use of personal safety equipment such as lifejackets and the procedures to be followed in an emergency. In addition, Annex 7 confirmed that the skipper should brief *at least one other person* on board about various safety features and emergency procedures, including the recovery of a person from the sea. This information could also be conveyed using a safety card.

Annex 3 of the SCV Code stated that single-handed operations were not recommended by the MCA, but outlined various conditions to be met if vessels were to be operated in this manner. Among other things, these included making certain that:

- the skipper was appropriately qualified for the operating area;
- the area of operation was restricted to Area Category 3, 4, 5 or 6 in favourable weather conditions;
- trip details and a voyage plan were left with a suitable person ashore for every single-handed voyage;
- communication was made with a person ashore or with a vessel in company at regular agreed intervals;
- an engine kill cord was used at all times.

Section 7.2 of Annex 3 stated that:

> *In some cases, because of the size and arrangement of the vessel, the Certifying Authority may deem the vessel not to be suitable for single handed operations. In all cases where single handed operations are carried out, the owner/managing agent and the skipper should be satisfied that it is safe to do so. The vessels certificate should show that it is suitable for "single handed" operations.* [sic]

Neither of the RIBs operated by Seadogz RIB Charter Limited had a notation on their SCV Certificate indicating that the vessels could be operated single-handedly.

Section 8 of Annex 3 detailed the responsibility of the owner/managing agent for safe manning of the craft, stating that they:

> *…should also ensure that there are sufficient additional crew on board having regard to the type and duration of voyage/excursion being undertaken.*

Section 9 of Annex 3 stated it was the responsibility of the skipper to ensure that a person with adequate experience is in charge of the navigational watch at all times. In taking this decision, the skipper should consider all factors affecting the craft's safety, including *the proximity of navigational hazards*.

1.7.5 Forward visibility

The SCV Code included no generic requirements for forward visibility, but Section 9.1.2 stated that the *control position should be located so that the person conning the vessel has a clear view for the safe navigation of the vessel*. Section 25.3 stated that cargo should be stowed so as to ensure *unobstructed visibility from the wheelhouse*. Section 25.6.3 for dedicated pilot boats stated that visibility should be *adequate in both the vertical and horizontal planes*.

1.7.6 Risk assessment

Section 2.10.1 of Annex 3 to the SCV Code described the requirements and responsibility for risk assessment and stated:

> *The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 (SI1997/2962) apply wherever "workers" are employed on ships. Under these regulations all employers have a duty to ensure the health and safety of workers and others, so far as is reasonably practicable. To fulfil this duty, employers are required to carry out "a suitable and sufficient assessment of the risks of the health and safety of workers arising in the normal course of their activities or duties".*

Section 2.10.1 also made reference to the guidance on the application of the regulations and the assessment of risk in MGN 20 (M+F)[19]. In July 2020, this MGN was replaced by MGN 636 (M)[20], which was subsequently amended in September 2020 and July 2023.

Section 2.10.2 stated:

> *Applying the principles of health and safety requirements to Code Vessels means that the operator or skipper should take a proactive approach to safety and consider what particular hazards are likely to arise in the context of work activities on board. They should then take appropriate measures to remove the risks in so far as possible. The goal is to provide, as far as reasonably practical, for a safe working environment, with crew following safe working practices.*

1.7.7 Navigation equipment

Section 19.1 *Nautical Publications* required the carriage of charts and other nautical publications to plan and display a craft's route and to plot and monitor positions throughout the voyage, but allowed the use of an electronic chart plotting system that complied with MGN 262 (M+F)[21]. In November 2006, MGN 262 (M+F) was

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[19] MGN 20 (M+F) Implementation of EC Directive 89/391 – Merchant Shipping And Fishing Vessels (Health And Safety At Work) Regulations 1997.

[20] MGN 636 (M) Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997.

[21] MGN 262 (M+F) Acceptance of Electronic Chart Plotting Systems for Fishing Vessels Under 24 metres and Small Vessels in Commercial Use (Code Boats) Up To 24 Metres Load Line Length.

replaced by MGN 319 (M+F)[22], which was subsequently reissued as Amendment 1 in March 2023. None of these MGNs provided any guidance on the positioning of the chart plotter system on board the craft.

1.7.8 Very high frequency radio requirements

On the general requirements of radio equipment, Section 16.1 required craft such as *Seadogz* to be equipped with a fixed VHF radio and to carry at least one portable VHF.

1.8 HEALTH AND SAFETY AT WORK PROVISIONS

As indicated at section 1.7.6 above, The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations required employers to conduct a risk assessment. It also obliged them to inform workers of any significant findings of the assessment and the measures taken for their protection.

Regulation 5 outlined the expected general duties for employers, which included ensuring the health and safety of workers and other people as is reasonably practicable by following various principles. These included:

- *adoption of work patterns and procedures which take account of the capacity of the individual…*
- *adaptation of procedures to take account of new technology and other changes in working practices…* [sic]

Regulation 6 mandated that a written health and safety policy was to be prepared but did not explicitly state the need for operational procedures. It also did not require audits to be conducted of an operator's health and safety documentation.

MGN 636 (M) provided further guidance on the application of the 1997 Health and Safety at Work Regulations for operators, including the following high-level responsibilities (emphasis as included in MGN 636 (M)):

- *Shipowners should ensure that masters have adequate support to carry out their responsibility for health and safety management effectively while on board.*
- *The ship's master should ensure that the shipowner's health and safety policy and procedures are implemented on board ship…The master sets the tone for the safety culture on board...*

1.9 THE WORKBOAT CODE EDITION 2

The *Safety of Small Workboats and Pilot Boats – A Code of Practice* (The Workboat Code Edition 2[23]) was the technical standard applicable to small commercially operated workboats at sea and all pilot boats in the UK[24]. Published in December 2018[25], The Workboat Code Edition 2 was an updated standard to both the Brown Code and the relevant parts of the SCV Code relating to workboats and pilot boats and was therefore not applicable to *Seadogz*.

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[22] The title was the same as that of MGN 262 (M+F).

[23] Merchant Shipping Notice 1892 (M).

[24] Under Regulation 3(1) of The Merchant Shipping (Small Workboats and Pilot Boats) Regulations 1998, as amended. Statutory Instrument 1998 No. 1609.

[25] Amendment 1 was issued in August 2019, with no technical changes to the original document.

The Workboat Code Edition 2 defined *High Speed* as an operating speed of 20kts or more and included the following requirement for the risk assessment of operations:

> *While every effort has been made to ensure this Code is suitable for generic work boats / pilot boats operating, there may be local conditions or circumstances or equipment not taken into account within the Code which require additional measures to be put in place to mitigate known risks. Prior to plan approval taking place, a risk assessment shall be carried out by the owner / managing agent to ensure that any circumstances, local conditions or equipment not covered by the provisions of the Code are adequately considered and all known risks are mitigated. This should be presented to the Certifying Authority(s) conducting the examinations prior to plan approval so that they too may take account of the risks identified.* [sic]

Section 25.8 outlined specific requirements for workboats operating at speed or in planing[26] mode, noting that such craft *must be suitably constructed for that purpose*.

It went on to state that, among other things:

- *The Certifying Authority should ensure that vessels have suitable inboard seating for all persons on board that allow them to effectively brace themselves and provide lateral support, which should be located so that persons avoid the greatest shock loads. These loads will normally be greatest at the forward part of the vessel. Owner/managing agents should remind persons to remain seated (or stood over jockey seats, as appropriate) during operation unless moving about the boat for a specific purpose. Owner/ managing agents of RIBs and open boats should ensure that persons only sit in designated seats. Inboard seats do not include the gunwale or the tubes of a vessel fitted with a buoyant collar;*
- *Appropriately positioned handholds and foot placements can improve the ability for persons to brace effectively; and*
- *Further guidance can be found in the publications "Small Passenger Craft High Speed Experience Rides", "Passenger Safety on Small Commercial High Speed Craft" and MGN 436 (M+F).* [sic]

Section 26 dealt with manning, affirming that a craft *should be safely manned*, and provided guidance for having an additional person on board to assist the master while operating in the area categories at sea. It also specified that the *owner/ managing agent should also ensure that there are sufficient additional crew on board having regard to the type and duration of voyage/excursion being undertaken*.

Section 30 further stated, *All vessels operating under this code are recommended to implement a Safety Management System (SMS) which complies with the principles of the ISM Code*[27]*, but is commensurate with the size and complexity of the vessels and company's operations*. [sic]

Appendix 7 of The Workboat Code Edition 2 provided guidance on the development and implementation of an effective SMS for coded vessels, including: development of a risk assessment that systematically identifies risks to personnel, vessels and the environment; and procedures to ensure safe operation, including onboard operational procedures for aspects such as navigation and handling.

[26] Planing hull boats rise up and ride on top of the water when operating at speed.

[27] The International Safety Management (ISM) Code, published by the IMO.

1.10 RECREATIONAL CRAFT DIRECTIVE

1.10.1 Overview

Seadogz was built to comply with the requirements laid down in the Recreational Craft Directive (RCD)[28] design category B[29]. The RCD was introduced in 1998 by the European Commission (EC) to ensure a uniform level of safety in the design and manufacture of recreational craft with a hull length of between 2.5m and 24m throughout the European Economic Area. It was first implemented in the UK by the Recreational Craft Regulations 1996, which were superseded by the Recreational Craft Regulations 2004 and 2017.

1.10.2 Essential requirements and Declaration of Conformity

Figure 18: The boat builder's plate on board *Seadogz*

Manufacturers of boats complying with the RCD were responsible for ensuring that a boat met 32 essential requirements, covering various aspects of the design and construction of the craft as listed at Annex I of the RCD. The manufacturer was also required to obtain a Conformité Européen (CE) mark, which had to be placed on a builder's plate on the craft. The plate fitted to *Seadogz* **(Figure 18)** stated that the boat had been designed for a maximum capacity of 14 persons and a maximum engine power of 520 kilowatts (kW) or 700hp.

In 2015, the Stormforce 950 design was certified as compliant with the RCD by the approved body HPi Verification Services Ltd. The associated certificate reiterated the maximum load of 14 persons and stated that the maximum power should be 441kW or 600hp.

Compliance with the essential requirements of the RCD was also confirmed in a written Declaration of Conformity (DoC) issued by the manufacturer. The DoC prepared for *Seadogz* **(Annex F)** included references to the relevant harmonised standards or other technical specifications used to demonstrate compliance with the essential requirements and recommended a maximum engine power of 520kW.

1.10.3 Owner's Manual

As detailed in the DoC, an owner's manual was required for the RIB in accordance with BS EN ISO 10240:1996[30]. The purpose of this manual was to provide information necessary for the safe use of the craft and its equipment.

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[28] The RCD, Directive 94/25/EC was repealed and replaced with Directive 2013/53/EU, which was published in December 2013.

[29] RCD design category B. Offshore – Designed for offshore voyages where conditions up to, and including, Beaufort wind force 8 and significant wave heights up to, and including, 4m may be experienced.

[30] The Standard for Small craft. Owner's manual. This British Standard (BS) was the English language version of EN ISO 10240:1996 Small craft – Owner's manual, published by the European Committee for Standardization.

The owner's manual for *Seadogz* was prepared by Red Bay Boats Ltd and provided *essential information* for each of the Stormforce 850, 950 and 1050 RIB designs, including a general arrangement drawing and the main characteristics for each design. The maximum recommended number of persons to be carried on board a Stormforce 950 design was listed as 10, while the maximum recommended engine power was 522kW or 700hp; the Stormforce 950 general arrangement drawing in the manual showed a central wraparound console with four seats.

The manual included general information on handling, operations and maintenance, as well as a safety manual and guidance on personal survival at sea; there was no specific information relating to the console and seating configuration on *Seadogz*.

The owner's manual also featured a range of general areas of *Caution, Warning* and *Danger* and contained a number of operational warnings, including:

- *Do not operate at maximum speed while in congested high traffice waterways or in weather and sea conditions of reduced visibility, high winds or large waves. Reduce speed and wake as a courtesy and as a safety consideration to yourself and others. Observe and obey speed limit and no wake zones.* [sic]
- *Always be certain to have sufficient distance to stop or manoeuvre if required to avoid collisions.*
- On the danger identified for personal flotation devices, *Follow the manufactures advice on fitting and servicing* [sic]
- For seating, *Before moving away, make sure that everyone is securely seated and have good handholds. Always communicate with your crew before executing a manoeuvre; this is for the safety and comfort of everyone on board.*

1.10.4 Seat design

None of the RCD's essential requirements specifically related to a craft's seat design. The DoC for *Seadogz* referred to Part 3 of the 2001 version of standard BS EN ISO 6185[31], concerning the overall design of inflatable boats, but contained no specific requirements for seat design. A separate conformity assessment report for the Stormforce 950 open RIB design confirmed that it had been assessed to Part 4 of the 2011 version of BS EN ISO 6185[32]. This was the applicable version at the time of the construction of *Seadogz*, and included a requirement for *Seating and attachment systems (where offered as standard or optional equipment)*:

> *Seating and handholds shall provide support for spinal neutral alignment and postural stability for each person up to the crew limit and also to prevent them falling or being thrown on deck or overboard.*

1.10.5 Visibility from the main steering position

The essential requirement for Field of Vision (2.4) in the RCD stated that:

> *For motor boats, the main steering position shall give the operator, under normal conditions of use (speed and load), good all-round visibility.*

[31] Inflatable boats – Part 3: Boats with a maximum motor power rating of 15 kW and greater.

[32] Inflatable boats – Part 4: Boats with a hull length of between 8m and 24m with a motor power rating of 15kW and greater.

The DoC for *Seadogz* confirmed that this essential requirement had been met by compliance with BS EN ISO 11591:2001[33]. This standard was superseded in 2011 and again in 2019 and 2020, and the 2020 standard was amended in 2021.

BS EN ISO 11591:2001 defined high eye and low eye positions for the helmsman when seated or standing at the vessel's steering wheel; the height of the low and high eye positions above the craft's deck for a standing person were 1480mm and 1730mm, respectively. Section 3.1 of the standard required that:

> *The helmsman's position shall permit the operator to have a field of vision, including sight of the water surface, conforming with the requirements of this International Standard when in the fully loaded, ready for use, condition during cruising, manoeuvring, docking or other extended operational modes.*

Section 4.1 further defined that the unobstructed visibility forward to the water surface with the craft level should not exceed four times the hull length. In addition, Section 4.2 required that planing craft less then 10m in length met the forward visibility requirement with the bow raised by 4°. These requirements did not consider the effect of persons obstructing the operator's field of vision.

The field of vision assessment for the Stormforce 950 RIB provided by Red Bay Boats Ltd following the accident demonstrated compliance with the forward visibility requirements in BS EN ISO 11591:2020 **(Figure 19)**.

The 2020 standard included the same unobstructed forward vision requirement for a fully loaded and level craft but did not require any consideration of the effect of the craft planing. Amendment 1 to the 2020 standard in 2021[34] introduced a further requirement for the maximum running hull trim angle to be considered when evaluating the forward field of vision.

Both the 2001 and 2020 versions of ISO 11591 included a requirement for the owner's manual for a craft to include a note that operator vision from the helm can be obstructed by various factors, including trim plane angles, speed and persons or moveable gear in the operator's field of vision. No such warning was included in the owner's manual provided for *Seadogz*.

Image courtesy of Red Bay Boats Ltd

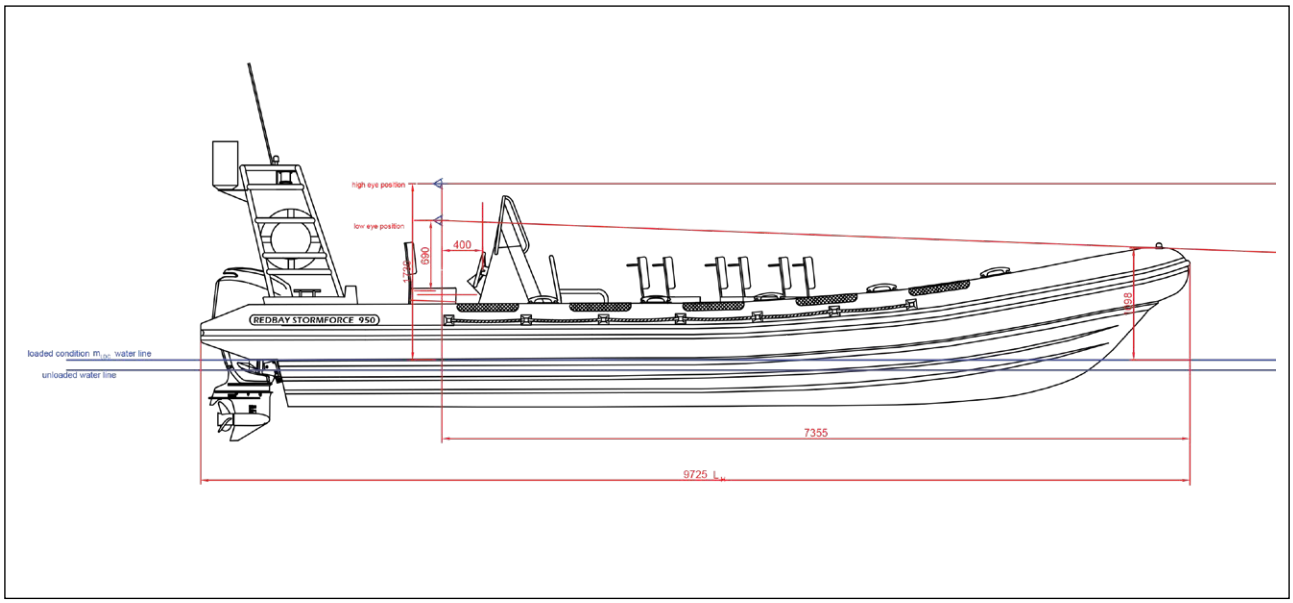

Figure 19: Red Bay Boats Ltd field of vision assessment for the Stormforce 950 RIB

[33] Small craft, engine-driven — Field of vision from helm position.

