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“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 such 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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Fax: 023 8023 2459

## **Collision of the rigid inflatable boat *Tiger One* with a mooring buoy, River Thames, London, England 17 January 2019**

### **SUMMARY**

At 1738 on 17 January 2019, the commercially operated rigid inflatable boat *Tiger One* hit a mooring buoy on the River Thames in London, England, at a speed of about 26 knots in darkness. Two passengers and the boat's two crew were taken to hospital with minor injuries. *Tiger One* was severely damaged.

The skipper did not see the mooring buoy in time to take avoiding action. The buoy's light was possibly difficult to see against the back scatter of shore lights and might also have been obscured to some degree by birds. The skipper had limited experience of commercial passages in darkness in the area. He was navigating solely by eye and had either thought that *Tiger One* was closer to the centre of the navigable channel, or had forgotten that the buoy was there.

More serious consequences resulting from the collision were prevented by *Tiger One*'s robust construction, seating arrangements, and the skipper's use of a kill cord. However, the circumstances of the collision indicate that there is significant potential for more serious consequences to result from similar high-speed accidents in the future.



*Tiger One*

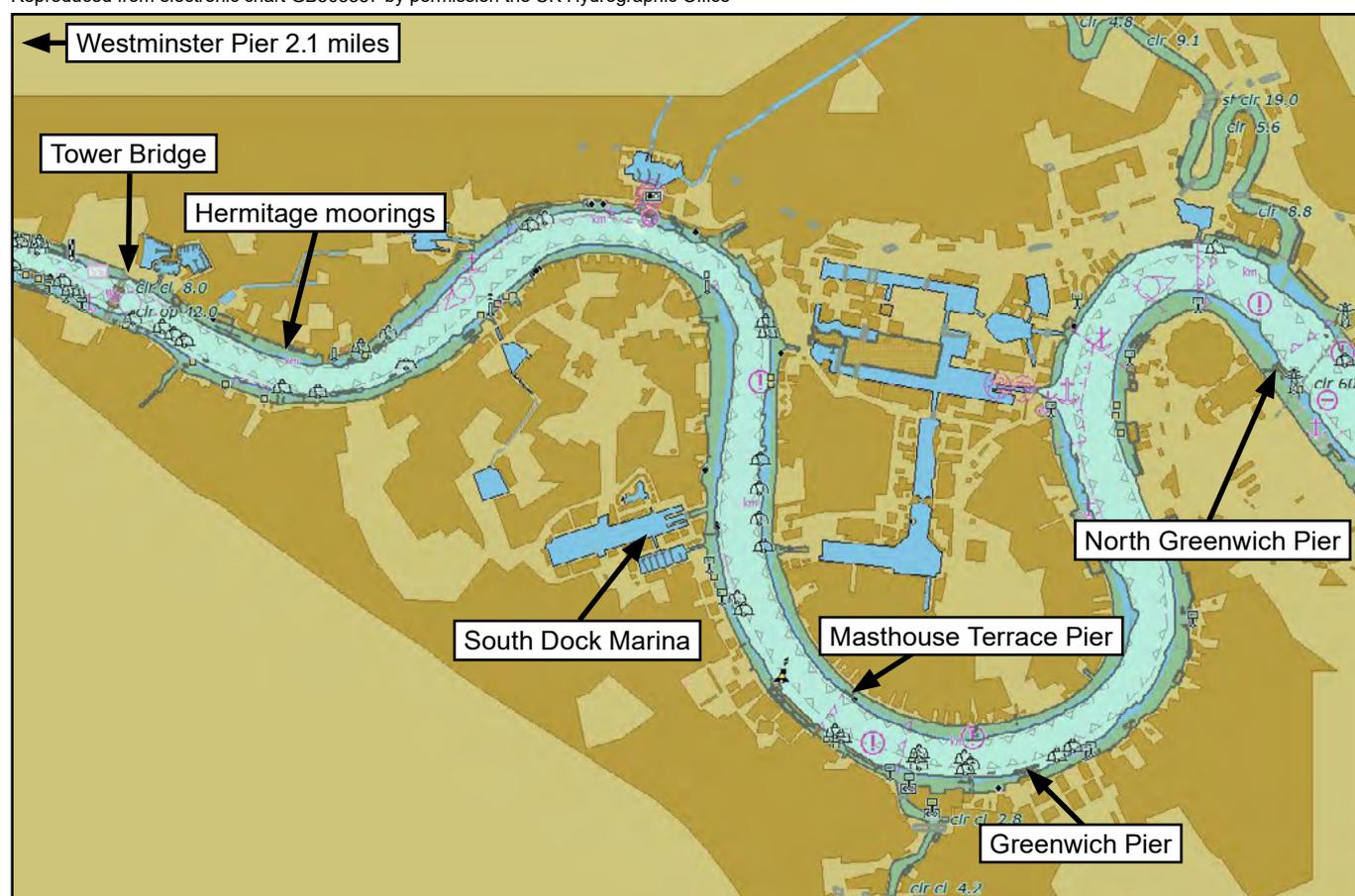
Following the accident, the Port of London Authority has, among other things, removed its authorisation for open deck high-speed craft to navigate above 12 knots during the hours of darkness, and taken steps to enable these craft to report passenger numbers via the automatic identification system. The Royal Yachting Association has included guidance on night operations and passenger number reporting in its recently revised guidance on passenger safety on board small commercial high-speed craft and experience rides. In view of the actions taken, no recommendations have been made.

