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Ferry Safety Investigation Report

Children overboard at Riverview College Ferry Wharf, Riverview, NSW, 16 February 2023

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Cover image: OTSI

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Executive summary

On 16 February 2023, passenger vessel *Violet McKenzie* conducted a timetabled public passenger ferry service from Hunters Hill, on the Lane Cove River, to Circular Quay, NSW. At the Riverview College Wharf, the crew experienced difficulties berthing the vessel due to several factors. This resulted in a number of aborted attempts to safely secure the vessel to the wharf.

Once the vessel was secured, school students disembarked via the vessel's gangway. During disembarkation, the vessel moved away from the wharf. The movement of the vessel resulted in the gangway separating from the wharf and falling into the water along with two students, between the vessel and wharf. A third student on the gangway fell forward and grasped the edge of the wharf, preventing a fall into the water, before being assisted by other students.

The gangway overturned as it entered the water, with the two students underneath. One of the students managed to free themselves and climb onto the gangway. The second student remained under the gangway with their backpack, between the submerged handrails.

As the ferry crew commenced preparations to retrieve the students, another student jumped into the water from the open gangway door. The student under the gangway was eventually freed, likely with the assistance of that third student, who was their sibling. The three students were subsequently retrieved from the water by the crew. The Master positioned the vessel back to Riverview College Wharf and disembarked passengers without further incident.

The investigation found that the probable cause was the crew's management of the interface between the Super Rocket Class vessel and Riverview College Wharf considering the berthing conditions present at the time of the incident. These berthing conditions included a short wharf berthing face, the practise of running astern, limited mooring points, Master's line of sight restriction, wind and tide. The investigation also found several factors in connection with the incident including;

- The operator's Safety Management System (SMS) did not effectively identify and mitigate against the risks of gangway usage at Riverview Wharf.
- Ineffective passenger management likely influenced by ineffective crew communication, time pressure and local conditions.
- The positioning of backpacks over both shoulders limited students movement and mobility whilst in the water

The investigation identified safety improvement opportunities including:

- Improvements to the Operator's SMS to ensure that the hazards and risks associated with the berthing and embarkation/disembarkation of passengers at wharves on individual operators' services are identified and assessed, and effective risk control measures implemented to ensure safe passenger operations.
- Improvements to the Operator's SMS to provide ongoing assurance that the risk controls implemented remain effective in managing hazards and risks.
- Improvements to the Operator's SMS to provide assurance that crew members have achieved and maintain competency in safe berthing and gangway operations.

- Review of the human factors and ergonomics impacting the Master and the crew's berthing tasks, to ensure that elements such as wheelhouse visibility and cruciform positioning support safe passenger operations.
- Review of risk control measures in place for student ferry services, including consideration of backpacks or other articles carried by students across gangways.
- Review of safety infrastructure available at step/fixed wharves to ensure that safety support assets such as steps, edge markings, flotation devices are fit for purpose to support an effective emergency response if required.

Full details of the Findings and Recommendations of this ferry safety investigation are contained in Parts 3 and 4 respectively.

Part 1 — Factual information

Events leading up to the occurrence

1.1 On 16 February 2023, prior to commencing regular services the two rostered crew of the Super Rocket Class vessel *Violet McKenzie,* a Master and Deckhand, commenced duty at 0600[1] at Neutral Bay Marina. This was the fleet base of the ferry operator, Captain Cook Cruises (CCC).

1.2 After the crew prepared the vessel for the day's operations, they departed Neutral Bay and turned west after entering the main harbour to travel to Hunters Hill, where the first scheduled ferry service commenced. The vessel travelled upstream, under the Sydney Harbour Bridge, into Parramatta River.

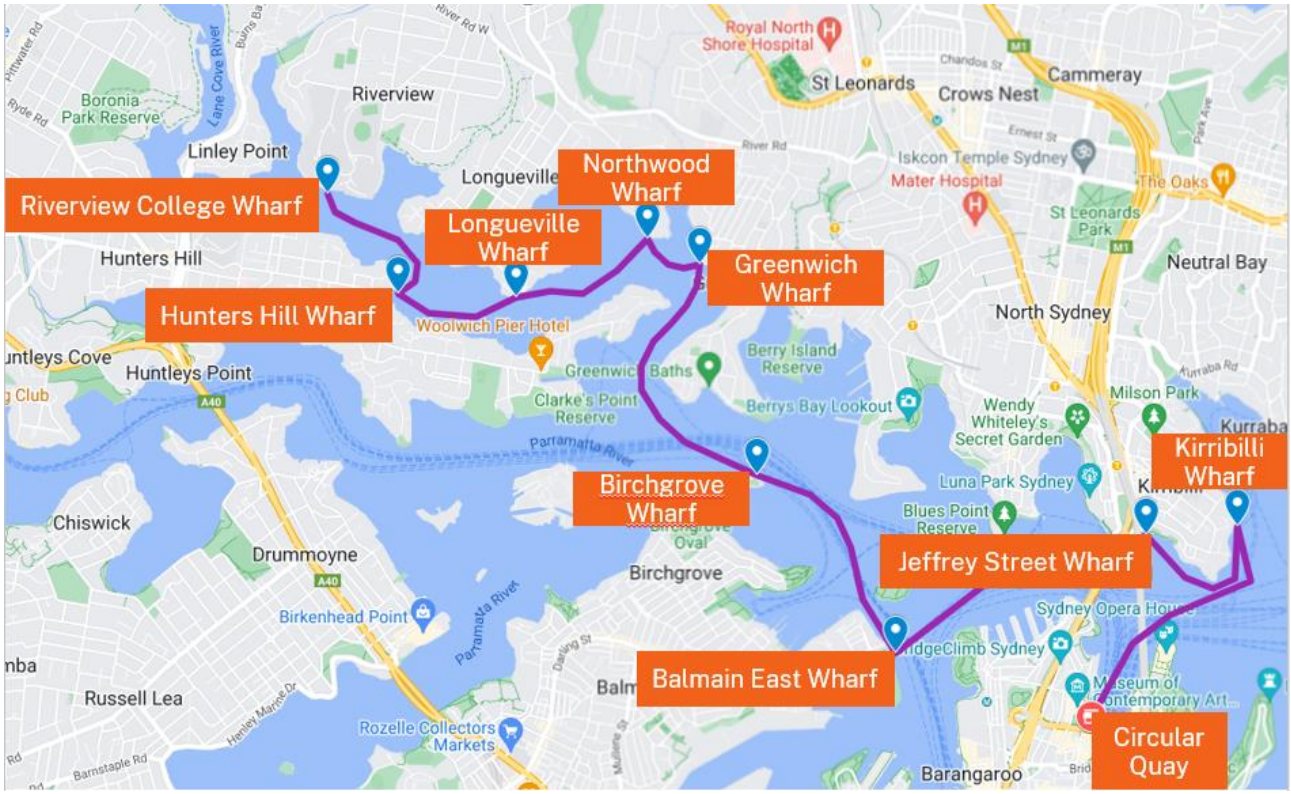
1.3 When *Violet McKenzie* reached Greenwich, the Master turned north and entered the Lane Cove River. The Master navigated upstream along Lane Cove River to Alexandra Street Wharf at Hunters Hill to commence their first service of the day.

1.4 At approximately 0700, the vessel departed Hunters Hill, after embarking passengers. The crew completed the service without incident, arriving at Circular Quay for the 0730 scheduled departure to Hunters Hill. The Master reported that the vessel operated as expected, with no issues.

1.5 After departing Circular Quay, the vessel travelled upriver, stopping at several wharves to pick up passengers, consisting mainly of school students. The 0730 service, operating on the school term timetable, stopped at six wharves on the trip upriver, and included a stop at Riverview College Wharf on the return service.

[1] Times in this report are in 24-hour clock form in Australian Eastern Daylight Time.

Figure 1: Lane Cove River Ferry Service route



Source: CCC using Google Maps. Image annotated by OTSI (note Kirribilli Wharf only serviced on afternoon school term timetable)

1.6 The vessel arrived at Hunters Hill a few minutes behind schedule, then commenced a late running return 0801 passenger service to Circular Quay (Figure 1). The vessel travelled west up Lane Cove River, past Riverview College Wharf, before turning around to approach the wharf from the west and disembark passengers from the portside.[2]

The occurrence

1.7 At 0809:19,[3] following several unsuccessful attempts to berth the vessel and about four minutes behind schedule, the vessel again approached Riverview College Wharf. The Deckhand threw a mooring line at the wharf post second from the east, to line up the forward gangway door with the western platform of the wharf. The Deckhand then proceeded to secure the line to the vessel's foremost portside cruciform bollard.[4]

[2] Portside refers to the left side of a vessel when viewed from the rear.

[3] Time recorded on vessel closed circuit television (CCTV) showed 0818:19. A review following incident identified a recorded time discrepancy of the CCTV timestamp being nine minutes ahead. Report timeline shows corrected time.

[4] Also known as a 'crucifix' bollard

Figure 2: Riverview College Wharf river facing layout

Source: OTSI

1.8 At 0809:36, during the berthing attempt, the Deckhand communicated with the Master on the intercom and pointed to the western end of the wharf. The crew recognised that they could not safely secure the ferry on the eastern platform of the wharf and decided to reposition to the western platform, as the tide was too high to utilise the wharf steps. While the Deckhand let out more line, the Master pivoted the vessel with the engine controls. When the vessel was almost parallel to the wharf, the Master engaged astern[5] propulsion and the vessel slowly moved backwards, parallel to the wharf (Figure 3). The Deckhand let out more line and then tied it off to align the forward gangway door with the wharf's western platform.

1.9 Between 0809:36 and 0811:27, the Master and Deckhand made repeated attempts to safely position and secure the vessel, lining up the forward gangway door with the wharf's western platform. Each attempt resulted in the ferry stern (rear) drifting away from the wharf. On each occasion, the Deckhand loosened the mooring line and readjusted its length before refastening it once the Master repositioned the vessel.

[5] Engines placed in reverse thrust.

Figure 3: Onboard portside CCTV showing position of vessel alongside the wharf before the incident

Source CCC. Image annotated by OTSI

1.10 At 0811:29, the Deckhand secured the mooring line and deployed the gangway[6] onto the western platform (Figure 4). The chain on the gangway was not secured to the vessel as was documented practice. Students quickly moved forward from the foredeck, as a group, to disembark.

1.11 During disembarkation, students crowded onto the gangway closely behind each other, with up to five students on the gangway at one time. The students crossed the gangway in a continuous flow, at times in pairs side by side, carrying a school backpack over their shoulders, and often with an accompanying sports bag and/or sporting equipment.

[6] A gangway provides a walkway between the ferry and wharf. It has two handrails and is put in place by the crew once the vessel is secured alongside the wharf.

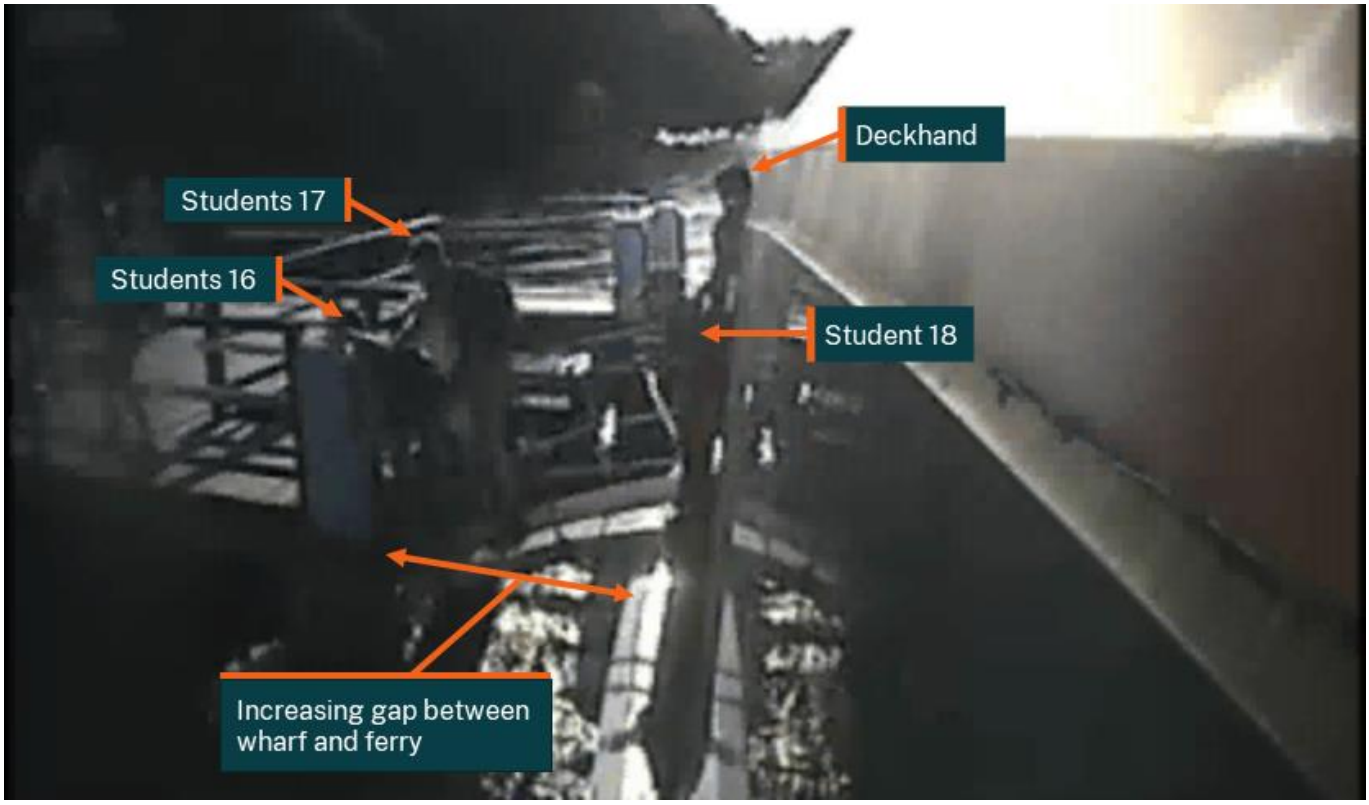
Figure 4: Onboard forward deck CCTV showing students crowding around the gangway at 0811:29

Source: CCC

1.12 Shortly after disembarkation commenced, the Deckhand was observed to look down towards their hand, then up towards shore, to count those passengers that had disembarked. It was an operator procedure for the Deckhand to count the number of passengers during disembarkation. As the students continued to disembark, the vessel's stern started to drift away from the wharf, resulting in an increasing gap between the wharf and vessel.

