ACCIDENT REPORT

Report on the investigation into the

stand up paddleboarding accident

that resulted in four fatalities

at Haverfordwest Town Weir, Wales

on 30 October 2021

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 13/2022 DECEMBER 2022

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 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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For all enquiries:

Marine Accident Investigation Branch
First Floor, Spring Place
105 Commercial Road
Southampton
SO15 1GH
United Kingdom

Email: maib@dft.gov.uk
Telephone: +44 (0)23 8039 5500

Press enquiries during office hours: +44 (0)1932 440015
Press enquiries out of hours: +44 (0)300 7777878

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

°C	-	degrees Celsius
BS	-	British Standard
CCTV	-	closed-circuit television
CIRIA	-	Construction Industry Research and Information Association
COVID-19	-	coronavirus
CPR	-	cardiopulmonary resuscitation
DCWW	-	Dŵr Cymru Welsh Water
HKC	-	Haverfordwest Kayak Club
HSW Act	-	Health and Safety at Work etc. Act 1974
ISA	-	International Surfing Association
ISO	-	International Organization for Standardization
LHS	-	left-hand side
Ltd	-	Limited
m	-	metre
MCIB	-	Marine Casualty Investigation Board
MHPA	-	Milford Haven Port Authority
N	-	newton
NGB	-	national governing body
nm	-	nautical mile
NRW	-	Natural Resources Wales
PCC	-	Pembrokeshire County Council
PFD	-	personal flotation device
PLA	-	Port of London Authority
RHS	-	right-hand side
RNLI	-	Royal National Lifeboat Institution
RYA	-	Royal Yachting Association
SUP	-	stand up paddleboard

The weir	-	Haverfordwest Town Weir
UK	-	United Kingdom
UKHO	-	United Kingdom Hydrographic Office
WAID	-	Water Incident Database
WSA	-	Water Skills Academy
WSF	-	Welsh Surfing Federation

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

Haverfordwest Town Weir

SYNOPSIS

At about 0900 on 30 October 2021, a group of nine stand up paddleboarders on a commercial river tour from Haverfordwest to Burton Ferry, Wales, descended Haverfordwest Town Weir. Four of the group became trapped in the weir and subsequently lost their lives.

The river tour was led by the owner of the Salty Dog Co Limited with the assistance of an associate and fellow leader. They had conducted a reconnaissance of the route in August 2021, during which river conditions were benign and the weir was largely submerged. Before setting off on the day of the accident, the leaders checked the condition of the river as it passed through Haverfordwest town centre and assessed that it was safe for the tour to go ahead; they did not visit the weir and were unaware of the high river level, tidal conditions and flood alert in force at the time, nor did they heed the sign close to their launch point that warned users that the weir was dangerous and advised them to exit the river and carry their craft around the weir.

The investigation found that the four stand up paddleboarders died because they fell from their paddleboards as they descended the weir and became trapped in the hydraulic towback, from which there was no means of escape. The tour leaders, who were qualified to teach stand up paddleboarding to beginners and novices in benign conditions but not lead tours on fast-flowing rivers, had organised and led three river tours over the summer and this may have resulted in a misplaced sense of confidence in their ability to plan and lead the tour and a poor understanding of the associated risks.

The signage at the launch point of the tour, and on the river, did not conform with national water safety signage conventions or adequately alert the group to the location of the weir and the risks of descending it. The use of personal protective equipment such as clothing, buoyancy aids and leashes was also inconsistent across the group and did not follow recognised advice that stand up paddleboarders on fast-flowing water should wear a quick release waist leash and a personal flotation device.

The investigation also noted that stand up paddleboarding was a fast-growing sport and recreational activity that takes place in a variety of settings that include lakes, rivers, coastal waters and surf. However, as the national governing bodies for the sport had not set recognised national standards for training, an environment had been created where there were multiple providers with inconsistent governance. Consequently, recreational paddleboarders had no means by which to judge the competence of a training or tour provider. Against this unregulated backdrop the Salty Dog Co Limited's owner offered tours (not training) without accreditation from the national governing body for the sport.

In May 2022, the MAIB issued a recommendation to Dŵr Cymru Welsh Water, the owner of Haverfordwest Town Weir, to conduct an immediate risk assessment of the hazard posed by the weir and to implement control measures to mitigate that risk. Recommendations have been made to the UK Sports Councils to: complete their review to identify the best organisation(s) to act as the national governing body for the sport of stand up paddleboarding; include safety management in their criteria for conferring recognition as a national governing body; and, publish a national governing body Guide to Good Practice.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF STAND UP PADDLEBOARD

VESSEL PARTICULARS	
Vessel's name	Not applicable
Flag	UK
Certifying Authority	Not applicable
Hull identification number	Not applicable
Type	Stand up paddleboard
Registered owner	Privately owned
Manager(s)	Not applicable
Construction	Inflatable stand up paddleboard
Year of build	Not applicable
Length overall	Not applicable
Registered length	Not applicable
Gross tonnage	Not applicable
Minimum safe manning	Not applicable
Authorised cargo	Not applicable

VOYAGE PARTICULARS	
Port of departure	Haverfordwest
Port of arrival	Burton Ferry (Intended)
Type of voyage	Inland
Cargo information	None
Manning	1 person per paddleboard (9 in total)

MARINE CASUALTY INFORMATION	
Date and time	30 October 2021 at about 0900
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Haverfordwest, Wales
Place on board	Upper deck
Injuries/fatalities	4 fatalities
Damage/environmental impact	None
Vessel operation	Commercial river tour
Voyage segment	Inland
External & internal environment	Daylight; wind, westerly force 2; sea state calm; flood alert in force for the Western Cleddau
Persons on board	1 person per paddleboard (9 in total)

1.2 BACKGROUND

The owner of the Salty Dog Co Limited (Ltd), referred to in this report as the tour leader, and her associate, the fellow leader, planned and advertised a commercial stand up paddleboard (SUP) Pembrokeshire Tour to take place over the weekend of 29-31 October 2021. The leaders' plan was for the tour participants to meet on Friday afternoon and stay overnight at a rented property in Tenby. The group would then travel to Haverfordwest on Saturday morning to paddle down the Western Cleddau river to Burton Ferry **(Figure 1)**, before staying a second night in Tenby and returning home on Sunday.

In the event of bad weather, the leaders had promulgated an alternative plan to replace the SUP tour with a walk. The group comprised of nine paddleboarders: the two leaders; the wife of one of the leaders; and six paying participants.

Background map courtesy of Ordnance Survey

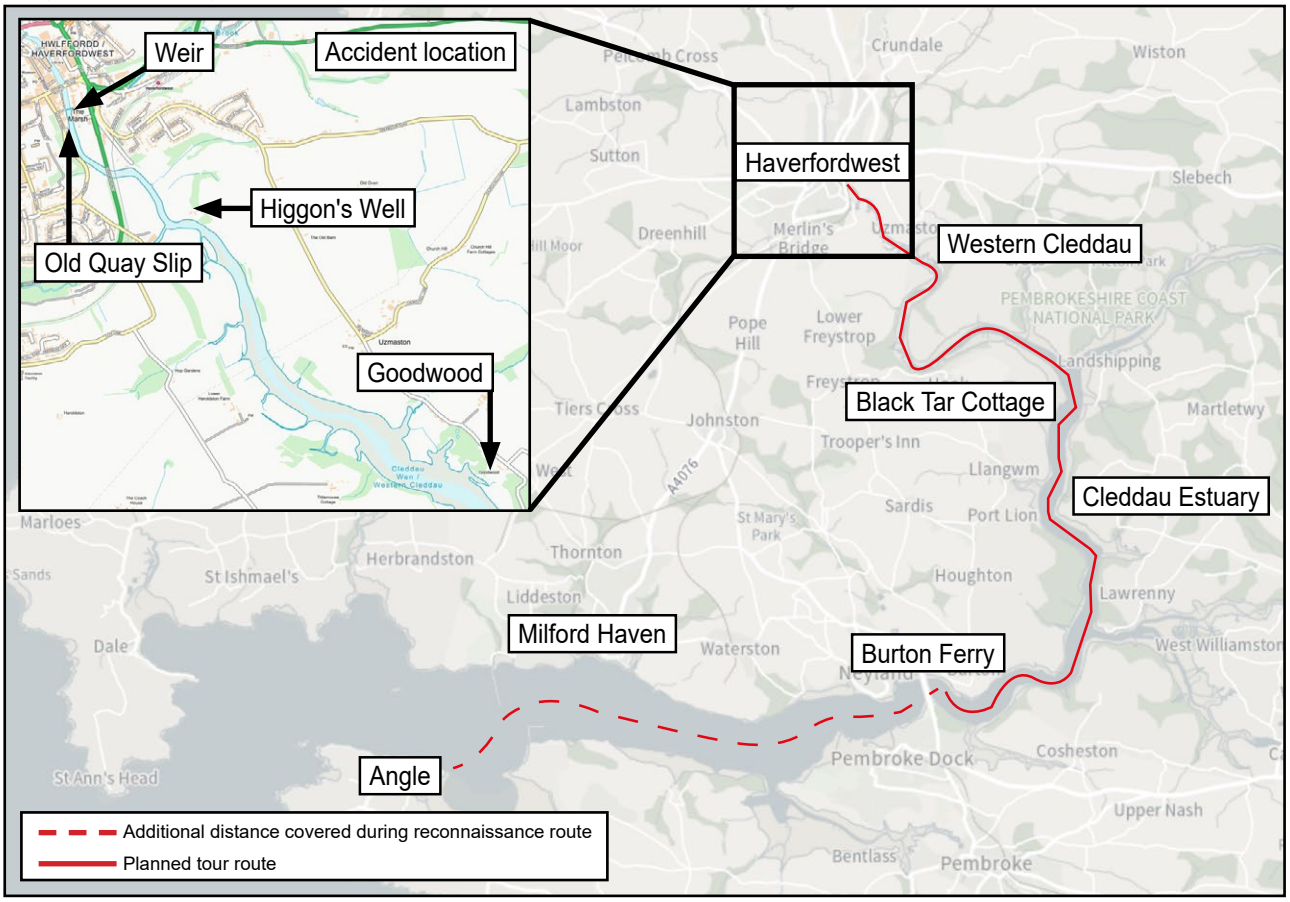

Figure 1: The reconnaissance route and planned route for the Salty Dog Co Ltd's Pembrokeshire Tour, and the accident location

1.3 NARRATIVE

At about 0600 on Saturday 30 October, the two leaders discussed the weather for the day and agreed that conditions were suitable for their SUP tour to go ahead. Approximately 40 minutes later, one of the participants informed her partner by phone that the group had been told that it was safe for the SUP tour to go ahead due to low wind conditions. About an hour later, the group of nine paddleboarders loaded their equipment into the fellow leader's van and set off by road to Haverfordwest from their overnight accommodation in Tenby.