## FACTUAL INFORMATION

### Narrative

At 1713<sup>1</sup> on 17 January 2019, the rigid inflatable boat (RIB) *Tiger One* departed from Westminster Pier, River Thames, London, for passage to North Greenwich Pier, 8 miles downriver (**Figure 1**). On board were the skipper, a deckhand and six passengers, all of whom were wearing lifejackets and warm clothing. It was a cold, dark evening with good visibility and the riverbanks were brightly illuminated by city lights.

Reproduced from electronic chart GB503337 by permission the UK Hydrographic Office



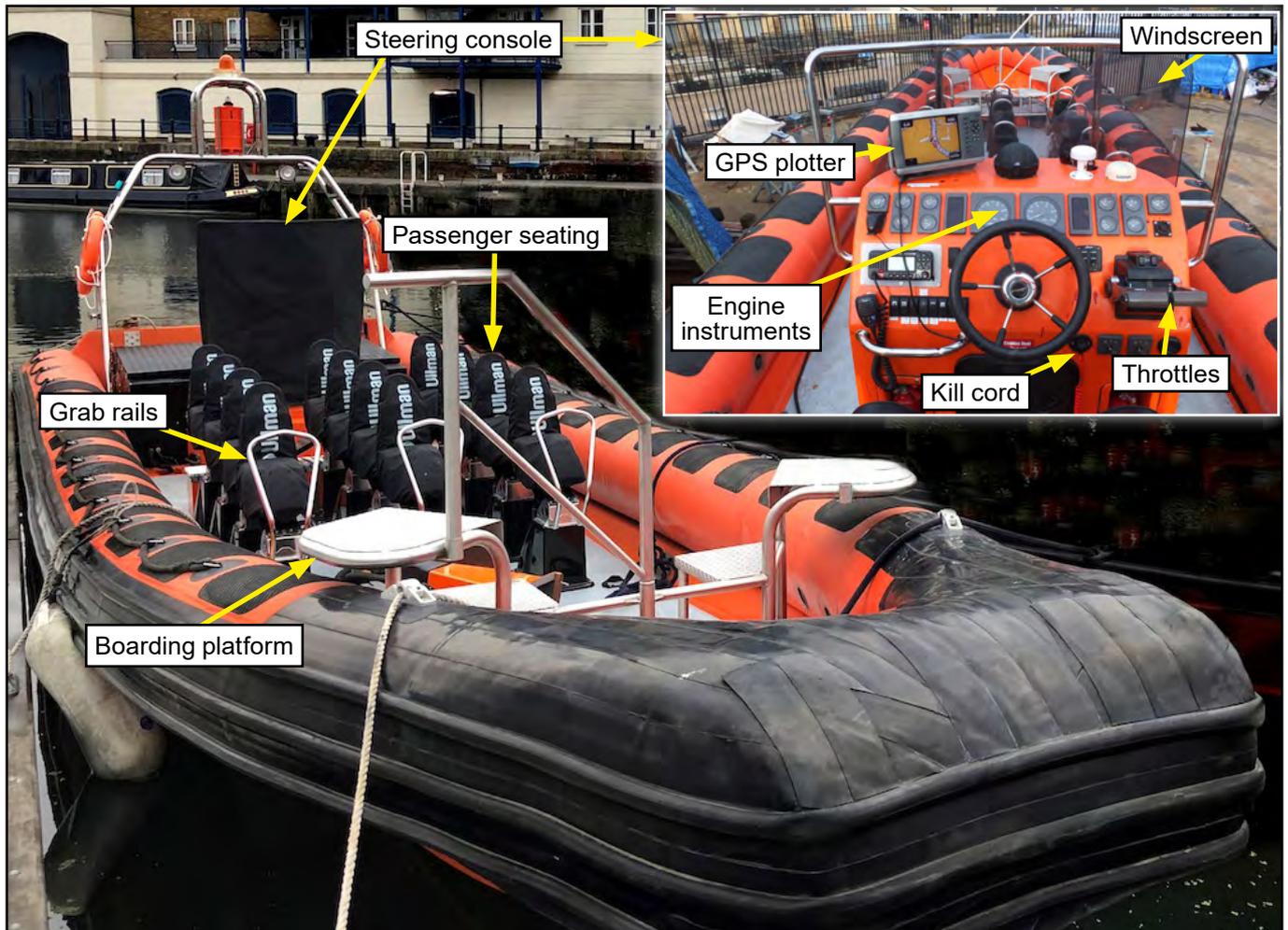
**Figure 1:** Extract of electronic chart GB503337 showing points of interest