1.13 By 0811:46, 15 students had disembarked onto the wharf. As the next three students (Students 16, 17, 18) crossed the gangway, the Deckhand noticed the increasing gap between the wharf and vessel. The Deckhand called up at the wheelhouse to warn the Master of the situation, just as the gangway slipped off the wharf and dropped towards the water (Figure 5). The Deckhand attempted to stop the fall of the gangway as it dropped off the vessel but was unable to.

Figure 5: Onboard portside CCTV of gangway separating from wharf at 0811:46

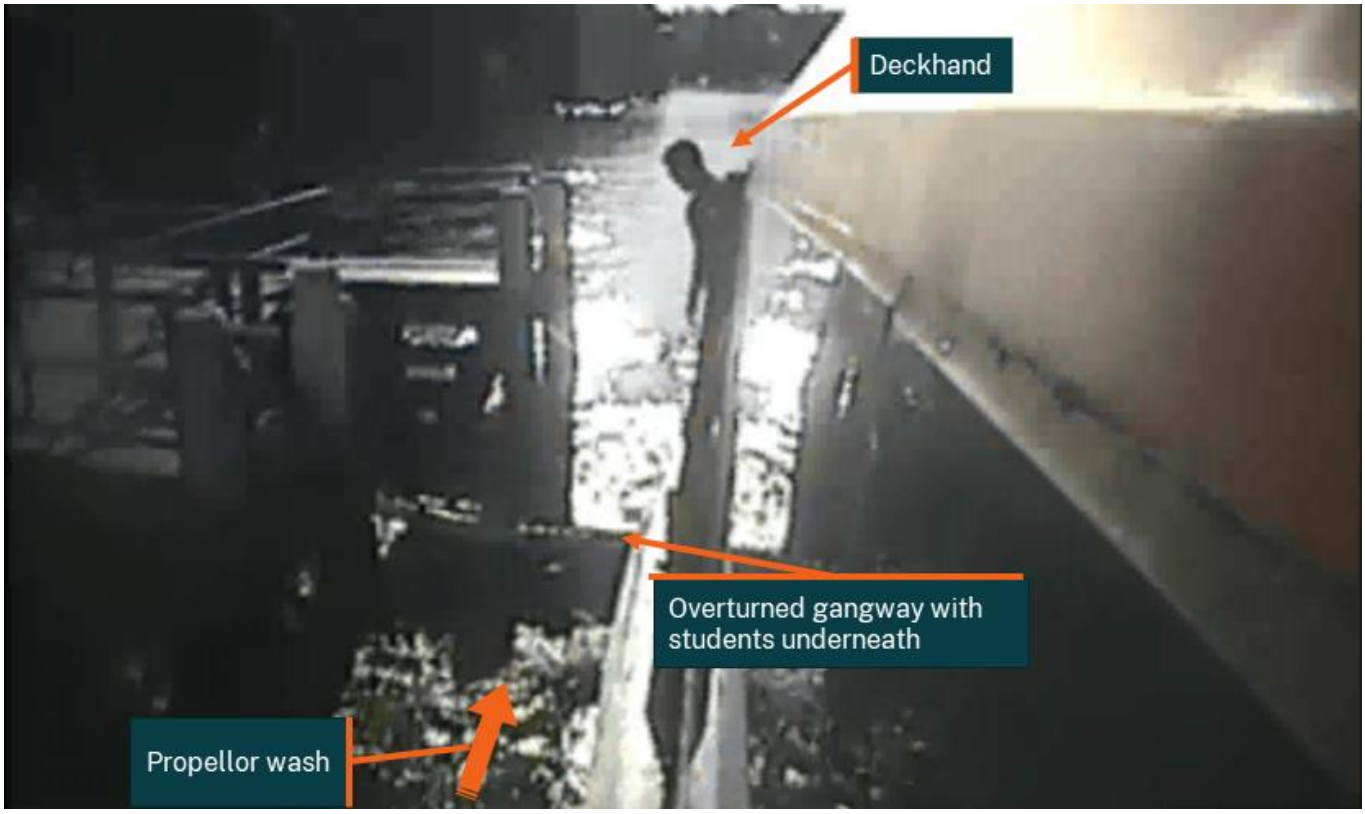


Source: CCC. Image annotated by OTSI

1.14 At that time, two students at the front of the gangway (Students 16 and 17) fell forward, into the side of the wharf. Student 17, who was in Year 8, caught the edge of the wharf and held on until assisted onto the platform by a nearby student. Student 16, who was in Year 5, fell into the water, after momentarily holding onto the wharf's edge. The wash, created by the vessel's propeller, pushed this student under the falling gangway.

1.15 The third student on the gangway (Student 18, also in Year 5) fell with the gangway into the water. As the gangway entered the water, it rolled over on top of both students in the water. With the gangway in an upturned position, these students were positioned under the gangway, in-between the handrails. The vessel's propellor wash pushed the students and gangway towards, and then through, a narrow gap between the bow (front) of the ferry and the wharf (Figure 6).

Figure 6: Onboard portside CCTV showing overturned gangway with two students underneath at 0811:51



Source: CCC. Image annotated by OTSI

1.16 As the propellor wash pushed the students and gangway towards the narrow gap, student 18, moved through one of the handrails and climbed up onto the upturned gangway. Student 16 remained under the gangway, reporting that they struggled to free themselves from their backpack, with straps over both their shoulders and caught in the gangway handrails.

1.17 As the two students were washed forward, away from the vessel, the Deckhand stood in the open doorway, surrounded by a group of students trying to see what was happening in the water (Figure 7). At 0811:53, the Deckhand signalled the Master, pointing out the direction of the students in the water.

Figure 7: Onboard forward deck CCTV showing students crowding into open door at 0811:51

Source: CCC. Image annotated by OTSI

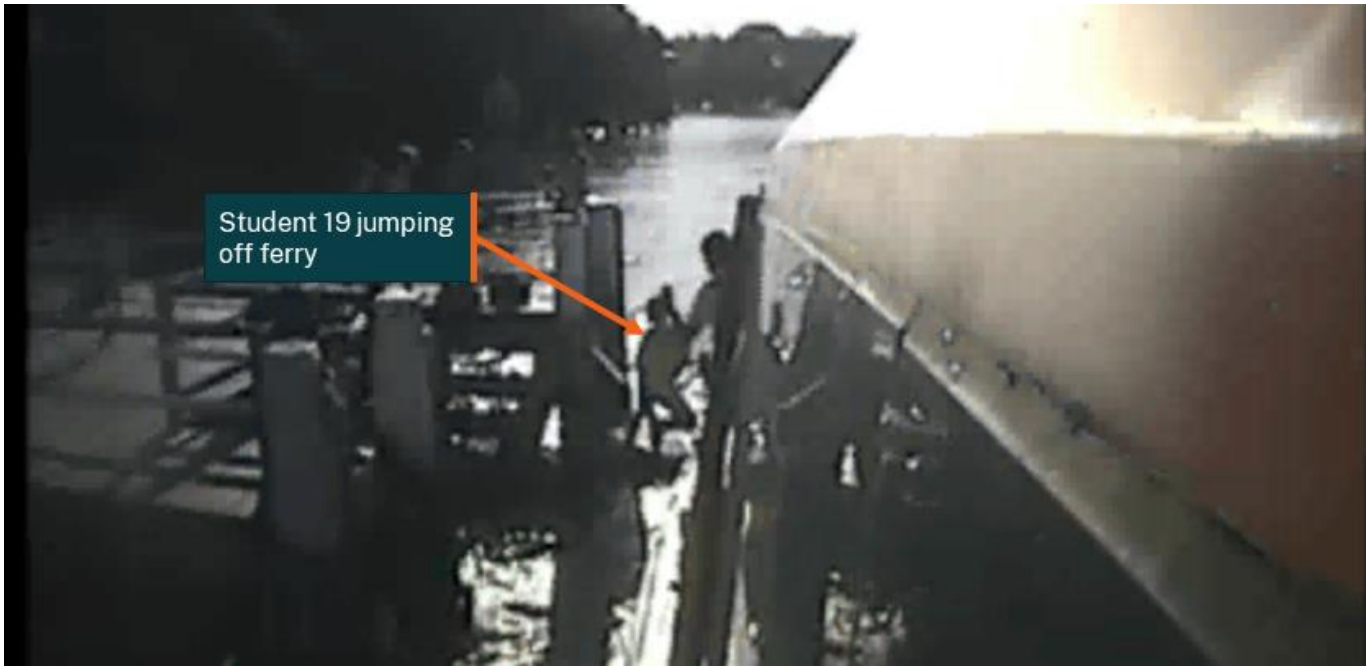
1.18 At 0811:55, the Deckhand turned around and stepped away from the door to retrieve the Person Overboard (POB) ladder. At that time, a student (Student 19), whose sibling fell into the water, moved past the Deckhand into the open doorway. At 0811:57, the Deckhand motioned for students to clear the area (Figure 8).

Figure 8: Onboard forward deck CCTV showing the Deckhand motioning for students to clear the area at 0811:57

Source: CCC vessel working deck CCTV camera, annotated by OTSI

1.19 When the Deckhand moved from the open doorway, Student 19 jumped into the water, between the ferry and wharf (Figure 9).

Figure 9: Onboard portside CCTV showing a student jumping into water from unattended door at 0811:57



Source: CCC. Image annotated by OTSI

1.20 While the Deckhand was retrieving the POB ladder, the open door was unattended. Six students crowded into the opening to see what was happening in the water. At 0812:19, the Deckhand returned carrying the POB ladder (Figure 10). The Deckhand again instructed students to move away from the area, which they did, allowing the Deckhand to set the ladder in position.

Figure 10: Onboard portside CCTV screenshot showing the Deckhand returning with POB ladder at 0812:19

Source: CCC. Image annotated by OTSI

1.21 At 0812:28, the Master manoeuvred the vessel away from the wharf and towards the three students in the water, who had drifted downstream to the east. The movement of the vessel away from the wharf caused the attached mooring line to break.

1.22 At 0812:33, as the Master positioned the vessel towards the students in the water, Student 18 was on the upturned gangway with Student 19 in the water next to it (Figure 11). At that time, Student 16 was reported trapped underneath the gangway, with their backpack, positioned with the straps over their shoulders, lodged between the submerged gangway handrails. Student 19 swam underwater to free Student 16 from under the gangway, reported to have taken several attempts. Student 16 subsequently surfaced free of the gangway, with the assistance of Student 19.

Figure 11: Onboard portside CCTV showing the vessel manoeuvring towards students and gangway at 0812:33

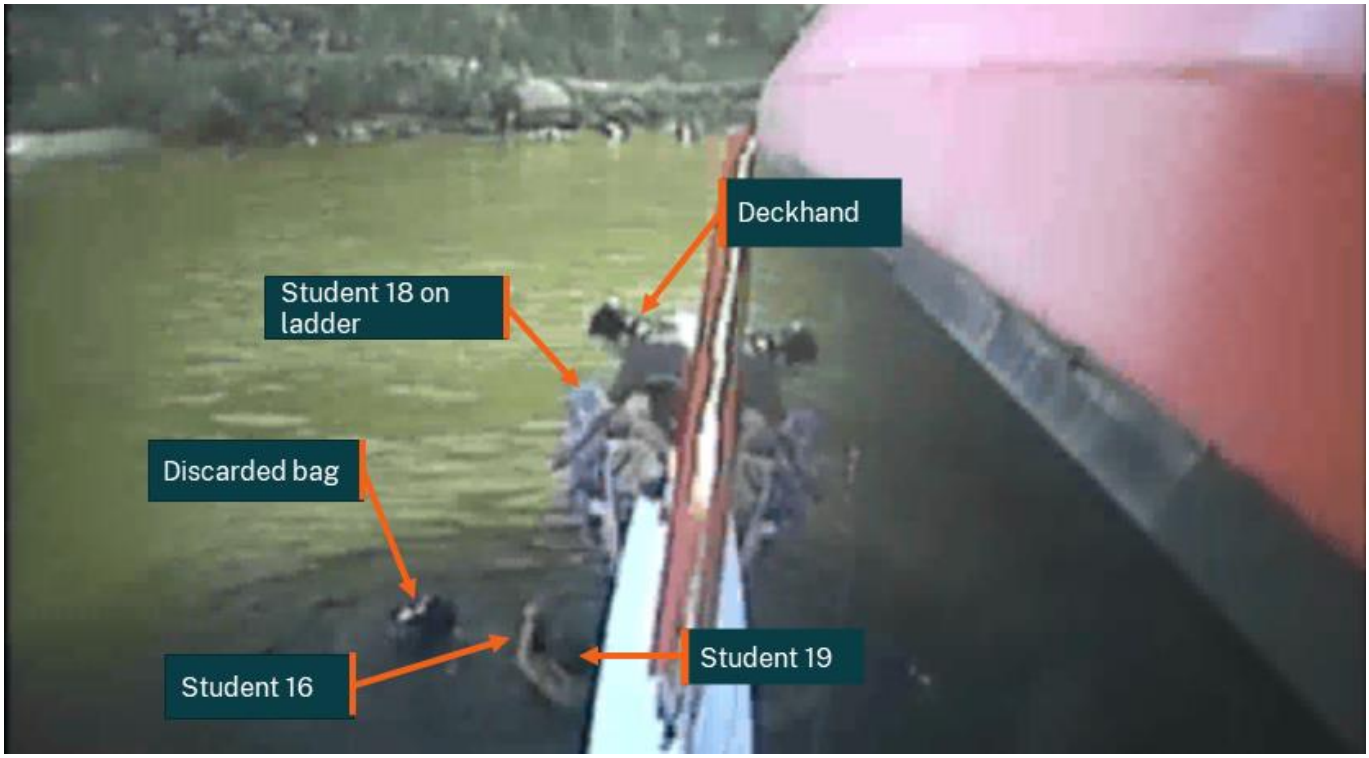
Source: CCC. Image annotated by OTSI

1.23 At 0812:43 the Deckhand finished setting the POB ladder and began to give bearings to the Master for the position of the students in the water, via hand signals. The Master manoeuvred the vessel to the students' position.