Image courtesy of Google Maps

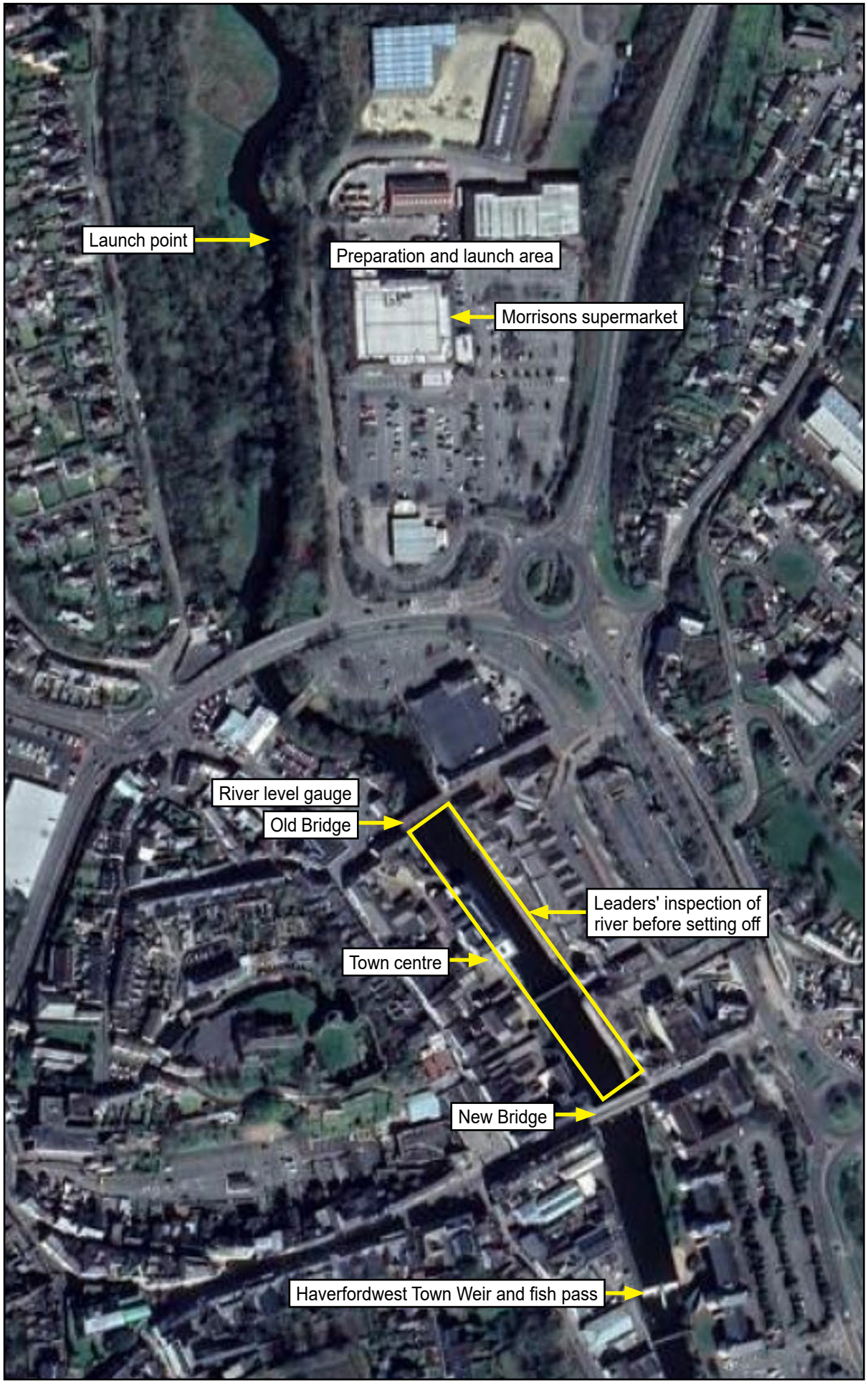

Figure 2: Aerial photograph of Western Cleddau, showing significant locations

Just before 0800, the van stopped in Haverfordwest town centre and the two leaders got out to inspect the river **(Figure 2)**. They assessed that, while the river was flowing faster than it had been during their reconnaissance trip in August, conditions were suitable for the SUP tour.

The van was then driven a short distance north and parked on a road between Morrisons supermarket and the river. The group then unloaded their equipment, inflated their SUPs and prepared to begin their trip.

Once the leaders were content that the tour participants were ready, each member of the group carried their SUP and equipment to the river access point. The tour leader launched her SUP first, positioned herself clear of the current, and waited for the other tour participants to launch and join her. It was a bright, cloudy day, the river was protected from the light westerly breeze and had a calm glassy appearance, and the water and air temperature were approximately 11°C.

At about 0849, once all the participants were afloat, the group set off downriver with the tour leader at the front and the fellow leader at the rear. After about 5 minutes, the nine participants, carried along by the current and paddling lightly, passed through the centre of Haverfordwest; one of the group was playing music through a portable speaker **(Figure 3)**. A few minutes later, in the vicinity of New Bridge, the tour leader instructed those close by to follow her and keep to the centre of the river as they approached the weir **(Figure 4)**.

At 0856, the tour leader, kneeling on her SUP, slid down the fish pass in the centre of the weir and was swept quickly downriver **(Figure 5)**. The next participant tried to copy the leader but was unable to align her SUP with the fish pass and was washed over its right-hand side. She fell from her SUP into the river and was swept downstream. As the other participants approached the weir, the fellow leader, who was following at the rear, told those nearby to kneel down and keep left.

Within about a minute, the next six participants of the group descended the weir; four to the right of the fish pass and two to the left. As they did so, their SUPs pitched forward and all six of them fell into the turbulent water at the foot of the weir **(Figure 6)**. Three of the group were washed clear and swept downstream, holding on to their SUPs. The other three were trapped within the recirculating flow on the downstream side of the weir; two to the right of the fish pass and one to the left.

Image courtesy of Dyfed Powys Police

Figure 3: CCTV image of the Salty Dog Co Ltd's Pembrokeshire Tour pass through the town centre

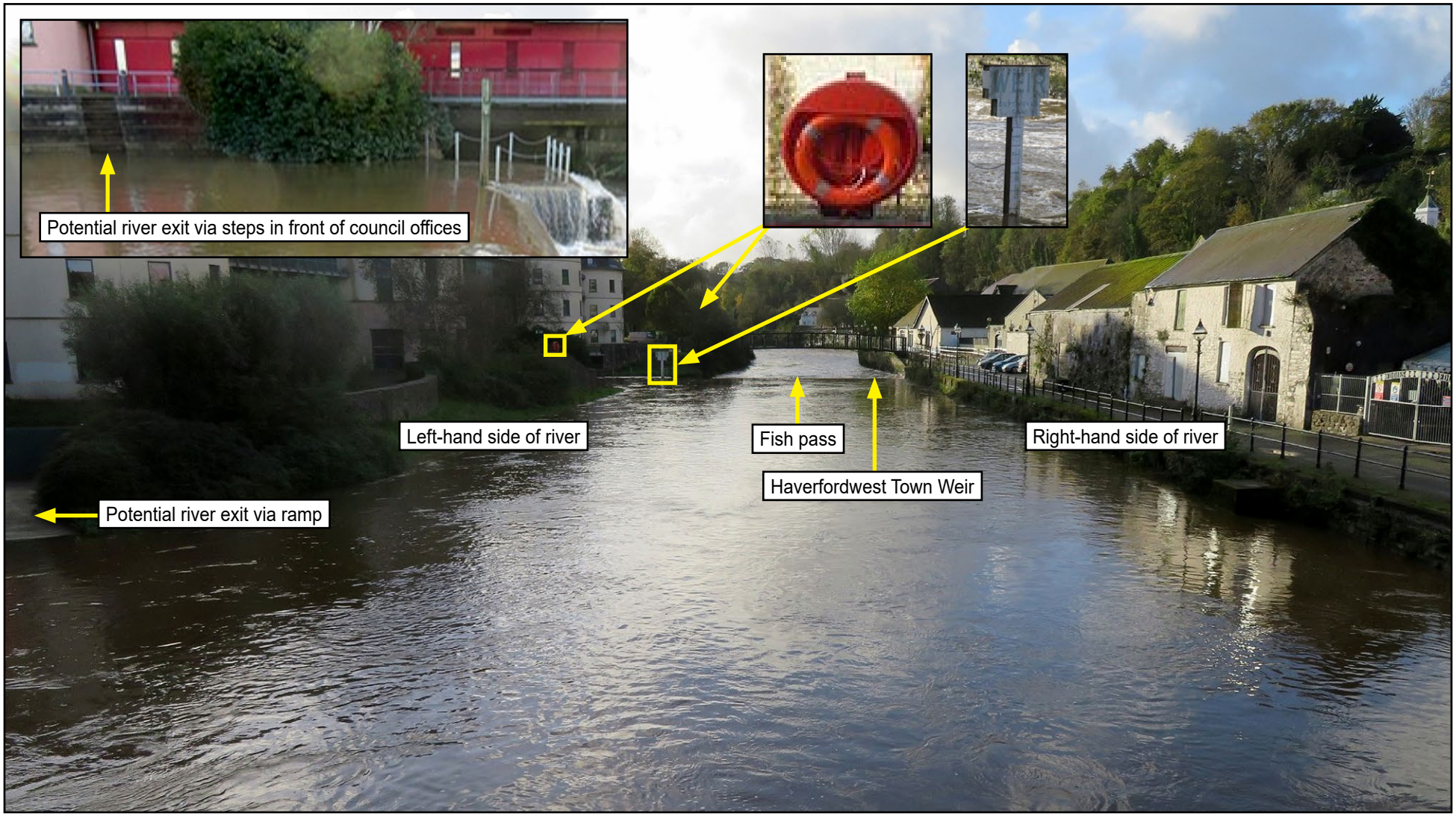

Figure 4: View of the town weir from New Bridge the day after the accident

Image courtesy of Dyfed Powys Police

Figure 5: CCTV image of the Salty Dog Co Ltd's owner sliding down the fish pass at the town weir

Image courtesy of Dyfed Powys Police

Figure 6: CCTV image of the Pembrokeshire Tour participants descending the weir to the right of the fish pass

The fellow leader, monitoring from the rear of the group, was standing on his SUP and could see something was wrong. He paddled to the right-hand side of the river and climbed up onto the road with his SUP, removed the leash connecting his leg to the SUP and took a few steps downstream to look along the face of the weir, which is when he saw that some of the tour participants were in difficulty.

At 0858, having placed his dry bag of spare equipment and paddle on the road, the fellow leader grabbed his SUP and jumped into the river above the weir. He was then carried over the right-hand side of the weir. Closed-circuit television (CCTV) showed that, at the same time, a paddleboarder trapped to the left of the fish pass was being repeatedly swept a short distance downstream and then pulled back towards the weir.

At 0902, a member of the public saw tour participants in difficulty at the weir and alerted the emergency services by phone. He then ran over the bridge to fetch a lifebuoy and throw line before returning to the footpath on the right-hand side of the weir to assist those in difficulty. The member of the public repeatedly threw the lifebuoy to the paddleboarders, who were struggling in the turbulent water at the foot of the right-hand side of the weir, but none of them were able to grasp it.

Approximately 8 minutes later, emergency services began to arrive at the scene. A multiagency response followed that involved coastguard rescue teams and helicopter, police, the fire and ambulance services, the air ambulance, Royal National Lifeboat Institution (RNLI) assets, and representatives from the local authority and other agencies. During this operation fire service boats recovered several items that were trapped by the current next to the weir, including two SUPs, a dry bag and buoyancy aid.

The bodies of three paddleboarders, including the fellow leader, were recovered downstream and, after examination by medical personnel, were declared dead at the scene. A fourth participant was recovered from the water close to the weir and, although resuscitated, died from her injuries in hospital.

The tour leader was unable to provide emergency contact details for all of the participants, which delayed the police contacting the families of those who had died.

1.4 THE WESTERN CLEDDAU RIVER

The Western Cleddau river flows south through the centre of Haverfordwest and joins the Cleddau Estuary before flowing into Milford Haven and the Irish Sea. The Cartlett Brook joins the left-hand side of the Western Cleddau just below the weir. Natural Resources Wales' (NRW) river gauge monitored the level of the river upstream of the weir; in the 3 months before the accident, this ranged from 0.4m (on 3 August) to 1.33m (on 30 October). NRW's website also published flood warnings and alerts for the area[1] **(Figure 7)**.

At 1645 on 28 October, NRW issued a flood alert for the Western Cleddau. At 1045 on 29 October, the alert was updated and was in force at the time of the accident. At 0900 on 30 October, the river level of the Western Cleddau at Haverfordwest was 1.32m.

[1] https://rivers-and-seas.naturalresources.wales/?layers=river+tidal&extent=171455.20712870004+191957.98652659997+242968.86832442007+219478.14882955997+27700, accessed on 15 June 2022.