The passengers were seated while the skipper stood behind the steering position (**Figure 2**), from where he could see over the console's windscreen. As soon as the RIB was clear of the pier, the deckhand put on a music soundtrack through the boat's sound system. She then served the passengers champagne.

*Tiger One's* skipper initially kept the RIB's speed to 12 knots<sup>2</sup> as required by local regulations. As it approached Tower Bridge (**Figure 1**), the deckhand started to collect the empty glasses and checked

<sup>1</sup> Times in this report are to the nearest minute unless shown otherwise

<sup>2</sup> *Tiger One's* speeds in this report are taken from AIS data and are 'over the ground'.



**Figure 2:** *Tiger One* deck layout

that the passengers were seated correctly. She then stood at the skipper's left-hand side and the skipper told her to keep a look out ahead for, among other things, kayaks and lights.

Shortly before 1730, the skipper increased *Tiger One's* speed to about 29 knots as the RIB passed Hermitage moorings. River traffic was light and the skipper did not expect debris to be a problem. He also turned up the music volume. As the passengers enjoyed the night sights, the skipper occasionally reduced *Tiger One's* speed to about 18 knots to minimise the RIB's wash when passing piers and moorings.

At 1737, *Tiger One* passed Masthouse Terrace Pier (**Figure 3**), where the ferry *Cyclone Clipper* was departing its berth, and entered Greenwich Reach. The RIB's skipper usually slowed down here on routine sightseeing tours, but did not do so on this occasion because he did not want to delay dropping off his passengers due to the cold conditions.

At 1737:21 *Tiger One* passed the outer upper Ship Tier (UST) buoy. The skipper was navigating solely by eye and assessed that the RIB was clear of all fixed obstructions and hazards. Sixteen seconds later, the RIB hit the outer lower Ship Tier (LST) buoy at a speed of about 26 knots. The skipper had seen the buoy a split second before but too late to take avoiding action. On impact, *Tiger One* was momentarily propelled into the air. The skipper and deckhand were thrown into the steering console, and three passengers were thrown on to the deck. The skipper's movement detached the kill cord from the control panel and the RIB's engines stopped.

*Tiger One's* skipper checked that everyone was on board and transmitted a "Pan Pan" urgency message via very high frequency (VHF) radio. He informed London Vessel Traffic Services that the RIB had struck