[34] ISO 11591:2020/Amd 1:2022 Small craft – Field of vision from the steering position – Amendment 1.

1.11 MARINE GUIDANCE NOTE 436 (M+F)

1.11.1 Overview

MGN 436 (M+F) *Whole Body Vibration: Guidance on Mitigating Against the Effects of Shocks and Impacts on Small Vessels* was first issued by the MCA in September 2011 to provide guidance for operators and designers of small craft on the mitigation of the effects of whole-body vibration (WBV) and severe physical shock as a result of impacts. As detailed below, this MGN has subsequently been amended three times.

1.11.2 Original version

Section 4.3 of MGN 436 (M+F) referred to seating and stated at 4.3.3 that *Seating should to be situated correctly to allow the person occupying the seat to be in the best possible posture*. [sic]

Section 4.3.6 advised that:

> *In some circumstances it may be appropriate to fit seatbelts/restraints. The design, operation and use of such restraints should be appropriate to the design and use of the craft, and the crew and passengers should receive the appropriate training on their use. Consideration should be given to the need to escape quickly in an emergency.*

Section 4.4 included the following guidance:

- *Handholds should be situated to allow the occupant of the seat to take up a suitable posture and have suitable anchoring and strength to assist that person to brace themselves, with the upper body maintained firmly upright and facing in the direction of travel, in the event of a sudden vertical deceleration…They should also have a texture suitable for providing a secure and comfortable grip by users of various physical builds.*
- *The position of the handholds should provide the appropriate lateral and longitudinal postural stability. This may be achieved by having the handholds in front of the body roughly shoulder-width apart and at a height between the shoulders and abdomen of the seat occupants.*
- *Expert advice should be sought to ensure that handholds and foot-straps are appropriate.* [sic]

Section 5.3, *Demographics of those onboard*, stated that:

- *When planning a voyage of any kind, the demographics of those on board should be considered. In some cases it may be necessary to refuse to allow certain people onboard the vessel or it may be necessary to adjust the voyage style to suit those onboard.*
- *Children and adults of a small stature may be unable to maintain the necessary postural stability and make effective use of the foot-straps and handholds…Operators should ask passengers whether they have any health condition for which the motions of the vessel may present a risk to health and then carefully consider those onboard and their susceptibility to injury when undertaking voyages and adjust their voyage accordingly…Operators should make those on board their vessels aware of the risks involved.* [sic]

Section 5.6 dealt with speed perception and stated:

- *It should be noted by operators that are providing "experience rides" that those onboard are likely to perceive that they going considerably faster than they are. Therefore operators should consider travelling at slower speeds than they themselves may perceive as fast. This will reduce the likelihood of injury to those onboard.* [sic]

Section 6 contained details of other relevant regulations and guidance. This included a link to the Passenger Boat Association (PBA)[35] *Small Passenger Craft High Speed Experience Rides Guidance* and the RYA's document *Passenger Safety on Small Commercial High Speed Craft* issued in 2010, but no reference to MGN 280 (M) or the SCV Code.

1.11.3 Amendment 1

In March 2019, Amendment 1 of MGN 436 (M+F) was issued, which was the version in place at the time of the accident. This amendment included no substantive changes but did update the links and contact details in the document.

1.11.4 Amendment 2

In September 2021, Amendment 2 of MGN 436 (M+F) was issued by the MCA to reflect the evolving knowledge and best practice in this area, including the use of shock mitigating technology and data[36]. The text in the previous version was updated and various new sections of text inserted, including in Section 1:

> *Whilst this guidance primarily covers mitigation of shocks during normal operating conditions, risk assessments should also consider how vessel design and operating practices may affect crew and passengers in the event of emergency situations, including, but not limited to, high-speed collisions.* [sic]

In Section 6.1: *Training and competence*, the previous text was amended to state that: *Understanding vessel handling characteristics and limitations, assessing weather and matching boat speed to sea conditions and passenger comfort can reduce the likelihood of an incident occurring*. Other sections were also added, including:

> *Provision of adequate manning should take into consideration not only competency but also the speed of the vessel, passenger safety and requirement to maintain a good lookout at all times and in all conditions. For example, when operating in waves the boat driver may need their full attention for assessing the sea conditions.*

Sections 6.3.4 and 6.6.1 also highlighted the need for: boat drivers to be able to maintain communication with everyone on board throughout a trip; pre-departure briefings to highlight the importance of self-awareness; and passengers to be able to raise their concerns during a voyage, with the driver then reacting accordingly.

Section 9 updated the previous reference to the PBA and RYA guidance in 2010, with details of the high-speed passenger vessel (HSPV) Voluntary CoP issued by the RYA, PBA and British Marine in 2019 (see section 1.12.3 below).

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[35] A Group Association within British Marine, which is a trade association for the UK leisure, superyacht and small commercial marine industry. The PBA retains its own identity, aims and objectives but contributes to and benefits from the broader resources available within British Marine.

[36] Amendment 3 of MGN 436 (M+F) was issued in July 2023, but without any revisions to the text in Amendment 2.

1.12 INDUSTRY GUIDANCE

1.12.1 Overview

In addition to the SCV Code and guidance provided by the MCA, several industry organisations had sought to provide additional operational guidance for the operators of small high-speed passenger vessels with the publication of codes of practice.

1.12.2 Professional Charter Association

The Professional Charter Association (PCA) was an independent industry organisation formed in 1991, the aims of which included ensuring the safety of passengers and crew on board chartered craft belonging to its members. It also aimed to ensure that its members' craft were equipped and maintained to the highest standards and operated within or exceeding national and local regulations.

Organisations wishing to join the PCA as members were required to demonstrate that their craft were compliant with licensing regulations and that skippers were both qualified and experienced. The PCA had published its own guide, the PCA *Code of Practice* (CoP), to assist its members to achieve its aims. This guidance included the need for safety briefings to cover a *Man overboard procedure*, a *Skipper incapacitation procedure* and *How to avoid facial injury on hand rails*. [sic]

The PCA CoP also included requirements relating to keeping records of proposed and actual passage plans, as well as for safe operating systems. These included:

- *RIBs are not driven through the wash of any motor vessel (other than RIBs) at speed except for purposes of safe navigation, collision avoidance…;*
- *RIBs are only driven through the wakes of other RIBs in a sensible and controlled manner with at least 75 metres behind the RIB in front; and*
- *No manoeuvre shall be undertaken that will result in a collision subsequent to an engine failure in either the skipper's own or any other vessel.* [sic]

On 19 June 2020, Seadogz RIB Charter Limited applied for PCA membership, which it obtained on 26 June 2020. The PCA did not require any conditions of membership. The RYA training centre operated by the skipper of *Seadogz* was also a member of the PCA.

1.12.3 Passenger Safety on Small Commercial High Speed Craft and Experience Rides – A Voluntary Code of Practice

In March 2010, the PBA published *Small Passenger Craft High Speed Experience Rides Guidance* in response to the MAIB's investigation into the injury on the commercially operated RIB *Celtic Pioneer*[37] (see section 1.18.1). The purpose of the document was to provide additional management guidance for the operators of small high-speed craft engaged in the provision of *exhilarating fast experience rides*. In the same month, the RYA published the document *Guidance Notes – Passenger Safety on Small Commercial High Speed Craft*. In April 2019, the latest version of the guidance code, issue 3, was published by the RYA, PBA and British Marine as the *Passenger Safety on Small Commercial High Speed Craft & Experience Rides – A Voluntary Code of Practice*.

[37] https://www.gov.uk/maib-reports/heavy-landing-during-boat-trip-on-the-rigid-inflatable-boat-celtic-pioneer-in-the-bristol-channel-near-penath-wales-with-1-person-injured

Commonly referred to as the HSPV Voluntary CoP, issue 3 combined the two documents issued in 2010 and provided operators, crews, statutory authorities and other responsible organisations with guidance on the operation of commercial high-speed experience rides. Its aims and objectives were:

> *To recommend and promote common safe working practices for the industry by addressing areas where current guidance and legislation fails to fully capture the specific features of small passenger craft high speed operations.* [sic]

The guidance did not replace the statutory requirements in the SCV Code, but covered topics including crew manning and qualifications, passenger safety and suitability, area of operation, operations in close proximity to other craft, hazard perception and the voluntary auditing of operations.

The foreword to the issue 3 included the following comments:

> *For many passengers their trip may be their first experience afloat in this type of craft. However competent skippers may be, over time there is a likelihood for them to become "desensitized" to the thrill of the ride and thus risk providing an experience that is comfortable for them but at the same time could be considered terrifying by their passengers…In contrast to a thrill ride at a theme park where every twist, drop and turn is calculated to remain within acceptable parameters, a ride on a small high speed craft takes place in a dynamic environment and relies heavily upon the skill and judgement of the skipper at the helm.* [sic]

Section 3, *Design and Construction Considerations*, contained the following guidance on seating and handhold design:

- *When operating vessels at sea with bench seats without lateral support in any sea state beyond calm, the vessel should be driven in such a manner so as to mitigate against the risk of injury or ejection through actions such as lower speeds and wider, slower turns than might otherwise be the case.*
- *Handholds – all seats should have handholds located in front of the passenger allowing them to hold on with both hands. These should be roughly at chest height and shoulder width apart. Consideration should be given to the potential loss of firm hand grip during cold conditions. Further consideration may need to be given to padding the rear facing back of a seat and associated handholds to avoid risk of facial injury to the passenger behind in the event of rapid deceleration.* [sic]
- *The boat design should minimise the amount of structure that passengers could fall onto or impact with in the event of a slam incident, thus reducing the risk of injury.*

The rear of the seat backs and handholds on *Seadogz* were not padded.

Section 3 of the Code did not comment on the appropriateness of helm positions, but figures depicting typical seating configurations were annotated to show rear helm positions as having *good all-round visibility*.

The SCV Code allowed lone manning, but Section 6 of the HSPV Voluntary CoP, *Crew to Passenger Ratio*, recommended that operators carry an additional trained crew member to assist in safely operating the craft and to monitor passenger and crew comfort and safety. It also stated that:

> *The additional crew member could prove essential in the event of an emergency requiring attention to a passenger, while the vessel returns to a safe haven.*

Section 9, *Passenger Safety Briefing*, provided guidance on the key features of a pre-departure briefing, which included as a minimum the correct fitting and operation of lifejackets. It noted that it was essential that advice was given on the importance of using correct handholds and adopting a good posture, and also stated the importance of establishing a method of communication for passengers to indicate if they are in discomfort. In addition to passengers raising their hand to alert the skipper, the possible use of a shouted word was mentioned.

Section 11, *Safety whilst on Passage*, stated that the *guiding principle of ensuring a safe ride is to keep the craft in contact with the water* and that high-speed turns should be carried out gently and at a safe speed and appropriate rate of turn. It further highlighted that operators should ensure that their procedures clearly state maximum safe operating parameters.

Section 12, *Hazard Perception*, stated that operators should: carefully review all actual and potential hazards; and ensure that robust procedures are in place and all crew work within the operating parameters.

Section 13, *Communications* emphasised that skippers and crew should be familiar with the company's emergency procedures, as well as the importance of using VHF to establish initial contact with the coastguard in an emergency.

Section 18, *Voluntary Auditing of Operation*, advised that, *In the general interests of safety and the industry image, it is recommended that operators implement a Safety Management System (SMS) and arrange and undertake their own audits of their SMS*. [sic]

1.13 OTHER REGULATIONS AND GUIDANCE

1.13.1 International Regulations for Preventing Collisions at Sea, 1972

The International Maritime Organization (IMO)'s Convention on the International Regulations for Preventing Collisions at Sea (IRPCS) 1972, commonly known as the COLREGs, outlined the rules for the navigation of ships at sea. The COLREGs entered into force in 1977 and applied:

> *to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.*

The COLREGs included 41 rules divided into six sections, including:

> *Rule 5* (Look-out) *Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.*
>
> *Rule 6* (Safe speed) *Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision…*

In the UK, the COLREGs were implemented by MSN 1781 (M+F) The Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations 1996, as amended, and applied to ships or other vessels as defined in the Merchant Shipping Act 1995.

1.13.2 International Code of Safety for High-Speed Craft

Although not applicable to an open RIB such as *Seadogz*, high-speed craft engaged in international voyages, and which had their keels laid on or after 1 July 2008, were required to comply with the 1994 High-Speed Code and 2000

High-Speed Code (HSC Code) published by the IMO. Chapter 4 of the 2000 HSC Code included requirements for seating construction, noting that the seats shall be arranged in enclosed spaces. Seats and the structure in the proximity of the seats shall be of a form and design to minimise the possibility of injury and entrapment following a collision, with seats and their supports having good energy-absorbing characteristics. Annex 10 included requirements for the testing and evaluation of seats to minimise occupant injury in the event of a collision.

1.13.3 High-Speed Craft Human Factors Engineering Design Guide

The High-Speed Craft Human Factors Engineering Design Guide was prepared for the UK Ministry of Defence and supported by the ABCD[38] Working Group on Human Performance at Sea to provide naval architectural and human factors guidance on the design and evaluation of high-speed craft. Published in 2008, the topics covered included situational awareness and seat design factors such as lateral stability, foot straps and the use of restraint systems. It noted that seating should be of the appropriate dimensions to provide the correct postural support for the full anthropometric range of users.

1.14 HUMAN FACTORS INVESTIGATION

The MAIB commissioned STResearch Ltd (STR), experts on human factors issues relating to RIB/high-speed craft design and operations, to conduct an independent assessment of the accident. The aim of the assessment was to determine the levels of protection that *Seadogz* and its seating arrangements provided to the passengers during the high-speed impact. The assessment also considered the requirements set out in the SCV Code and the intent of MGN 436 (M+F) Amendment 1.

STR visited *Seadogz* following the accident to obtain information on its design and the damage sustained and review evidence gathered by the MAIB. The assessment considered marine industry best practice and guidance, along with human factors and engineering standards and guidance, to identify any noncompliance and its influence on the craft's operation and the accident.

The conclusions of STR's assessment included:

- The handholds on the *Seadogz* front passenger seats were too low to provide postural stability and provide any restraint against forward/aft motion. Therefore, there was nothing to prevent the front seat passengers from being thrown forward and impacting with the RIB's structure.
- The design of the bench seat and the handholds fitted to the rear of the jockey seats provided very little postural stability as the handholds were too narrow.
- The design of the handholds increased the risk of impalement during a collision and increased the severity of the injuries sustained. This was particularly the case for the reinforced extended handhold in front of B2, which could penetrate further into an individual's torso than the shorter handles to the rear of seats J7 and J9. By holding onto the extended handhold in front of B2, the passengers sitting outboard on the bench seat (B1 and B3) would have 'funnelled' the passenger at B2 into the extended handhold.
- Teenagers and, potentially, small adults were unable to effectively use the bench seat and handholds provided, therefore restricting their ability to maintain their postural stability. Anthropometric analysis **(Figure 20)** indicated that the passenger in seat position B2 was unable to reach the handhold in front of her or to rest her feet on the floor if she sat with her back against the bench seat backrest.

[38] A working group of American, Australian, British, Canadian and Dutch researchers and defence agencies.

- The aft helm position on *Seadogz* allowed the skipper to monitor the passengers, but the passenger's positional stance and the vessel's raised bow resulted in him having no effective forward view **(Figure 21)**. This situation could have been mitigated by placing the helm station on a raised plinth.
- The design of *Seadogz* did not support the skipper's ability to obtain and maintain 'situational awareness' due to his inability to interact with the navigation system while standing.
- Seadogz RIB Charter Limited's and the skipper's procedure for passengers to indicate they were uncomfortable by raising their hands was ineffective.
- MGN 280 (M) was not specific enough for small high-speed craft design and operation and did not address the demands and risks inherent in such operations.
- The HSPV Voluntary CoP included details that did not reflect industry best practice, including the use of images showing passengers adopting poor postures due to the seat design/configuration and describing rear-positioned helm positions as having good all-round visibility.

The STR report stated that:

- *HSC and RIBs are not designed with any features to enhance crash safety. They are designed to have the strength and rigidity to withstand high levels of shock and vibration exposure, which will therefore transfer the crash forces / impulse directly to the craft's occupants.* [sic]
- *There is no evidence that the seat and console structures are designed to minimise injury in a crash or shock from a wave slam (vertical) / stuff (horizontal)*[39] *event. Unfortunately, the design of the craft, e.g., the choice and configuration of the seating, and some of the seat features were responsible for increasing the severity of the injuries sustained.* [sic]

1.15 ROYAL YACHTING ASSOCIATION TRAINING

The RYA had developed a series of powerboat training courses aimed at small open craft such as RIBs and launches and other similar craft. The courses were provided through the RYA's network of approved training centres and schools, with the qualifications being recognised internationally.

The Level 1 Start Powerboating qualification provided a practical introduction to boat handling and safety while the Powerboat Level 2 certificate (PB2) was the recognised minimum standard required for commercial powerboat skippers. Training for the PB2 certificate typically took 2 days to complete and included practical and theoretical elements. The course was assessed, but there was no formal examination or requirement for previous powerboating experience. A further 2-day Powerboat Intermediate Course built on the foundation knowledge acquired in the PB2 course.

In addition, a Powerboat Advanced Course was available, which covered planing speed[40] boat handling, advanced manoeuvres and rough weather handling. Candidates were expected to be competent to the standard of the intermediate

[39] A force acting in a horizontal plane.

[40] The speed at which a boat is considered to be *on the plane*, which may be in excess of the definition of high-speed in Workboat Code Edition 2 (a speed in excess of 20kts).