Image courtesy of Natural Resources Wales

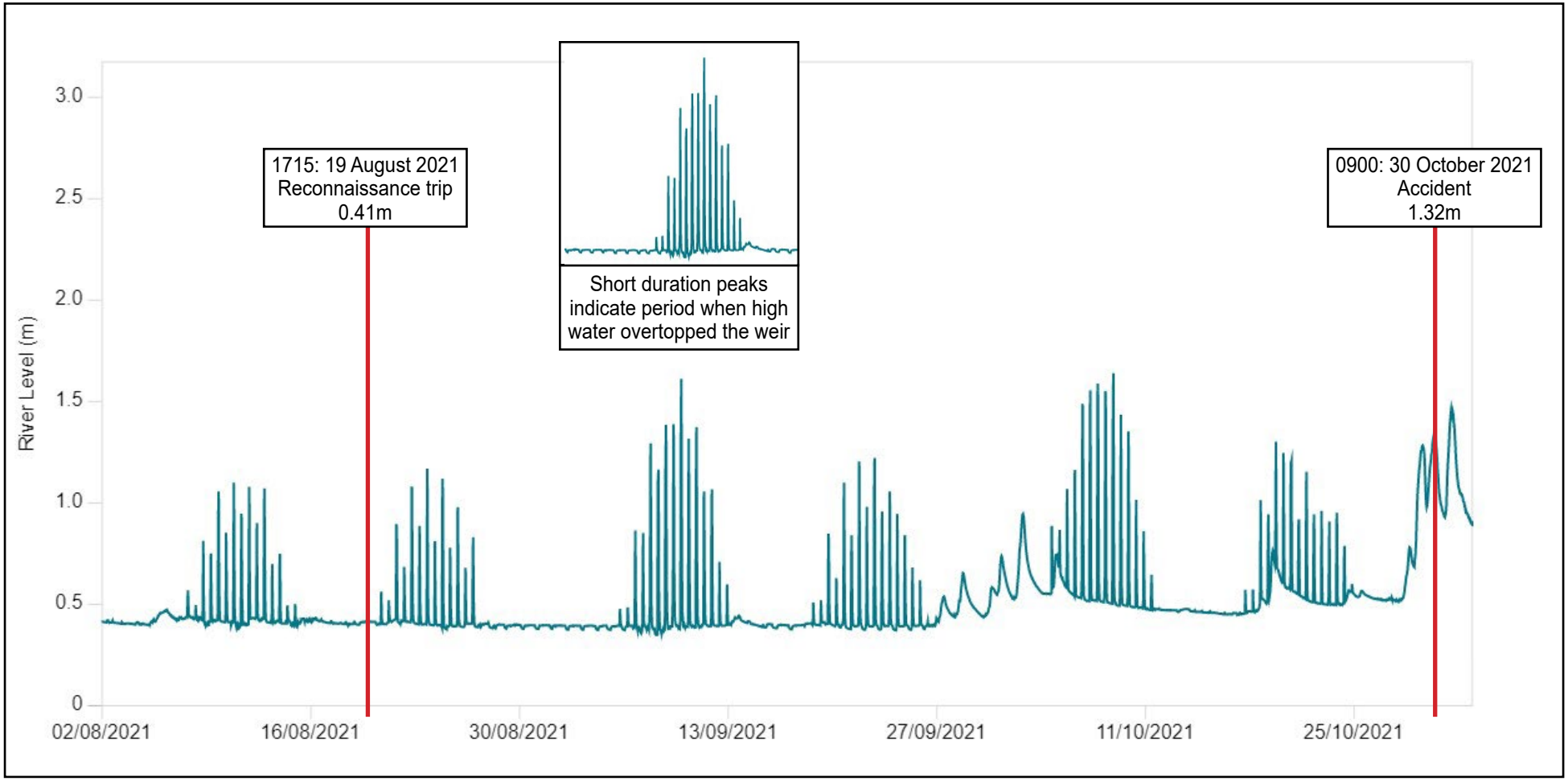

Figure 7: Natural Resources Wales graph of the river level at Haverfordwest for the reconnaissance trip (19 August 2021) and the accident (30 October 2021)

The weir at Haverfordwest marked the approximate limit between tidal and nontidal water[2]. The United Kingdom Hydrographic Office (UKHO) predicted that high water at Haverfordwest would be at 1419 on 30 October, with a height of 0.66m (Neap tide). The UKHO tidal information noted that there was no prediction for low water as downstream of the weir the river dried out *except for river water*[3]. The UKHO predicted that low water 5 nautical miles (nm) away at Black Tar Cottage, Llangwm, would be at 0758 and that by 0900 the height of tide would be 0.2m; it can therefore be assumed that, at the time of the accident, there was little or no tidal affect at the weir.

1.5 THE SALTY DOG CO LIMITED'S PEMBROKESHIRE TOUR

1.5.1 Background

The Pembrokeshire Tour was promoted and sold by the Salty Dog Co Ltd, based in Port Talbot. Established in June 2020, the company was initially used by the owner to sell clothing online. In May 2021, the company began to deliver SUP rental and training at Aberavon Beach and nearby lakes and rivers.

Over the summer and autumn of 2021, encouraged by the popularity of SUP training during the COVID-19 lockdown, the company organised and led commercial tours on the River Thames and River Wye. The Pembrokeshire Tour was the company's final SUP river tour of the year.

1.5.2 The tour leaders

The Pembrokeshire Tour leaders were experienced paddleboarders. The Salty Dog Co Ltd's owner and tour leader, who was sole director of the company and a police officer at the time of the accident[4], had been an RNLI volunteer[5] and crew member at Port Talbot lifeboat station since 2017. In addition to her surf-style clothing and SUP instruction and rental business, she also led a cold water swimming group from Aberavon beach.

The fellow leader who assisted her with the Pembrokeshire Tour was a friend and neighbour; he was a keen surfer and army veteran. Both leaders were described as confident individuals who, in addition to previous SUP training and tours, had organised and led SUP events to raise money for local charities[6].

1.5.3 The tour leaders' qualifications

The Pembrokeshire Tour leader and fellow leader had both completed the Water Skills Academy (WSA) *SUP Safety & Rescue* and *SUP Foundation Instructor* courses. The training took place, in benign conditions, on the River Tawe, near Swansea, and was delivered by an experienced WSA instructor.

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[2] When the tide at Milford Haven exceeds a height of approximately 6.1m, water from downstream will flood over the weir and increase the river level north of the weir **(Figure 7)**.

[3] ADMIRALTY TotalTide digital publication.

[4] The Salty Dog Co Ltd's owner has now left the police.

[5] The Salty Dog Co Ltd's owner is no longer an RNLI volunteer.

[6] On 18 September 2021, about 140 participants paddled from The Mumbles to Aberavon. From 22-23 October 2021, the two Salty Dog Co Ltd leaders, accompanied by one of the Pembrokeshire Tour participants, paddled 100 miles in 24 hours on the River Wye.

The first day of training, on 21 April 2021, was spent completing the 1-day SUP Safety & Rescue course. This course covered the operational considerations of SUP instruction, essential equipment knowledge, the management of risk, laws and legal considerations of being an instructor, SUP rescue techniques and the care and repair of inflatable SUPs. The WSA SUP Safety and Rescue Guide recommended the use of personal flotation devices (PFD) on rivers[7] and advised that:

> *in all environments other than sheltered water venues, the leash should be attached to a quick release system that allows the paddler to release the board should it become snagged or entrapped.*[8]

The second and third days of training, on 22 April and 23 April 2021, were spent completing the SUP Foundation Instructor course. The leaders were taught basic SUP beginner and novice instruction techniques for operating in sheltered waters and bays, and on flat waters, small lakes, and slow-moving rivers. The maximum teaching ratio for such conditions was one instructor to eight students[9].

As part of this training both leaders became professional members of the WSA. During instruction, the leaders were on occasion required to wear quick release waist, rather than ankle, leashes. The WSA SUP Foundation Instructors course was not intended to be used by candidates to provide instruction in more advanced operating conditions, organise and run expeditions, or operate on hazardous or fast-flowing rivers, nor did the training syllabus of either course cover the hazard posed by weirs.

1.5.4 The Pembrokeshire Tour plan

On the evening of 19 August, having researched the route, the two leaders conducted a 15nm reconnaissance trip for the Pembrokeshire Tour from Haverfordwest to Angle **(Figure 1)**. During the reconnaissance, the leaders launched their SUPs into the Western Cleddau adjacent to Morrisons supermarket at Haverfordwest and paddled downstream.

At about 1741, CCTV imagery showed the two leaders approaching the weir. The CCTV image **(Figure 8)** showed that there was little difference in the water level above and below the weir, and the glassy, still river surface indicated that there was almost no current at the weir. The NRW gauge at the time indicated the river level was 0.41m **(Figure 7)** and the UKHO predicted high water at Haverfordwest had been at 1654, with a height of 1.1m.

On completion of their reconnaissance trip, the leaders assessed that the route to Angle was too long and decided to advertise a shorter 10nm trip from Haverfordwest to the Jolly Sailor pub at Burton Ferry. The two leaders discussed the weir and decided that, if any member of the group was uncomfortable descending it, they would offer the option of exiting the river on the left-hand side by using the steps in front of the Pembrokeshire County Council (PCC) offices and then carrying their SUP downstream before relaunching onto the river below the weir.

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[7] Water Skills Academy SUP Safety and Rescue Guide, version 01, page 4.

[8] Water Skills Academy SUP Safety and Rescue Guide, version 01, page 16.

[9] Water Skills Academy SUP Foundation Instructor course, page 3.

Image courtesy of Pembrokeshire County Council

Figure 8: CCTV image looking upstream as the two leaders approach the weir on 19 August 2021, alongside a post-accident picture in similar river and tidal conditions (new weir sign in place, warning is now replicated on both sides)

Salty Dog Co Ltd's Pembrokeshire Tour was advertised on social media and by word of mouth. The tour date was initially set for September but was later changed to 29-31 October. Once participants had registered their interest and paid the Salty Dog Co Ltd they were added to a *Pembs Tour* WhatsApp group. The fellow leader used WhatsApp to share details of the plan and a list of equipment that participants were recommended to bring with them. He also advised the WhatsApp group members that in the event of bad weather, in particular strong winds and rain, the alternative plan would be to replace the SUP trip with a circular walk. As a result, participants were also requested to bring walking kit.

The Salty Dog Co Ltd's owner had not produced written risk assessments for the Pembrokeshire Tour and there were no indications that either leader was aware of the scale of the hazard posed by the weir, the implications of the height of tide, or the NRW flood alert that was in force for the Western Cleddau. They had not assessed the competency of tour members who had not been previous customers of the Salty Dog Co Ltd and the participants were not required to complete a legal disclaimer, medical declarations, or provide emergency contact details before starting the tour.

1.5.5 Preparations on the day

On the day of the accident, the Pembrokeshire Tour leaders stopped their van in Haverfordwest town centre and inspected the river between the Old Bridge and the New Bridge; however, they did not inspect conditions at the weir **(Figure 2)**. In addition, although the leaders circulated within the group before they set off, the participants were not briefed on the presence of the weir or how to descend it.