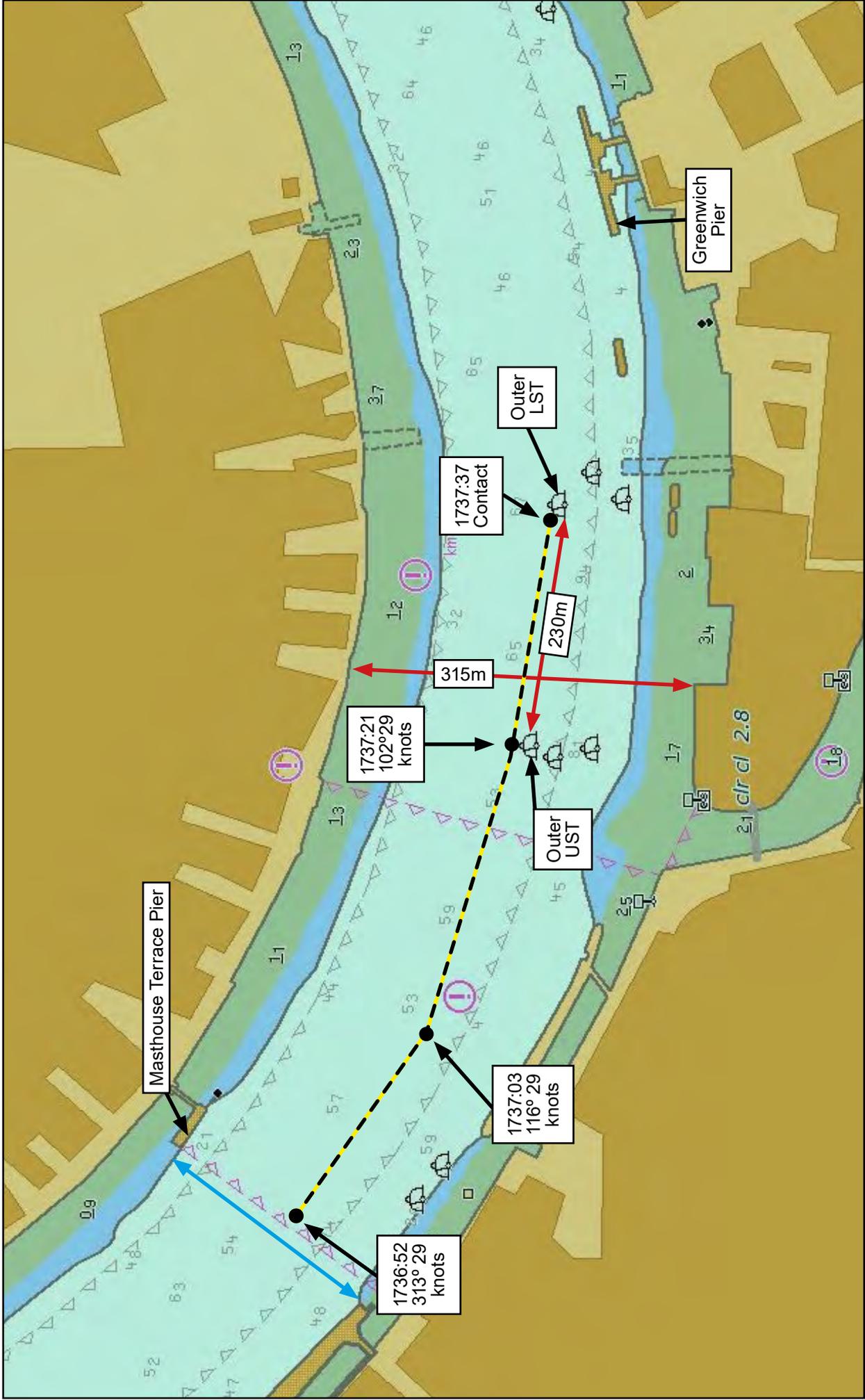


Figure 3: Extract of electronic chart GB503337 showing Greenwich Reach with Tiger One's track

an object and that 10 persons were on board. The skipper also requested lifeboat assistance. Meanwhile, *Cyclone Clipper's* master, who had seen *Tiger One* hit the outer LST buoy and heard the VHF exchange, manoeuvred the ferry closer to assist.

*Tiger One's* skipper checked the RIB and confirmed that it was not sinking. He then drove the RIB alongside Greenwich Pier, where the passengers and crew disembarked and were treated by the Tower lifeboat crew. Police breathalysed the skipper and deckhand; the results were negative. Both crew and two of the passengers were taken to hospital with facial injuries. Both crew also suffered bruising to the upper body. *Tiger One's* bow and starboard propulsion drive unit were badly damaged (**Figure 4**). There was no damage to the LST buoy.



**Figure 4:** Damage to bow, windscreen and stern drive

### Environment

The wind was north-westerly at 6 knots. Sunset was at 1622, visibility was good and the air temperature was 3°C. The predicted low water at Greenwich was 1552 and the tidal stream was flooding at a rate of 1.4 knots. The height of tide at 1738 was 2m and the water temperature was 8°C.

## **Tiger One**

*Tiger One* was one of two 12m RIBs owned and operated by 88 London Ltd, trading as Thames Tigers, that were used to provide sightseeing tours and charters on the River Thames. *Tiger One* was certified by the Port of London Authority (PLA) and permitted to navigate up to a maximum speed of 30 knots.