Image courtesy of STResearch

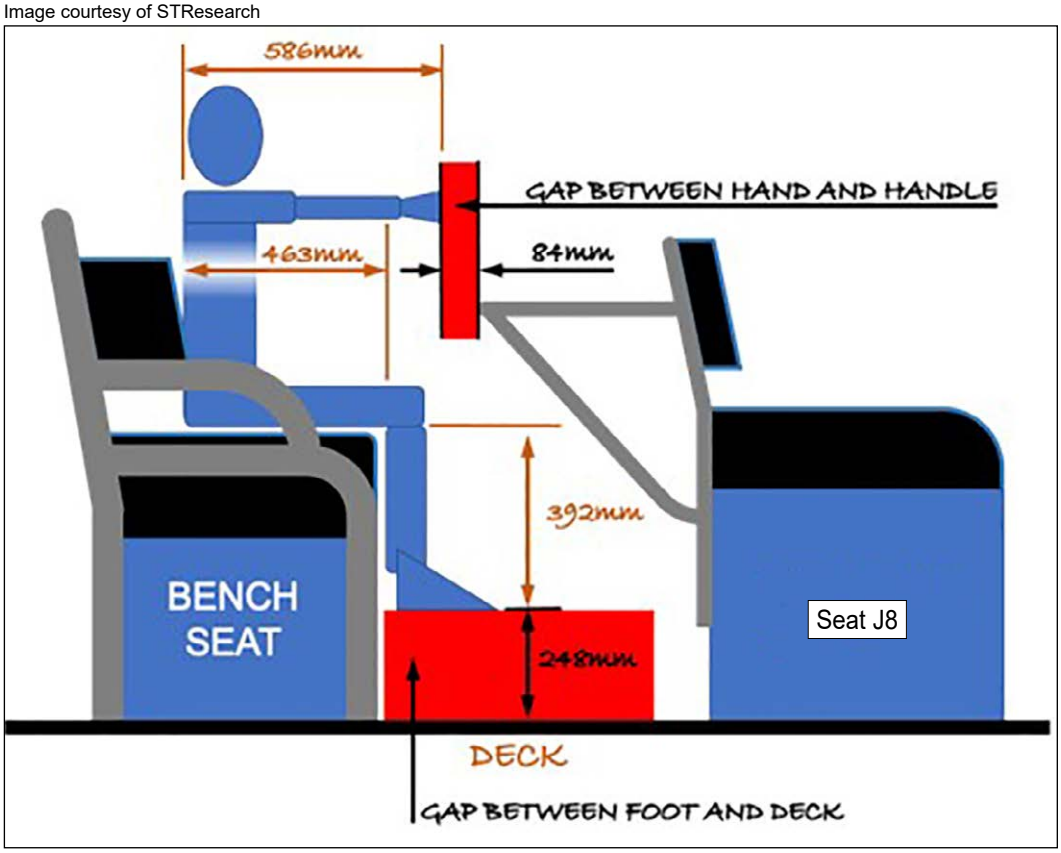

Figure 20: Reproduction of STResearch report figure – anthropometric representation of passenger position while seated at seat B2 on the bench seat on *Seadogz*

Base image courtesy of Seadogz RIB Charter Limited

For illustrative purposes only: not to scale

Figure 21: Representation of skipper's forward view being obscured by the seated passengers

course before attending the advanced course. Candidates were required to have minimum sea time experience[41] before attempting the examination. There were two types of advanced certificate:

- course completion certificate, issued by a training centre on successful completion of a 2-day course; and
- Certificate of Competence, awarded by the RYA/MCA on successful completion of a practical examination.

An RYA powerboat qualification required a commercial endorsement before it was valid for use on board a commercial craft subject to MCA codes of practice. The endorsement showed that the holder had relevant experience, was medically fit and had completed basic sea survival training. Completion of the RYA Professional Practices and Responsibilities online course was compulsory for new and revalidating commercial endorsement holders and covered topics including: the importance of correct manning; safe management of commercial craft; compulsory carriage and maintenance of safety equipment; and how to create and implement risk controls. Certificates were issued on the basis that candidates had an understanding of their duty of care to crew, passengers and other water users.

RYA certificates that could receive a standard commercial endorsement included the Powerboat Advanced Certificate of Competence and course completion certificates for the PB2 course and Powerboat Advanced Course[42].

1.16 OVERSIGHT AND MANAGEMENT OF PORT OPERATIONS

1.16.1 Port Marine Safety Code

In 2000, the UK's Department for Transport (DfT) issued the Port Marine Safety Code (PMSC)[43] in response to lessons learned from the grounding of the oil tanker *Sea Empress* in 1996. The Code was last updated in 2016. The purpose of the PMSC was to set out a national standard for every aspect of port marine safety and enhance safety for everyone using or working in the UK port marine environment.

The PMSC was applicable both to the Statutory Harbour Authority (SHA)[44] and other marine facilities, which may not have statutory powers and duties. It referred to some of the existing legal duties and powers about marine safety that affected organisations but did not in itself create any new legal duties. The PMSC also identified ten measures that SHAs must consider in order to comply with it, including:

> *Risk Assessment: Ensure that marine risks are formally assessed and are eliminated or reduced to the lowest possible level, so far as is reasonably practicable, in accordance with good practice.*
>
> *Marine Safety Management System: Operate an effective MSMS which has been developed after consultation, is based on formal risk assessment and refers to an appropriate approach to incident investigation.*

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[41] 30 days; 2 days as skipper; 800 miles; or 12 night hours. This reduced to 20 days; 2 days as skipper; 400 miles; or 12 night hours once the Powerboat Advanced certificate was held.

[42] The Powerboat Advanced Course was only eligible for a commercial endorsement if the course completion certificate was issued before 1 January 2005. In addition, the RYA could commercially endorse a Power Boat Advanced course completion certificate if it was issued after 1 January 2005 and the candidate had completed their original Power Boat Advanced Instructor Course before April 2011.

[43] https://www.gov.uk/government/publications/port-marine-safety-code

[44] Statutory bodies responsible for the management and running of a harbour in the UK. The powers and duties in relation to a harbour are set out in local Acts of Parliament or a Harbour Order under the Harbours Act 1964.

Section 4 of the PMSC provided an overview of the specific duties and powers that were relevant to port safety and that should be used to support safe navigation, subject to the local legislation in place. The PMSC indicated that a harbour authority typically had the power in its local legislation to appoint a harbourmaster, who was accountable to the authority for the safety of marine operations within the harbour. The PMSC also explained the various powers available to harbour authorities, which included:

- Byelaws – these were used to regulate activities in the harbour, reflecting local circumstances and enable the safe and efficient operation of the harbour rather than prohibit activities unless the appropriate byelaw-making power so specified.
- Directions (usually referred to as Special Directions) – under local legislation the appointed harbourmaster generally had powers to give specific directions to specific vessels for specific movements rather than for setting general rules.
- General Directions – some harbour authorities had additional powers through their local enabling legislation to give 'general directions' to regulate the movement and berthing of ships.
- Harbour Directions – The Marine Navigation Act 2013 created a new procedure for harbour authorities to obtain powers to issue 'harbour directions', similar to General Directions.

1.16.2 A Guide to Good Practice on Port Marine Operations

The PMSC was supplemented by *A Guide to Good Practice on Port Marine Operations* (GTGP)[45] that was intended to provide information and guidance on the management of ports, including the development of a Marine Safety Management System (MSMS) and risk assessments. The GTGP detailed the range of subjects that could be covered by byelaws, including navigational rules, speed limits and the licensing of port craft and personnel, which is further discussed at section 1.16.3 below.

Guidance was also provided on the duties and powers of a harbour authority, including that harbour authorities could attempt to secure the additional duties or powers associated with *general directions* by applying for a harbour revision order under Section 14 of the Harbours Act 1964.

1.16.3 Regulation of port craft and licensing

The GTGP provided guidance on the regulation of craft operating in port authority areas and noted that craft operating commercially *at sea*, i.e. outside Category C and Category D waters, were required to comply with defined codes of practice, such as the SCV Code. Where craft were not subject to these regulations, the GTGP stated that harbour authorities should have procedures for ensuring that the craft were properly maintained, equipped and manned and used only for purposes for which they were capable. Section 11.3.3 of the GTGP further stated that:

> *Local legislation may empower harbour authorities to register, inspect and license commercially operated port craft. Where this is not the case, the authority's risk assessments should show some form of agreement with commercial operators about the maintenance and proper use of these vessels. It may be appropriate for the authority to consider seeking these powers.*

[45] https://www.gov.uk/government/publications/a-guide-to-good-practice-on-port-marine-operations

1.16.4 Public Health Acts Amendment Act 1907

Section 94 of the Public Health Acts Amendment Act 1907 (the 1907 Act), as amended by the Local Government (Miscellaneous Provisions) Act 1976, enabled local authorities in the UK to grant a licence to pleasure craft, including those used to carry passengers *for hire*. The 1907 Act provided a means for a local authority to formally grant permission for a craft to be operated in its jurisdictional waters. The use of the powers afforded by the 1907 Act was optional and, in accordance with Section 94(4) of the act, the powers, where used, could not be applied to vessels certified under any MCA regulations.

In accordance with the 1907 Act, some UK local authorities and port authorities required all vessels operating commercially in waters under their jurisdiction to hold a licence. For example, the Port of London Authority (PLA) issued byelaws in 2014 requiring vessels operating commercially within PLA limits to hold a licence issued by either the PLA or an alternative licensing authority. The PLA applied the *Inland Waters Small Passenger Boat Code* to vessels carrying 12 or less passengers.

1.16.5 Industry organisations

A number of industry membership organisations existed to support the work of harbour authorities in the UK, including:

- The British Ports Association (BPA) – a national membership body for ports, formed in 1992, representing the interests of operators handling 86% of all UK port traffic.
- UK Harbour Masters' Association (UKHMA) – formed in 1993, comprising harbourmasters and other port roles, commercial bodies that serve the port sector and other appropriate personnel and organisations.
- UK Major Ports Group (UKMPG) – the trade body for the UK's major port operators, formed in 1993, representing nine of the top ten port operators in the UK.

1.17 THE PORT OF SOUTHAMPTON

1.17.1 Harbour Authority

Southampton was one of the UK's busiest ports, with over 42,000 shipping movements in 2020. Associated British Ports (ABP) Southampton was the SHA for Southampton Water. The port was provided with a 24-hour VTS, which included surveillance of radar imagery, with an AIS overlay and closed-circuit television cameras. All vessels in excess of 20m in length, bound to or from or passing through the Port of Southampton, were required to communicate with VTS by VHF.

1.17.2 Local regulations

At the time of the accident, the primary powers of ABP Southampton as SHA were conferred by a series of Acts[46] enabling it to make the 2003 Southampton Harbour Byelaws.

Byelaw 7.(1) covered the speed of vessels and prohibited navigation without due care and attention or at a speed or in a manner that endangered the safety of any person or another object. It also imposed the speed limit of 6kts north of a line from Hythe Pier through the Weston Shelf buoy to Weston Shore **(Figure 22)**.

[46] Section 83 of the Harbours, Docks & Piers Clauses Act 1847 (incorporated by Section 4 of the British Transport Docks Act 1964 and applied by Section 51 of that Act); Section 53 of the Southampton Harbour Act 1863; Sections 52 and 53 of the British Transport Docks Act 1964; and Section 16 of the British Transport Docks Act 1972.

After a powerboat accident in Southampton Water in 2015[47] (see section 1.19.6), the Port of Southampton harbourmaster issued Notice to Mariners No 57 (NtM No 57) of 2015: *Port of Southampton – Safe Speed within the Port of Southampton Statutory Area*. This stated that speeds in excess of 40kts in Southampton Water were not considered to comply with Byelaw 7.(1) or Rule 6 of the IRPCS, 1972 unless the master had conducted an appropriate risk assessment and given prior notice to Southampton VTS. This notice was withdrawn from the ABP Southampton website in 2019 and the skipper of *Seadogz* was unaware that it was no longer extant.

There were no designated areas for high-speed operations within the Port of Southampton. Two crossing points had been designated for recreational craft to cross the main channel in Southampton Water in order to deconflict with larger commercial traffic. The first was located between Hythe Village Marina and No.1 buoy, the second to the south of a line between the Cadland and Greenland buoys.

The byelaws contained no specific regulations relating to commercial high-speed passenger operations, nor did they enable the port authority to issue licences to commercially operated passenger craft.

At the time of the accident, ABP Southampton had no 'general direction' powers. In June 2020, it had made a formal application to the Marine Management Organisation under Section 14 of the Harbours Act 1964 for The Port of Southampton Harbour Revision Order (HRO) to increase its powers of general direction. This HRO underwent consultation between April 2021 to June 2021, and at the time of the publication of this report ABP was awaiting the outcome of its application.

Image courtesy of ABP Southampton (www.southamptonvts.co.uk)

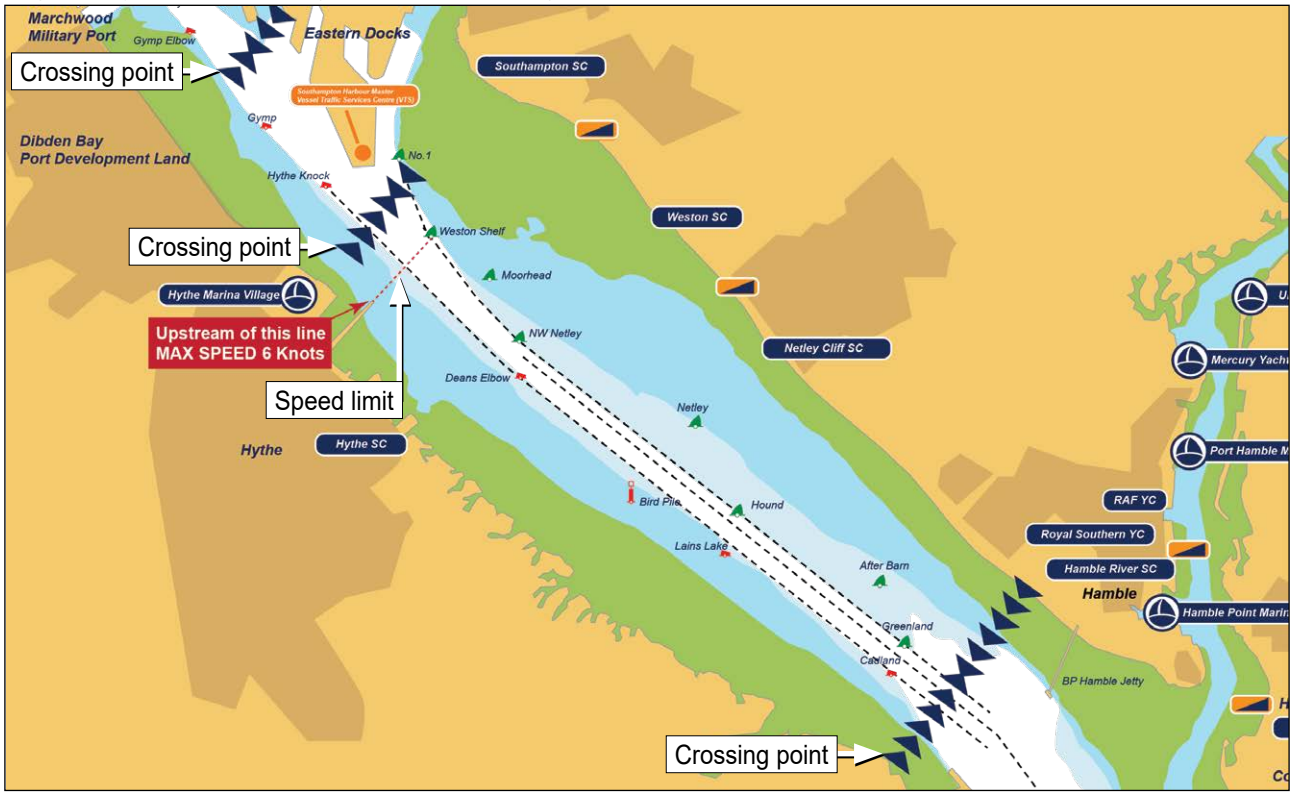

Figure 22: Chart showing Southampton Water crossing points and speed limit at the time of the accident

[47] MAIB report 2/2016.

1.17.3 North-West Netley buoy

The North-West Netley buoy was located in the Port of Southampton's area of responsibility on the starboard hand side of the main channel. The buoy was painted green and it had a conical green top mark and a light-emitting diode light. The buoy weighed about 5 tonnes (t), had a diameter of 3m and when afloat it extended about 4.6m above the waterline. The buoy was anchored to the seabed using 25m of 42mm chain connected to a 1.5t cast iron sinker.

1.17.4 Marine Safety Management System and risk assessments

ABP Southampton had an MSMS and risk assessments in place relating to the operations of the port, including risk assessments covering high-speed vessels colliding with navigational marks and high-speed vessels colliding with floating objects. There were no specific risk assessments developed for the hazards associated with the operations of high-speed small commercial passenger craft within the port, nor did the risk assessments show any form of agreement with the operators of *Seadogz* about the maintenance and proper use of its RIBs.

1.17.5 Oversight of high-speed commercial passenger operations

ABP Southampton had not received any complaints about the operation of *Seadogz* before this accident. It also had no records of any recent incidents relating to the operation of high-speed commercial passenger operations within the port.

1.17.6 Boat licensing requirements

As the local authority for Southampton Water, Southampton City Council (SCC) issued licences to pleasure craft, including those carrying passengers for hire, in accordance with Section 94 of the 1907 Act. ABP Southampton's harbourmaster acted as the council's agent in assessing the fitness of craft and the suitability of their crew.