1.5.6 Equipment

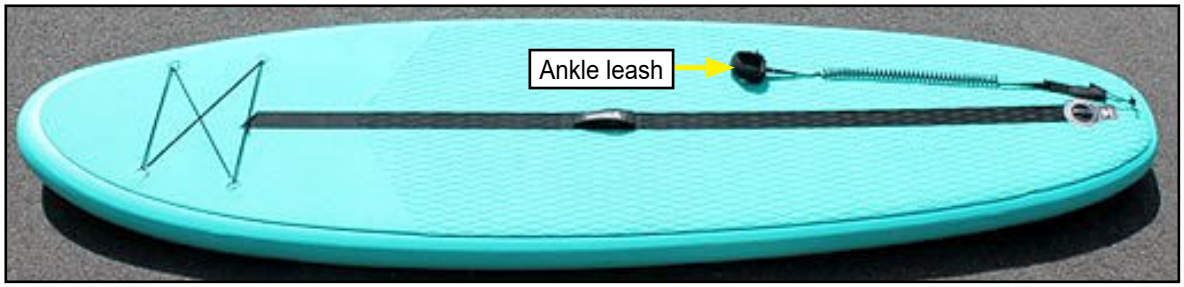
The *Pembs Tour* WhatsApp group members were advised to bring the following equipment with them: their SUP, pump, leash, a buoyancy aid to act as their PFD, trainers, wetsuit, waterproof jacket, bottle of water and waterproof dry bag containing their personal effects and a change of clothing for the end of the tour.

All Pembrokeshire Tour participants were using inflatable SUPs that, once inflated, formed a rigid buoyant board on which the paddler could stand, kneel or lie. The SUPs were fitted with a fin at the rear of the board to provide directional stability and an ankle leash that attached the user to the SUP to ensure they were not separated from it if they fell off.

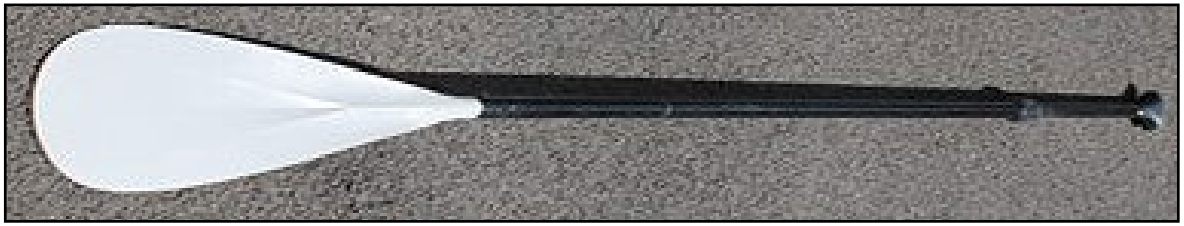
SUPs sold in the UK are generally provided with ankle leashes. These ankle leashes were fitted to the rear of the SUP and designed to be attached by Velcro to the user's leg (below the knee) or ankle. Alternatively, the leash could be attached to the user's waist using a quick release belt system. Of those participants who were wearing a leash, none of them used a quick release waist belt to secure their leash. The SUPs were propelled using a lightweight, adjustable paddle **(Figure 9)**.

The equipment used by the Pembrokeshire Tour participants, whether they had previously completed training or a river tour with the Salty Dog Co Ltd, and their status at the end of the tour is summarised in **Table 1**.

PFD



Inflatable stand up paddleboard (3.2 to 3.8m long)



Adjustable paddle

Waterproof dry bag

Figure 9: Examples of similar equipment to that used by the Pembrokeshire Tour participants

Sequence of descending the weir	Role	Weir: fish pass/ left-hand side (LHS)/ right-hand side (RHS)	PFD (Yes/No)	Leash attached (Yes/No)	Clothing	Previous customer of the Salty Dog Co Ltd (Yes/No)	Status
1	Tour leader	Fish pass	No	Yes	Wetsuit	Yes	Survived
2	Participant	Fish pass	No	No	Leggings, jacket and hat	Yes	Survived
3	Participant	RHS	Yes	Yes	Leggings, top and fluorescent jacket	Yes	Deceased
4	Participant	RHS	No	Yes	Wetsuit, coat and hat	Yes	Survived
5	Participant	RHS	Yes	Yes	Leggings, top, puffer jacket and hat	Yes	Survived
6	Participant	RHS	Yes	Yes	Wetsuit and kagoule	Yes	Deceased
7	Participant	LHS	Yes	Yes	Tracksuit bottoms and long-sleeved top	No	Survived
8	Participant	LHS	Yes	Yes	Wetsuit, kagoule and hat	No	Deceased
9	Fellow leader	RHS	No	Yes, but removed before re-entering river at weir	Drysuit	Yes	Deceased

Table 1: Weir descent sequence and location, participants' equipment and whether they had been previous customers of the Salty Dog Co Ltd

1.6 THE DECEASED

Four participants lost their lives as a result of the accident:

Andrea Powell, the third paddleboarder to descend the weir, was a 41-year-old mother of one from South Wales who worked as a dental hygienist. A good swimmer, Andrea had completed previous SUP river tours with the Salty Dog Co Ltd. She was recovered from the water, no longer attached to her SUP, at Old Quay Slip **(Figure 1)** close to the weir by members of the public and resuscitated at the scene. Andrea was then taken to hospital but died six days later due to injuries caused by drowning.

Nicola Wheatley, the sixth paddleboarder to descend the weir, was a 40-year-old mother of two from South Wales who worked as a poisons information specialist and toxicologist. A confident swimmer and described as naturally risk averse, Nicola started paddleboarding in August 2021 and had completed SUP training with both the Salty Dog Co Ltd and another provider over the summer; this was her first SUP river tour with the Salty Dog Co Ltd. Nicola was recovered from the river by tour participants and brought ashore at Higgon's Well **(Figure 1)**, where they conducted cardiopulmonary resuscitation (CPR) on her until the emergency services arrived. She was not attached to her SUP when recovered. Her postmortem recorded that she died due to immersion.

Morgan Rogers, the eighth paddleboarder to descend the weir, was a 24-year-old assistant supermarket manager from South Wales. Morgan was a strong swimmer who had paddleboard experience on the sea and canals; she had had no previous interaction with the Salty Dog Co Ltd. In 2015/16, Morgan was awarded a British Canoe Union Paddlesport Performance 1 and 2 Star certificates[10]. In 2017, she attained a BTEC[11] Level 3 National Diploma in Sport (Outdoor Adventure). She had also been a young firefighter with South Wales Fire and Rescue Service and had gone on to become a junior firefighter instructor. She was in training to become a full-time firefighter with a view to joining a water rescue station in Wales and was interested in becoming an RNLI crew member. Morgan's body was recovered by tour participants and brought ashore at Higgon's Well, where they conducted CPR on her until emergency services arrived. She was not attached to her SUP when recovered. Morgan's postmortem recorded that she died as a result of immersion.

Paul O'Dwyer, the ninth paddleboarder to descend the weir, was the 42-year-old fellow leader who had been travelling at the rear of the group, and who had descended the weir to help those in difficulty. An engineer and army veteran, he was a former army surf champion and keen sportsman. He was also a committed fundraiser for several local charities. Paul's body was located further down river by the coastguard helicopter, in the vicinity of Goodwood **(Figure 1)**, and was recovered by RNLI personnel at approximately 1100. His postmortem recorded that he died as a result of immersion.

1.7 HAVERFORDWEST TOWN WEIR

The Haverfordwest Town Weir was built in 1966 by the local authority to improve the appearance of the river as it passed through the town centre and to protect sewer pipes that crossed the Western Cleddau. The concrete weir was perpendicular to the river flow and bounded with a 1.5m wall on the right-hand side and a paved landing area, which was in front of the PCC's offices, approximately 0.9m above the top of the weir on the left-hand side of the river.

It is likely that ownership and responsibility for the weir had been transferred between a number of agencies/authorities between 1966 and 2021. Enquiries by the MAIB prompted correspondence between the relevant local authorities and in May 2022 it was agreed that Dŵr Cymru Welsh Water (DCWW) owned the weir, with the land on either side of it lying under PCC's jurisdiction. Milford Haven Port Authority (MHPA) managed navigation on the tidal water up to the southern face of the weir.

[10] British Canoe Union 1 Star certificate is a basic award based around an introductory course in a kayak or canoe, and the 2 Star certificate indicates that the paddler can use fundamental paddlesport skills on flat water to control movement of both canoes and kayaks.

[11] Business and Technology Education Council.

1.8 THE FISH PASS

In 2003, the Environment Agency[12] replaced the original wood and steel fish pass in the middle of the weir with a concrete 'laddered' fish pass. As part of the planning process for the construction of the new fish pass, the Environment Agency consulted Canoe England[13].

Canoe England proposed that the construction should include the insertion of *corner fillets* of block stone at the bank ends and on either side of the fish pass to *considerably lessen the hazard of potential drowning due to entrapment in the hydraulic jump*[14]. The desired effect was that the *corner fillets* would weaken the hydraulic forces at the weir and create flush points to wash anyone trapped at the weir downstream **(Figure 10)**. Plans show that these *corner fillets* were inserted in 2003; no flush points were observed at the weir, in similar conditions, the day after the accident.

1.9 WEIR HYDRAULIC HAZARDS

Chapter 10 of the Construction Industry Research and Information Association's (CIRIA) paper, *River weirs – Design, maintenance, modification and removal*[15] described the hazards and operational safety management of weirs **(Annex A)**. It stated that:

> *The greatest hazard due to weirs is hydraulic. The recirculating flow…at the base of the weir can prevent a floating object such as a person, dog or canoe from escaping. The person or object is repeatedly dragged underwater at the base of the weir, carried downstream underwater, back to the surface, only to be dragged underwater at the weir tow again, eventually leading to exhaustion and drowning. Aeration of the flow decreases buoyancy making it hard for the victim to stay afloat.*[16]

The CIRIA paper noted that the hazard depends on the weir flow type and defined four cases **(Figure 11)**:

Case A Swept-out jump
Case B Optimum jump
Case C Submerged jump
Case D Drowned weir.

The CIRIA paper also referred to a *Weir Assessment System*[17], the latest version of which is at **Annex B**. This system described the features and hazards of a weir **(Figure 12)** in terms of:

<u>Towback</u>
The distance from the base of the hydraulic/stopper to the boil line

<u>Depth of hydraulic/stopper</u>
The vertical distance from the top of the boil line to the base of the hydraulic

[12] Natural Resources Wales took over the management of the natural resources of Wales from the Environment Agency in 2013.

[13] Canoe England is now British Canoeing.

[14] Canoe England minute to Atkins Consultants Ltd on 18 February 2003.

[15] CIRIA C763, *River weirs – Design, maintenance, modification and removal*, 2016.

[16] CIRIA C763, *River weirs – Design, maintenance, modification and removal*, 2016, page 90.

[17] Natural Resources Wales/Rescue 3 Europe, March 2016 v.21.0.