The RIBs were purpose-built in 2008 by Ribcraft for personnel transport operations off Tunisia, but had been purchased and returned to the UK in 2017. The hulls were glass reinforced plastic fitted with 'puncture-proof' sponsons, and propulsion was via two 275hp inboard diesel engines with stern drives. The skipper considered the RIBs to be very manoeuvrable and was confident that he could avoid objects sighted 30m ahead at speeds up to 30 knots.

Modifications made before the RIBs entered service on the River Thames in June 2017 included the replacement of bench type passenger seats with 12 individual 'Ullman' suspension seats, each of which was equipped with grab rails. Two rigid jockey type seats were fitted behind the steering console for the crew, and boarding platforms were installed at the bow (**Figure 2**).

The RIBs were also equipped with an electronic chart plotter, a Class A automatic identification system (AIS) transceiver, and a VHF radio. The chart plotter was operating during the trip on 17 January, but its display was dimmed in order not to interfere with the crew's night vision. Waterproof jackets and trousers, hats, gloves and clear safety glasses were carried on board for the passengers.

## **Crew and passengers**

*Tiger One's* skipper was also the owner of 88 London Ltd. He was 58 years old and had been boating from an early age. His qualifications included an RYA/MCA<sup>3</sup> Yachtmaster Offshore certificate of competence issued in 2010 and a PLA local knowledge endorsement issued on 26 July 2017. The skipper had also completed an RYA Powerboat Advanced Day and Night course in March 2017<sup>4</sup>, and first-aid and sea survival courses. He was medically fit, and a post-accident eyesight test indicated that his vision was not impaired.

The skipper's qualifying trips towards his local knowledge endorsement were conducted in daylight. He had subsequently carried out about six trips at night, some in excess of 12 knots.

The deckhand was 54 years old and had held an RYA Powerboat Level 2 certificate since August 2017. She had worked part-time on board the Thames Tigers' RIBs and was familiar with their operation. The deckhand was an additional lookout when *Tiger One* was navigating over 12 knots as required by local regulations.

The skipper and deckhand often wore eye protection when operating at high speed during daylight to prevent their eyes drying out and watering. They did not wear eye protection during the night trip because they could see more clearly without it. Neither experienced dry eyes, or other eye discomfort prior to the collision.

The passengers were aged between 38 and 60 and were reported to be physically mobile and in good health. Two of the passengers described seeing birds close by *Tiger One* just before its impact with the buoy, but none of the passengers saw the buoy.

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<sup>3</sup> Royal Yachting Association, Maritime and Coastguard Agency.

<sup>4</sup> The Powerboat Advanced course is for users of open powerboats operating in demanding situations. The syllabus includes boat-handling, seamanship and navigation to the standards required to drive a powerboat safely by day and night in coastal waters.

## Ship Tier buoys

The Ship Tier buoys comprised six mooring buoys used by cruise ships visiting central London. The outer UST and LST buoys were anchored in the navigable channel (**Figure 3**) with a swing radius of about 5m depending on the height of tide. They were cylindrical (4m in length with a 2.4m diameter) and were painted yellow (**Figure 5**).