1.24 At 0812:53, the vessel overshot the students in the water. The Deckhand again used hand signals to direct the Master back towards the three students. At 0813:15, the students were close to the base of the ladder when the Deckhand left the doorway to get a life ring, which was deployed at 0813:23.

1.25 At 0813:41, all three students swam to the base of the ladder and began to climb up onto the vessel. Student 18 went first, after discarding their backpack which had become waterlogged, impeding their climb (Figure 12).

Figure 12: Onboard portside CCTV showing students climbing the ladder at 0813:45



Source: CCC. Image annotated by OTSI

1.26 By 0814:10, all the three students were recovered safely back onboard the vessel, with Student 19 last up the ladder. Older students assisted the students up off the ladder and provided reassurance once back onboard.

Events following the occurrence

1.27 Following recovery of the three students, the Master manoeuvred the ferry to retrieve the floating gangway. The Deckhand righted the gangway in the water which had a backpack wedged between the gangway handrails. Recovery of the gangway and bag was then carried out by the Deckhand, with the assistance of students onboard. (Figure 13).

Figure 13: Onboard portside CCTV showing recovery of the gangway and backpack at 0815:53

Source: CCC. Image annotated by OTSI

1.28 The crew later recovered the life ring before the Master manoeuvred the vessel back to the wharf. At 0818:47, the Master approached the wharf again. The Master instructed the Deckhand to secure the mooring line to the western side of the wharf so that they could secure the vessel and engage ahead (forward) propulsion, rather than laying astern (in reverse), as before.

1.29 The Master made several unsuccessful attempts to position the ferry, with the stern repeatedly moving away from the wharf. At that time, the Deckhand made several attempts to secure the vessel. The Deckhand later reported they were challenged when securing the mooring line to the aft crucifix bollard, due to the bollards proximity to the open gangway door.

1.30 At 0821:56, when satisfied the vessel was in position, the Deckhand deployed the gangway and instructed the students to disembark. Three students crossed the gangway before the Deckhand stopped the fourth, after noticing that the stern of the vessel was drifting away from the wharf (Figure 14). The Deckhand signalled the Master to inform them of the situation.

Figure 14: Onboard forward deck CCTV showing the Deckhand signalling the Master and stopping disembarkation

Source: CCC. Image annotated by OTSI.

1.31 The Master, now alerted to the movement of the vessel away from the wharf, used the rudder to reposition. At 0822:33, with the vessel secured and gangway in position, the remaining 53 students (including those recovered from the water) disembarked safely.

Student incident account

1.32 In consideration of potential further trauma exposure to the involved students, through the investigation interview process, OTSI did not interview the three students retrieved from the water. Witness notes were provided to the investigation by a parent of two of the involved students. The witness notes detailed information covering:

- Multiple unsuccessful attempts made to berth the vessel at the Riverview wharf and observations of the Deckhand during that period.
- The number of students needing to disembark the vessel at Riverview wharf.
- Advice from the Deckhand that the service was running late.
- The sequence in which students disembarked the ferry once the gangway was put in place for passengers to disembark.

- Observations of the vessel and gangway moving away from the wharf.
- An account of the students falling into the water and how the gangway trapped one of the students under water.
- An account of Student 19 observing what was being done to recover the students in the water with Student 19 jumping into the water to assist in the recovery.
- Recovery of the students from the water.
- Student welfare following the incident.

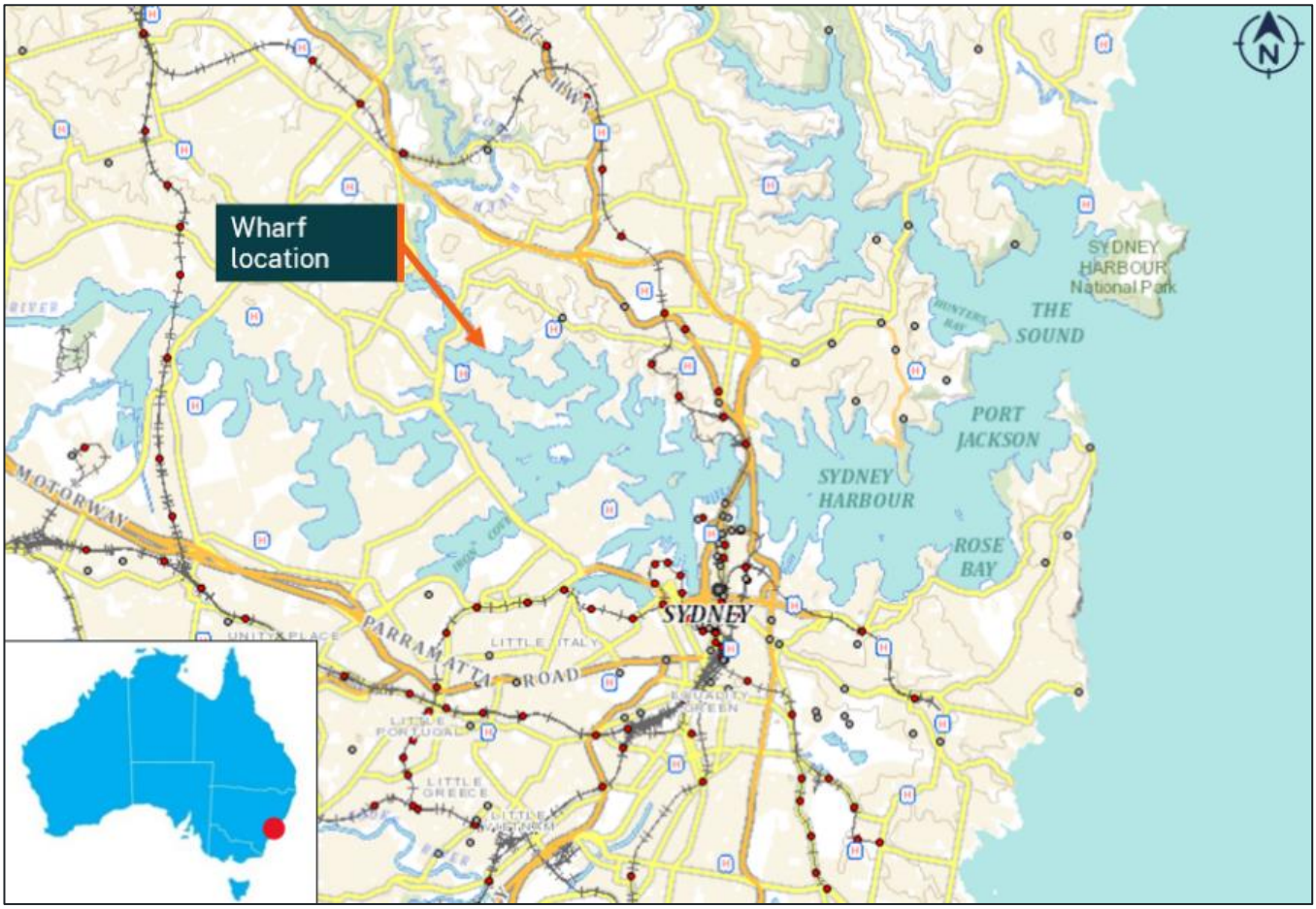
1.33 OTSI reviewed the student incident account along with other evidence, including the available CCTV coverage and crew incident accounts. That review provided sufficient evidence to inform the investigation of the safety related incident events.

Incident location

Overview

1.34 The incident occurred at Riverview College Wharf, located on the northern shore of the Lane Cove River, in the suburb of Riverview, NSW (Figure 15).

Figure 15: Map showing location of Riverview College Wharf



Source: Six Maps. Image annotated by OTSI

1.35 Lane Cove River was a northern tributary of the Parramatta River to the west of Sydney Harbour. The Lane Cove River estuary was the tidal part of the river between the weir at Lane Cove National Park and the mouth of the river, between Greenwich Point and Woolwich. Riverview College Wharf was located within this tidal region.

1.36 Lane Cove River was a narrow waterway. The lower reaches of the river were an average of 250 to 300 m wide, with a narrow marked navigable channel.

1.37 The river's shoreline was occupied by private jetties, wharves and bays filled with small recreational vessels. The river had five public passenger wharves, with four located on the north bank and one positioned on the southern bank. Riverview College Wharf was the west most and furthest upstream public passenger service wharf.

Riverview College Wharf

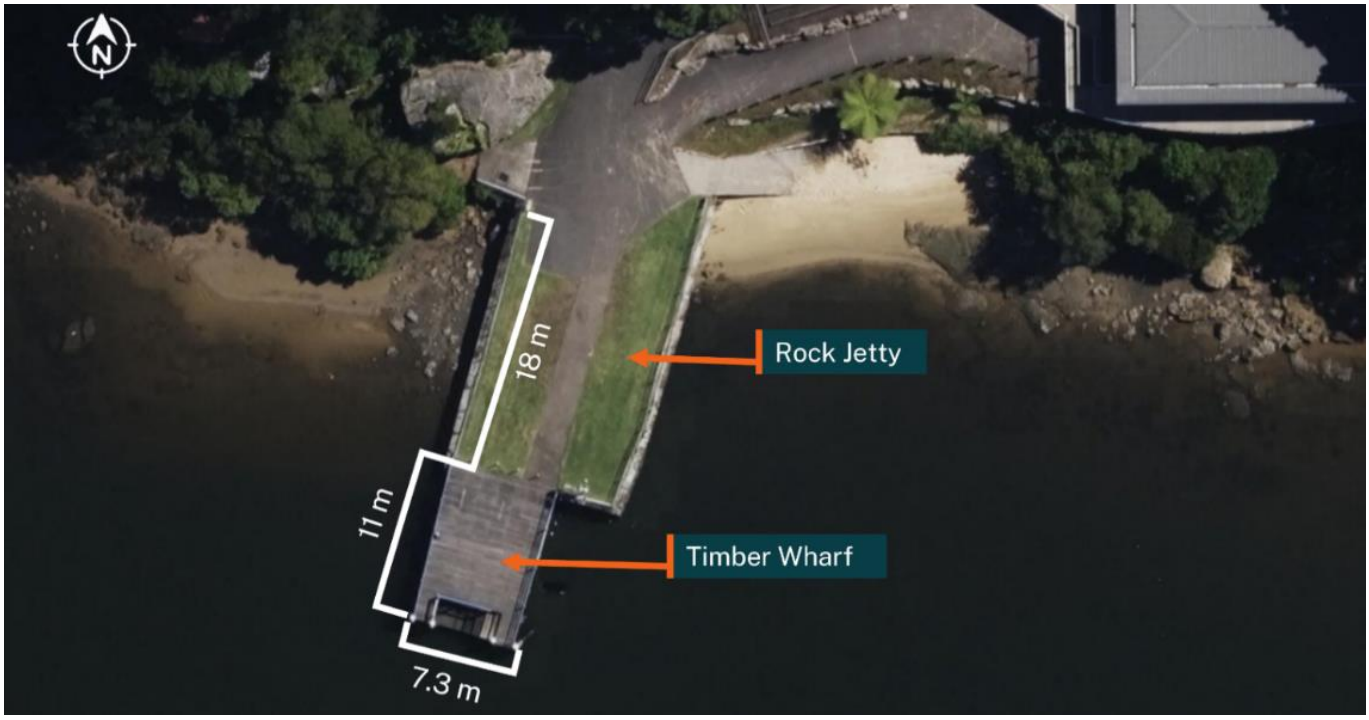
1.38 Riverview College Wharf, privately owned by Saint Ignatius' College, was a fixed wharf structure[7] with steps. It was the only privately owned wharf on the Lane Cove River Ferry Service (see *Wharf information*).

1.39 The exact date of construction of the wharf was not available to the investigation, but it was known to have been part of the school's infrastructure for a significant period.

1.40 The wharf was located at the end of an 18 m long earthen filled rock jetty, on the southern end of a peninsular which separated Burns Bay and Tambourine Bay. It was built of timber, and comprised of a timber planked deck, supported by timber piles. The combined rock and timber structure, jutted out from the peninsular to the south-southwest. The dimensions of the timber structure were approximately 7.3 m wide and 11 m long (Figure 16).

[7] Fixed wharf denotes a structure fixed to and parallel to the foreshore (or jetty) alongside which vessels may lie to load or unload cargo, passengers. Floating pontoon denotes a stable, floating platform restrained by guide piles or anchors that can be accessed via a gangway.