Image courtesy of Natural Resources Wales/Canoe England

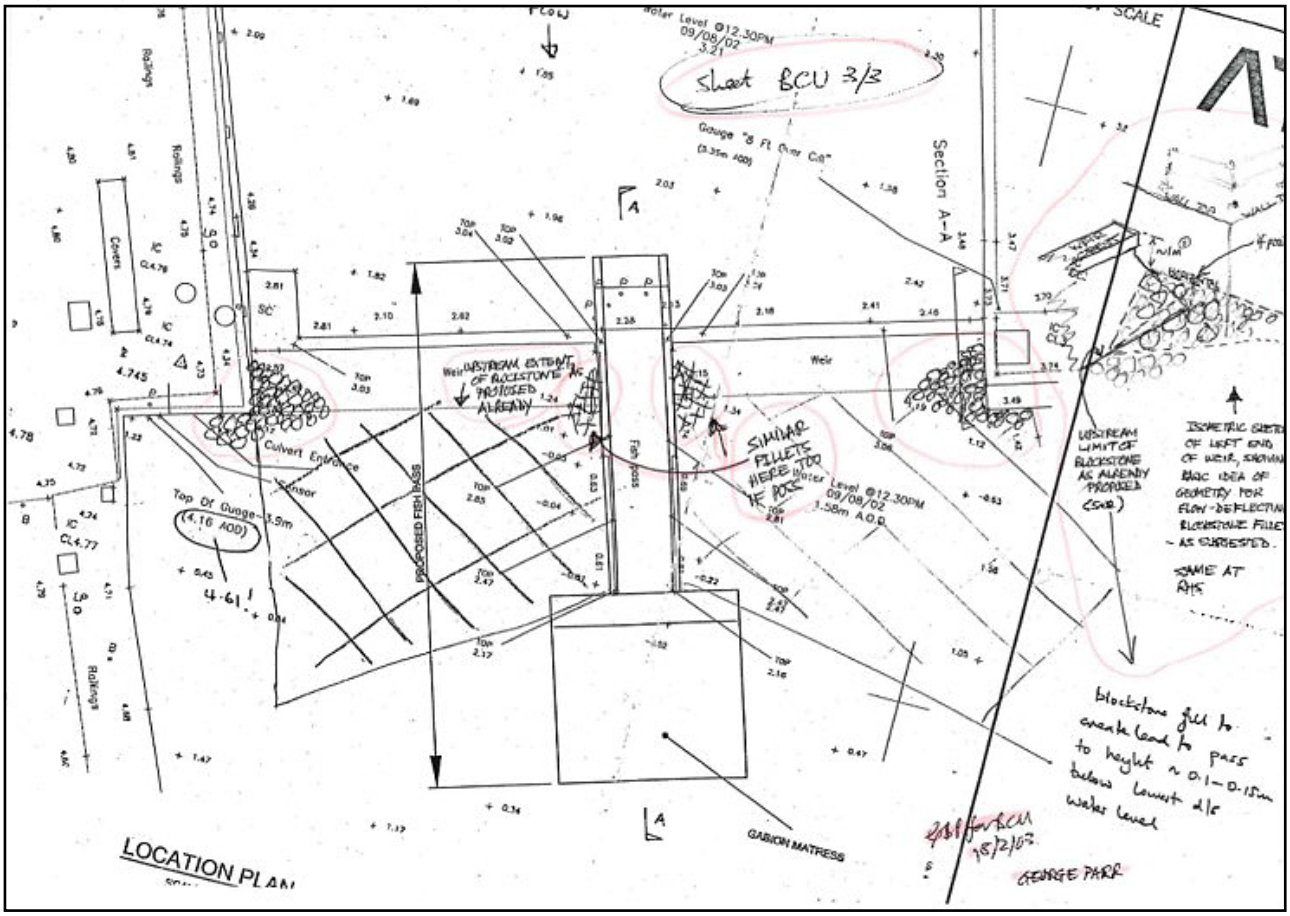


Figure 10: Extract of Canoe England's proposal, dated 18 February 2003, to insert 'corner fillets' to ensure that *any hydraulic jump that forms…is not closed ended*

Image courtesy of CIRIA

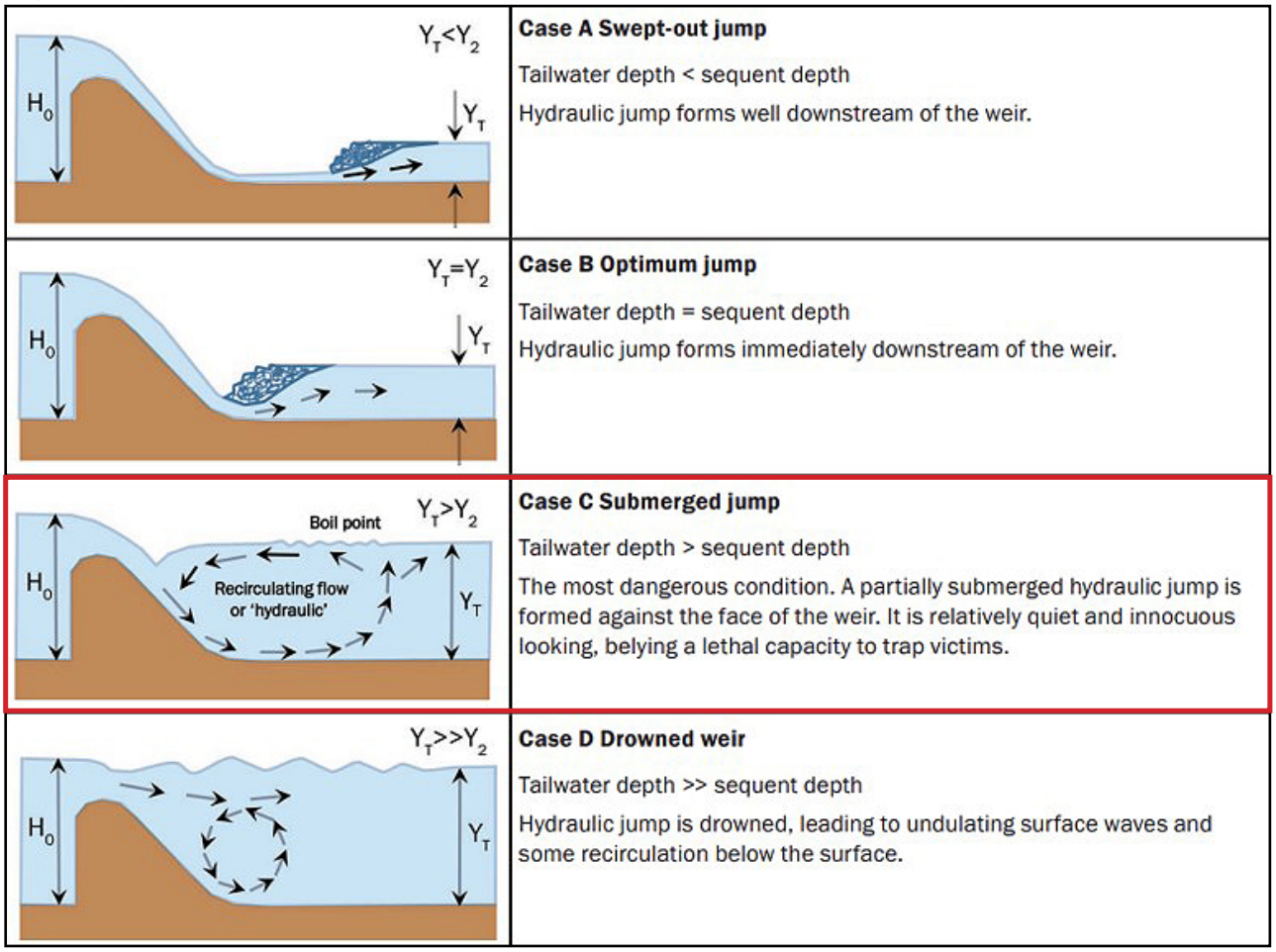


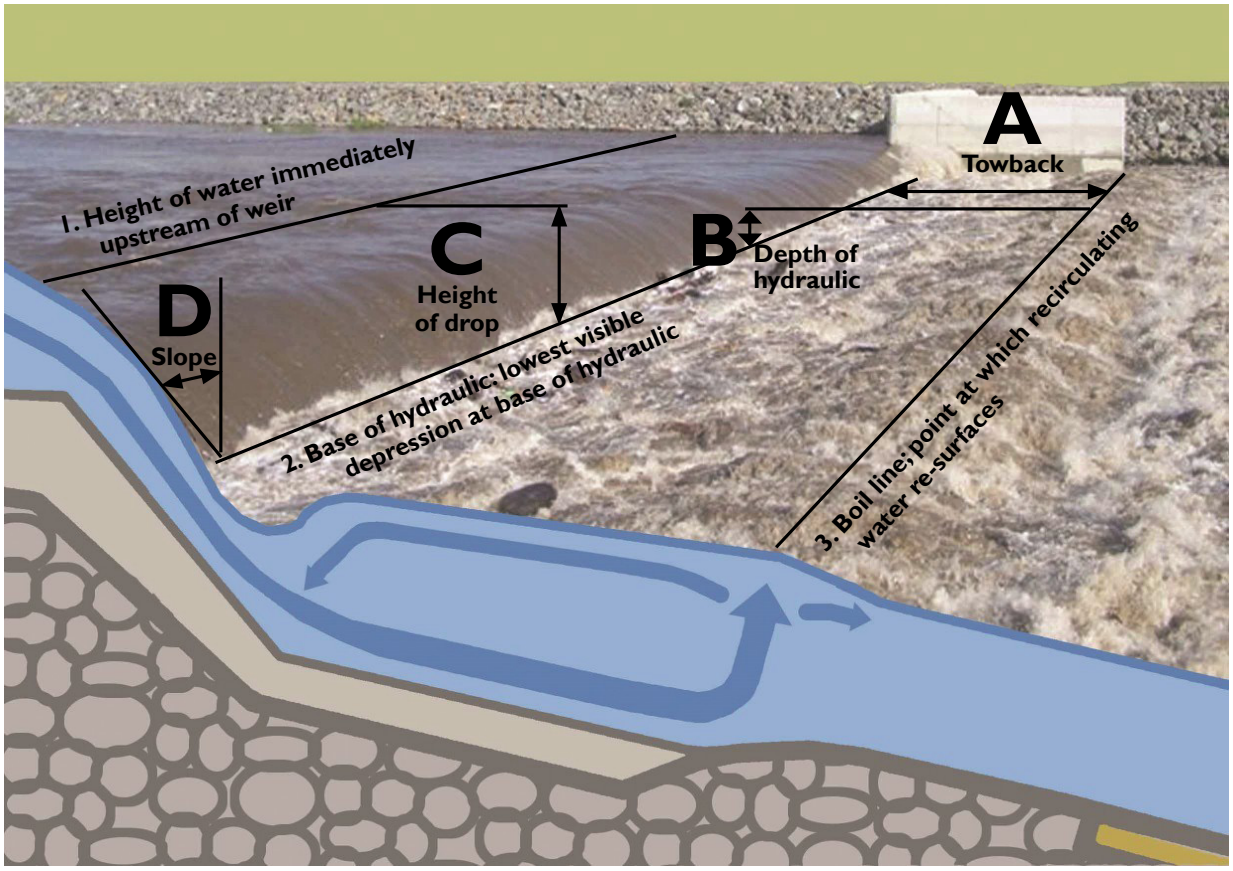
Figure 11: Weir flow types (from Tschantz and Wright, 2011)

Height of drop
The vertical distance between water level immediately upstream of the weir and the base of the hydraulic/stopper

Slope
The angle of water flowing over the face of the weir from vertical.

Image courtesy of Natural Resources Wales/Rescue 3 Europe

WEIR FEATURES AND HAZARDS



FEATURES/HAZARDS

A. Towback:
The distance from the base of the hydraulic/stopper (2) to the boil line (3)

B. Depth of hydraulic/stopper:
Vertical distance from top of boil line (3) to base of hydraulic (2)

C. Height of drop:
Vertical distance between water level immediately upstream of weir (1) and base of hydraulic/stopper (2)

D. Slope:
Angle of water flowing over face from vertical

Figure 12: Weir Assessment System – weir features and hazards

The hazard posed by Haverfordwest Town Weir depended on a combination of the river height and rate of flow and the height of tide. This meant the likelihood of the weir to cause harm could vary between *Very Unlikely* to *Almost Certain* in a single day.

MAIB observation of the weir in similar conditions[18] the day after the accident indicated that *Case C Submerged jump* had been created, which the CIRIA paper described as *the most dangerous condition*. From the measurements taken on that day, the Weir Assessment System rated the weir hazard level as *Very High* and the likelihood of the weir to cause harm as *Very Likely* **(Figure 13)**. At the time of the accident there were no records that DCWW, PCC or MHPA had conducted a risk assessment for Haverfordwest Town Weir.

It was also noted that the closed, vertical sides downstream of the weir, at both the fish pass and the right and left-hand banks, meant that there was no means of escape from the water for someone trapped at the weir; and, that it would be very difficult for others to rescue them.

1.10 WEIR RISK MANAGEMENT

While there was no national standard to assess and manage risk at weirs, the Canal and River Trust had created and adopted its own process to manage the risk to the public posed by weirs. This process required the weir to be assessed using the *Weir Assessment System*. The results of the weir assessment were then used to determine whether to introduce a range of risk control measures that could include signage, measures to divert users away from the hazard or installing a boom, as well as providing means of assisted rescue/self-recovery and fencing.