**Figure 5:** Outer lower Ship Tier buoy

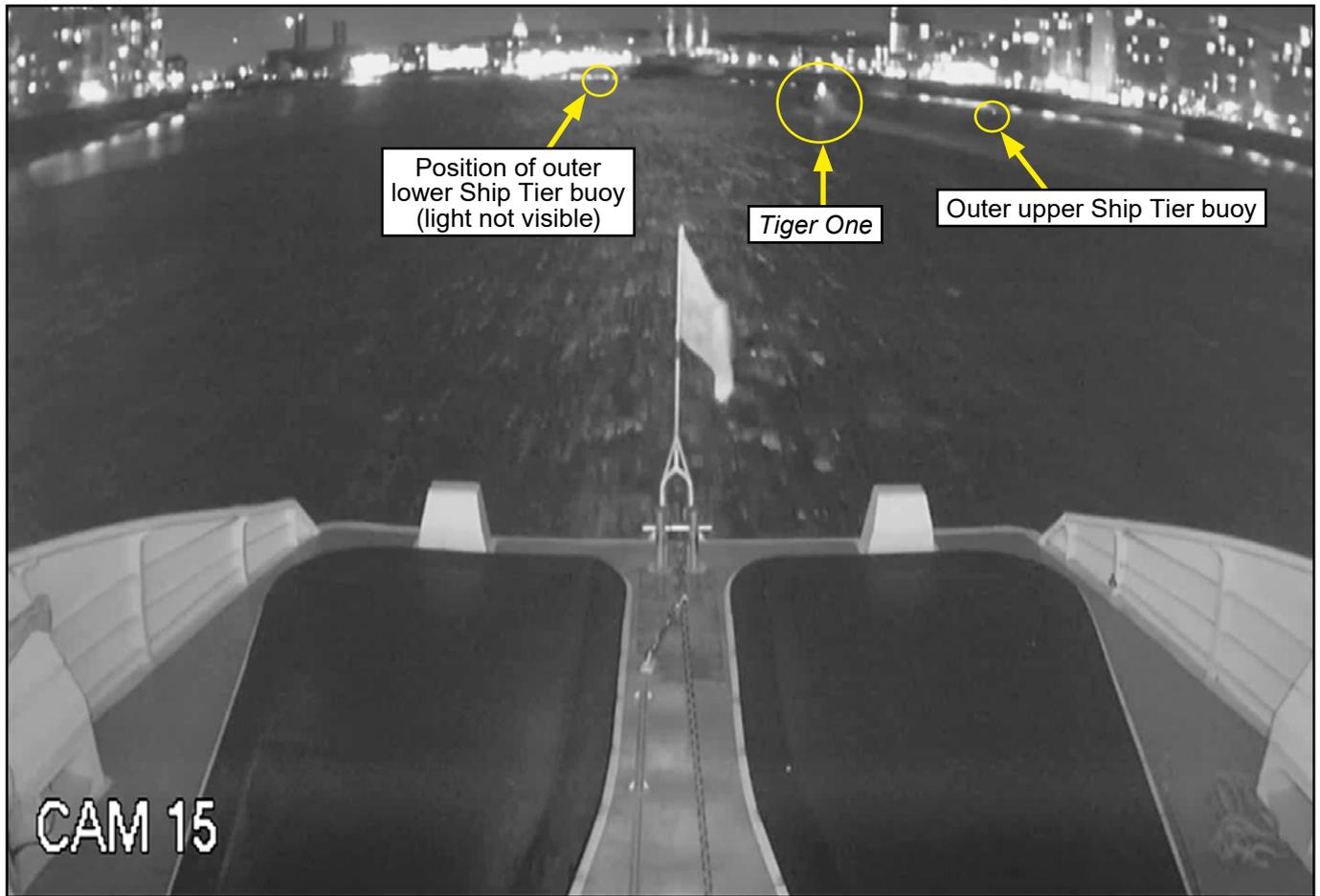
The outer buoys were fitted with solar powered 'fixed blue' light emitting diode (LED) lights with a nominal range of 0.7 mile<sup>5</sup>. The LED lights were protected by steel cages and were fitted with data loggers for maintenance and diagnostic purposes. The middle and inner buoys were unlit.

According to its data logger, the outer LST buoy's LED light was illuminated continuously between 1619 on 17 January 2019 and 0654 the following morning, but it became visible on *Cyclone Clipper's* CCTV recordings (**Figure 6**) only a split second before the impact. It remained visible thereafter. The outer UST buoy's LED light was illuminated and visible on *Cyclone Clipper's* CCTV recordings when *Tiger One* passed it.

## Port of London Authority

The PLA is the statutory harbour authority for the River Thames with legal powers to regulate navigation, including the licensing of boats that operate solely in its tidal waters. The PLA issues certificates of compliance to vessels it authorises to exceed the 12 knots speed limit, up to a maximum of 30 knots. Certificate of compliance requirements incorporate the principles of several codes, including: the PLA's '*Passenger Vessel Operations – A Code of Practice for the Tidal Thames*', the MCA's '*High-Speed Craft Code*' and '*Small Commercial Vessel Code*', the '*Inland Waters Small Passenger Boat Code*' and the '*International Safety Management Code*'. To meet these requirements owners are required to show that,

<sup>5</sup> The nominal range of a light is the maximum distance at which a light can be seen when the visibility is 10 nautical miles.



**Figure 6:** *Cyclone Clipper* CCTV still at 1737:25 showing *Tiger One*

among other things, boats are of approved construction, manned by competent crew, and that a safety management system incorporating passage plans and risk assessments has been established. Boats are also required to carry and operate AIS and a yellow flashing light. Certificates of compliance are renewed annually. *Tiger One* had been surveyed and its certificate of compliance issued in May 2018.