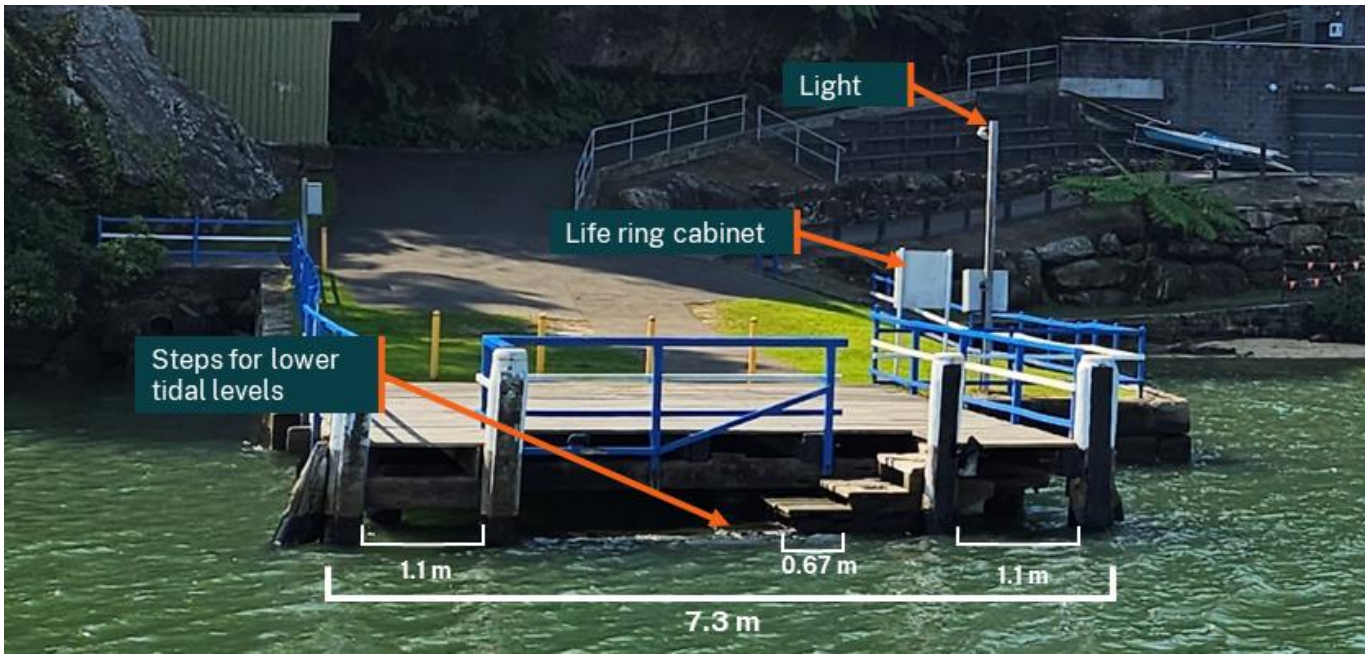
Figure 16: Riverview College Wharf viewed from overhead



Source: Google maps. Image annotated by OTSI

1.41 Riverview College Wharf had two deck level landings of approximately 1.1 m width, located at the Western and Eastern sides of the southern 7.3 m berthing face. The central section of the berthing face included four steps descending to a landing. As there were no mooring cleats or bollards, wharf piles were used to secure vessels. The wharf had a life ring cabinet positioned shoreside on the edge of the rock jetty, and an adjacent overhead light (Figure 17).

Figure 17: Riverview College Wharf viewed from Lane Cove River



Source: OTSI

1.42 There were four wooden steps, the first approximately 450 mm wide with the remaining three 670 mm wide, leading down to a wooden landing that was approximately 2 m wide (Figure 18). The landing and lower two steps were covered with a Fibre Reinforced Plastic nonslip surface. The steps and lower landing were utilised by ferry crew during lower tidal periods when transferring passengers to and from the vessel. At the time of the incident, the wharf had no nonslip paint, edge markings, person overboard retrieval ladder or lighting at the wharf face.

Figure 18: Riverview College Wharf profile at low tide

Source: CCC

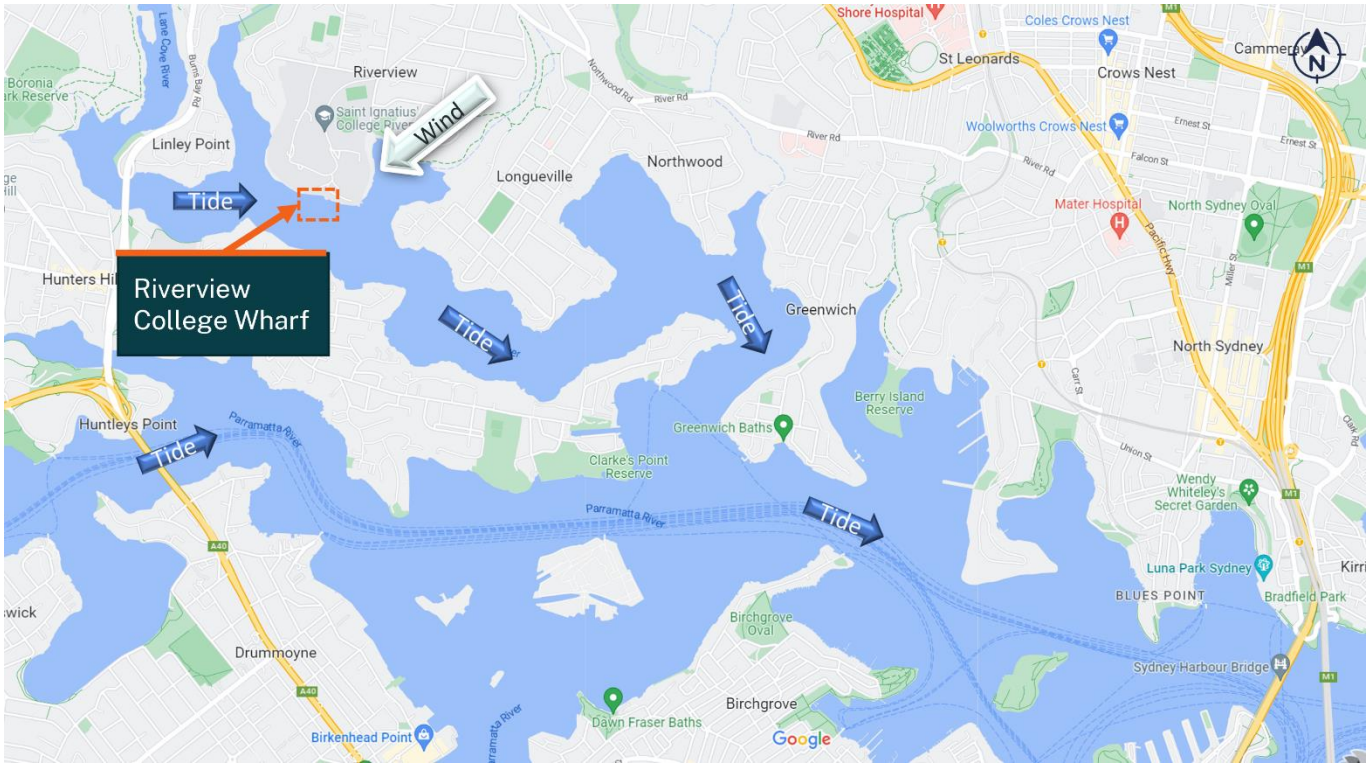
Environmental conditions

1.43 The morning of 16 February 2023 was dry and sunny. The Bureau of Meteorology (BOM) recorded a temperature of 22.2°C at 0900 at the Sydney Harbour (Observatory Hill) weather station, about 5.5 km southeast of the incident location. The wind at 0900 was recorded from the northeast at 11 km per hour. The wind direction at the Riverview College Wharf, at the time of the incident, was offshore.

1.44 The tide on the day was a high at 0507 of 1.61 m dropping to a low of 0.48 m at 1209. At the time of the incident the tide was ebbing.[8] The tidal direction at Riverview College Wharf was from west to east (Figure 19).

[8] Ebb is the tidal phase during which the tidal current is flowing toward the sea.

Figure 19: Map showing the location of Riverview College Wharf and environmental conditions at time of incident



Source: Google maps. Image annotated by OTSI

1.45 At the time of the incident the Sun was low in the eastern sky, with an approximate altitude of 19.5°. While the crew did not report that the sun glare affected their ability to effectively berth the vessel, sun glare was recorded from the locations of onboard forward facing CCTV cameras during berthing and recovery of the students in the water. Neither the tide nor wind were strong. However, both applied a force consistent with influencing the movement of the vessel away from the face of the wharf.

Vessel information

1.46 *Violet McKenzie* was the fourth and last vessel built of the second-generation Rocket Class of 24 m low wash passenger ferries, known as 'Super Rockets' (Super Rocket Class). The vessel was manufactured in 2014 and entered passenger service on 1 December 2014 with CCC.

1.47 *Violet McKenzie* was a catamaran type alloy construction (Figure 20) with a beam[9] of 7.2 m and a draft[10] of 1.7 m. The vessel had a measured length of 23.9 m, displaced 30.5 tonnes, and a rated speed of 21 knots at 1500 engine revs. *Violet McKenzie* was powered by two six-cylinder Scania DI13 diesel engines rated at 368 kW[11] each.

[9] The beam of a vessel is its width at the widest point.

[10] The vertical distance from the bottom of the keel to the waterline.

[11] kW or Kilowatt, is a measurement of power equal to 1000 watts.

1.48 The vessel had a capacity of 198 persons in class 1 D survey,[12] which was the service classification in which the vessel was operating at the time of the incident, and 128 persons in class 1 C survey.

Figure 20: Super Rocket Class vessel *Violet McKenzie*

Source: OTSI

1.49 At the time of the incident, *Violet McKenzie* had current Certificates of Survey and Operation, issue by the national regulator, the Australian Maritime Safety Authority (AMSA).[13]

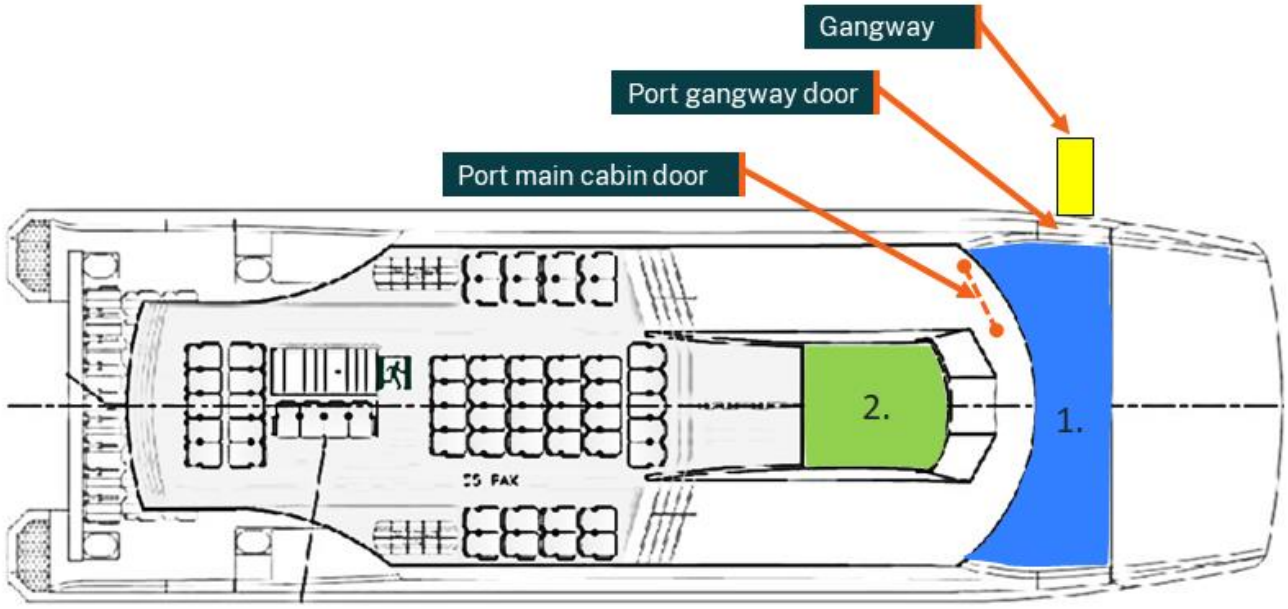
1.50 Passengers were normally embarked and disembarked via one of two forward gangway doors, located on either side of the vessel near the bow. Once on board, passengers entered the main cabin via either the port or starboard[14] forward main cabin doors. These doors were closed by the crew once the ferry departed the wharf to isolate the forward working deck (Figure 21).

[12] For an explanation of survey and classes see: https://www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/vessel-classes-and-service-categories

[13] See Australian Maritime Safety Authority below for further information.

[14] Starboard refers to the right side of a vessel when viewed from the rear.