Recognised national water safety signs were defined in BS ISO 20712-3:2020 *Water safety signs and beach safety flags*[19], which gave guidance on the selection and use of prohibition, hazard, mandatory and information safety signs **(Figure 14)**.

In 2019, signs adjacent to the launch point were put in place by the Bridge Meadow Trust in conjunction with the Haverfordwest Kayak Club (HKC), NRW, PCC and the Welsh Council for Voluntary Action.

Two information signs were located close to the area where the Pembrokeshire Tour participants inflated their SUPs and prepared for the trip, a third was alongside the river access path that they used to launch their SUPs onto the Western Cleddau **(Figure 15)**.

One of these signs warned river users to be aware of the current, advised that bank access could be difficult and stated:

> *There is a dangerous weir below the Picton Place Bridge* (also known as New Bridge)*. This should be portaged on the river left if proceeding down the Cleddau Estuary.* [sic]

Portaged was a technical term used by canoeists, meaning that users should leave the river and carry their craft around the weir[20].

[18] At a similar height of river and tide.

[19] This version replaced the ISO 20712-3:2014.

[20] https://www.britishcanoeingawarding.org.uk/resource/virtual-coach-portaging-your-canoe/.

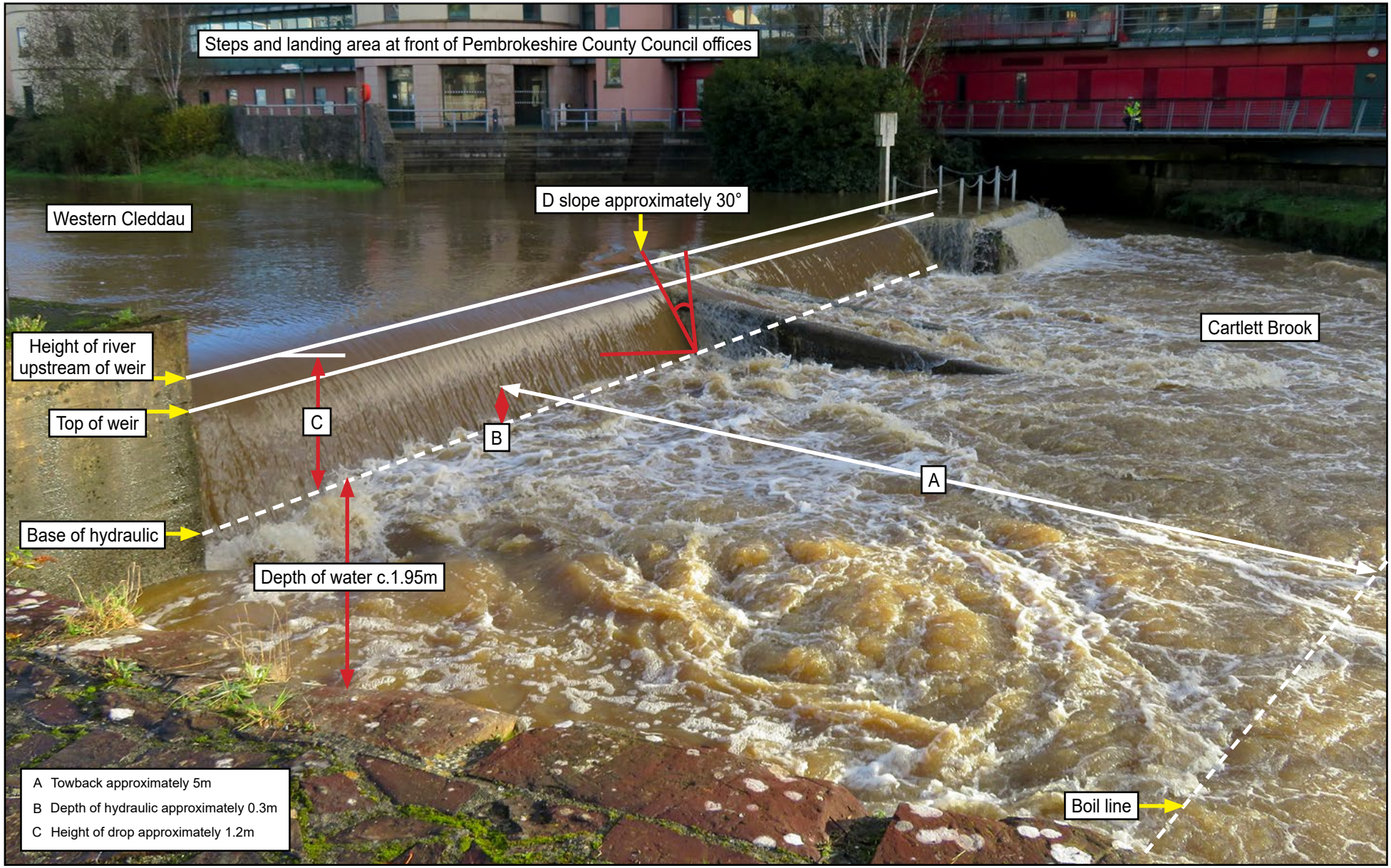


Figure 13: Conditions at the weir the day after the accident

Other control measures included two lifebuoys, with throw lines, which were positioned on the left-hand side of the weir.

Image courtesy of RoSPA

Figure 14: Examples of recognised national water safety signs

1.11 HAVERFORDWEST KAYAK CLUB

The Western Cleddau was regularly used by HKC members. Club risk assessments, published online, recommended that all weirs should be visually checked and dynamically assessed before being descended and warned that:

> *At high water levels the town weir becomes extremely dangerous with high potential for loss of life. The right hand side can be exceptionally dangerous.*[21] [sic]

HKC risk assessments also advised that:

> *the area below the New Bridge should not normally be used. However, prior to the new river access, the county council launch site just above the weir may be used when water level is 200mm below platform (gauge reading 0.62m). Two coaches should be present, one to supervise launching, the other to guard the weir. Open canoes must not launch here with any form of downstream wind.*[22]

[21] Haverfordwest Kayak Club Risk Assessment: River Cleddau Haverfordwest Revision 3, dated 28 December 2018.

[22] Haverfordwest Kayak Club Risk Assessment: River Cleddau Haverfordwest Revision 3, dated 28 December 2018.

Figure 15: Signage adjacent to river access path used by the Pembrokeshire Tour group

1.12 COLD WATER IMMERSION

Sudden immersion in cold water (less than 15°C) results in the lowering of skin temperature, causing a rapid rise in heart rate, and therefore blood pressure, accompanied by a gasp reflex followed by uncontrollable rapid breathing. This is known as the cold shock response, which peaks within 30 seconds and can last for 2 to 3 minutes. During this response, the inability to hold breath if the head goes underwater will often lead to water entering the lungs in quantities sufficient to cause death. Cold shock is considered to be the cause of the majority of drowning deaths in cold water[23].

If the cold shock response is survived, cold incapacitation usually occurs within 2 to 15 minutes of entering cold water. The blood vessels are constricted as the body tries to preserve heat and protect the vital organs. This results in restricted blood flow to the extremities, causing cooling and consequent deterioration in the functioning of muscles and nerve ends. Useful movement is lost in hands and feet, progressively leading to the incapacitation of arms and legs. Unless a lifejacket is worn, death by drowning can occur as a result of impaired swimming.

1.13 UK GOVERNANCE OF STAND UP PADDLEBOARDING

1.13.1 Background

Stand up paddleboarding has become an increasingly popular sport in the UK and, with the introduction of readily available inflatable paddleboards, it is viewed as an easy way to get onto the water for a relatively modest cost. A 2019 survey indicated that stand up paddleboarding was the fastest growing UK water sport and that, between 2015 and 2019, participation increased by over 285% to more than 600,000[24].

1.13.2 Governance of sport in the UK

Governance of sport in the UK is the responsibility of the individual National Governing Body (NGB) for that sport. The national Sports Councils, Sport England, Sport Northern Ireland, **sport**scotland and Sport Wales, funded via their respective governments, were empowered by royal charter to support, encourage and foster sport and physical recreation within their nation; they do not, however, act as regulator or have governance responsibilities for all sport in their respective nations.

Sports Councils are able to confer recognised status on an NGB. Recognised status means that the relevant Sports Council recognises that organisation as the body that *governs and administers a sport on a national basis*[25] and described NGBs as *the custodians and guardians of their sport*. The Sports Councils do not have regulatory powers and recognition does not mean, they have approved an NGB's systems or processes.

[23] Golden and Tipton, Essentials of Sea Survival, 2002, page 59.

[24] Rushall Marketing, Arkenford Watersports Survey 2019.

[25] Sports Councils' Recognition Policy 2017, section 2, paragraph 6, page 3.

The Sports Councils' recognition process for sporting NGBs was described in their 2017 Recognition Policy[26], which stated that NGBs were expected to deliver the following functions:

> *a) Control and regulate the environment of its sport;*
>
> *b) Administer the practice and participation of its sport;*
>
> *c) Develop its sport;*
>
> *d) Influence both members and organisations of which it is a member.*

While not explicitly mentioning safety, the recognition process required an NGB to demonstrate that:

> *Where a sporting activity presents a risk of injury, the NGB should demonstrate it has taken measures to minimise and control risk to participants and has in place appropriate policies to manage the risk.*[27]

1.13.3 National governing body for stand up paddleboarding

The International Surfing Association (ISA) recognised SUP as a discipline of surfing in 2008. The Welsh and Irish Surfing Federations were already recognised as NGBs for surfing at that time and would have incorporated SUP within their remits as a result of the ISA's decision. The Scottish Surfing Federation and Surf England were recognised as NGBs for surfing in 2014 and 2017, respectively. Since then the surf NGBs have focused their attention on surf and coastal SUP[28].

In 2020, the International Court of Arbitration in Sport decided that, while the ISA would retain control of SUP at an Olympic level, it would allow both the ISA and the International Canoe Federation to hold official SUP competitions.

In early October 2021, the Salty Dog Co Ltd's owner made an online application to become an affiliated member of the Welsh Surfing Federation (WSF). On 13 October, the WSF secretary's response stated that, before the company's application could be accepted, the owner would need to provide a certificate of third party and public liability insurance, risk assessments, normal operating procedures, an emergency action plan and copies of current coaching qualifications and rescue awards for the instructors. The Salty Dog Co Ltd's owner did not provide this information and the application was not approved.

In 2022, British Canoeing, the Scottish Canoe Association, Canoe Wales and the Canoe Association of Northern Ireland, applied to their respective Sports Councils to be recognised as NGBs for SUP. At the time of this investigation, the Sports Councils' recognition panel had yet to decide on this application.

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[26] Sports Councils' Recognition Policy 2017, section 2, paragraph 9, pages 3-4.

[27] Sports Councils' Recognition Policy 2017, section 7, paragraph 49(a), page 15.

[28] https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2021-12/List%20of%20UK%20recognised%20NGBs%20and%20sports%20-%20December%202021.pdf?VersionId=SOfAFj7Gop0galWfPxvJelOdEhHZeyWS, accessed on 3 March 2022.

1.13.4 Delivery of stand up paddleboard training and safety advice

At the time of the accident SUP training was delivered by a variety of training providers, and it was left to individual instructors to decide which provider to choose.

Most of the independent training providers offered a range of instructional qualifications from basic SUP beginners' courses to advanced tour and tour leaders. Once qualified, some training providers required an instructor to work within a recognised training school that had completed external inspection or assurance, while others allowed instructors to operate independently.

In contrast, for more established water sports like sailing and canoeing where the Royal Yachting Association (RYA) and British Canoeing are the NGBs, there were nationally recognised instructional standards. All RYA training courses must be run by relevant RYA qualified instructors within the framework of an RYA Recognised Training Centre.