In accordance with Section 94(4) of the 1907 Act, *Seadogz* was not required to be issued with a licence by SCC as it was certified to the SCV Code.

Following this accident, the MAIB investigated the local licensing requirements for recreational charter activities in ports within the Solent and the adjoining areas. This review revealed an inconsistent approach to the licensing of such activities **(Annex G)**.

1.18 PREVIOUS ACCIDENTS – *SEADOGZ*

1.18.1 April 2012

On 18 April 2012, shortly after *Seadogz* was acquired by Seadogz RIB Charter Limited, a 50-year-old male passenger standing astride seat J8 suffered significant life-changing back injuries after a heavy landing as the RIB jumped waves in choppy conditions during a trip. This accident was not reported to the MAIB.

1.18.2 March 2013

On 27 March 2013, a middle-aged male passenger on board *Seadogz* injured his back when the RIB jumped the wake of another vessel. As the helmsman manoeuvred *Seadogz* over the wake of a ferry at a speed of about 24kts, the passenger was lifted from his seat as the RIB fell away and he landed heavily on the seat. Falling to the floor, the passenger raised his arm in the air and the RIB was brought to a halt. The trip was suspended and *Seadogz* returned to its berth at slow speed. The passenger sustained two fractured vertebrae.

1.18.3 July 2017

On 17 July 2017, a male passenger suffered rib injuries as a result of being thrown against the handhold on the back of the seat in front of him as *Seadogz* was driven over its own wake during a high-speed manoeuvre. The passenger was sitting on the bench seat and was unable to prevent himself from striking the handhold. This accident was not reported to the MAIB.

1.19 SIMILAR ACCIDENTS

1.19.1 *Celtic Pioneer* – heavy landing

On 26 August 2008, a 55-year-old female passenger on board the 9m RIB *Celtic Pioneer* suffered a lower back wedge compression fracture during a 60-minute boat trip in the Bristol Channel with 10 work colleagues as part of a team-building exercise. The injury occurred as the passenger was momentarily lifted into the air due to the RIB's motion.

The MAIB investigation report (MAIB Report 11/2009[48]) stated that, at the time of the accident, thrill rides and similar activities were not specifically included in the four MCA 'coloured' Codes of Practice or SCV Code, and there was no industry approved CoP. Consequently, the standards of safety management among UK operators of such boats varied considerably.

A recommendation was made to the MCA and RYA to *Review and revise the deck manning and qualification requirements of the harmonised SCV Code taking into account the speed of craft and the type of activity intended in addition to the distance from shore and environmental conditions*.

It is anticipated that this recommendation will be addressed with the introduction of The Sport & Pleasure Vessel Code in 2024 (see section 1.7.1).

1.19.2 Delta 8.5m RIB – heavy landing

On 6 May 2010, a male passenger suffered lower back compression fractures while a RIB was transporting him and fellow workers to a jack-up barge on the River Thames (MAIB Report 1/2011[49]). The injury occurred when, due to the RIB's motion, the passenger was momentarily lifted off the locker lid on which he had been sitting and then landed heavily back onto it. The injured person was permitted to sit in a location where, with the boat proceeding at high-speed, he was unable to maintain the posture necessary to prevent injury.

During the drafting stage of the MAIB's report, the MCA had advised that MGN 280 (M) was being reviewed with a target date for publication of late 2011. The revised code would include guidance on passenger safety. The MAIB's report identified an increasing trend for this type of accident and the MCA was recommended to *Prioritise and resource the revision of MGN 280 to ensure the updated code of practice for small commercial vessels is published as early as is possible*.

As detailed at sections 1.7.1 and 1.19.1, this recommendation is set to be achieved when The Sport & Pleasure Vessel Code is published in 2024.

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[48] https://www.gov.uk/maib-reports/heavy-landing-during-boat-trip-on-the-rigid-inflatable-boat-celtic-pioneer-in-the-bristol-channel-near-penath-wales-with-1-person-injured

[49] https://www.gov.uk/maib-reports/heavy-landing-on-a-delta-rigid-inflatable-boat-on-river-thames-england-with-1-person-injured

1.19.3 Two Cardiff Bay Yacht Club RIBs – collision

On 27 October 2010, two RIBs belonging to Cardiff Bay Yacht Club collided at night while transporting a number of children across Cardiff Bay (MAIB Report No 19/2011[50]). The RIBs were proceeding at about 20kts in the dark and carried no navigation lights or torches. Both RIBs had more occupants on board than seats, so the children without designated seats had to sit on the inflatable tubes; three of these children were thrown into the water when the RIBs collided. One of the children sustained a traumatic brain injury, two others required subsequent extended medical treatment and several of the children suffered bruising and soreness following the collision.

1.19.4 Vector V40R powerboat – contact

On 13 May 2015, a Vector V40R powerboat hooked[51], inverted and made contact with a navigation buoy near the entrance to the River Hamble in Southampton Water while operating at high speed (MAIB Report 2/2016[52]). As a result of the accident, one of the powerboat's four occupants was seriously injured and the others required hospitalisation.

This accident led to the Port of Southampton harbourmaster issuing NtM No 57 of 2015, effectively imposing a speed limit of 40kts in Southampton Water (see section 1.17.2).

1.19.5 *Osprey* and *Osprey II* – collision

On 19 July 2016, two RIBs conducting fast commercial passenger rides collided in the Firth of Forth, Scotland (MAIB report 10/2017[53]). A passenger who was sitting on an inflatable tube was crushed between the helm console of the RIB she was on and the bow of the other RIB, sustaining serious life-changing injuries. The MCA was recommended to:

> *Include in its forthcoming Recreational Craft Code with respect to commercially operated passenger carrying RIBs:*
>
> - *A requirement for the certificated maximum number of passengers to be limited to the number of suitable seats designated for passengers.*
> - *Guidance on its interpretation of "suitable" with respect to passenger seating.*
> - *A requirement for passengers not to be seated on a RIB's inflatable tubes unless otherwise authorised by the Certifying Authority and endorsed on the RIB's compliance certificate with specified conditions to be met for a particular activity.*

The MCA has retitled the Recreational Craft Code referred to in this recommendation as The Sport & Pleasure Vessel Code, in which it intends to address the points identified when it is introduced in 2024 (see sections 1.7.1, 1.19.2 and 1.19.3).

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[50] https://www.gov.uk/maib-reports/collision-between-2-rigid-inflatable-boats-while-transporting-a-number-of-children-across-cardiff-bay-wales-with-3-people-injured

[51] A violent alteration of course and deceleration resulting in a significant, momentary, delivery of G-force being exerted on the craft and its occupants. This often leads to the ejection of the craft's occupants.

[52] https://www.gov.uk/maib-reports/contact-made-by-vector-v40r-powerboat-with-navigation-buoy-with-3-people-injured

[53] https://www.gov.uk/maib-reports/collision-between-rigid-inflatable-boats-osprey-and-osprey-ii-resulting-in-serious-injuries-to-1-passenger

1.19.6 *Tiger One* – collision

On 17 January 2019, a commercially operated RIB collided with a mooring buoy on the River Thames at a speed of about 26kts in darkness (MAIB report 10/2019[54]). The skipper did not see the mooring buoy in time to take avoiding action. Two passengers and the RIB's two crew were taken to hospital with minor injuries. While no recommendations were made, the report noted that *there is significant potential for more serious consequences to result from similar high-speed accidents in the future*.

[54] https://www.gov.uk/maib-reports/collision-between-rigid-inflatable-boat-tiger-one-and-a-mooring-buoy-with-4-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

Seadogz was being operated in favourable conditions in the sheltered waters of Southampton Water to provide what should have been an exciting experience for its paying passengers. Its skipper was appropriately qualified and highly experienced to operate the RIB, which was a modern craft that had been designed and surveyed to the appropriate standards. The company operating *Seadogz* was likewise experienced in providing such trips. Yet the trip ended in tragedy with the loss of a young life and with the other passengers all sustaining injuries, many of which were serious.

The circumstances of the RIB's impact with the buoy and the reasons why the skipper and his passengers suffered such serious injuries are analysed in this section of the report. The underlying factors that contributed to this fatal accident will also be discussed, including the conduct of the trip, the crash protection of the RIB and the emergency preparedness. The organisational and regulatory barriers that should have prevented this accident are also considered. The shoreside emergency response has not been reviewed as part of this investigation.

2.3 THE ACCIDENT

Seadogz hit the North-West Netley buoy because its skipper did not see it in sufficient time to take avoiding action. Before the accident, *Seadogz* was being operated at high speeds with close passes to various navigation buoys and the ferry *Red Falcon* to provide a thrill ride experience for the RIB's passengers. When *Seadogz* passed astern of *Red Falcon* for the fourth time, around 50 seconds before the accident, the skipper's view of the North-West Netley buoy would have briefly become obscured by the advancing ferry **(Figure 23)**. Analysis indicated that the buoy would have then become visible again ahead of the ferry as *Seadogz* overtook it on its starboard side **(Figure 24)**. However, as the RIB turned to starboard at around 30kts with the Deans Elbow buoy ahead, the North-West Netley buoy would have been aft of *Seadogz* **(Figure 25a** and **25b)** and then again obscured by *Red Falcon*, as the skipper of *Seadogz* completed the turn near to the ferry **(Figure 26)**. The North-West Netley buoy would then have only become visible for about 14 seconds before the accident as *Seadogz* exited the turn at 33.1kts **(Figure 27)** and began to cross *Red Falcon*'s wake for the fifth and final time. Despite the buoy being almost directly ahead during this period, the skipper of *Seadogz* did not see it until just before the impact at a speed of 38.4kts; the RIB had been accelerating on a relatively steady easterly heading for the final 10 seconds before hitting the buoy.

As indicated at **Figures 24**, **26** and **27**, the decision to operate *Seadogz* at high speed in the vicinity of the outbound *Red Falcon* significantly reduced the time its skipper had to see the North-West Netley buoy in the period before the accident. Nonetheless, given the RIB's manoeuvrability, the 14 seconds when the buoy would have been visible before the impact should have still provided the skipper with sufficient time to take avoiding action had he seen the buoy early enough. The following sections consider the possible factors that contributed to the skipper not seeing the buoy until just before the impact.

Field of vision angle based on BS EN ISO 11591:2020

Base charts reproduced from Admiralty Chart 2041 by permission of HMSO and the UK Hydrographic Office

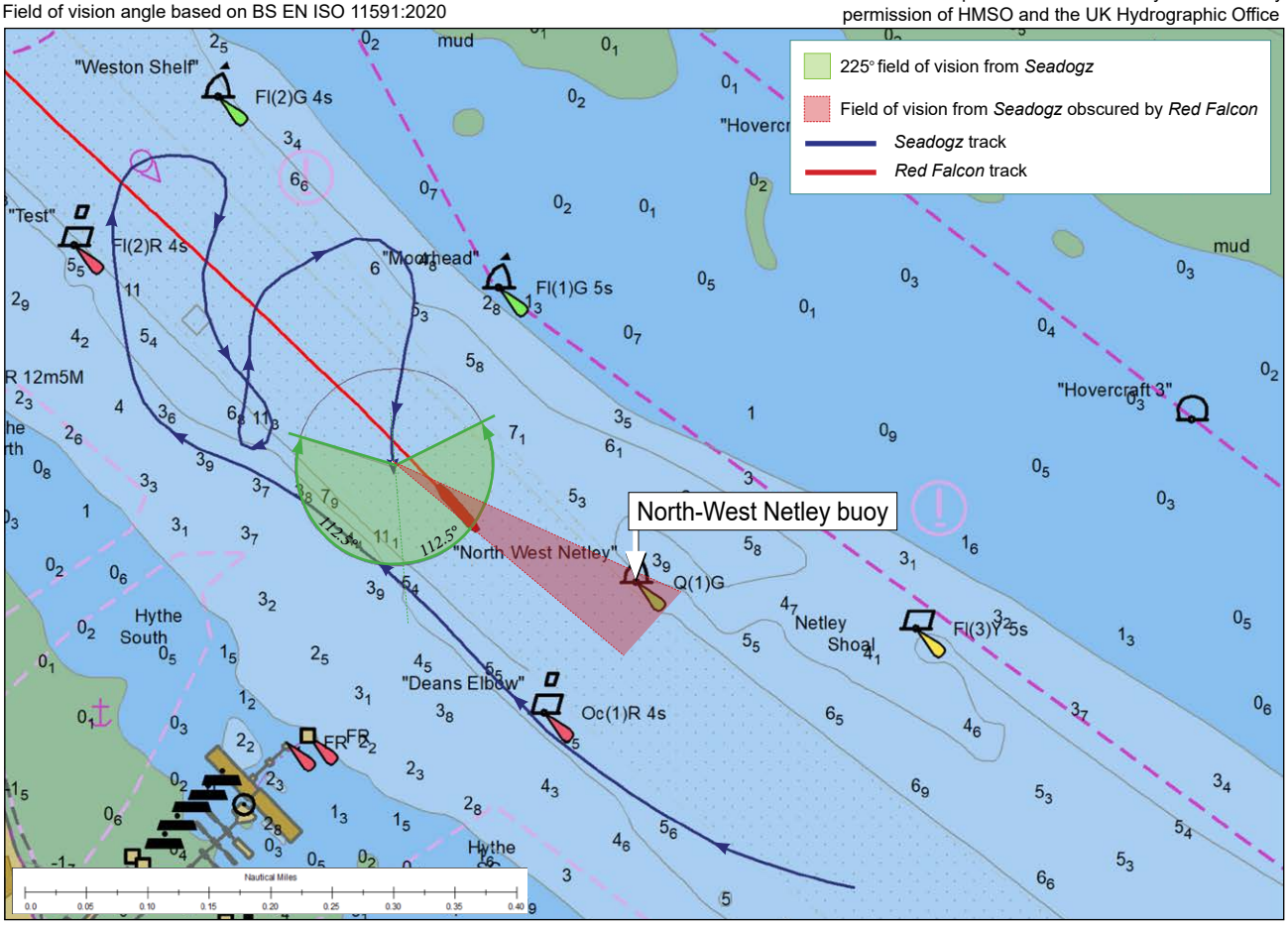


Figure 23: Representation of the view of the North-West Netley buoy from the helm position on *Seadogz* becoming obscured by *Red Falcon* at 1010:21

Field of vision angle based on BS EN ISO 11591:2020

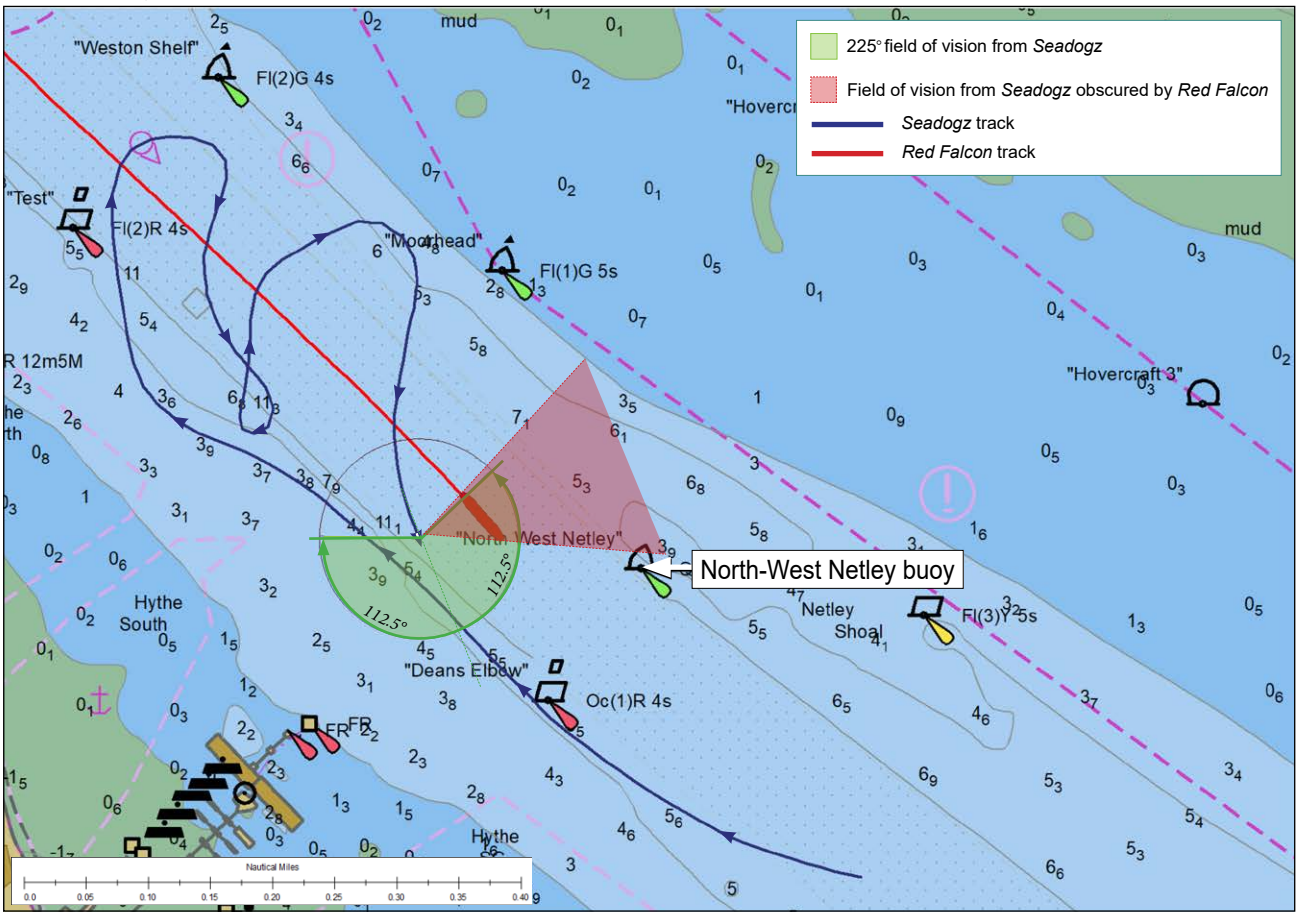


Figure 24: Representation of the view of the North-West Netley buoy becoming visible as *Seadogz* overtakes *Red Falcon* at 1010:28