Figure 21: Violet McKenzie General Arrangement view

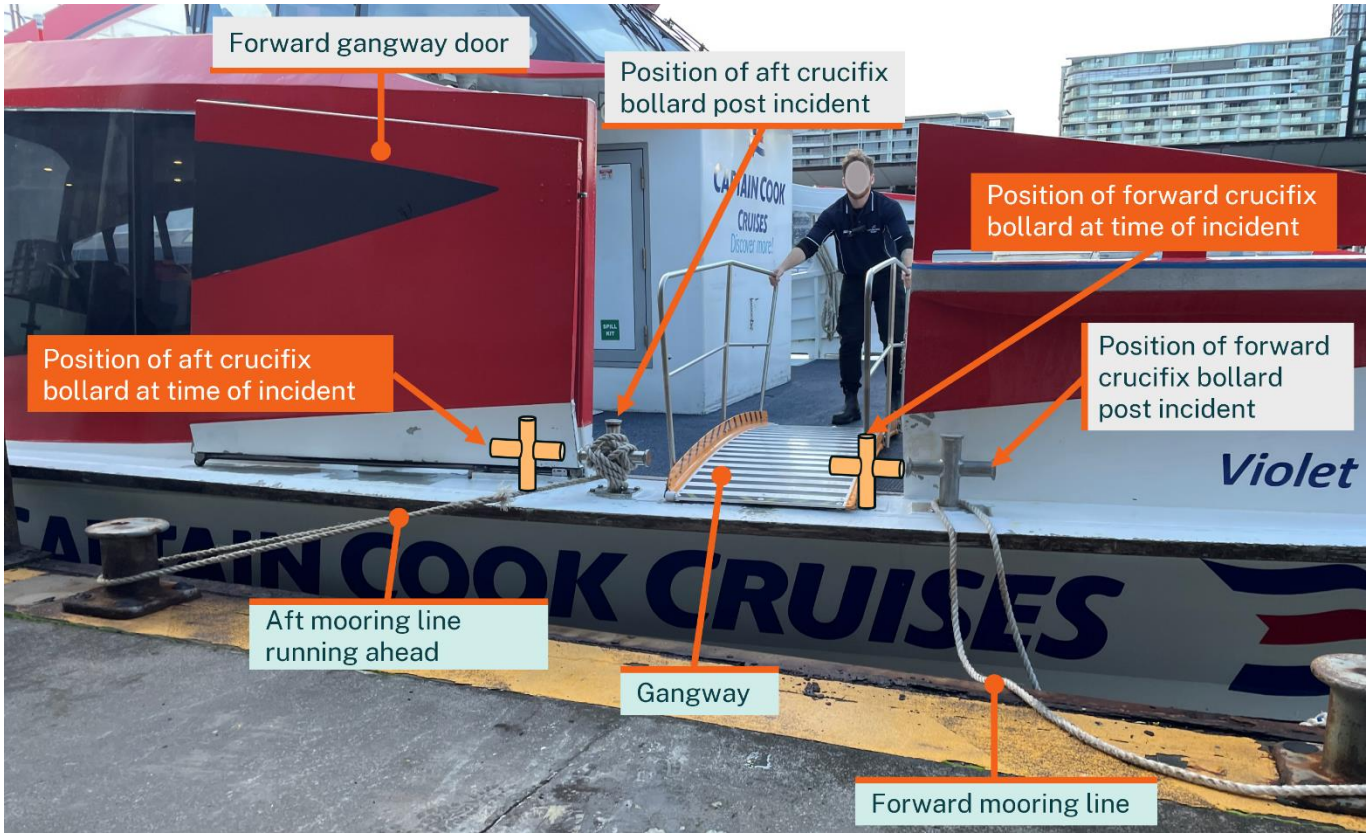


Source: CCC. Image annotated by OTSI

1.51 Berthing of *Violet McKenzie* was undertaken through securing mooring lines at the forward or aft crucifix bollards, or both, as necessary. The position of the aft crucifix bollards, at the time of the incident (Figure 22) were close to the open sliding gangway door. It was reported that the proximity of these bollards to the sliding gangway doors made it challenging for a Deckhand to secure a mooring line. This was due to several factors including proximity to the door, and reduced accessibility. In this configuration, it was reportedly easier for a Deckhand to secure a mooring line to the forward crucifix bollard, as it was clear of obstructions and facilitated the vessel berthing running astern.

1.52 Post incident, on the 12 May 2023, the positions of the crucifix bollards, at the forward gangway doors, were returned to their 'as built' original configuration (Figure 22). This configuration favoured use of the aft crucifix bollards as they were clear of any obstruction, and therefore was easier to berth the vessel running ahead.

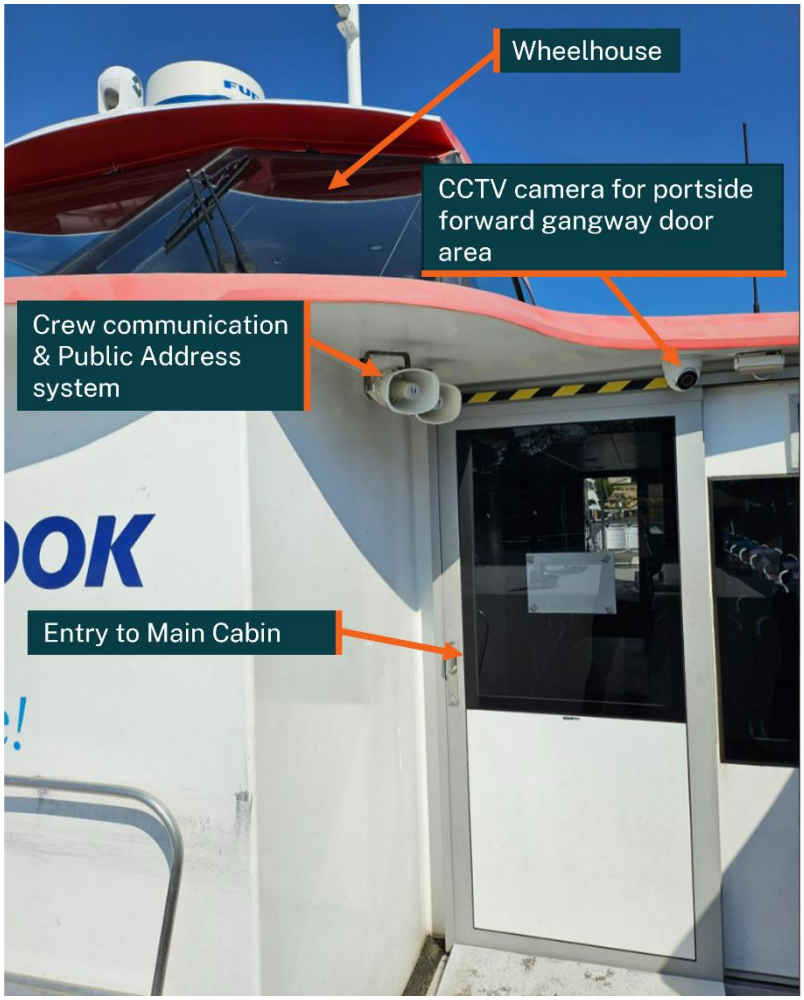
Figure 22: Violet McKenzie crucifix bollard positions on the starboard forward gangway door location



Source: OTSI

1.53 The vessel had a voice communication system, which incorporated loudspeakers with two way communication capability for both Master and Deckhand, and also a vessel wide Public Address (PA) system. The two way voice communication system was provided on both port and starboard forward working decks. CCTV cameras were also located in these areas (Figure 23).

Figure 23: Port forward deck view towards wheelhouse

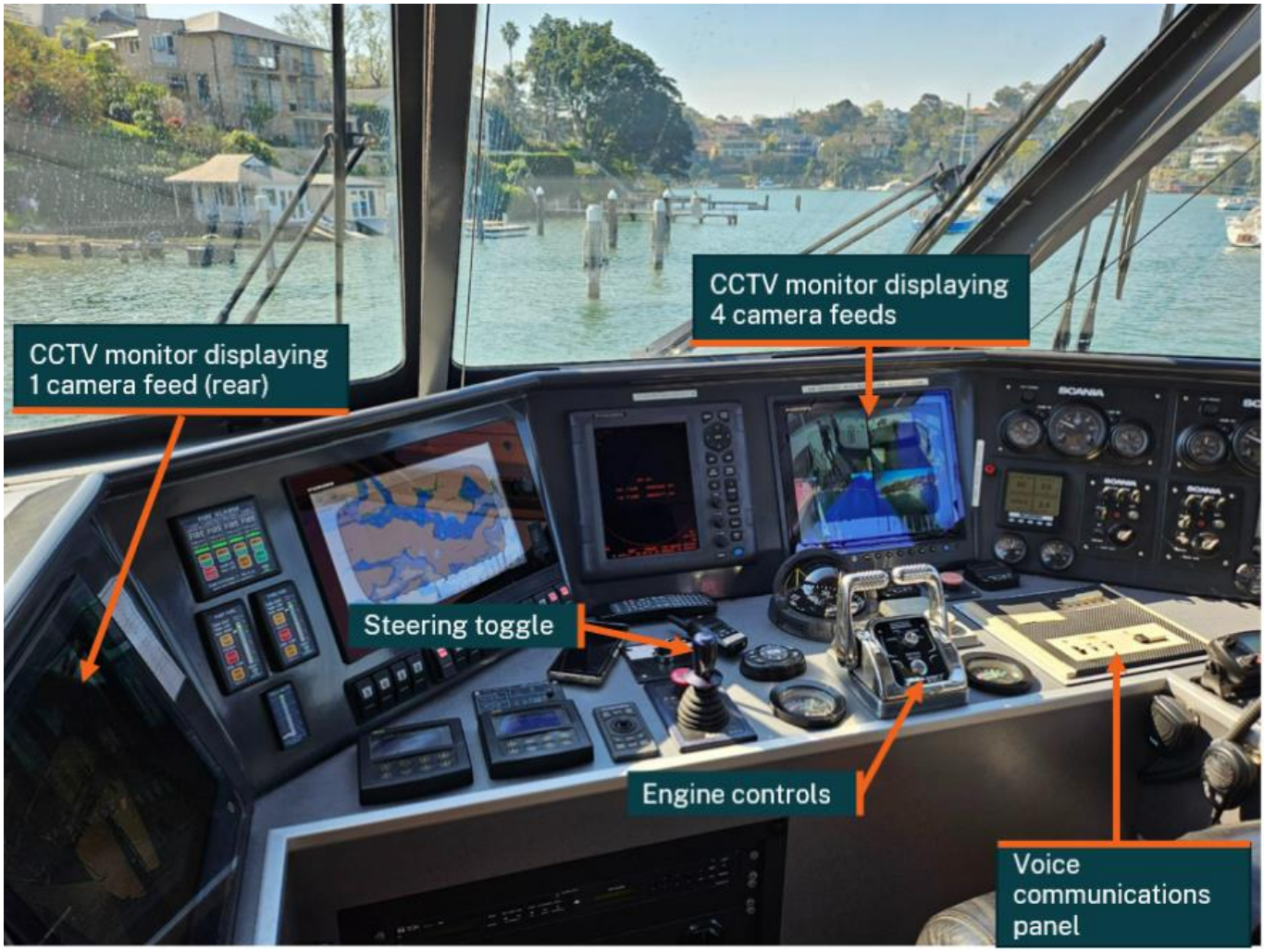


Source: OTSI

1.54 The voice communications panel in the wheelhouse was located adjacent to the engine controls and below a CCTV monitor displaying four onboard camera feeds (Figure 24).

1.55 On the Super Rocket Class vessels, there was limited direct visibility from the Master's position in the wheelhouse to view the forward deck and gangway door areas. Due to direct visibility limitations the Super Rocket Class vessels, including *Violet McKenzie*, had several CCTV cameras to assist the Master in monitoring the working deck and sections of the vessel that could not be seen from the wheelhouse position. The cameras streamed images to monitors located in the wheelhouse (Figure 24).

Figure 24: Super Rocket Class wheelhouse layout



Source: OTSI. Note: position of sun, lighting and reflections in image are not indicative of conditions at time of incident

1.56 One monitor on Super Rocket Class vessels was usually set to simultaneously display four CCTV camera feeds. A single camera feed could also be displayed full screen. It was reported that the CCTV cameras usually displayed on this monitor were from both port and starboard forward gangway decks, and views towards the stern of the vessel, along either side. These CCTV cameras did not provide a view of the port side of the ferry where it interacted with the wharf. However, that CCTV view was available.

1.57 There were also two CCTV monitors located on the port and starboard side of the wheelhouse, these monitors were set to display camera feeds from their respective port and starboard sides of the rear passenger deck (Figure 25).

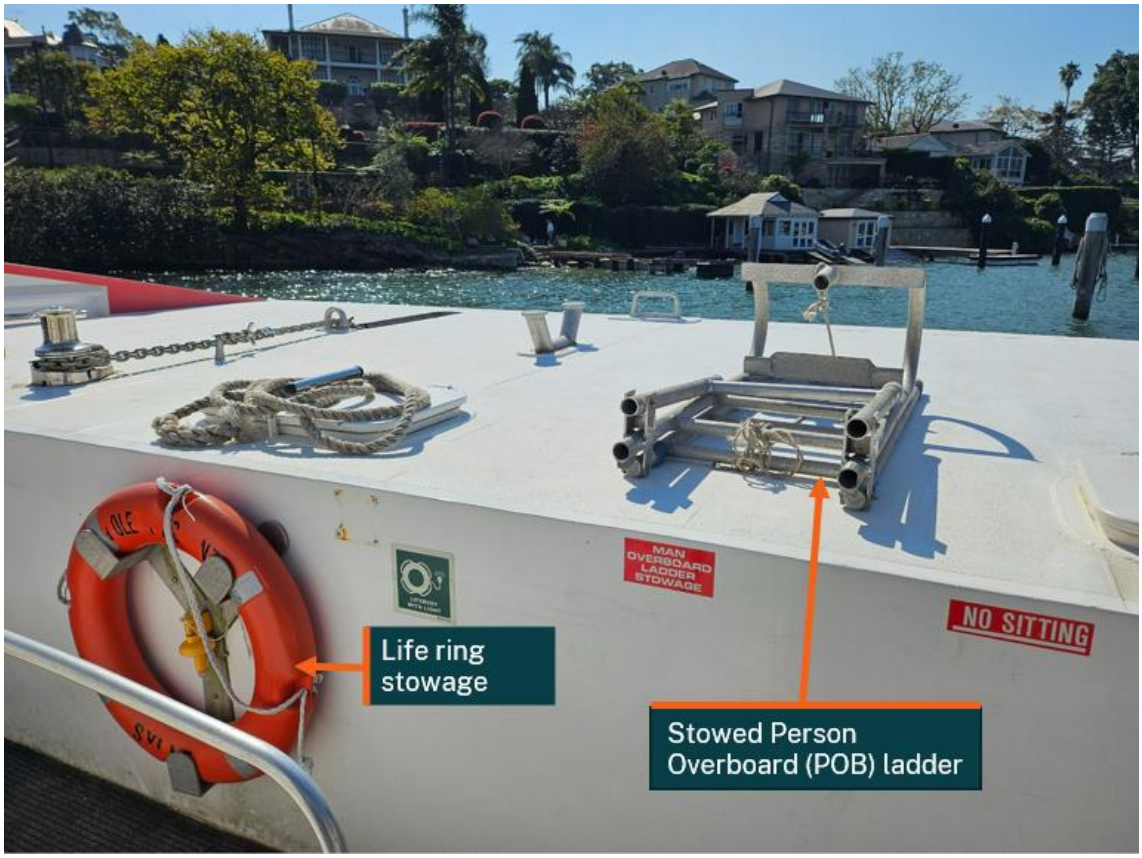
Figure 25: Port and Starboard side wheelhouse console CCTV monitor layout

Source: OTSI

1.58 The Master could change the CCTV cameras displayed by manipulating a computer mouse located close to floor level near their feet. During the investigation, Masters reported that settings were normally left as set, with the rear views providing the most practicality during normal operations, backing out of high traffic wharves like Circular Quay.