Local knowledge endorsements are issued by the PLA to masters and skippers who hold specified commercially endorsed qualifications and have completed at least 60 trips in the Thames local knowledge area. They must also pass an oral examination, which tests a candidate's knowledge of the river, including its navigation marks and hazards, tidal patterns, river depths, VTS procedures, as well as applicable national and local regulations.

The PLA is also a local lighthouse authority and is responsible to the general lighthouse authority, Trinity House, to ensure that navigation aids, such as buoys, lights and marks, are deployed and maintained. The PLA requires Trinity House's authorisation to change the position or characteristics of navigation marks.

## ANALYSIS

### Buoy visibility

*Tiger One* collided with the outer LST buoy because the skipper and his lookout did not see the buoy until it was too late to take avoiding action. The skipper, who was navigating by eye, had a clear view ahead over the top of the console windscreen and, despite the lack of eye protection while travelling at high speed and in cold weather, had no visual impairments. That the buoy was not seen by the RIB's passengers and the buoy's blue LED light was not visible on *Cyclone Clipper's* CCTV recordings (**Figure 6**) until about the time of impact, suggests the light had been inconspicuous during *Tiger One's* approach.

The outer LST buoy's data logger indicated that the LED light was 'on' during *Tiger One's* approach and, as the visibility was good and the light's nominal range was 0.7 mile, it should have been visible from Masthouse Terrace Pier, which was less than 700m upriver. In the strong flood tidal stream the light would also have been canted towards *Cyclone Clipper* and *Tiger One*. Therefore, the light must have been difficult to pick out against the backscatter from the bright bankside lights in Greenwich, and/or it was obscured to some degree.

It was evident from the amount of guano present on the surface of the outer LST buoy (**Figure 5**) that birds regularly perched on the river's mooring buoys. As birds were seen flying close to *Tiger One* immediately before impact, the likelihood that the buoy's LED light was obscured or partially obscured by birds cannot be discounted. Without a light, the silhouette of the outer LST buoy alone would have been very difficult to see.

### Navigation and local knowledge

*Tiger One's* skipper was familiar with Greenwich Reach. He had been driving his Thames Tiger RIBs for over 18 months and had been issued a local knowledge endorsement by the PLA, having completed over 60 qualifying trips and having passed an oral examination. However, the skipper's experience on the River Thames was generally limited to daylight operations. Before the accident on 17 January, he had completed only six commercial passages in darkness in the area.

Nonetheless, after leaving Westminster Pier the skipper showed an awareness of the RIBs position by initially keeping to the 12-knot speed limit until 1730, and then slowing down when passing moorings to minimise wash. Although he did not reduce speed when passing Masthouse Terrace Pier, as he had done on previous occasions, this was a conscious decision made in consideration of the comfort of the embarked passengers; not an oversight. In the cold conditions, the skipper opted to maintain speed so he could disembark the passengers as soon as possible.

As *Tiger One* transited Greenwich Reach, the RIB was making good 29 knots, and the skipper was making small alterations to port to follow the main channel (**Figure 3**). That the RIB passed 15m from the outer UST buoy, the light of which was on and visible, but the skipper did not recollect seeing it, and that the skipper was not concerned that he could not see the outer LST buoy, which was only 230m ahead, indicates that he thought the RIB was in the navigable channel and clear of hazards. However, it is also possible that he had forgotten that the outer Ship Tier buoys were located in the main channel.

*Tiger One's* skipper was navigating solely by eye, which is not unusual in open high-speed craft operating in confined waters. However, navigating at night solely using local knowledge is generally more difficult than during daytime. This is largely due to the limitations of the human eye and the effect of backscatter and reflections of lights, which tend to make objects difficult to see and distances harder to judge. Although the chart plotter would have shown that *Tiger One* was on the starboard side of the channel, and was heading towards the UST and LST mooring buoys, the skipper and deckhand did not look at it because it was dimmed to protect their night vision. Its use at high speed would also have been challenging due to the importance of the skipper keeping his focus ahead. In the circumstances, slowing the RIB for the transit of Greenwich Reach, until the Ship Tier buoys were sighted, would have been appropriate.

### Potential consequences

*Tiger One's* impact with the buoy resulted in injuries to the crew and passengers. The RIB was also seriously damaged. In view of the speed of impact, that the consequences were not more significant was probably due to several factors. These included the angle of impact, the robust construction of the hull, the softening of the landing by the suspension seats, and the provision of grab rails for the passengers to hold on to. Following the impact, the operation of the kill cord also prevented the uncontrolled movement

of the RIB in the time it would have taken the skipper to recover and make sense of the situation. The skipper's urgency call was prompt, but his report that there were ten persons on board rather than eight, which was incorrect and misleading, was indicative of the degree of shock he had experienced.