Field of vision angle based on BS EN ISO 11591:2020

Base chart reproduced from Admiralty Chart 2041 by permission of HMSO and the UK Hydrographic Office

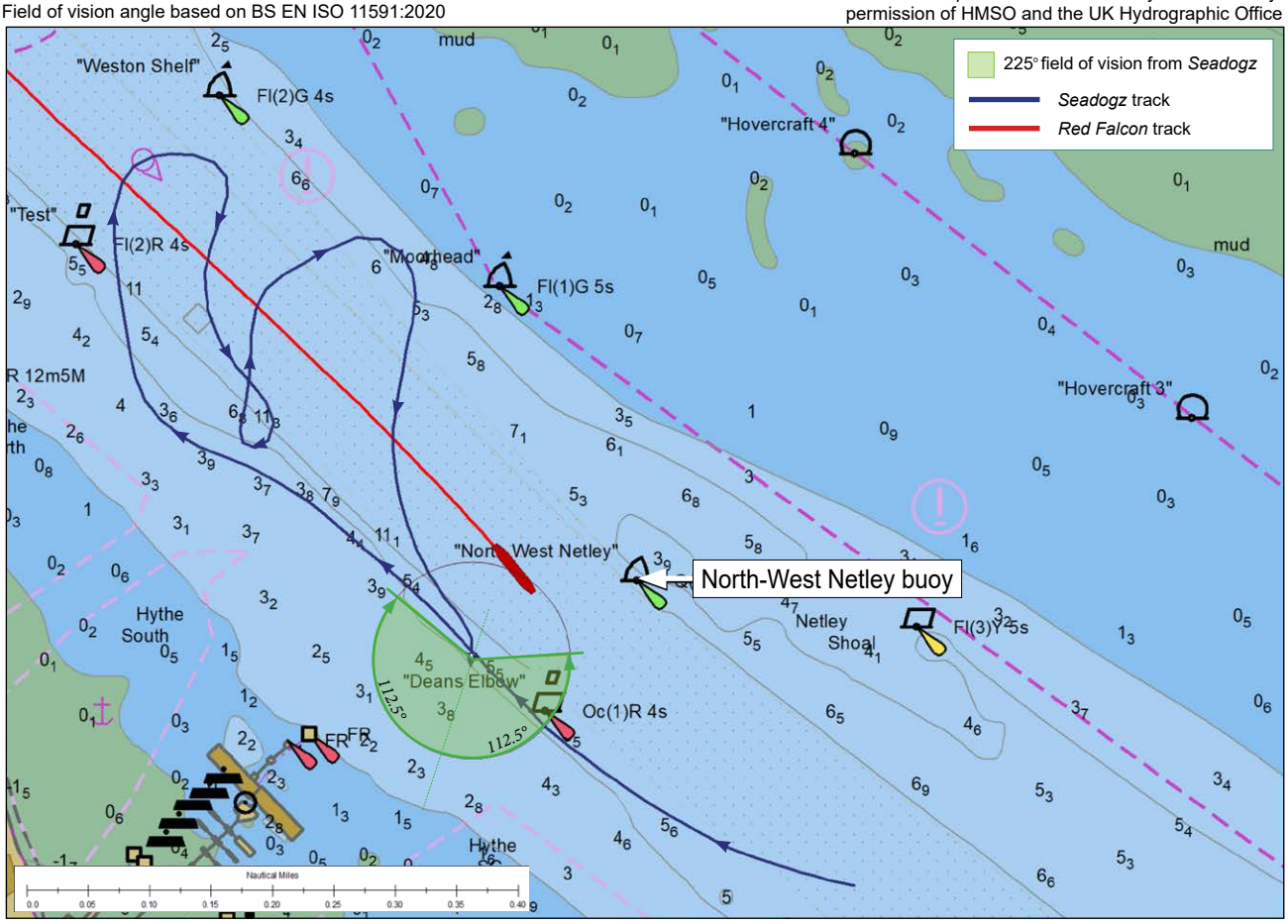


Figure 25a: Representation of *Seadogz* beginning its turn to starboard with the North-West Netley buoy astern at 1010:39

Image courtesy of R. Tong

Figure 25b: CCTV still from Hythe, showing *Seadogz* and *Red Falcon*

Field of vision angle based on BS EN ISO 11591:2020

Base charts reproduced from Admiralty Chart 2041 by permission of HMSO and the UK Hydrographic Office

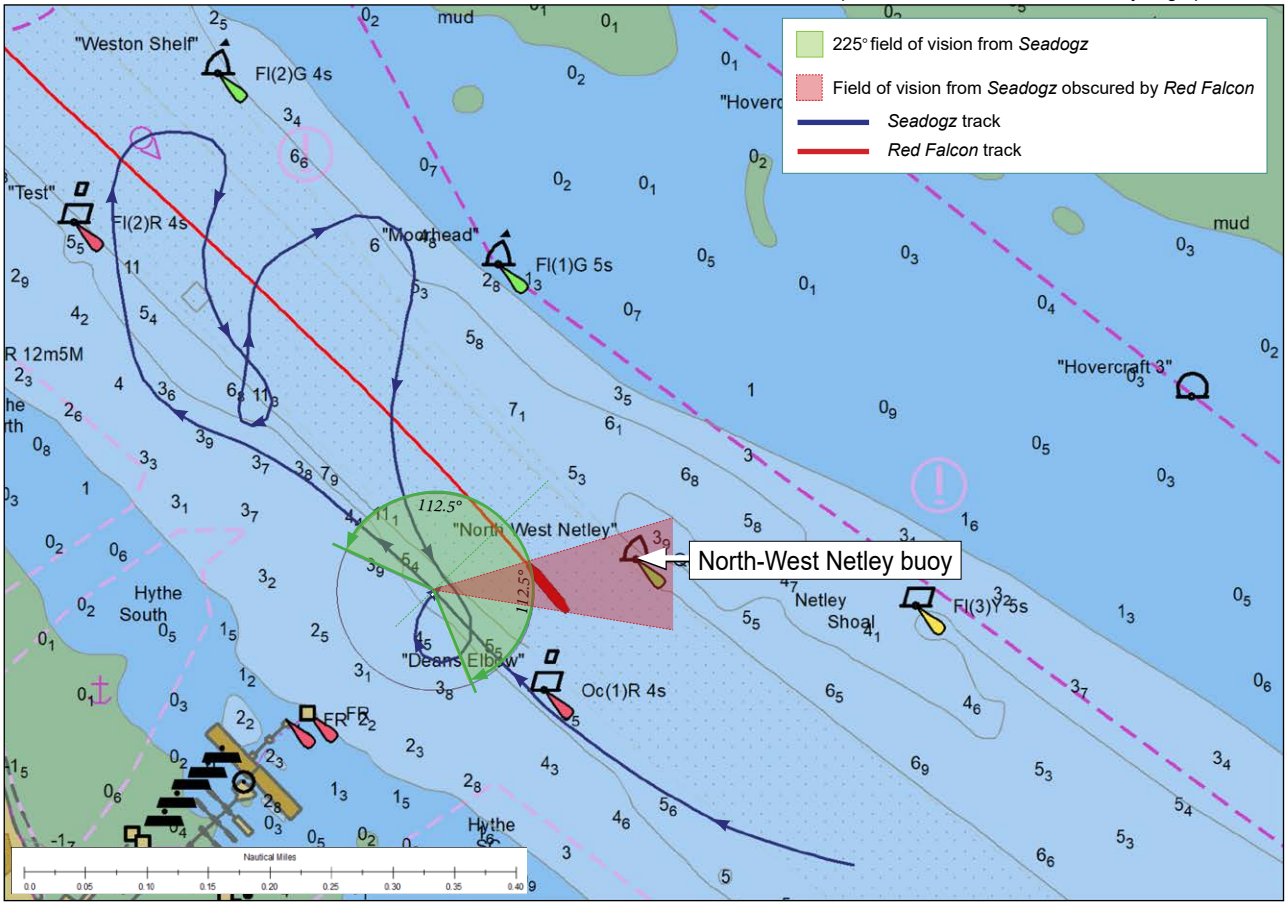


Figure 26: Representation of the view of the North-West Netley buoy obscured by *Red Falcon* as *Seadogz* completes its turn at 1010:52

Field of vision angle based on BS EN ISO 11591:2020

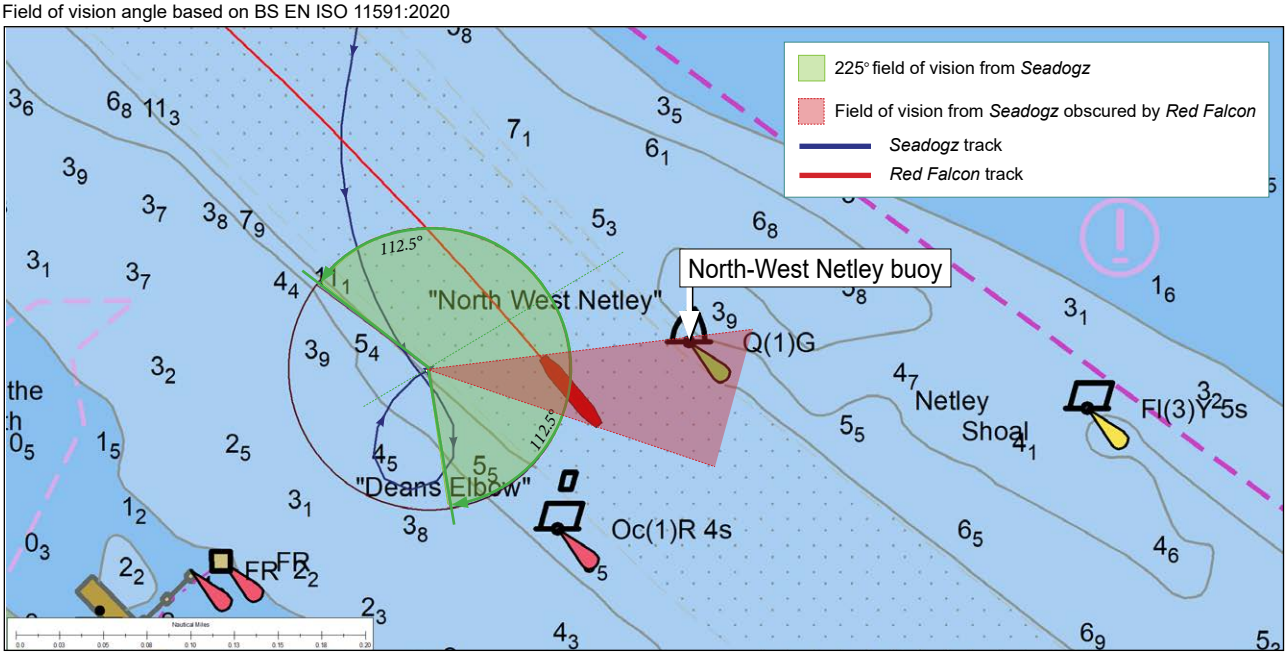


Figure 27: Representation of the final turn by *Seadogz* before contact, demonstrating view of the North-West Netley buoy obscured by *Red Falcon* at 1010:54

2.4 LATE DETECTION OF THE BUOY – POSSIBLE CONTRIBUTORY FACTORS

2.4.1 Consideration of individual factors possibly contributing to the late detection of the buoy

The skipper was appropriately qualified to operate *Seadogz*, having completed various training courses forming part of the RYA's recognised and well-established training system, which was intended to assure the safe operation of powerboats. Furthermore, as a qualified instructor and principal of his own RYA recognised training centre he should have had a detailed understanding of the content of these courses. These included the RYA Professional Practices and Responsibilities course, which detailed the safe management of commercial craft and the duty of care to passengers. He was also highly experienced both in the operation of RIBs and navigating in Southampton Water.

Despite this experience, the task of driving the RIB at high speed in the vicinity of the buoys was highly demanding and required significant mental resources. This would have particularly been the case as this was the skipper's first trip of this type on *Seadogz* for some time due to the restrictions earlier in 2020 relating to the COVID-19 pandemic. This could have increased his risk of experiencing an attentional breakdown impairing his perception and response to the hazards.

Tests conducted following the accident confirmed that the skipper was not under the influence of alcohol or recreational drugs at the time of the accident. He was also rested and there was no evidence that fatigue was a factor. The skipper held a valid ML5 fitness certificate and medical investigations did not identify any evidence of physiological factors having suddenly and temporarily impaired his vision or cognitive abilities prior to the accident, so this has been discounted.

There was no evidence to indicate that the face mask being worn beneath the skipper's helmet visor **(Figure 10)** either rode up or was blown over his eyes, nor that it caused his spectacles or the visor to mist up. Before the accident, the RIB was on an easterly heading and the wind was west-south-westerly and therefore from astern of the RIB; additionally, the mask was shielded behind the visor. The skipper had not experienced any problems with the mask during the trip nor did he take his hands off the throttle at any point during the accident to readjust his mask.

In the period immediately before the accident, *Seadogz* was broadly heading into the sun, which was low in the sky with an azimuth of about 35° relative to the RIB's easterly heading. However, analysis of the available video footage of the accident **(Figure 25b)** indicated that the area near the buoy did not appear to be in bright sunshine at the time of the accident.

The skipper was wearing his prescribed spectacles to correct his vision and the photochromic nature of the lenses should not have affected his ability to detect the large green buoy in clear and bright daylight; the buoy was of a standard design and would have been easily distinguishable from the background landscape. Furthermore, *Seadogz* had intentionally passed the same buoy on an almost similar heading at close range around 10 minutes before the accident, albeit without any other traffic in the vicinity to create a wake or distract the skipper.

Although the skipper's helmet visor was found to be scratched after the accident, this was due to the consequences of the impact with the buoy, and no previous issues affecting his visibility through the helmet visor had been reported.

Had the skipper's eyesight or vision been impeded by any of these factors, the appropriate and instinctive action would have been for him to immediately reduce speed until his vision had been restored. However, the RIB's speed instead

increased as it tracked directly towards the buoy. Furthermore, as some of the passengers saw the buoy before the impact, there is no evidence to suggest that the buoy was not visible before *Seadogz* struck it.

No onboard audible or visual distractions were identified that could have affected the skipper's concentration. He would have been acclimatised to the loud music that he had chosen to play for the 12 minutes preceding the accident and, in any case, he could have reduced the volume if it was affecting his attention. There was likewise no evidence of any external communications or use of his mobile phone that could have formed a distraction to the skipper before the accident.

Without any evident individual factors affecting his performance, it is difficult to identify a single reason why the skipper did not detect the buoy during the 14 seconds before the impact. Like the *Tiger One* accident, it is evident that the skipper did lose positional awareness in the moments before the accident; this was further corroborated by his misidentification of the marker following the accident as the Hound buoy, which was nearly 1nm to the south-east. The degradation of his positional awareness was most likely due to a combination of:

- his desensitisation to the risks of high-speed RIB operations;
- the high mental workload associated with operating *Seadogz* alone at high speed near other marine assets; and
- some of the RIB's design features, which are discussed in more detail at section 2.5 below.

2.4.2 Skipper's desensitisation and attitude to risk

The purpose of the *Seadogz* trip was to provide an exhilarating experience for the passengers. In pursuing a 'thrill' for the passengers, the skipper opted to pass close to large navigation buoys, cross other vessels' wakes and carry out tight figure-of-eight turns at very high speeds. In the context of the trip, the skipper evidently perceived the risk of doing so to be acceptable. However, the operation of the RIB on the day of the accident contravened recognised industry best practices, as well as the guidance highlighted in the owner's manual provided by the RIB's manufacturers. Despite the operator of *Seadogz* and the skipper's RYA recognised training centre both being members of the PCA, the instructions in its CoP regarding safe manoeuvring and not driving RIBs through the wash of vessels at speed were not followed. In addition, by choosing to repeatedly carry out the latter activity, the skipper was deviating from the HSPV Voluntary CoP's guiding principle of keeping the RIB in contact with the water at all times. This thereby increased the risk of passenger injury and compromised the forward visibility from the helm position in the moments before the accident as the RIB's bow rose and dropped several times after crossing *Red Falcon*'s wake **(Figure 7)**.

The skipper's decision to accept these risks may have reflected a misguided sense of trying to provide the best possible experience for the passengers. However, as the text in the foreword of the HSPV Voluntary CoP suggested, it is likely that, over time, he had become desensitised to the 'thrill' and associated risk of operating RIBs close to fixed objects and other vessels at very high speeds.

It is also likely that the passengers became progressively 'habituated'[55] to the high-speed close encounters with the buoys as the trip progressed and so were not at first worried as the RIB headed towards the North-West Netley buoy. Despite this, the course set towards the buoy did cause some concern among those passengers who had seen the buoy ahead. As MGN 436 (M+F) noted, it is likely that the

[55] Habituation (psychology): the diminishing of an innate response to a frequently reported stimulus leading to a drop in arousal level in these subjects.

passengers perceived that they were going even faster than the actual high speeds being maintained. However, none of the passengers felt secure enough to let go of the handholds at any point to indicate their concern to the skipper. By operating *Seadogz* in a high-speed and risky manner, the skipper not only desensitised the passengers to the hazards being encountered, but also reduced their ability to alert him to an impending hazard. Consequently, a barrier that could have helped prevent the impact with the buoy was effectively removed.