1.59 A Person Overboard ladder (also known as a 'Man Overboard' ladder) was stowed on the forward deck area, next to one of the life rings (Figure 26).

Figure 26: Person Overboard Ladder & life ring stowage on Super Rocket Class

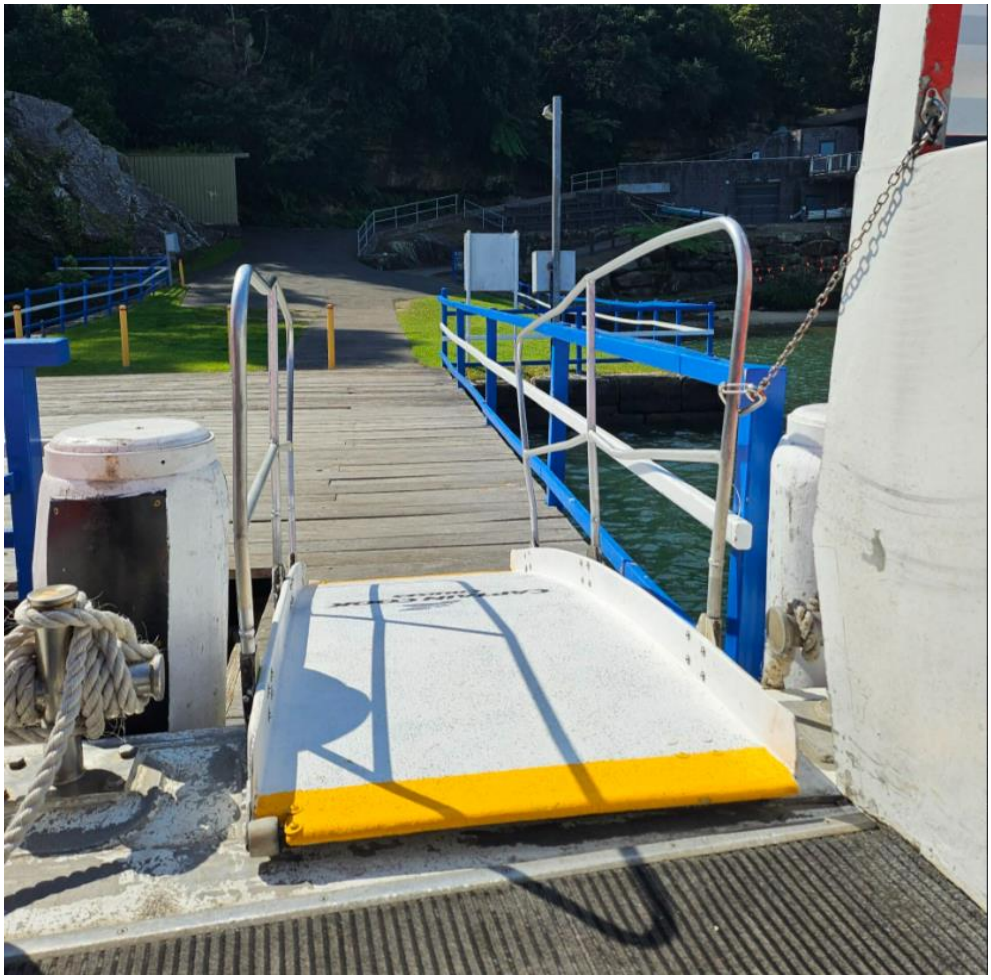


Source: OTSI

1.60 The gangway carried onboard the vessel and used on the Lane Cove River service was 850 mm wide and 2.4 m long. It weighed approximately 25 kg and was constructed of fibreglass, with aluminium handrails.

1.61 There was a chain attached to the handrail on one side, to clip the gangway to the vessel when in place for passenger embarkation/disembarkation (Figure 27).

Figure 27: Gangway design involved in incident



Source: OTSI. Note: this image is not of the actual gangway involved in the incident but of the same design

Crew information

1.62 At the time of the incident, *Violet McKenzie* was operated by two crew: a Master and qualified Deckhand. The crew's qualifications met the National Law (see paragraph 1.105) requirements for the vessel.

1.63 The CCC internal investigation report identified that both crew members involved in the incident had fewer than five shifts each operating Super Rocket Class vessels on the Lane Cover River service.

Master

Qualifications, training, competency assessment and experience

1.64 The Master held valid Master <24m Near Coastal (issued August 2021) and Marine Engine Driver Grade 2 Near Coastal (issued July 2022) Certificates of Competency.[15]

1.65 The Master attained seven years of experience working as a Deckhand across CCC's fleet of vessel classes. This included time as a Deckhand on Super Rocket Class and assessed as competent for the Deckhand role on that class of vessel in February 2018. At interview, the Master stated that most of their experience (as a Deckhand) was on First Generation Rocket Class vessels.

1.66 The Master was assessed as competent on the Super Rocket Class on 11 January 2023 (one month prior to the incident). The Master advised after they attained their certificate of competency in both deck and engineering, they spent time on the company's smaller and slower fleet of vessels. The Master stated at interview that training was mostly conducted through a 'buddy system' with a senior Master. After completing CCC's requirement of 400 hours in command, the Master progressed onto the First Generation Rocket Class vessels, operating the Lane Cove River service. The Master had accumulated 231 hours in command of the First Generation vessels of which 182 hours were on the Lane Cove River service.

1.67 The Master completed a fire safety drill and Bomb Threat/Terrorist drill in January 2023 on the Super Rocket Class. The Master had not completed a Person Overboard Drill in their current role but had carried out the emergency training as a Deckhand.

1.68 At the time of the incident, since November 2022, the Master had accumulated 60 hours in command of a Super Rocket Class vessels with eight of these hours on the Lane Cove River service. The operator identified that the service on the day of the incident was the Master's first shift operating a Super Rocket Class vessel during school term necessitating berthing at Riverview College Wharf to unload school students (72 of which unloaded on the day).

1.69 The Master stated at interview that they considered the Master's visibility, of the forward deck from the wheelhouse, better in the Generation 1 Rocket Class vessels than the Super Rocket Class. They considered visibility of the forward deck from the wheelhouse of the Super Rocket Class vessels to be challenging. Internal CCTV cameras were required to facilitate the Master's visibility of the forward gangway door.

1.70 The Master also stated that due to the configuration of the Generation 1 Rocket Class, they found it easier to position the vessel when berthing due to the improved visibility and gangway door location being a longer distance from the bow. The Master stated they normally 'ran ahead' on the line on the Gen 1 vessels.

[15] For a detailed explanation of Certificates of Competency see Domestic Certificates of Competency (COCs) | Australian Maritime Safety Authority (amsa.gov.au)

1.71 At interview, the Master stated that they considered the Riverview College Wharf challenging for Super Rocket Class operations. The pylons were not suitable to secure the vessel on high tides. The Master also stated that due to the location of the forward gangway door on the Super Rocket Class vessels, the vessel superstructure could rub on wharves when 'running ahead' (forward) on the line. The Master also reported that during high tides, the wharf pylons would rub below the sponson.[16] High tides also resulted in steep gangway angles. The Master identified that making announcements during passenger disembarkation was distracting and took focus away from actively monitoring the position of the vessel against the wharf.

1.72 The Master stated that on the day of the incident they were fit for duty.

Incident account

1.73 The Master recalled the first service was uneventful. During the second service, they were running about five minutes late approaching Riverview College Wharf, but the Master was not concerned as the service normally ran late at that point.

1.74 The Master recalled that due to the tide height, the steps at Riverview College Wharf could not be used to disembark passengers, so the Master aligned the forward gangway door of the vessel with the eastern platform. There were subsequently several aborted attempts to berth the vessel. The Master could see that the Deckhand was struggling to secure the line. The Master considered that the position of the aft bollard on the vessel resulted in the Deckhand being unable to lock the line to secure it. The crew then discussed running the line ahead, then astern, which would have placed the gangway over the line. The crew determined that while this was the practice used by some Masters on high tides, it was considered 'risky' in these circumstances and dismissed as an option.

1.75 The Master stated that they found it challenging to communicate with the Deckhand using the onboard intercom system, due to the noise from a large number of passengers on the forward deck area.

1.76 The Master decided to run the vessel astern (backwards) from the line on the eastern pile and disembark the students on the western platform of the wharf. The Deckhand secured the line and the students started to disembark. The Master estimated that there were 70 to 80 students. The Master had the vessel laying astern with both engines engaged, with slightly more thrust on the starboard (right) engine to keep the stern parallel with the wharf. While the students were disembarking, the Master made announcements to passengers using the PA system.

1.77 The Master then realised that there was an issue at the gangway and there were students in the water. The Master did not have direct view of the gangway from the wheelhouse and did not have the CCTV camera display for the forward deck selected.

1.78 The Master stated at interview that they made an announcement for all passengers to return inside to the vessel cabin area. The Master then manoeuvred the vessel backwards, away from the wharf, to provide visibility from the wheelhouse of the students in the water. The Master saw students in the water, holding onto the upturned gangway, which was floating just below the surface, with one small student on top of the gangway platform. There were bags in the water, floating around the students.

[16] An addition to the side of a vessel that is outside its normal hull and which provides added deck space and/or greater flotation stability. Can also be a sacrificial strip on the side of a vessel.

1.79 The Master instructed the Deckhand to deploy the Person Overboard ladder and life ring. The Master then manoeuvred the vessel alongside the students in the water, which the Master reported as challenging. The ladder and life ring were deployed, and the students, bags and gangway retrieved from the water.

1.80 The Master stated that they then instructed the Deckhand on how to place the line on the wharf and the vessel was secured on the first attempt. Students, including those involved in the incident, disembarked from the vessel without further incident.

1.81 The Master later reported the incident to CCC management and for a wellbeing check of the involved students to be conducted.

Learning opportunities

1.82 The Master considered that automated announcements were a safety improvement opportunity.

Deckhand

Qualifications, training, competency assessment and experience

1.83 The Deckhand commenced working with CCC in December 2021, working on various vessels in the fleet. They were assessed competent as a Deckhand on Super Rocket Class in October 2022.

1.84 The Deckhand held a valid Master <24m Near Coastal and Marine Engine Driver Grade 2 Near Coastal Certificates of Competency, which were both issued in January 2023.

1.85 At the time of the incident, the Deckhand had recently completed Person Overboard and Loss of Control/Steering Failure safety drills, conducted on 30 January 2023.

1.86 An internal investigation conducted by CCC found that while the Deckhand was assessed as competent on the Super Rocket Class, they had only completed one shift on that vessel class during training. This was contrary to CCC's training policy, which required the completion of 'two to four' shifts before a Deckhand could be assessed as competent on a vessel class.

1.87 At interview, the Deckhand stated that on the day of the incident they were fit for duty.

Incident account

1.88 They recalled that the first service was uneventful. On the second service, the crew left Hunters Hill Wharf (the stop before Riverview College Wharf) between three to five minutes behind schedule.

1.89 The Master approached Riverview College Wharf from upstream. The tide was too high to use the wharf steps, so the crew had to use one of the platforms for disembarkation.

1.90 The Deckhand stated that they assumed that the Master wanted to run ahead and threw the mooring line at the wharf pile that would facilitate it. The crew had not discussed or confirmed prior the positioning of the vessel at this wharf.

1.91 The Deckhand had trouble securing the mooring line to the vessels' aft bollard, which resulted in further delays as they could not safety secure the vessel to the wharf. The Deckhand stated at interview that they felt concerned and self-conscious about the delay in securing the vessel. They called the Master on the onboard intercom system, but it was difficult to understand

what the Master was saying, due to the noise coming from the large number of school students in the cabin area. The Deckhand reported that there were no students on the forward deck but the door to the cabin was open and there was a high level of noise from the students.

1.92 After communicating with the Master, the Deckhand thought the Master wanted a mooring line placed on the second last wharf pile from the east, and then run around the eastern-most pile, to enable the Master to lay the vessel back on the line. The Deckhand was concerned that this would run a mooring line under the gangway, which was high risk. Confusion about the placement and running of mooring lines led to further delays in berthing.