At the time of the accident, British Canoeing had issued specific safety advice to SUP users on choosing the right leash **(Annex C** and **Figure 16)**. Surf England had issued advice for the surf zone; since the accident this has been updated to reflect British Canoeing's advice[29].

1.14 REGULATION

The UK's primary legislation governing occupational safety was the Health and Safety at Work etc. Act 1974 (HSW Act), as amended.

The HSW Act required employers, so far as reasonably practicable, to ensure the health and safety of employees and anyone else who may be affected by their operation. The HSW Act applied to all work activities and premises and everyone at work had responsibilities under it, including the self-employed.

The Management of Health and Safety at Work Regulations 1999 also applied to the Pembrokeshire Tour. This secondary legislation required the owner of the Salty Dog Co Ltd to assess and manage the risks to which those participating in its tour could be exposed.

1.15 PREVIOUS SIMILAR ACCIDENTS

1.15.1 Weir accidents

In 2004, the MAIB investigated the capsize of the passenger launch *Swan* on the River Avon, Bath (MAIB report 11/2005[30]). The investigation found that *Swan* was driven too close to the weir and the current (towback) pulled the vessel under a cascading flow of water, causing the boat to capsize. Fortunately, *Swan*'s passengers and crew survived by clinging to the vessel's upturned hull until they were rescued by the fire service.

In 2010 the Republic of Ireland's Marine Casualty Investigation Board (MCIB) investigated the deaths of two kayakers who became trapped in weir towback on the River Clodagh (MCIB/180[31]). The investigation found that the kayakers had not

[29] https://www.surfingengland.org/sup-safety/

[30] https://www.gov.uk/maib-reports/flooding-and-capsize-of-passenger-launch-swan-under-pulteney-weir-on-river-avon-bath-england

[31] https://www.mcib.ie/reports.7.html?r=141

Image courtesy of British Canoeing

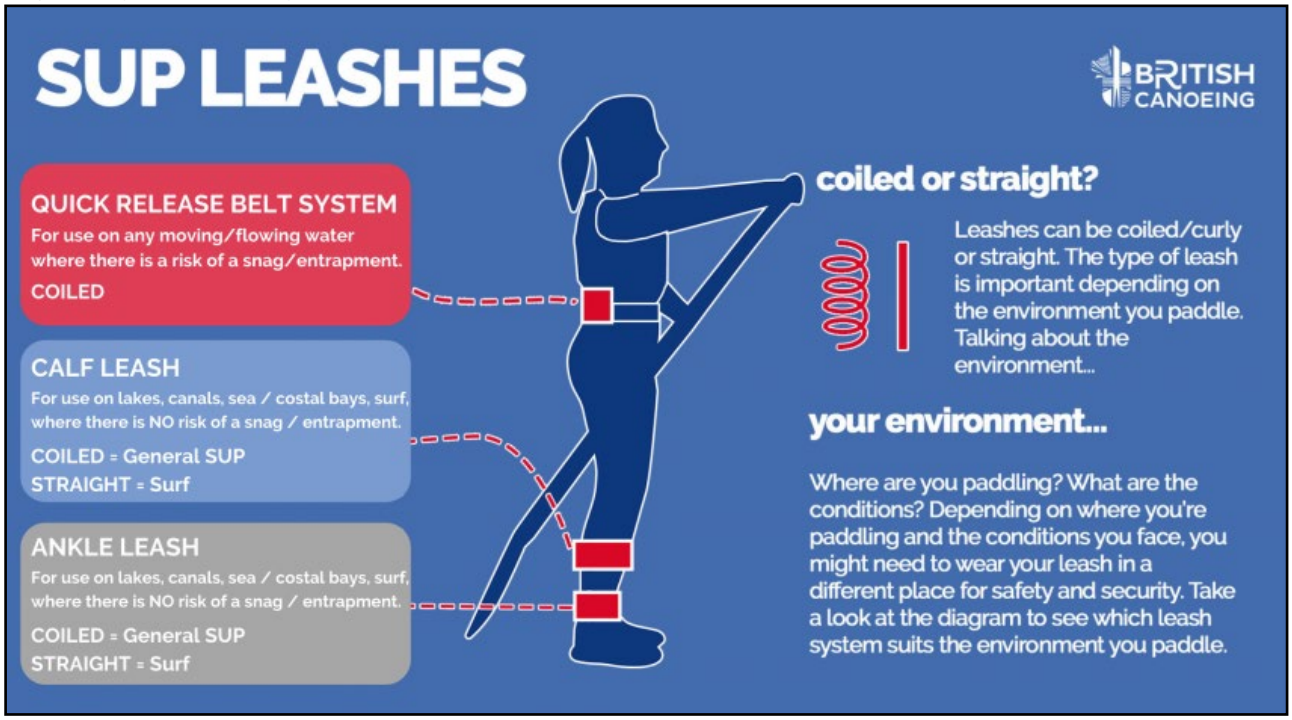

Figure 16: British Canoeing poster, providing advice on SUP leashes

conducted a risk assessment for their route, were not properly trained for swift water rescue, and that there were no lifesaving appliances or escape ladders at the weir, making it impossible for them to escape from the water.

The UK national water safety forum's Water Incident Database (WAID) recorded that from 2016-2020 there were 19 deaths at UK weirs. This statistic indicated that the public and river users did not appreciate the risks presented by weirs.

1.15.2 Stand up paddleboarding accidents

On 31 August 2020, a member of the public was stand up paddleboarding on the Camel Estuary, at Rock, Cornwall, when he fell from his SUP, which went one side of a mooring buoy while he went the other. The tidal stream then pressed him against the side of a moored boat where, unable to release the ankle leash that attached him to the SUP, he was pulled underwater. Despite being quickly recovered, the paddleboarder could not be resuscitated. As a result of this accident the paddleboarder's family and friends launched an initiative to promote and improve safety advice to the public on the use of SUP safety leashes.

In July 2020, following several incidents on the Thames, the Port of London Authority (PLA) issued a Safety Bulletin (PLA No.6 of 2020[32]) advising paddleboarders to use quick release waist leashes as recommended by British Canoeing.

In November 2020, after the Camel Estuary accident, British Canoeing issued an information sheet providing safety advice to SUP users on choosing the right leash **(Annex C)**.

[32] Port of London Authority, http://www.pla.co.uk/assets/6of2020-covid-19restrictions-recreationleisureactivities.pdf

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

At approximately 0900 on 30 October, four paddleboarders who were taking part in a commercial SUP tour perished when they became trapped in the hydraulic *towback* at the base of Haverfordwest Town Weir. The paddleboarders lost their lives because the leaders of the tour were unaware of the treacherous conditions at the weir.

This section of the report will assess the circumstances of the accident, the planning of the tour, the equipment used by the participants, the weir design and risk assessment, the river signage, the leaders and the governance of SUP in the UK.

2.3 THE ACCIDENT

On the morning of the accident, the high river level, fast current and low tide resulted in treacherous hydraulic conditions at the weir. These conditions created a powerful recirculating flow and *Submerged jump* with its associated *towback* at the base of the weir, described by the CIRIA paper as a weir's *most dangerous condition* **(Figure 11)**.

This meant that the paddleboarders who did not use the fish pass fell from their boards as they descended the weir and dropped approximately 1m directly into this powerful recirculating flow. Once there, the hydraulic forces pushed them against the face of the weir, before attempting to pull them under. If they were submerged then the underwater current may have briefly pulled them downstream, before pushing them back towards the face of the weir. While some paddleboarders were able to swim clear, it is almost certain that those who lost their lives were unable to escape these forces until, exhausted, they were immersed and drowned.

A further contributory factor would have been the cold river water; even though some who perished were wearing wetsuits or drysuits, the cold water would have cooled their muscles, further sapping their strength and endurance and contributing to their exhaustion within the recirculating flow.

2.4 TOUR PLANNING

Encouraged by the popularity of the Salty Dog Co Ltd's previous river tours, the two leaders decided to plan the Pembrokeshire Tour. Their principal concern was the effect of wind, sea state and precipitation and whether there was sufficient water to allow their SUPs to float over the weir. Their WhatsApp group exchanges with tour participants focused on accommodation and logistical arrangements for the weekend, as well as the alternative plan to replace the SUP tour with a circular walk if conditions were unsuitable.

The Salty Dog Co Ltd's owner had not produced written risk assessments for the tour and the ease with which she had descended the weir during the reconnaissance trip meant that she did not believe it would pose a hazard. The two leaders were also unaware of NRW's flood alert for the river, or the dangers of the weir highlighted in the HKC's online risk assessments. Instead, when the leaders inspected the river they may have felt that there was no need to check conditions at the weir. As a result, rather than viewing the fast-flowing, mud laden water as an indication of danger, they interpreted the fast-flowing river's smooth unrippled surface as an indication that it was safe for their SUP tour to go ahead.

The administrative planning for the tour by the Salty Dog Co Ltd was also incomplete. The organiser had not assessed the participants' ability, asked them to complete a legal disclaimer, medical declarations or provide emergency contact details before they set off. This meant that there were post-accident delays in contacting the families of those who had lost their lives.

Had the Salty Dog Co Ltd produced a methodical, documented risk assessment for the tour, searching for advice on the passage down the Western Cleddau from local sources such as HKC, the organisers would have understood the hazard of the weir, adapted their plan, not launched onto the river Cleddau, and thereby have avoided placing the tour participants in danger. Regrettably, the owner decided to commence the SUP tour without an accurate understanding of the risk to its participants.

2.5 EQUIPMENT

The fellow leader advised the Pembrokeshire Tour participants of the equipment required for the tour via a WhatsApp group. In addition to a SUP, pump, leash and paddle, participants were told to bring a buoyancy aid to act as their PFD, trainers, wetsuit, and a waterproof jacket to wear during their river trip to Burton Ferry. However, on the day of the accident, as shown in **Table 1**, not all of the group followed this advice.

In terms of personal flotation, a buoyancy aid is most suitable if the wearer has reasonable expectation of entering the water (dinghy sailing, canoeing, SUP, etc.) and is able to self-rescue. Buoyancy aids were therefore appropriate for the tour, and they would have provided the wearers with additional flotation as they reacclimatised to being immersed in cold water. To this end, the leaders should have insisted that buoyancy aids were worn by both themselves and the participants. However, the 50 newtons (N) buoyancy provided by a typical buoyancy aid would only have been of partial assistance given the hydraulic forces at the weir.

Too much positive buoyancy can hinder someone trying to escape from a submerged jump as it can keep them in the towback zone **(Figure 12)**, potentially pressed against the face of the weir. Without the buoyancy they would submerge and possibly be flushed out of the weir, but it would have been better to avoid the weir altogether.

CCTV imagery of the accident showed that one of the participants, on the left-hand side of the weir, repeatedly drifted downriver without their SUP, only to be pulled back towards the weir. The most likely explanation for this is that the participant's SUP was trapped at the weir by either hydraulic forces or debris, which meant that even though the participant was being repeatedly washed downstream, they were

unable to escape the towback as they were restrained by their ankle leash. If this participant had been wearing a quick release waist leash then it is possible that they would have been able to release themselves from their trapped SUP and swim clear of the hydraulic forces at the weir.

As CCTV of the paddleboarders trapped on the right-hand side of the weir was obscured it has not been possible to determine whether their ankle leashes affected their ability to escape from the weir. However, given that a number of SUPs could be seen trapped against the face of the weir, it is possible that their ankle leashes may have prevented the wearers from separating themselves from their SUPs and swimming clear.