Of concern, is that the trip involved a series of twists and turns, many of which were very tight and introduced a serious risk of the craft 'hooking', which was a factor in the Vector V40R powerboat accident. As a qualified RYA instructor and training centre principal, the skipper should have been aware of the associated risks; however, he still elected to operate *Seadogz* in this manner, further reflecting his attitude to risk.

2.4.3 Mental workload associated with hazard avoidance at speed

During the trip leading up to the accident, *Seadogz* performed nine passes at close range to navigation buoys at speeds in excess of 30kts, each involving relatively tight turns that were intended to 'thrill' the passengers. The high speeds involved and the proximity to the buoys positioned the boat unnecessarily near to large, tethered, floating objects. This therefore introduced an unacceptable level of risk of an impact and was inconsistent with the need to maintain a safe speed to enable effective action to be taken to avoid a collision, as required by Rule 6 of the COLREGs.

Pursuing a 'thrill' experience for the passengers by effecting high-speed manoeuvres close to other marine assets would have increased the mental workload for the skipper of *Seadogz* given the pace at which he needed to make decisions and take action. This would have diminished his capacity to maintain attention on all the tasks he was required to carry out at the same time, which included monitoring the passengers' welfare and maintaining an effective all-round lookout.

Operating boats at slower speeds increases the time available to process information and make a decision, thereby improving the ability to effectively conduct all the tasks associated with operating the craft. However, at higher speeds a greater distance is covered during the decision-making time. For example, a RIB travelling at 40kts will travel over 20m per second and could cover 60m to 80m before a helm operator is able to react to a hazard and take avoiding action.

As above, analysis indicates that the skipper would have had sufficient time to react to the buoy's proximity had he observed it shortly after clearing *Red Falcon*'s stern. However, it is without doubt that the skipper's decision to pass astern of the outbound *Red Falcon* just before the accident contributed to it occurring. Not only did it restrict his ability to see the buoy, as discussed at section 2.3, it also significantly added to his mental workload. Factors for the skipper to consider would have been the transit across the ferry's wake, as well as the distraction of the underway ferry itself. Given that the next *Seadogz* trip was due to start at 1030, it is also possible that the skipper was considering his next high-speed alteration of course in order to start to head back to Ocean Village Marina rather than focusing on what was directly ahead.

The distractions and mental activities discussed above would have been exacerbated by the unstructured and high-speed nature of the trip. It is highly likely that the skipper's decision to unnecessarily conduct the transit close to *Red Falcon* contributed significantly to his high mental workload and therefore the loss of positional awareness that led to the accident.

2.4.4 Mental workload associated with lone manning

As the RIB's lone operator, the skipper of *Seadogz* was required to maintain an effective lookout during the trip, as required by Rule 5 of the COLREGs, to detect and avoid hazards, monitor passenger welfare and make sound route decisions.

The tasks associated with acting as sole watchkeeper, navigator and passenger attendant undoubtedly further increased the mental workload for the skipper. His ability to effectively perform all of the required tasks, including hazard avoidance, would therefore have been greatly reduced while operating the RIB single-handedly and contributed to the accident.

As recommended in the SCV Code, an additional trained crew member is fundamental to ensuring the safe operation of a high-speed passenger RIB given the high mental workload associated with operating single-handedly.

2.5 LATE DETECTION OF THE BUOY – BOAT DESIGN FACTORS

2.5.1 Restricted forward visibility from the helm position while operating at speed with passengers

Helm positions on passenger-carrying RIBs are typically located towards either the stern or bow to maximise passenger capacity and opinions differ as to which represents the optimum solution. The HSPV Voluntary CoP referred to the good all-round visibility provided by rear helm positions; these also facilitate the monitoring of passenger welfare and generally offer more favourable motions for the crew. Forward helm positions provide enhanced visibility ahead but are less comfortable for the crew and make it harder for them to monitor the passengers behind the skipper.

The aft helm position on *Seadogz* resulted in the skipper's field of vision ahead being obscured, both by the passengers in front of him and when the bow was raised as shown in photos of *Seadogz* operating on previous occasions **(Figure 28)**. The skipper's forward visibility would also have been further compromised with the RIB's movement after it crossed *Red Falcon*'s wake for the fifth and final time **(Figure 7)**.

As suggested in the STR report, the RIB crew's effective forward visibility could have been enhanced by raising the helm station and crew seats up on a plinth, as was the case on *Jack Black* **(Figure 29)**, the other RIB operated by Seadogz RIB Charter Limited. *Jack Black* was a different make and design of RIB to *Seadogz* so the two vessels were not directly comparable. Nonetheless, operational experience and feedback from the skippers of both *Seadogz* and *Jack Black* could have prompted consideration of possible solutions to improve the practical issues with the former's forward visibility while carrying passengers; however, there was no regulatory impetus to do so.

The SCV Code included generic statements on visibility for cargo carrying vessels and dedicated pilot boats but contained no specific forward visibility requirements for a RIB, such as *Seadogz*. Neither the HSPV Voluntary CoP nor the PCA CoP provided any specific guidance on forward visibility. This lack of any requirement or specific advice reduced the ability of operators and surveyors to effectively assess the risks and ensure that a RIB's forward visibility was appropriate for its intended operations.

The design of *Seadogz* conformed with the RCD, which also meant that it was verified as complying with the essential requirement for forward visibility as stipulated in BS EN ISO 11591:2001. Following the accident, the manufacturers

of *Seadogz* demonstrated compliance with the 2020 version of this standard **(Figure 19)**; the height of the skipper, at 1.655m, was shown to be within the range of eye positions stipulated in the standard. However, as this version of the standard no longer required the effect of planing on visibility to be considered, there was no evidence that this had been evaluated for the design of *Seadogz*. This apparent anomaly in the 2020 version of ISO 11591 was addressed with the 2022 amendment, which required the maximum running hull trim angle to be evaluated as part of the verification of the visibility.

Not taken on the day of the accident — stock photograph courtesy of Tripadvisor

Figure 28: Previous *Seadogz* excursion, showing its bow raised while crossing a wake

Figure 29: Example of raised plinth helm station as found on *Jack Black*

Although both the 2001 and amended 2020 versions of ISO 11591 required a boat's forward visibility to be evaluated based on a fully loaded condition, there was no requirement to consider the presence of any passengers or crew when evaluating the operator's field of vision. As **Figures 21** and **30** demonstrate, the positioning of passengers on an aft-helmed RIB can have a significant impact on forward visibility; in this instance it would have reduced the opportunity for the skipper to see the buoy directly ahead before hitting it. Further, the obscuration of the skipper's forward view impeded the safe conduct of the trip, increasing the risk of collision with other vessels, navigational features and possible grounding, especially while travelling at high speed. A requirement in ISO 11591 for the effect of the full loading of persons to be included in the evaluation of the operator's field of vision with the craft at its maximum running trim angle value would ensure that the actual operational forward visibility is adequate.

Notwithstanding the above omission, both the 2001 and 2020 versions of ISO 11591 required a note to be included in owner's manuals stating that the operator's vision can be obstructed by various factors, including persons on board. However, no such warning was included in the owner's manual for *Seadogz*. Furthermore, the owner's manual listed the maximum recommended number of persons to be carried on board a Stormforce 950 design as 10, while the SCV certificate and builder's plate fitted on *Seadogz* both recorded the maximum capacity as 14 persons. It is unlikely that either of these anomalies in the owner's manual directly contributed to the accident. However, they do reflect a lack of consistency and rigour in the manufacturer's documentation that is unhelpful when creating a framework to support the safe operation of the craft.

2.5.2 Degraded ability to monitor the RIB's onboard navigation aids

Although the console on *Seadogz* was fitted with a chart plotter, the skipper was not using it to monitor the RIB's position and he was navigating solely by eye, which is not uncommon for the operators of high-speed craft operating on short inshore trips. Despite the skipper's familiarity with Southampton Water and its various landmarks, his misidentification of the North-West Netley buoy reflected his loss of positional awareness at the time of the accident.

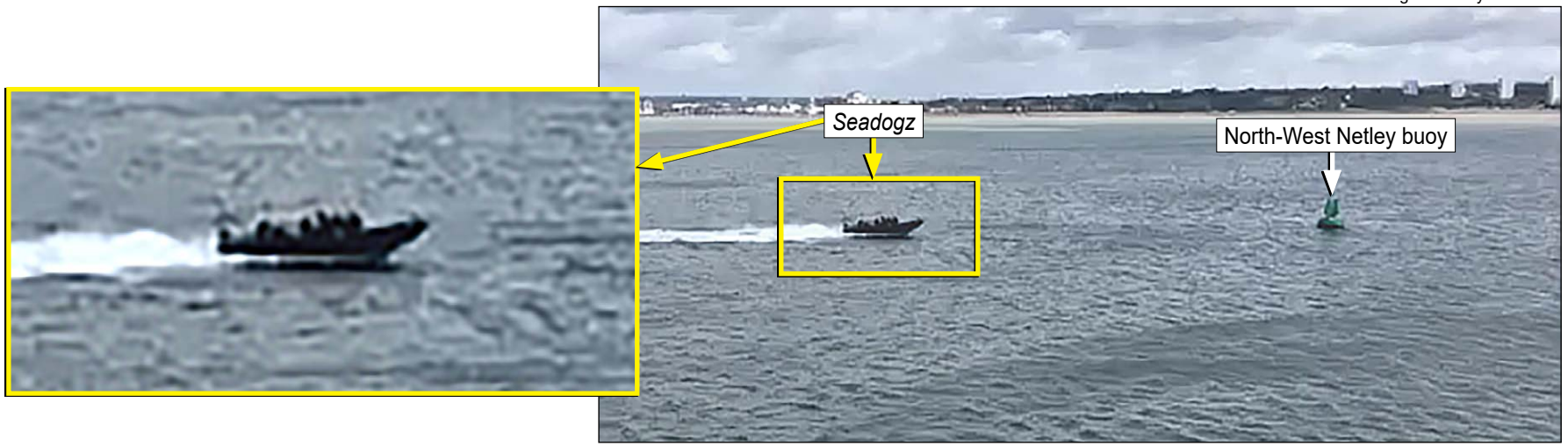
By not using the chart plotter, for example to check the vessel's speed over ground, a barrier to help the skipper safely conduct the trip was removed. However, as noted in the STR report, the chart plotter's location on the port side of the console limited the skipper's ability to interact with the system while standing on the starboard side of the console to drive the RIB **(Figure 14)**. The SCV Code and MGN 319 (M+F) provided no guidance on the optimum positioning of chart plotting systems. Nonetheless, the chart plotter's position in front of the port side console seat, with the steering wheel in front of the starboard console seat, possibly reflected the manufacturer's intent that the RIB should ideally be operated by two persons, one to helm and one to navigate.

2.6 PASSENGER PROTECTION

2.6.1 Overview

The sudden deceleration when *Seadogz* impacted the buoy caused its unrestrained occupants to be projected forward. This resulted in Emily Lewis sustaining fatal injuries when she struck the extended handhold in front of her during the impact and most of the passengers sustaining serious injuries, either from striking the seat structure or handholds in front of them. In the case of two of the passengers in the front seats, it led to them being ejected forward out of the boat. Once in the water, deficiencies in the fitting and arrangement of the passengers' lifejackets also became apparent.

Image courtesy of H. Tuck



Base drawing courtesy of Red Bay Boats Ltd

Field of vision angle based on BS EN ISO 11591:2020

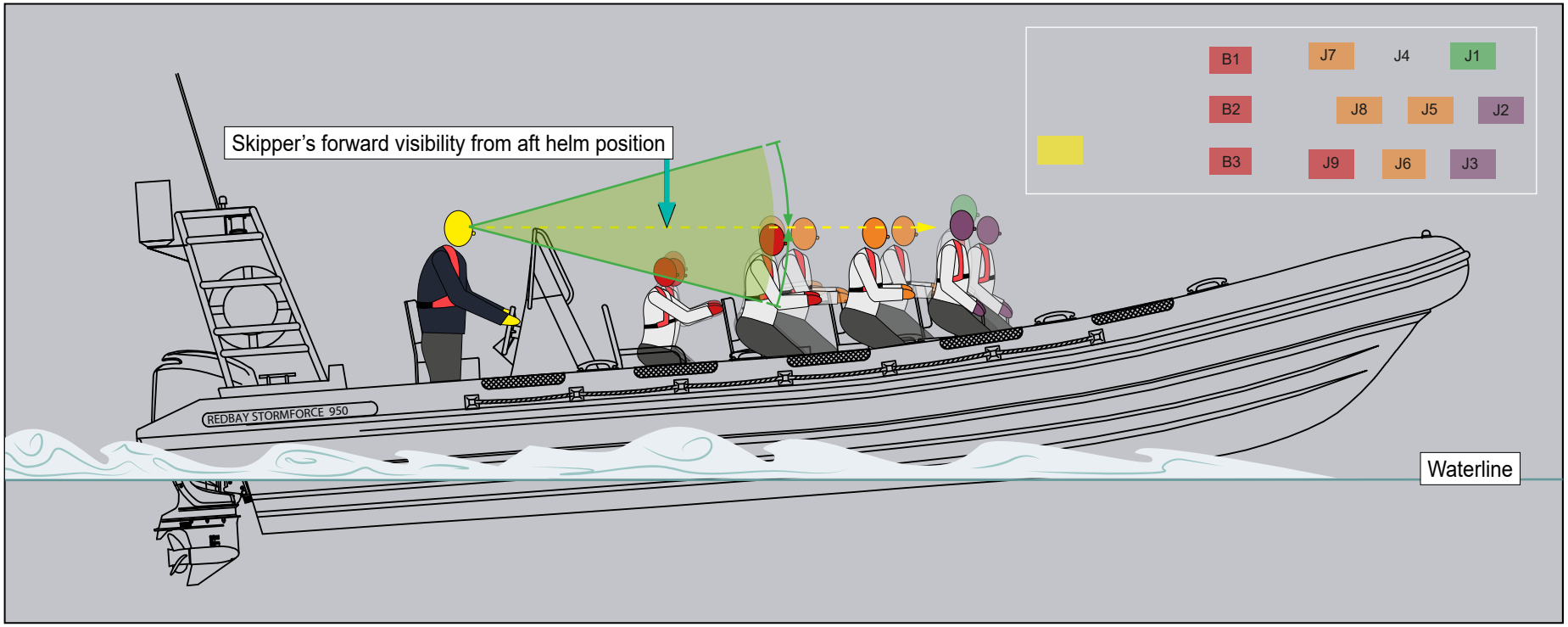


Figure 30: Representation of *Seadogz* 2 seconds before contact, showing obstruction of skipper's forward view

2.6.2 Safety briefing

The skipper of *Seadogz* delivered a short safety briefing before the start of the trip, giving an overview of the trip and an explanation of the function and use of the provided lifejackets. This included demonstrating how to correctly don the lifejackets, and carrying out a visual inspection of the lifejackets once the passengers were wearing them. However, he did not assist the passengers or physically check the fit of their lifejackets. This was despite the company's COVID-19 social distancing policy allowing him to assist the passengers in donning the lifejackets if he took appropriate precautions. Significantly, it was also in spite of the company's COVID-19 risk assessment highlighting the importance of correctly fitting the lifejackets.

The removal of the lifejackets' crotch straps a couple of weeks before the accident meant that checking to ensure the lifejackets were fitted properly around the passengers' torsos was even more important. When the female passenger was ejected overboard, a combination of her poorly fitted lifejacket and the missing crotch strap meant that her lifejacket rode up over her head, rendering it ineffective. As a non-swimmer she was extremely fortunate that the other passenger in the water was able to promptly assist her, despite being injured himself. In this instance, that the safety check had not identified that the lifejacket was being worn incorrectly could have contributed to the loss of another life.

Lifejackets should always be worn in accordance with the manufacturer's instructions, in particular by ensuring that all of the provided straps are appropriately tightened. The company's decision to remove the crotch straps degraded the effectiveness of the lifejackets and reflected a poor attitude to safety. The skipper's decision not to physically check that the lifejackets were being properly worn further demonstrated a suboptimal approach to passenger safety.

As part of the briefing the skipper showed the passengers how to correctly sit astride the jockey seats on board *Seadogz* and brace their legs against any motions. However, he did not provide any specific information on how to sit on the bench seat or use the handholds in its vicinity. In any case, and as discussed in section 2.6.3, the physical size and dimensions of the passengers that the skipper allocated to this seat meant that they were unable to effectively brace themselves while using the seat. Had the guidance in MGN 436 (M+F) been followed, this could have prompted the skipper to either consider refusing to allow Emily's family to take part in the trip or to adjust the voyage style to accommodate their reduced ability to maintain postural stability; this latter aspect should have resulted in him operating the RIB in a risk averse way, with a significant reduction in speed.

Although the SCV Code allowed a safety card to be provided to passengers instead of a briefing, Seadogz RIB Charter Limited had not developed one. The company had produced *Safety Brief Notes* to support skippers' delivery of safety briefings **(Annex B)**, but these were not always shared with the skippers, and had not been made available on the day of the accident. Neither the *Safety Brief Notes* nor the actual briefing provided to the passengers covered all the elements outlined in the SCV Code. For example, the skipper did not provide full details of the location of all the on board personal safety equipment and how to use it. Nor did he provide an enhanced safety brief to any of the passengers to help him in an emergency situation. In addition, the *Safety Brief Notes* did not fully cover all of the aspects stated in the guidance provided by MGN 436 (M+F), the PCA CoP and the HSPV Voluntary CoP; various aspects of emergency response and, crucially, the establishment of an effective protocol for passengers to raise their concerns during the trip were not included. Although the skipper did suggest that the passengers raise their hand if they felt uncomfortable, in reality this was not considered practical or safe by the passengers, and was therefore not an effective mitigation, as identified in the STR report.