1.93 The Deckhand stated they then felt more time pressure and were unsure how the Master wanted to approach the situation. There was continued noise from the students inside the cabin which was also distracting.

1.94 The Deckhand threw a mooring line at the wharf's eastern pile and secured it to the vessel's forward crucifix bollard. The Master then ran the vessel astern (backwards) off the line, with the gangway door positioned on the wharf's western platform.

1.95 During disembarkation, the Deckhand stood on the bow side of the open gangway door, looking towards the stern, then counted the students leaving the vessel, while attempting to slow the flow of students over the gangway.

1.96 After about half of the 60 to 70 students onboard had disembarked, the Deckhand noted the vessel's stern was moving away from the wharf and gap between the vessel and wharf increasing. The Deckhand recalled shouting out to the Master 'your stern' twice, while motioning to the students to stop disembarking.

1.97 The Master started to manoeuvre the vessel to realign with the wharf. This resulted in the vessels' bow moving away from the wharf and the gangway falling upside down into the water with two students.

1.98 The Deckhand stated that they froze for a moment and then began shouting 'Man overboard'.

1.99 The mooring line broke as the Master manoeuvred the vessel. The Deckhand retrieved the Person Overboard ladder and positioned it on the vessel's portside. The Deckhand could not recall a third student jumping into the water from the vessel. The Deckhand observed one student climbing up onto the flowing gangway and two students holding onto it in the water.

1.100 The students were retrieved from the water, then the Deckhand used a hook to retrieve the students' floating bags and gangway.

1.101 The crew subsequently berthed the vessel at Riverview College Wharf. The Deckhand offered assistance to the students who were in the water and obtained their contact details. The service then continued.

Learning opportunities

1.102 The Deckhand identified learning opportunities involving planning, crew communication, running the vessel ahead at that wharf (rather than astern) and better crowd control. The Deckhand stated that the operator had introduced new procedures which addressed the issues but operations at that wharf were still challenging, especially during high tides.

Operator information

1.103 At the time of the incident, the involved operator, CCC, operated the Lane Cove River service under contract to Transport for NSW (TfNSW). CCC operated 16 vessels of different classes. It was reported that the service operating to Riverview College Wharf had one of the highest numbers of passengers embarking and disembarking of the scheduled public passenger ferry services operated by CCC.

1.104 The involved service was scheduled to arrive at Riverview College Wharf at 0805 (Figure 28).

Figure 28: Lane Cove River timetable, with involved service highlighted

Effective for travel from 10 January 2023

* Drop off only. Special timetables may operate on public holidays & special events.

Lane Cove to City - Monday to Friday excluding public holidays

	AM	AM	AM	AM	PM	PM
Lane Cove – Riverview College					3:54^	
Hunters Hill - Alexandra St	7:00	7:30	8:01	8:26	4:00^	
Lane Cove – Riverview College			8:05^	8:31^		5:55^
Longueville- Longueville Wharf	7:05	7:35	8:11	8:35	4:05^	
Northwood - Northwood Wharf	7:10	7:40	8:16	8:39	4:09^	
Greenwich - Bay Street	7:15	7:45	8:19	8:42	4:12^	
Greenwich – Greenwich Point					*4:16^	
Birchgrove – Long Nose Point					*4:18^	6:05^
Balmain East					4.20^	6:07^
Circular Quay – Wharf 6	7:30	8:00	8:35	8:56	*4:26^	6:15
North Sydney – Jeffrey Street	7:36	8:05	*8:41		*4:30^	
Balmain East			8:43	9:00		
Darling Harbour – Pier 26			8:51	9:10	*4:43^	

City to Lane Cove – Monday to Friday excluding public holidays

	AM	AM	PM	PM	PM	PM
Darling Harbour – Pier 26				5:10		
Circular Quay – Wharf 6	7:30	8:00	3:25^	5:25	6:20	7.10
Kirribilli – Kirribilli Point Wharf			3:30^			
North Sydney – Jeffrey Street	7:36	8:05	3:36^			
Balmain East	7:38^	8:07^				
Birchgrove – Long Nose Point	7:42^	8:11^				
Greenwich – Greenwich Point	7:44^	8:13^				
Greenwich - Bay Street	7:50^	*8:16		5:37	6:32	7.22
Northwood - Northwood Wharf	7:53^	*8:19		5:41	6:35	7.25
Longueville- Longueville Wharf	7:57^	*8:23		5:44	6:39	7.29
Hunters Hill - Alexandra Street	8:01	8:26	3:51^	5:47	6:43	7.33
Lane Cove - Riverview College	8:05^	8:31^	3:54^	5:55^		
Darling Harbour – Pier 26						*7.52

* Set down only.

^2023 Private School Term Dates: Mon30Jan-Fri07Apr, Wed26Apr-Fri07Jul, Tue18Jul-Fri29Sep, Mon09Oct-Thur

Source: Captain Cook Cruises. Image annotated by OTSI

1.105 Under rules found in the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cwlth)* (National Law),[17] *Violet McKenzie* had a minimum crew complement of two: a Master <24 m and a Marine Engine Driver 3.[18] Within these minimum crewing rules, there was provision for a Master, with the appropriate engineering qualifications, to combine roles and for the engineer position to be replaced by another person.

1.106 The National Law required operators to carry out an assessment to determine the appropriate crewing for a vessel. The crewing assessment was to consider scenarios (passenger numbers, weather, location) the vessel would encounter during its operations, both normal and emergency. The operator, Captain Cook Cruises (CCC), conducted a crewing assessment for the Super Rocket class of ferries before the vessels entered service. This assessment concluded that the minimum crew found in the National Law, a Master and an Engineer (Figure 29: Extract from the operator's Super Rocket Class appropriate crewing assessment) was acceptable for passenger operations.

1.107 The crewing assessment also allowed for the Engineer to be replaced by a Deckhand if the Master was dual certified Master (M<24 m/MED 3). While the Deckhand could hold appropriate certificates of competency, the assessment allowed uncertified staff to act as deckhands, if they had completed the company induction for the specific vessel class.

Figure 29: Extract from the operator's Super Rocket Class appropriate crewing assessment

Appropriate Crew Assessment – Super Rockets

STEP 1 – CONSIDER VESSEL CORE COMPLEMENT			
Vessel	Super Rockets Class – Annabelle Rankin, Mary Reibey and Violet McKenzie		
Measured Length	Annabelle and Violet – 23.90m		
Core Complement Options	Manning 1	Certificated Crew	1 x Master < 24m, and 1 x MED 3
	Manning 2	Certificated Crew	1 x Master < 24m with MED 3, and 1 x Deckhand
This vessel will be operated with at least the core complement as described by Manning 1 or Manning 2			

Source: CCC

[17] National Law Act, Federal Register of Legislation - Marine Safety (Domestic Commercial Vessel) National Law Act 2012

[18] For further information on Domestic Commercial Vessel qualifications see Domestic Certificates of Competency (COCs) (amsa.gov.au)

Safety Management System

1.108 CCC developed and implemented a Safety Management System (SMS) for their fleet of vessels as required by the National Law.[19] The SMS consisted of both a high-level document, that generally followed the AMSA guidelines, and supporting documents including instructions relevant to individual vessel classes and operations.

1.109 At its core, the SMS provided for a risk-based approach to manage safety by identifying risks, maintained through a risk register, and developing and implementing procedures to mitigate those risks. CCC's two level approach to managing safety involved mitigating risk both fleetwide, with generic procedures relevant to all vessels, and class specific, with a vessel class focused section which provided more individually tailored instructions, such as vessel startup and shut down.

1.110 The SMS included policies and procedures for training, assessment, maintenance, hazard identification and ongoing assurance activities to monitor that the SMS was effectively managing operational risks. While the SMS identified passenger boarding as a priority risk and included a generic fleet wide instruction, it did not specifically identify risks associated with the Super Rocket wheelhouse line of sight, the Lane Cove River service wharves or associated procedures.

Risk Assessment

1.111 The involved operator's SMS contained a risk assessment for Super Rocket Class vessels. The risk assessment, conducted on 30 June 2019, identified risks and control measures associated with safe passenger transport operations on the class of vessel, and considered 'Person Overboard' and 'Crowd Control'.

1.112 Before mitigation, Person Overboard was rated as an extreme risk which CCC considered unacceptable, requiring treatment/mitigation. The assessment highlighted that 'the height of the railings is such that passengers would have to actively climb to fall off the vessel.' It also identified gangway doors being left un-latched as a risk. The assessment identified incidents whilst loading children presented the highest risks.

1.113 CCC identified control measures to mitigate the extreme rating of the untreated risk, including:

- Master to keep passengers and crew informed via PA system if time permitted.
- Observant crew during boarding operations.
- Observant crew with children and intoxicated passengers.
- Crew to make safety announcements.
- During operations, the cabin door and gangway doors are closed by the crew to prevent passengers accessing restricted areas of the vessel.
- Person Overboard drills conducted as per vessels' SMS.

[19] AMSA did not accept or approve the SMS.

1.114 The treated risk rating for Person Overboard was reduced to 'High' after controls were implemented, which required further treatment to be considered by CCC.

Operational procedures

1.115 The SMS contained a procedure specific to operations in the Lane Cove River. The procedure, titled 'Lane Cove River Operations' highlighted several environmental hazards, including fog, moorings, narrow channel, rowers, and wash.

1.116 The CCC fleet wide SMS contained generic procedures to address identified risks. Passenger loading was addressed in the 'Embarkation and Disembarkation Procedure'. This procedure stated that:

> The Master has a duty of care to ensure the safety of all passengers and crew at all times and therefore accepts full responsibility for the safe and efficient use of all ship gangways. The Master must therefore provide the direction, supervision, and hands-on management to ensure this is achieved.

1.117 The procedure included the following crew requirements:

- When passengers are boarding or disembarking the vessel, a deckhand must be on hand at the gangway to ensure safe movement of passengers.
- The Master must actively supervise the boarding area, directing passengers and crew to ensure safe boarding and disembarkation.

1.118 The procedure contained 12 steps (Figure 30).

Figure 30: Extract from the Operator's Embarkation and Disembarkation Procedure

7.0 Embarkation / Disembark Procedure:

- Establish communication between Master and GPH
- Clear passengers from line working area
- Safely secure vessel alongside
- Put out gangway, securing to ensure it cannot move
- Check for wash
- Advise passengers to take care when embarking / disembarking, encouraging them to maintain 3 points of contact while on the gangway
- Pay attention to passengers with special needs
- On completion of embarkation retrieve gangway
- Monitor passenger behaviour specifically, signs of being under the influence of drugs or alcohol
    - Alert the Master or Cruise Director if any concerns are identified
- Let vessel go and secure sliding gates / doors
- Advise Master 'Let go'
- Stow gangway

Source: CCC. Note: 'GPH' is a General Purpose Hand and was the equivalent of a Deckhand on Super Rocket Class

1.119 The 'Embarkation and Disembarkation Procedure' was supported by a fleetwide Safe Gangway Usage procedure, and the Passenger Verification procedure.

1.120 The 'Safe Gangway Usage' procedure required Masters to remain attentive during embarkation/disembarkation. It required Masters to ensure the gangway was deployed in a manner that passengers could utilise it safely and ensure there was no excessive incline. The Safe Gangway Usage procedure advised Masters to utilise two mooring lines where suitable, but if they berthed with only one line they should 'remain in the wheelhouse watching the gangway position as passengers board and maintain vessel position to allow safe boarding'.

1.121 The Safe Gangway Usage procedure placed a responsibility on both Master and Deckhand to ensure the ferry was correctly secured and positioned prior to utilising the gangway to transfer passengers. The Deckhand was tasked with assisting the Master achieve this by actively monitoring the ferry's position and stopping passengers from crossing the gangway if a hazard appeared.

1.122 The Passenger Verification procedure required crew to be alert to potential hazards. It also required the crew to maintain an accurate count of passengers on board the ferry. The procedure instructed the Deckhand to count passengers as they embarked and disembarked the ferry at every wharf. The total count was to be communicated to the Master and recorded in vessel documents.

1.123 The operators' Person Overboard risk assessment identified that a control measure to prevent persons from falling overboard was 'During operations the cabin door and gangway doors are closed by the crew to prevent passengers accessing restricted areas of the vessel'. The *Embarkation and Disembarkation Procedure* contained an instruction to 'secure sliding gates/doors' when the vessel departed a wharf.

1.124 The Super Rocket Person Overboard procedure identified that a third crewman, when carried, was to manage passenger crowd control.

Training

1.125 Training was addressed in the CCC document titled '*Training, Competency & Career Progression'* in the operator's SMS. This document stated that all employees 'must be aware and competent in their roles and responsibilities'. All employees were required to complete:

- the general company induction;
- the Health Safety and Environment induction;
- position specific induction; and
- 'Vessel Specific Training' conducted by designated position trainers,[20] which may have included senior personnel working in the relevant position.

[20] Trainers were not required to hold a formal training qualification. CCC permitted training to be undertaken by staff qualified in the respective roles.

1.126 A vessel Master was responsible for providing induction and safety training to all new crew as soon as practical upon them joining the vessel. This training included:

- general emergency procedures
- an overview of the location and use of safety equipment
- location of emergency plans
- emergency responses.

1.127 Following a new crew member completing the induction and safety training, they were required to complete a 'Position Specific Induction'. This included:

- job description
- skill specific training necessary for the role
- safe work practices relevant to the job.