*Tiger One* might have overturned in marginally different circumstances, with passengers and crew thrown into the cold river. Although all were wearing lifejackets, which would have kept their heads clear of the water, they had no means of raising an alarm, other than the whistles on the lifejackets, and their rescue would have been dependent on passing traffic or witnesses ashore. Even then, rescuers would not have been aware of the numbers of persons that had been on board as Thames Byelaws require only Class IV, V and VI passenger vessels to report to VTS the number of passengers embarked before commencing a passage. In darkness and in cold water, a lengthy rescue would have undoubtedly resulted in hypothermia or worse.

The potential severity of the consequences of future similar accidents of this type warrants the review and amendment of the regulatory framework that authorises open craft to operate in darkness on the River Thames at speeds exceeding the promulgated limits.

## CONCLUSIONS

- *Tiger One* collided with the outer LST buoy because its skipper did not see the buoy until it was so close it became too late to take avoiding action.
- The light on the buoy might have been difficult to see against the backscatter from the bright lights in Greenwich. It might also have been obscured to some degree by birds.
- *Tiger One's* skipper was experienced in navigating Greenwich Reach in daylight, but he had little experience of operating in the area at speed during darkness.
- The skipper was navigating solely by eye and he either thought that the RIB was close to the centre of the navigable channel, or had forgotten that the outer Ship Tier buoys were there.
- More serious consequences were prevented, among other things, by *Tiger One's* construction, seating arrangements, and the use of a kill cord.
- The potential for more serious consequences to result from similar accidents in the future is significant and warrants a review of high-speed open boat operations on the River Thames during darkness.

## ACTION TAKEN

### Actions taken by other organisations

**Tiger One's owner, 88 London Ltd,** has:

- Revised its safety management system, risk assessments and passage to include, among other things, procedures for navigating during darkness.
- Implemented procedures for the reporting of crew and passenger numbers to a designated person ashore.

**The Port of London Authority** has:

- Removed authorisation for open deck, high-speed craft issued with a certificate of compliance to navigate above 12 knots during darkness.
- Taken steps to enable passenger numbers on open deck, high-speed craft to be reported via AIS.
- Trialled the use of isophase lights on the Greenwich Ship Tier buoys. The trial was unsuccessful due to a loss of light intensity, and research into the use of alternative lights and light characteristics is ongoing.
- Further amended its technical requirements for certificates of compliance to include a formal annual independent audit of RIB operator safety management systems, the results of which will be considered in the process for the certificate's annual renewal.
- Revoked *Tiger One's* certificate of compliance; the certificate was reissued following the owner's revision of risk assessments, passage plans and the safety management system.
- Reviewed the risk assessments, passage plans and the safety management systems of all high-speed RIB operators.

**The Royal Yachting Association** has:

- Included guidance on night operations and the reporting of passenger numbers in its latest revision of '*Passenger Safety on Small Commercial High Speed Craft and Experience Rides*'.

## RECOMMENDATIONS

In view of the actions taken, no recommendations have been made.

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

## SHIP PARTICULARS

Vessel's name	<i>Tiger One</i>
Flag	UK
Classification society	N/A
Type	Ribcraft 12m rigid hull inflatable
Registered owner	88 London Limited
Year of build	2008
Construction	GRP hull with foam filled tubes
Length overall	12.0m
Capacity	2 crew + 12 passengers

## VOYAGE PARTICULARS

Port of departure	Westminster Pier, London
Port of destination	North Greenwich Pier, London
Type of voyage	Commercial passenger excursion
Cargo information	Passengers
Manning	2

## MARINE CASUALTY INFORMATION

Date and time	17 January 2019 at 1738 UTC
Type of marine casualty or incident	Serious Marine Casualty
Location of incident	River Thames UK. 51°29.1N 000°00.9W
Place on board	Bow
Injuries/fatalities	2 crew and 2 passengers
Damage/environmental impact	Damage to GRP hull forward and starboard drive unit
Ship operation	On passage
Voyage segment	In transit
External & internal environment	Wind NW 6 knots. Night, clear visibility. Sunset 1622, civil twilight 1700 Low water Greenwich 1552, 1.2m Air temperature 3° C Water temperature 8° C
Persons on board	8