Given the experience of the operator and the skipper, the limitations of the safety briefing process were surprising and did not provide an effective framework to assure the safety of the passengers both during the trip and following the accident.

2.6.3 The bench seat

The cushioned rear bench seat on *Seadogz* was a common arrangement on passenger-carrying RIBs offering inshore trips. Such seats are often considered to represent a favourable position for seating children and smaller adults due to:

- the aft location offering a more comfortable ride with less exposure to the shock and vibration caused by a RIB's vertical impacts as it passes through waves;
- the perception that a child or smaller adult would be afforded better general protection from the effects of the ride while sitting between two adults on the bench seat in comparison to sitting alone on a jockey seat; and
- the belief that bench seats provided a better postural position for individuals with short legs who could not effectively straddle a jockey seat with their feet on deck; this was necessary if they were to brace themselves against the shock and vibration of the ride.

As Emily was the smallest person on board *Seadogz*, the skipper allocated the bench seat to her family group, and Emily sat between her mother and sister in the middle seat position (B2). Unfortunately, as the tragic consequences of this accident and the post-accident anthropometric analysis conducted by STR demonstrated **(Figure 20)**, the skipper's perception of the suitability of the bench seat was misguided. The bench seat did not represent a safe and secure location for Emily, her mother and sister as none of them were able to put their feet on the RIB's deck at the same time as having their backs against the seat's backrest. This meant that they were unable to use their feet to gain any purchase on the deck in order to brace themselves against the forward motion.

Emily needed to perch on the edge of the bench seat to reach the handhold in front of her, despite it having been extended. This was a precarious position, particularly for a smaller person, which brought Emily closer to the handhold with her back unsupported, thereby compromising her postural stability. The extended nature of the handhold, which was reinforced and had no padding fitted, also increased the risk of an impalement during a collision or impact. Furthermore, the handhold's design was too narrow to facilitate the shoulder-width grip that MGN 436 (M+F) stated was needed to ensure effective postural stability.

Emily's mother and sister elected to hold on to the extended handhold with one hand and use their other hand to hold on to the handholds on the rear of the jockey seats in front of them. This was most likely because the individual handholds in front of seat positions B1 and B3 were too narrow and it would have felt safer and more comfortable to also hold on to the extended handhold in front of position B2. However, as noted by the STR report, the effect of also holding on to the extended handhold would have been to inadvertently 'funnel' Emily onto the extended handhold when the impact occurred.

Although the cushioning on the bench seat had moulded contours **(Figure 11)** to indicate the three seated positions, the shape and depth of the indentations were insufficient to provide lateral support for people sitting on the seat.

Bench seats are a popular feature on passenger RIBs. However, without effective individual shaped backrests and adequate restraints against vertical and horizontal motions, the ability of bench seats to ensure adequate postural stability and a means of bracing against rapid motions is compromised.

2.6.4 The jockey seats

Cushioned jockey seats are commonly fitted to high-speed RIBs as a means of providing postural stability for the passengers who sit astride the seat and can use their legs to brace against the RIB's motions. In this context, the jockey seats provided on *Seadogz* were not unusual and the skipper demonstrated how to use them in advance of the trip **(Figure 2b)**. Nonetheless, their use during this accident contributed to multiple serious injuries; as the STR analysis verified, the jockey seats did not provide a safe arrangement to mitigate the forces associated with a rapid horizontal deceleration.

Although each jockey seat was provided with a dedicated stainless steel semicircular handhold, they were too narrow to enable a shoulder-width grip to be achieved, and their location was below the seat occupants' centre of mass. The handholds on the front passenger seats were particularly low as they were fitted to the front of the seats themselves. The low position of the handholds afforded minimal effective restraint against horizontal motions and made it extremely difficult for the seats' occupants to brace themselves in the event of a rapid deceleration. This meant that there was minimal restraint against being thrown forward onto the RIB's structure and, in the case of the front passengers sitting at J1 and J3 **(Figure 3)**, being ejected out of the boat.

In summary, the configuration and location of the jockey seat handholds did not facilitate the passengers maintaining lateral postural stability during tight turns, nor did they provide a means of effectively bracing against rapid decelerations.

2.6.5 Crash protection and general passenger protection

It is evident that the severity of the injuries can be attributed to *Seadogz*'s inadequate protection for its passengers after the rapid deceleration caused by the contact with the buoy. A rapid deceleration is an inherent risk of high-speed operations when considering the possibility of making contact with objects, which might not be easily detectable, as well as groundings and collisions.

As already discussed in relation to the bench seat, the unprotected protruding handholds fitted to the rear of the jockey seats contributed to the injuries sustained by the passengers when they were thrown forward. The lack of padding fitted to the handholds and, in particular, on the rear faces of the jockey seats, further indicated that the crash protection afforded by *Seadogz* was inadequate.

Seadogz was coded under the requirements of the SCV Code and complied with the essential requirements of the RCD. However, neither code provided specific requirements or guidance relating to the RIB's crash protection or seat designs.

Although the SCV Code suggested that handgrips, toeholds and handrails should be provided as necessary to ensure the safety of all persons on board high-speed passenger craft, there was no specific requirement or advice on their configuration. Likewise, none of the RCD's essential requirements specifically related to seat design; Part 4 of the standard ISO 6185 did include a requirement for seat design and handholds, but this lacked specific detail.

The introduction of MGN 436 (M+F) in 2011, one year before *Seadogz* was supplied to Seadogz RIB Charter Limited, did provide guidance on the provision of seatbelts/restraints appropriate to the design and use of passenger RIBs, as well as the fitting of handholds. This included general advice that handholds should be fitted shoulder-width apart at chest height to provide appropriate lateral and longitudinal postural stability. As stated previously, the handholds fitted on *Seadogz* by Red Bay Boats Ltd did not meet this guidance; MGN 436 (M+F) also noted that expert advice should be sought to ensure that handholds and foot straps are appropriate.

Further industry guidance on seating and handhold design was provided in the HSPV Voluntary CoP in April 2019. This included the sensible precaution of driving craft fitted with bench seats in an appropriate manner to mitigate against the risk of injury by reducing speed and making wider, slower turns. The CoP also reiterated the general guidance on handholds in MGN 436 (M+F), as well as suggesting that rear-facing seat backs and handholds should be padded to minimise the risk of injuries in the event of a rapid deceleration.

Like the advice included in MGN 436 (M+F), the safety guidance in the HSPV Voluntary CoP was not mandatory; nonetheless, it was disappointing to note that it had not been implemented by the operator or skipper of *Seadogz* given the obvious relevance to the RIB's mode of operation.

Although not applicable to a passenger craft such as *Seadogz*, the SCV Code did state that everyone on board a pilot boat should be provided with seatbelts and individual shock absorbent seating. In addition, The Workboat Code Edition 2 stated that suitable seating should be available to provide lateral support and enable everyone on board a workboat to effectively brace themselves. It is also noteworthy that high-speed passenger craft engaged in international voyages are required, by the HSC Code, to meet more onerous requirements for seat construction and crashworthiness, while detailed guidance is available for the design of seats and restraint systems on military high-speed craft. Although these craft operate with arguably more onerous risk profiles, it is difficult to justify the continued absence of any specific requirements for seat design and passenger protection for a commercially operated high-speed RIB carrying 12 passengers. This is particularly the case given the findings of the previous MAIB investigations into several serious RIB accidents, such as those involving the Delta 8.5m RIB, the Cardiff Bay Yacht Club RIBs and *Osprey* and *Osprey II*.

It is anticipated that the forthcoming introduction of The Sport & Pleasure Vessel Code and the supporting legislation will address the recommendations made as part of these previous MAIB investigations. It is recognised that the provision of adequate protection for passengers can be risk based and cover a range of considerations, such as the design of seating, handholds and restraints. An anthropometric assessment of high-speed passenger craft safety, focusing on the protection of passengers and crew with respect to WBV and sudden decelerations in the event of a horizontal impact, would support the introduction of specific requirements to assure the safety of those on board.

2.7 SKIPPER'S ACTIONS FOLLOWING THE ACCIDENT

In times of emergency, professional seafarers are expected to react in a manner that prioritises the safety of the craft and their passengers.

However, despite the skipper's extensive qualifications and experience, his initial actions after the accident were not as expected. It is possible that he suffered a negative startle response[56] either when he suddenly observed the buoy ahead, or immediately after the impact. This may have contributed to his confusion as to which buoy had been hit, as well as his physiological reactions and response to the accident, including his inability to communicate clearly.

It is possible that the damage sustained to the fixed VHF radio during the impact and the absence of a backup handheld VHF, which was required by the SCV Code, contributed to the delay in the skipper notifying the coastguard of the accident and led to him not alerting Southampton VTS. He may also have assumed that other vessels in the area would raise the alarm. However, he did use his mobile phone to

[56] A rapid, generalised defensive response to a sudden unexpected stimulus.

call the company in the immediate aftermath of the accident, rather than continuing to support the injured passengers, and eventually called the coastguard after the passengers had transferred to the other vessels.

Given the obvious damage to the craft and the number of seriously injured passengers, including two people in the water, a more appropriate action would have been to immediately contact the coastguard and then tend to the injured. The lack of a second crew member or a suitably briefed passenger to assist the skipper; the absence of a prescribed company emergency checklist to prompt him; the incomplete 'Mayday' aide-memoire **(Figure 14)**; and the missing handheld VHF collectively created a poor framework to support an emergency response. These deficiencies also further reflected the poor approach to safety management shown both by the operator and the skipper on the day.

2.8 COMPANY OVERSIGHT

2.8.1 Safety management and oversight

Despite having been operating for 10 years before the accident, Seadogz RIB Charter Limited did not have an SMS or written operating procedures covering its activities. However, there was no explicit requirement in the SCV Code for operators to provide them.

Although the 1997 Health and Safety at Work Regulations did require a written health and safety policy, the company did not have one. The regulations did make some reference to work patterns and procedures but did not explicitly state that operational procedures were required, nor did they require any audits to be conducted of an operator's health and safety documentation.

The 1997 Health and Safety at Work Regulations also required owners to conduct a risk assessment. Although Seadogz RIB Charter Limited had prepared a written risk assessment, it was cursory and generic and could not be considered *suitable and sufficient*, as directed by the SCV Code. For example, the risk assessment did not consider the risk of an impact or collision during a RIB experience ride, despite the craft being routinely operated at high speed in a busy port area close to navigational marks. It also did not consider the appropriate manning of the company's RIBs. Significantly, the risk assessment was not consistently made available to skippers, despite the 1997 Health and Safety at Work Regulations obliging owners to inform workers of any significant findings arising from an assessment.

Furthermore, the manner in which *Seadogz* was being operated on the day of the accident was not consistent with the operator or skipper taking a *proactive approach to safety*, as stated by the SCV Code. Nor did the skipper's decision-making reflect the expectation in MGN 636 (M) that he was responsible for setting the tone for the onboard safety culture.

As previously indicated, there were various other indicators of the operator's and skipper's poor approach to safety management and the welfare of the fare-paying passengers, such as: the removal of the lifejacket crotch straps; the ineffective pre-departure safety briefing; and the absence of an effective emergency response framework.

Despite both Seadogz RIB Charter Limited and the skipper's own RYA training centre being members of the PCA, neither followed the requirements stipulated in the PCA CoP to maintain records of proposed and actual passage plans. Consequently, the trips conducted on *Seadogz* did not follow a defined risk assessed route; instead, they were broadly governed by the allocated timescale

for each trip and the expectation of delivering an exciting experience to encourage repeat custom. Comprehensive predetermined routes, with defined parameters for passing distances and safe speed, supported by dynamic risk assessments provide skippers with a consistent margin of safety in which to operate. Otherwise, it can be left to individual skippers to decide what is safe and to find their own boundaries; this can lead to 'mission-creep' and operational standards becoming unsafe.

The informal arrangement for safety management, exemplified by the lack of comprehensive procedures and absence of oversight by the RIB's operator, undoubtedly created an environment that allowed the accident to occur. Without oversight or external audit of its operational practices, the likelihood that operational standards would deteriorate was heightened.

2.8.2 Manning

When Seadogz RIB Charter Limited began trading, the RIBs were operated with a skipper and an additional crew member, which reflected the best practice adopted by some high-speed passenger craft operators to use an additional crew member as a lookout. However, *Seadogz* and *Jack Black* had been operating with only a skipper on board for some time before the accident; this was despite the tasks associated with acting as a sole crew member undoubtedly increasing the mental workload of the lone skipper, as discussed at section 2.4.4.

Although this decision had reportedly been taken due to a lack of available personnel, no analysis of the onboard manning levels had been included in the risk assessment to identify the consequences and introduce additional control measures to mitigate this reduction in personnel. Furthermore, that both *Seadogz* and *Jack Black* were operating simultaneously on the day of the accident indicates that sufficient crew were available to operate one of the RIBs with two crew members on board. This therefore suggests that the choice to operate two RIBs single-handedly on the day of the accident was driven more by commercial imperative than crew availability.

Seadogz RIB Charter Limited employed skippers for their experience and they were initially assessed for their boat-handling skills before they were permitted to conduct trips. However, there was no formal validation of a skipper's competence, their compliance with the principles of the HSPV Voluntary CoP or PCA CoP, or any ongoing oversight of their performance. This again reflected the operator's limited approach to the management of operational safety.

2.8.3 Previous company accidents

In the 8.5 years preceding this accident, *Seadogz* had been involved in three accidents that resulted in passengers sustaining serious injuries. The outcome of the last of these accidents, in 2017, was remarkably similar to the circumstances of the tragic accident in 2020, when a passenger in the bench seat struck the handhold in front of him and suffered rib injuries. It is evident that Seadogz RIB Charter Limited did not learn from the lessons from these precursor events, which could have resulted in the risk assessment being reviewed and possible changes to operational practices being identified. Unfortunately, two of the accidents, including the 2017 accident, were not reported to the MAIB, which removed the opportunity for external analysis and the sharing of safety lessons.

A key component of an effective SMS is an accident reporting and investigation process. This ensures that the contributory factors are identified, the lessons are learned and promulgated, and actions are taken to prevent reoccurrence.

2.9 INDUSTRY OVERSIGHT OF HIGH-SPEED PASSENGER VESSEL OPERATIONS

2.9.1 Overview

The preceding sections of this report paint a bleak picture of a sector of the maritime industry that lacks appropriate standards and oversight; a sector that has had multiple precursor accidents with limited meaningful action taken in response to previous recommendations made by the MAIB; and an operator that itself had experienced multiple serious accidents leading up to this tragic event but had not learned from the lessons. Although an often and over-used cliché, the tragic events of 20 August 2020 were an 'accident waiting to happen'.

2.9.2 Regulatory requirements

Seadogz was operating in category C waters at the time of the accident and therefore only needed to comply with the Inland Waters Small Passenger Boat Code, which is restricted in scope. However, that it had been coded to the higher standards associated with the SCV Code and issued with an SCV Certificate should have had a positive effect. Nevertheless, there remain significant limitations in the application of the SCV Code to high-speed passenger craft. These include there being:

- No requirement for an operator to have an SMS and no explicit requirement for operational procedures.
- No requirement for any external oversight or audit of operational practices, procedures, and safety management.
- Limited guidance on the manning and crewing of the craft. Although single-handed operations were not recommended and the Code outlined various conditions to be met if craft were to be operated in this manner, these were generic and did not refer to key considerations such as the nature of the craft's operation, the traffic density and the location of the helm position.
- No minimum requirement for forward visibility from the helm position.
- Limited guidance and no specific requirements for the on board seating arrangement, including the crash protection afforded by the seating arrangement in the event of a high-speed impact.

As discussed in section 2.8.1, although the SCV Code directly referred to the 1997 Health and Safety at Work Regulations, these did not explicitly require operational procedures, nor did they require any audits. Appropriate external oversight of the safety management and risk assessments of an operator such as Seadogz RIB Charter Limited could help identify any shortcomings and provide assurance of the safety of the company's activities.

The SCV Code did require additional requirements for other craft types, such as the seating on pilot boats. The Workboat Code Edition 2 was also more explicit than the SCV Code in outlining specific requirements for small workboats. This included guidance on seating arrangements for workboats operating at speed or in planing mode and for manning requirements, taking the nature of the trip into consideration. It also required a risk assessment to be presented to the Certifying Authority and recommended that an SMS complying with the principles of the ISM Code be implemented, commensurate with the size and complexity of the operations.

It could be argued that the higher standards for workboats and pilot boats are justified by the nature of their work operations, often in harsh environmental conditions. However, the severity of the accident involving *Seadogz*, and the

previous small commercial high-speed passenger RIB accidents investigated by the MAIB resulting in death or serious injury to passengers or crew (see section 1.19), demonstrate that the safety standards for these craft need to be increased.

The MAIB has made a number of recommendations to review and revise various aspects of the SCV Code since 2009 and it is reported that these recommendations will finally be addressed with the introduction of The Sport & Pleasure Vessel Code. This new code is long overdue and it is essential that it is delivered with the requisite enabling legislation and that it addresses the further shortcomings in the SCV Code highlighted by this investigation.

2.9.3 Certification requirements

Compliance with the SCV Code was demonstrated by the issue of an SCV Certificate, such as the one provided for *Seadogz* **(Annex D)**.

The SCV Code stated that the certificate should indicate whether the craft was deemed suitable for *single handed* operations by the Certifying Authority. However, neither of the RIBs operated by Seadogz RIB Charter Limited had any notation on their SCV Certificates indicating that they could be operated single-handedly, nor was there a dedicated section on the certificate to record this information.

The SCV Code also did not require the intended function of a craft to be considered as part of the survey and certification process, nor for this information to be recorded on the SCV Certificate. Confirmation of the proposed activity of a RIB and its manning are fundamental to assuring that it is appropriate and safe for this purpose; this includes identifying and recording any limitations and required control measures. In the case of *Seadogz*, this would have identified the intention to use the RIB to conduct high-speed experience rides in busy restricted waters, which in turn affected whether it could be safely operated with a single crew member.