In 2020, the fatal SUP accident on the Camel Estuary, where the paddleboarder drowned because he was unable to remove his ankle leash, led to British Canoeing issuing SUP guidance on *Choosing the right leash* **(Annex C)**. This guidance advised paddleboarders to wear quick release waist leashes when operating on moving or flowing water where there was a risk of snagging or entrapment; a view reflected by their WSA training, during which the leaders were required to wear, on occasion, a quick release waist leash. However, despite this advice none of the group was wearing a quick release waist leash. Instead, while one of the group was not wearing a leash at all, the other eight were all attached to their SUP by an ankle leash, an action that might have adversely affected their chances of survival. One factor that may have contributed to this could be that SUPs are normally only sold with ankle leashes and their owners can therefore be unaware of the advice that a quick release waist leash might be more appropriate in certain conditions.

Clothing, buoyancy aid and leash wearing was inconsistent across the Pembrokeshire Tour participants. The Salty Dog Co Ltd leaders did not follow recognised advice, taught during their SUP instructor training, that paddleboarders on fast-flowing water should wear a suitable PFD and quick release waist leash, nor did they require tour participants to do so.

2.6 WEIR DESIGN AND RISK MANAGEMENT

In 2003, during the planning consultation for the new fish pass, Canoe England highlighted the danger of entrapment by hydraulic forces due to the *closed ends* of the weir. To mitigate this, they proposed the insertion of *corner fillets* of block stone to weaken the hydraulic forces at the weir and create flush points to wash anyone trapped at the weir downstream. While these fillets were reported to have been inserted in 2003, at the time of the accident there was no evidence that the desired flush points had been created. However, if they had been created they might have allowed some of the paddleboarders trapped against the face of the weir to escape by being washed downstream.

While five of the nine paddleboarders on the tour managed to clear the *Submerged jump* and its *towback*, it is almost certain that the four participants who lost their lives did so because they became trapped in the hydraulic recirculation at the base of the weir. Moreover, once trapped in these hydraulic forces the *closed-ended* nature of the weir meant that, without steps or a ladder, it was impossible for them to escape from the water and access for potential rescuers was challenging.

The MAIB's investigation into the capsize of *Swan* on the River Avon and Irish MCIB investigation into the deaths of two kayakers on the River Clodagh, along with the deaths recorded in the WAID, all indicate that the hazard and risks associated with weirs are well understood. However, this investigation could find no record of any risk assessment for the Haverfordwest Town Weir or evidence that appropriate control measures, such as those proposed in the Canal and River Trust guidance, had been put in place. This was unsurprising as none of the local agencies/ authorities considered that they were responsible for the weir. Having clarified that DCWW owned the weir, the MAIB issued an early recommendation to it to conduct an immediate risk assessment into the hazard posed to river users by the weir and, along with other stakeholders, implement appropriate control measures.

2.7 RIVER SIGNAGE

There was a closely scripted information sign, in English and Welsh, at the point where the Pembrokeshire Tour group accessed the river. This information sign advised river users that there was a *dangerous weir* that *should be portaged on the river left*. Next to it was another sign, displaying a map of the river that showed the location of the weir. On the river access path, a further yellow sign warned of dangerous currents and the risk of slipping **(Figure 15)** and on the left-hand side of the river, located next to the weir, was a white post with faded text indicating the location of the weir **(Figure 4)**.

This investigation has found no evidence that either the leaders of the Pembrokeshire Tour or its participants saw or, if they did, understood the implied message of these signs: that the weir was dangerous and should not be descended; and that river users should therefore exit the river and carry their craft around the weir. One explanation was that these signs did not adequately convey this critical safety message in a clear, unambiguous manner; the reliance on the written word instead of high impact, recognisable signage and the use of terms like *portage* (which might be understood by canoeists and kayakers but was not a term used by paddleboarders) almost certainly contributed to this.

The lack of effective signage on the river meant that those approaching the weir from upstream were not adequately warned of the hazard posed by it or the need to leave the river and carry their craft around it. If the signage had followed the BS and ISO standard for national water safety signs **(Figure 14)** it is highly likely that all those taking part would have been aware that the weir was dangerous and may, as a result, have taken the necessary action, by leaving the river, to avoid placing themselves in danger.

2.8 THE LEADERS

The two Pembrokeshire Tour leaders, a police officer/RNLI volunteer and army veteran, were experienced paddleboarders who understood the risks of operating in the coastal environment. The Salty Dog Co Ltd's owner had expanded the scope of the business, from selling clothing and delivering SUP lessons to beginners and novices, to include organising and leading river tours. The Pembrokeshire Tour was their last event of the season and, following their reconnaissance trip in August, they were confident that the participants would be able to complete and enjoy the tour.

Without a brief before they set off from Haverfordwest, the Pembrokeshire Tour leaders and participants had no shared mental model of what to expect during the tour. This meant that the participants were unaware that they would be descending the weir and that it was the leaders' intention that they should either descend it or, if they were uncomfortable doing so, exit on the left-hand side of the river immediately in front of the PCC offices and carry their SUP around the weir. Equally, the participants did not know that the two leaders, while apparently confident and competent, were not qualified to lead tours or expeditions. This meant that the participants did not challenge or question the leaders on their plan for the Pembrokeshire Tour but instead trusted them to safely guide them to Burton Ferry.

When the participants booked themselves on to the Salty Dog Co Ltd's Pembrokeshire Tour they were reliant upon online feedback and personal recommendation that the tour was being organised and led by qualified, competent leaders. They were unaware that the leaders did not have the training or experience to recognise, and so avoid, a dangerous weir or that their qualifications did not qualify them to lead a tour or expedition. As a result, although they might have had concerns about the state of the river, the tour leaders' decisions went unchallenged because they appeared confident and competent.

2.9 GOVERNANCE OF STAND UP PADDLEBOARDING

When the UK surf federations were recognised by the Sports Councils as the NGBs for surfing, which included SUP as one of its disciplines, they were not required to demonstrate that their safety management systems for surfing and its disciplines were comprehensive or appropriate. This is in-line with the purpose of the Sports Councils' Recognition Policy, which is to identify the NGBs the Sports Councils are willing to work with and support, not to test the validity of their operational procedures in areas such as safety. At the time of the accident, the surf federations had yet to agree nationally recognised instructional standards for SUP training or issue joint safety guidance on issues such as leash or PFD use to those taking part in this rapidly growing sport. Moreover, the environment in which SUPs were used had broadened from the surf zone to the open sea, coastal waters, rivers, canals and lakes.

In more established water sports such as sailing and canoeing, the relevant NGBs, RYA and British Canoeing have nationally recognised training schemes with appropriate standards for instructors and training centres. In these examples, recognition that the organisations are the NGB for their respective sports provides a level of assurance to the public when they use their services. In contrast, the six paying participants on the Pembrokeshire Tour had no recognised metric by which to judge whether the Salty Dog Co Ltd's leaders were qualified to lead and organise a river tour.

The Sports Councils' 2014 Recognition Policy was updated in 2017 and required potential NGBs to demonstrate that they had the capacity to control, administer, develop and influence those who take part in their sport, as well as that, where there was a *risk of injury,* the NGB had taken *measures to minimise and control risk*[33]. However, while the existing surf NGBs had a good understanding of the surf zone where their primary discipline was taking place, they did not all have the expertise to advise on the risks of operating SUPs in other areas, such as rivers.

[33] Sports Councils' Recognition Policy 2017, section 7, paragraph 49(a), page 15.

In November 2020, after the Camel Estuary accident, it was British Canoeing that issued an information sheet providing advice to SUP users on choosing the right leash **(Annex C)**. HKC, which had published risk assessments detailing the hazard posed by the weir, did so following British Canoeing's guidance.

The rapid increase in the popularity of SUP in the UK means that there is an increasing population at risk. However, without recognised safety messaging or a national standard for SUP training, this has created an environment of multiple providers with inconsistent governance, which means that recreational paddleboarders have no metric by which to judge the training standard of a provider. This situation could be addressed by the recognised NGB for SUP issuing guidance to SUP training providers that harmonises safety messages and training standards for the sport.

This investigation has also identified that the safety of participants in some sports lacks any consistent system of oversight. In sports that lack official licensing schemes, the Sports Councils are well placed to work with, and encourage, NGBs to help produce codes of practice for a sport that set out standards and scope the outputs required of NGBs. Providing it is practically possible, effective monitoring of such standards would help provide a system that gives members of the public entering a sport a level of assurance that activity and training providers with NGB accredited status are well run, competent and safe.

SECTION 3 – CONCLUSIONS

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

1. Four stand up paddleboarders lost their lives because they became trapped in the hydraulic *towback* at Haverfordwest Town Weir, from which there was no means of escape. [2.3]

2. The tour leaders had planned for accommodation transport and weather; however, without a documented risk assessment and briefing of the participants, the planning and preparation for the tour were inadequate and had overlooked both the active flood alert for the river and the risk posed by the weir. [2.4]

3. Clothing, buoyancy aid and leash wearing were inconsistent across the group and did not follow recognised guidance that paddleboarders on fast-flowing water should wear a suitable personal flotation device and quick release waist leash. [2.5]

4. Lack of clarity over responsibility for the Haverfordwest Town Weir resulted in the hazards it posed to river users being inadequately mitigated. Specifically, a weir risk assessment had not been carried out; the effectiveness of the fillets to create 'wash-out' zones had not been assessed; and the signage of the hazard was ineffective and did not conform to national guidelines. [2.6, 2.7]

5. The tour leaders were experienced paddleboarders who had undertaken training as instructors; however, they did not have the training, experience, or qualifications to lead itinerant tours, and their pre-tour planning and reconnaissance did not identify the hazard posed by the weir. [2.8]

6. The tour leaders' decisions went unchallenged by the participants because they appeared confident and competent. [2.8]

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

1. Without an active national governing body for the sport of stand up paddleboarding in the UK there is:

    a. no consistent safety messaging to the sport's participants on stand up paddleboard safety in respect of potential risks from weirs and other hazards, or on the wearing of appropriate safety equipment (PFDs and leashes, etc.); and,

    a. no metric for those who seek to participate in a sport in an environment where there are multiple unregulated training providers, with inconsistent governance, to judge the competence of those businesses offering stand up paddleboard training, tours or expeditions. [2.9]

SECTION 4 – ACTION TAKEN

4.1 MAIB ACTIONS

On 30 May 2022, the Chief Inspector of Marine Accidents wrote to **Dŵr Cymru Welsh Water** to issue the following recommendation:

2022/108 *In conjunction with Pembrokeshire County Council, Milford Haven Port Authority and other stakeholders as appropriate, conduct an immediate risk assessment of the hazard posed to river users by Haverfordwest Town Weir, and to implement control measures as appropriate to mitigate that risk. Such measures could include, inter alia, riverside signage, warning marker buoys and, if deemed necessary, physical barriers.*

The Chief Inspector of Marine Accidents has written to the **Local Government Association** to highlight the need for weir risk assessments to be carried out and inviting it to bring this investigation report to the attention of its members.

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

On 18 November 2021, the **Health and Safety Executive** issued a **Prohibition Notice** to the Salty Dog Co Limited to prohibit it from conducting instructing, coaching or leading stand up paddleboarding, whether of individuals or groups, which are likely to be carried on at inland and coast locations in Great Britain.

On 2 August 2022, representatives from **Dŵr Cymru Welsh Water** visited Haverfordwest Town Weir with other stakeholders and commenced a risk assessment of the hazard posed to river users by the weir.

Since the accident, **Surf England** has published more in depth stand up paddleboarding safety advice[34].

[34] https://www.surfingengland.org/sup-safety/

SECTION 5 – RECOMMENDATIONS

The **UK national Sports Councils** are recommended to:

2022/134 Complete their review of the governance of stand up paddleboarding in the UK and urgently ensure that the recognised national governing body(ies) have the resource, support and expertise to issue advice and guidance, including appropriate training standards to control risk to those who take part in this fast-growing sport.

2022/135 Review and develop as necessary its criteria for conferring recognition as a national governing body, to include the management of safety and adherence to good practice by the governing body and any organisation or companies it accredits.

2022/136 Develop and publish a national governing body Guide to Good Practice.

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

Marine Accident Report

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