The issue of appropriate crewing levels was previously identified as part of the MAIB's investigation into the *Celtic Pioneer* accident. This resulted in the recommendation made to the MCA and RYA in 2009 to update the crewing and qualification requirements in the SCV Code to take account of the speed of craft and the type of intended activity with respect to the operation. This recommendation remains outstanding, pending the long-anticipated introduction of The Sport & Pleasure Vessel Code.

A revision of the associated survey and certification process in this new code to ensure that the suitability of the craft and the crewing level for its intended function is considered, and that it is recorded on the certificate, would enhance the assurance process for high-speed passenger craft.

2.9.4 Industry guidance

Given the limitations of the SCV Code with respect to the operation of small commercial high-speed passenger craft, various documents have been developed to provide additional guidance to this sector.

This guidance has ranged from the specific advice in MGN 436 (M+F) on the mitigation of WBV to the more generic advice provided in the HSPV Voluntary CoP issued by the RYA, PBA and British Marine, and the separate PCA CoP.

The intention of the latter CoP was to help PCA members achieve the corporate aim of ensuring the safety of passengers and crew on board chartered craft. As discussed at section 2.4.2, the CoP detailed safety issues pertaining to RIB operations that were not being followed by Seadogz RIB Charter Limited and the skipper, despite both being members of the PCA; it is unclear why the advice in the CoP was not followed.

Recommendations made as part of the MAIB investigation into the *Celtic Pioneer* accident were the genesis for the HSPV Voluntary CoP, which set out to address matters specific to small high-speed passenger craft that were not addressed in the SCV Code. This included useful advice on safe operations and recommendations, such as the implementation of an internally audited SMS.

This and previous accidents have highlighted that despite the various information and guidance available to the industry there does not appear to be a uniform approach to managing the risks associated with high-speed passenger rides. Furthermore, there appears to be some inconsistency between the SCV Code and the other available guidance. For example, MGN 436 (M+F) refers to the guidance issued by the RYA, PBA and British Marine, but not the SCV Code.

The current requirements and guidance for the operators of small commercial high-speed craft are confusing and inconsistent. At the time of publishing this report, the HSPV Voluntary CoP was under review, while The Sport & Pleasure Vessel Code was under development; it is hoped that these documents can be aligned to ensure that the best practice guidance for the operational safety of small commercial high-speed passenger craft in the UK is standardised and consistent.

2.9.5 Local oversight

The issuing of licences provides local authorities and harbour authorities with a means of formally granting permission for a craft to be operated in the waters under their jurisdiction and to regulate their operation. This, therefore, provides another safeguard by allowing the 'local' authorities to intervene and prevent undesirable operations. However, despite Seadogz RIB Charter Limited's previous accident history all pointing towards the company's activities being hazardous, the company went unchecked.

In accordance with the 1907 Act, some UK local authorities and port authorities, such as the PLA, required all craft operating commercially in waters under their jurisdiction to hold a licence. Although the local authority, SCC, did require commercially operated passenger craft to be licensed in Southampton Water, the 1907 Act precluded this as *Seadogz* was certified to the SCV Code. For the same reason, although ABP Southampton were SCC's agents for the practical aspects of licensing, there was no requirement for it to issue Seadogz RIB Charter Limited with a licence to operate; in any case, ABP's byelaws did not provide it with the powers to do so.

ABP Southampton did have an MSMS in place and had conducted risk assessments. Although these included risk assessments covering high-speed vessels colliding with navigational marks and floating objects, they did not specifically address the operation of high-speed small commercial passenger craft within ABP Southampton's area of responsibility Small high-speed commercial passenger craft had a different operating profile to that of larger craft and were often open boats operating outside of channels and in shallow water. This meant that the opportunity to mitigate the risks associated with the operation being conducted by Seadogz RIB Charter Limited was missed.

The risk assessments also did not show any form of agreement with operators about *the maintenance and proper use of commercially operated port craft*, as recommended by the PMSC GTGP for instances where local legislation did not empower harbour authorities to do so. As ABP Southampton was not in a position to be able to issue a licence to Seadogz RIB Charter Limited, such an agreement would have provided a level of further assurance over the proper operation of the company's RIBs in the waters under its jurisdiction.

Following the *Seadogz* accident, an MAIB review of several port and local authority requirements for the operation of small commercial high-speed craft in their areas of responsibility identified significant variation in the requirements for licensing, even in adjacent ports **(Annex G)**. The framework for the licensing of commercially operated craft can be complex and subject to interpretation and it is apparent that some authorities apply more stringent controls and licensing requirements than others. It would also seem that many SHAs are aware of similar commercial high-speed passenger craft operations in their area of responsibility, but do not feel empowered to intervene. Harbour authorities would benefit from further guidance on how to best regulate and oversee commercial high-speed operators in their area of responsibility.

Although a 40kts speed restriction had previously been in place in Southampton Water, this had been removed, apparently inadvertently, and was therefore no longer effective at the time of the accident. The skipper of *Seadogz* was unaware that NtM No 57 had expired and had reportedly intended to proceed at speeds less than 40kts. However, analysis of the RIB's navigational plotter data showed that *Seadogz* frequently exceeded 40kts during the trip and probably reflected that the skipper was unaware of the actual speeds the RIB was proceeding at.

Seadogz was travelling at 38.4kts when it hit the buoy, which was less than the expired speed limit so that alone would not have prevented the RIB hitting the buoy at such a speed. However, the withdrawal of the speed limit removed the general safeguard ensuring safe speeds in the port. This has now been addressed in Southampton with the issue of further NtMs.

ABP Southampton's VTS featured both radar and AIS surveillance, with the latter providing the capability to monitor the identity, speed and track of vessels transmitting AIS in the harbour area. However, *Seadogz* was not fitted with AIS and was not required to by any code or local law. A requirement for the use of AIS on commercially operated high-speed craft would provide the opportunity for harbour authorities and operators of the craft to monitor a craft's operations and intervene if any unsafe practices are identified.

SECTION 3 – CONCLUSIONS

The analysis of the *Seadogz* accident resulted in the following conclusions and identified numerous safety issues, detailed in sections 3.1 to 3.4 below.

1. *Seadogz* hit the North-West Netley buoy because its skipper did not become aware of its proximity in sufficient time to take avoiding action. [2.3]

2. The impact with the buoy resulted in a sudden deceleration causing *Seadogz*'s unrestrained occupants to be projected forward. Emily Lewis sustained fatal injuries when she struck the extended handhold in front of her during the impact. Most of the passengers sustained serious injuries, either from striking the seat structure or handholds in front of them. [2.6.1]

3. The skipper lost positional awareness in the moments before the accident. This was most likely due to a combination of being desensitised to the risks of high-speed RIB operations and the high mental workload associated with operating *Seadogz* alone at high speed near other marine assets. [2.4.1]

4. It is likely that *Seadogz*'s passengers became desensitised to the high-speed close passing of navigation buoys and other vessels, reducing their ability to anticipate the accident and minimising their ability to alert the skipper to an impending hazard. [2.4.2]

5. It is highly likely that the skipper's decision to conduct the transit close to *Red Falcon* significantly contributed to his high mental workload and loss of positional awareness, therefore leading to the accident. [2.4.3]

6. It is possible that the skipper experienced a negative startle response when he suddenly observed the buoy ahead, or immediately after, the impact during the accident. This may have contributed to his confusion regarding the boat's location and impeded his ability to coordinate the emergency response. [2.7]

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

1. The tasks associated with acting as sole watchkeeper, navigator and passenger attendant undoubtedly increased the mental workload for the skipper of *Seadogz* and contributed to the accident. [2.4.3, 2.4.4]

2. The ability of bench seats to ensure adequate postural stability and a means of bracing against rapid motions is compromised without effective individual shaped backrests and adequate restraints against vertical and horizontal motions. [2.6.3]

3. The configuration and location of the jockey seat handholds did not allow the passengers to easily maintain lateral postural stability during the tight turns, nor did they provide a means of effectively bracing against any rapid decelerations. [2.6.4]

4. As recommended in the SCV Code, the employment of an additional trained crew member is fundamental to ensuring the safe operation of a high-speed passenger RIB given the high mental workload associated with operating single-handedly. [2.4.4, 2.5.2, 2.8.2]

5. The skipper's field of vision ahead was obscured by the passengers in front of him, the raised bow as the RIB planed at high speed, and when the bow rose and dropped several times after crossing *Red Falcon*'s wake in the moments before the accident. [2.5.1]

6. The forward visibility from the helm position on *Seadogz* had been assessed as complying with the requirements of BS EN ISO 11591. This standard did not account for the effect of the full loading of persons with the craft at its maximum running trim angle in its evaluation of the operator's field of vision to ensure forward visibility was maintained. [2.5.1]

7. The pre-departure briefing provided by the skipper did not assure the safety of the passengers during the trip and following the accident. [2.6.2]

8. The physical size and dimensions of the passengers that the skipper allocated to the bench seat meant that they were unable to effectively brace themselves against the forward motion while using the seat. Had the guidance in MGN 436 (M+F) been followed this could have prompted the skipper to consider refusing to allow Emily's family to take part in the trip or to adjust the voyage style. [2.6.2, 2.6.3]

9. The *Seadogz* seating arrangement did not provide adequate passenger protection in the event of a sudden deceleration and the handholds caused passenger injuries during the accident. [2.6.5]

10. Neither the SCV Code nor the essential requirements of the RCD provided specific conditions or guidance relating to the RIB's protection or seat designs. [2.6.5]

11. An anthropometric assessment of high-speed passenger craft safety, focusing on the protection of passengers and crew with respect to whole-body vibration and sudden decelerations in the event of a horizontal impact, would support the introduction of specific requirements to assure the safety of those on board. [2.6.5]

12. The operator of *Seadogz*'s written risk assessment was cursory and generic and did not consider the risk of an impact or collision during a RIB experience ride. [2.8.1]

13. The risk of the accident happening was increased because the operator of *Seadogz* did not have an SMS with an external review process or a structured approach to learn from previous accidents. [2.8.1, 2.8.3, 2.9.3]

14. The certification of *Seadogz* to the SCV Code did not prevent unsafe operational practices occurring as there were significant limitations in applying the SCV Code to high-speed passenger craft operators. [2.9.2, 2.9.3]

15. The framework for the licensing and oversight of commercially operated craft can be complex and subject to interpretation and would benefit from further guidance. [2.9.5]

16. ABP Southampton had not assessed the risks of high-speed small commercial passenger craft operations in its area of responsibility. [2.9.5]

17. ABP Southampton's risk assessments did not show any form of agreement with operators about the maintenance and proper use of commercially operated port craft. Such an agreement would have provided a level of further assurance over the proper operation of the company's RIBs in the waters under its jurisdiction. [2.9.5]

18. A requirement for the use of AIS on commercially operated high-speed craft would provide the opportunity for harbour authorities and operators of the craft to monitor a craft's operations and intervene if any unsafe practices are identified. [2.9.5]

3.2 OTHER SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT[57]

The current requirements and guidance for the operators of small commercial high-speed craft is confusing and inconsistent. [2.9.4]

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

The owner's manual prepared for *Seadogz* by its manufacturer had anomalies that could have affected the craft's safe operation. [2.5.1]

3.4 OTHER SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT

1. There were no evident individual factors affecting the skipper's performance before the accident occurred. [2.4.1]
2. The company's decision to remove the crotch straps degraded the effectiveness of the lifejackets and reflected a poor attitude to safety. The skipper's decision not to physically check that the lifejackets were being properly worn further demonstrated a suboptimal approach to passenger safety. [2.6.2]

[57] These safety issues identify lessons to be learned. They do not merit a safety recommendation based on this investigation alone. However, they may be used for analysing trends in marine accidents or in support of a future safety recommendation.

SECTION 4 – ACTION TAKEN

4.1 MAIB ACTIONS

The **MAIB** has:

- Published an interim report[58] on this accident that recommended that all UK Operators of small commercial high-speed craft, such as rigid inflatable boats and sports boats, engaged in carrying passengers on trips and charters:

  2021/109M *Review the risk assessments for the operation of their vessels and take measures, as appropriate, to ensure that they comply with the safe working practices and standards contained in the Passenger Safety on Small Commercial High Speed Craft & Experience Rides voluntary Code of Practice. Where an operator cannot comply with the provisions outlined in the Code of Practice, steps should be taken to mitigate against risk, and details of those measures included in the relevant operating procedures.*

- Issued a letter from the Chief Inspector of Marine Accidents to industry bodies and Certifying Authorities requesting that they bring the interim report and its recommendation to the attention of their members.

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

The **Royal Yachting Association** has started a review to update the *Passenger Safety on Small Commercial High Speed Craft and Experience Rides – A Voluntary Code of Practice*.

ABP Southampton has:

- Issued Notice to Mariners No 36 of 2021 – *Operation Wavebreaker & Safety In Small Vessels*, advising that speeds in excess of 40kts within Southampton Water is, *ordinarily, incompatible with the requirements and intent of both IRPCS Rule 6 and Byelaw 7.(1)*.
- Issued Notice to Mariners No 03 of 2023, *Port of Southampton – Safe speed in Southampton Water* to replace Notice to Mariners No 36 of 2021. This restated the advice about speeds in excess of 40kts, with the exception being where a person in charge of a craft has conducted an appropriate risk assessment and given a minimum of 24 hours' notice by email to Southampton VTS and Southampton Harbour Master's Office, which may request to review the risk assessment and/or require additional control measures.

  The notice further stated that:

  - *Where any vessel is navigated at an unsafe speed contrary to IRPCS Rule 6, her owner, her master and any person responsible for the conduct of the vessel are liable to be prosecuted under the relevant UK merchant shipping legislation; and*
  - *Where a person navigates or operates a vessel contrary to Byelaw 7.(1), they will be liable to be prosecuted under the relevant provisions of ABP Southampton's special legislation.*

- Reviewed its risk assessments for high-speed craft within its area of responsibility.

[58] https://www.gov.uk/maib-reports/collision-between-the-high-speed-passenger-craft-seadogz-and-a-navigation-buoy-with-loss-of-1-life

British Marine has:

- In May 2021, advised its members of the publication of the MAIB's interim report on the *Seadogz* accident.
- In May 2022, following the publication of the MCA's bulletin on the accident, reminded its members of the details of the MAIB's interim report.
- Advised its members that compliance with the HSPV Voluntary Code is now mandatory as a prerequisite for membership.

SECTION 5 – RECOMMENDATIONS

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

2023/120 Conduct an anthropometric assessment of the design and operational requirements for small high-speed passenger craft safety to develop a framework for assuring the protection of passengers and crew provided by the craft with respect to whole-body vibration and sudden decelerations in the event of a horizontal impact. The assessment should consider, among other things, the:

- full anthropometric range of passengers and crew;
- operational profile of the craft, including the range of speeds;
- crash protection and general protection of the seating arrangements, including the design and use of handholds and restraints.

2023/121 Ensure that the relevant outputs of the anthropometric assessment of the design and operational requirements for small high-speed passenger craft safety conducted in accordance with the MAIB recommendation 2023/120 are, where appropriate:

- promulgated in appropriate guidance for the operators and designers of small high-speed passenger craft at the earliest possible opportunity; and
- incorporated into a future revision of The Sport & Pleasure Vessel Code as requirements for the crash protection and general protection of passengers and crew.

2023/122 Further to the previous MAIB recommendations 2009/126, 2015/120 and 2017/115 made in relation to revisions of The Small Commercial Vessel and Pilot Boat (SCV) Code, expedite the introduction of The Sport & Pleasure Vessel Code and its enabling legislation at the earliest possible opportunity to ensure that additional requirements are introduced for small commercial high-speed passenger craft for:

- the operators of such craft to implement a safety management system that includes, but is not limited to:
    - operational procedures for the craft's full range of intended operations, including navigational and emergency response procedures.
    - accident reporting and investigation procedures;
- appropriate deck manning levels for the craft's intended operations;
- forward visibility from the helm position aligned with the requirements in BS EN ISO 11591;
- the installation and use of automatic identification systems;
- the recording of information relating to the permitted crewing level and function of the craft on the certificate issued to show the craft's compliance with The Sport & Pleasure Vessel Code.

The **British Standards Institution** is recommended to:

2023/123 Propose to the International Organization for Standardization that the ISO 11591 standard is revised to incorporate a requirement for the effect of the full loading of persons to be included in the evaluation of the operator's field of vision with the craft at its maximum running trim angle value to ensure that the actual operational forward visibility is adequate and compliant with the standard.

The **British Ports Association**, the **UK Harbour Masters' Association**, and the **UK Major Ports Group** are recommended to:

2023/124 Contribute to the development of guidance for their members clarifying the requirements and best practices for the oversight of small commercial craft operating in their areas of responsibility.

Associated British Ports Southampton is recommended to:

2023/125 Ensure that its risk assessments consider the operation of high-speed small commercial passenger craft within the port limits.

2023/126 Establish an agreement with any operator of high-speed small commercial passenger craft, where ABP Southampton is not able to issue a licence to the operator, to assure the proper use of the craft within the port limits.

Red Bay Boats Ltd is recommended to:

2023/127 Conduct a risk-based review of the design of the small commercial high-speed craft that it manufactures and undertake any required modifications to its processes and craft designs to ensure that the:

- documentation provided for its craft is accurate, consistent and includes all required information; and
- design of the seats, handholds and restraints meets the latest relevant industry guidance, including MGN 436 (M+F), the *Passenger Safety on Small Commercial High Speed Craft & Experience Rides – A Voluntary Code of Practice* and, when introduced, The Sport & Pleasure Vessel Code.

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

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Marine Accident Report

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