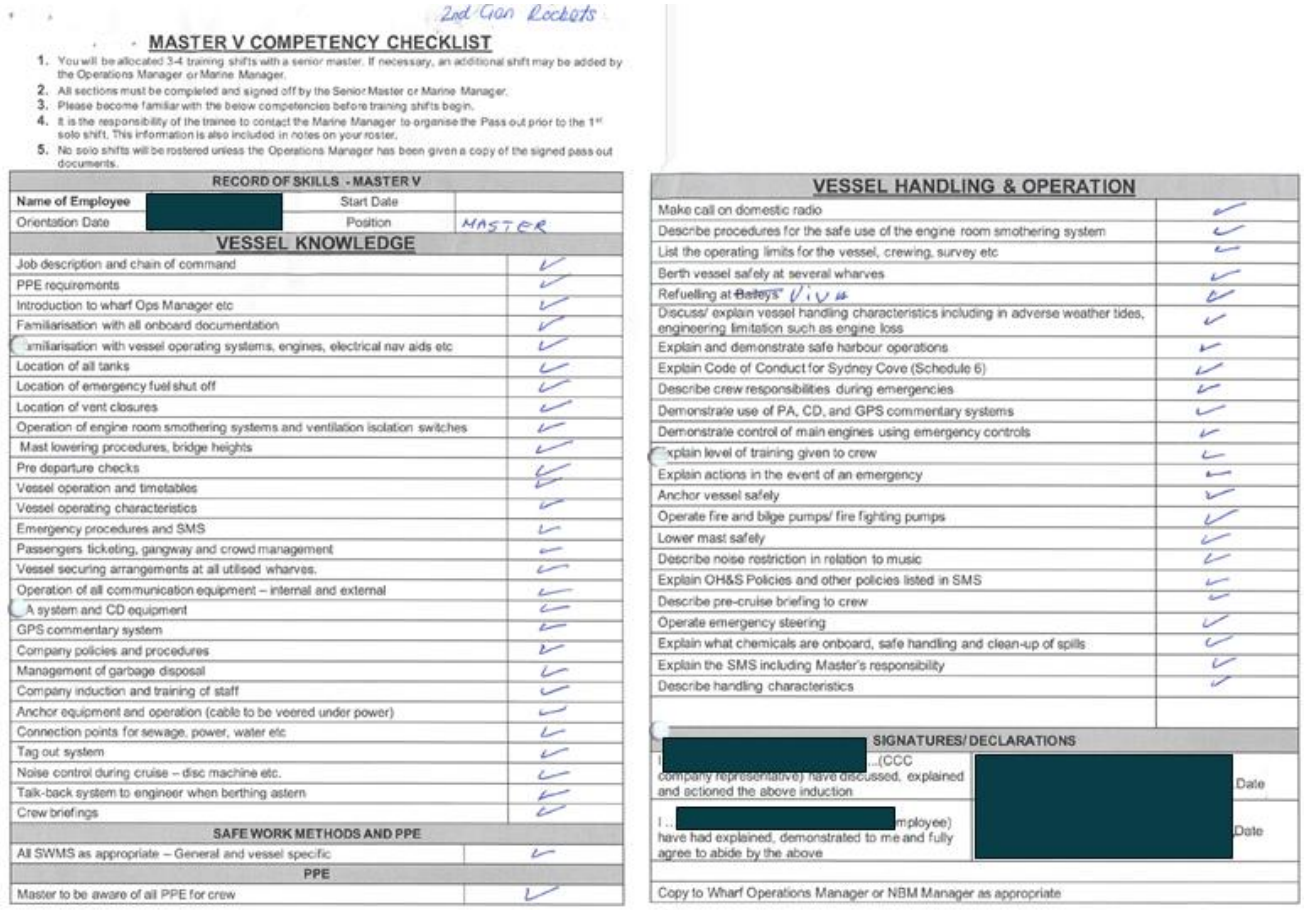
1.128 The training process also included a Vessel Specific Induction for the positions of Master, Engineer, and Deckhand. This section of the SMS included Pass Out Checklists for the Marine positions designed to ensure that all recruits were competent on a specific class of vessel before undertaking that position. The checklists covered:

- vessel knowledge
- personal protection equipment
- safe work methods
- vessel handling and operation including practical demonstration of competency.

1.129 The induction and competency assessment process was documented as follows:

1. A trainee was provided two to four paid training shifts with a Designated Position Trainer (such as a Senior Master). The number of shifts could be altered through consultation on an as needs basis, based on candidate competence.
2. Once a trainer considered the trainee ready, a formal pass out session was carried out. In this session, a 'Pass-out' document - Master (Figure 31) or Deckhand (Figure 32) was completed by the trainee and signed off by the Designated Position Trainer or Department Manager.

Figure 31: Master competency checklist



2nd Gen Rockets

MASTER V COMPETENCY CHECKLIST

1. You will be allocated 3-4 training shifts with a senior master. If necessary, an additional shift may be added by the Operations Manager or Marine Manager.
2. All sections must be completed and signed off by the Senior Master or Marine Manager.
3. Please become familiar with the below competencies before training shifts begin.
4. It is the responsibility of the trainee to contact the Marine Manager to organise the Pass out prior to the 1st solo shift. This information is also included in notes on your roster.
5. No solo shifts will be rostered unless the Operations Manager has been given a copy of the signed pass out documents.

RECORD OF SKILLS - MASTER V			
Name of Employee	[redacted]	Start Date	
Orientation Date		Position	MASTER

VESSEL KNOWLEDGE	
Job description and chain of command	✓
PPE requirements	✓
Introduction to wharf Ops Manager etc	✓
Familiarisation with all onboard documentation	✓
Familiarisation with vessel operating systems, engines, electrical nav aids etc	✓
Location of all tanks	✓
Location of emergency fuel shut off	✓
Location of vent closures	✓
Operation of engine room smothering systems and ventilation isolation switches	✓
Mast lowering procedures, bridge heights	✓
Pre departure checks	✓
Vessel operation and timetables	✓
Vessel operating characteristics	✓
Emergency procedures and SMS	✓
Passengers ticketing, gangway and crowd management	✓
Vessel securing arrangements at all utilised wharves.	✓
Operation of all communication equipment – internal and external	✓
PA system and CD equipment	✓
GPS commentary system	✓
Company policies and procedures	✓
Management of garbage disposal	✓
Company induction and training of staff	✓
Anchor equipment and operation (cable to be veered under power)	✓
Connection points for sewage, power, water etc	✓
Tag out system	✓
Noise control during cruise – disc machine etc.	✓
Talk-back system to engineer when berthing astern	✓
Crew briefings	✓
SAFE WORK METHODS AND PPE	
All SWMS as appropriate – General and vessel specific	✓
PPE	
Master to be aware of all PPE for crew	✓

VESSEL HANDLING & OPERATION	
Make call on domestic radio	✓
Describe procedures for the safe use of the engine room smothering system	✓
List the operating limits for the vessel, crewing, survey etc	✓
Berth vessel safely at several wharves	✓
Refuelling at ~~Bateys~~ Vivo	✓
Discuss/ explain vessel handling characteristics including in adverse weather tides, engineering limitation such as engine loss	✓
Explain and demonstrate safe harbour operations	✓
Explain Code of Conduct for Sydney Cove (Schedule 6)	✓
Describe crew responsibilities during emergencies	✓
Demonstrate use of PA, CD, and GPS commentary systems	✓
Demonstrate control of main engines using emergency controls	✓
Explain level of training given to crew	✓
Explain actions in the event of an emergency	✓
Anchor vessel safely	✓
Operate fire and bilge pumps/ fire fighting pumps	✓
Lower mast safely	✓
Describe noise restriction in relation to music	✓
Explain OH&S Policies and other policies listed in SMS	✓
Describe pre-cruise briefing to crew	✓
Operate emergency steering	✓
Explain what chemicals are onboard, safe handling and clean-up of spills	✓
Explain the SMS including Master's responsibility	✓
Describe handling characteristics	✓

SIGNATURES/ DECLARATIONS

[redacted] ...(CCC company representative) have discussed, explained and actioned the above induction [redacted] Date

I ... [redacted] employee) have had explained, demonstrated to me and fully agree to abide by the above [redacted] Date

Copy to Wharf Operations Manager or NBM Manager as appropriate

Source CCC annotated by OTSI

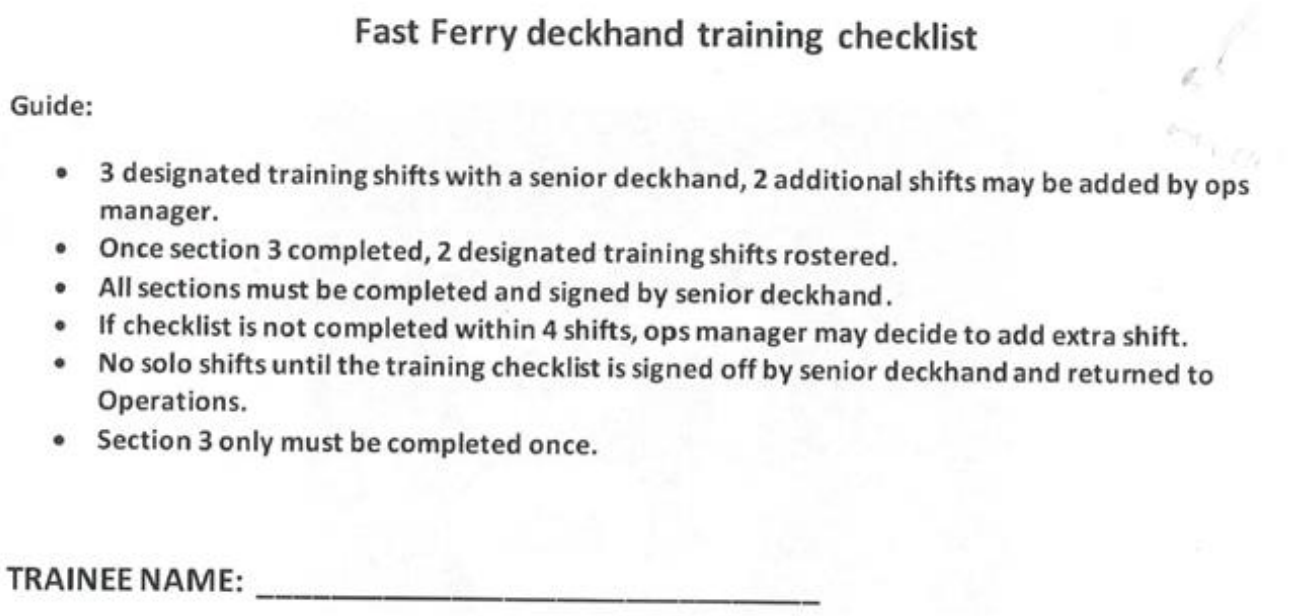
Figure 32: Extract from the Fast Ferry Deckhand training checklist – assessment criteria

TASKS	Competent (Trainer's Initials)	Not competent (Trainer's Initials)
Rope work. Trainee to learn methods and techniques of rope works. A) Tossing and removing lines. □ B) Techniques to secure vessel. □ C) Splicing the rope. □ D) Bowline. □ E) Clove hitch. □ F) Securing fenders using round turn 2 ½ hitches. □ G) Lock around single bollard. □	[redacted]	
Gangways. Trainee to learn types and correct use of gangways. A) "Tow" ball gangways. □ B) Ship gangways. □ C) Manning the gangways. □ D) Gangways at NBM. □ E) Safe use of gangways, read safe use of g/w doc. □ F) Securing gangways. □ G) Storing gangways. □	[redacted]	

Source CCC annotated by OTSI

1.130 An internal CCC investigation into the incident found that the Deckhand involved had only completed one training shift on the Super Rocket class. This was contrary to the required three to five shifts called for in the training checklist (Figure 33). CCC advised that the Deckhand was permitted to receive their competency assessment having only completed one training shift, due to their qualifications and previous experience.

Figure 33: Extract from the Fast Ferry Deckhand training checklist - instructions to qualify



Fast Ferry deckhand training checklist

Guide:

- 3 designated training shifts with a senior deckhand, 2 additional shifts may be added by ops manager.
- Once section 3 completed, 2 designated training shifts rostered.
- All sections must be completed and signed by senior deckhand.
- If checklist is not completed within 4 shifts, ops manager may decide to add extra shift.
- No solo shifts until the training checklist is signed off by senior deckhand and returned to Operations.
- Section 3 only must be completed once.

TRAINEE NAME: _____

Source CCC annotated by OTSI. Note Super Rocket class vessel were considered of the Fast Ferry class.

Safety assurance of vessel operation

1.131 CCC carried out annual reviews of their SMS documentation. These reviews included updating operational procedures where appropriate. A history of any changes to the operational procedures was documented within the respective procedure.

Regulatory information

1.132 On 1 July 2013, the Australian government enacted the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cwlth)* (National Law). This law replaced the eight different state legislations with one regulatory scheme of nationally agreed standards. From this date, Australian Domestic Commercial Vessels (DCVs) were governed by rules detailed in the National Standards for Domestic Commercial Vessels (NSCV). The NSCV detailed standards for vessel design, construction, and equipment. These included standards for visibility from the wheelhouse.

1.133 To operate in Australian waters, DCVs required both a Certificate of Survey and a Certificate of Operation.[21] The Certificate of Survey confirmed that a DCV was designed and built to the NSCV. Both the Certificate of Survey and the Certificate of Operations were issued by the Australian Maritime Safety Authority (AMSA).

1.134 The Certificate of Operations detailed conditions under which a DCV must operate. A mandatory condition of a Certificate of Operations was for a DCV operator to have an SMS.

[21] Domestic commercial vessels (amsa.gov.au)

1.135 An SMS had to comply with the requirements of Marine Order 504 (MO504),[22] which placed a responsibility upon an owner/operator of a DCV to implement and maintain an SMS which managed risks to safety arising from a vessel's specific operation. MO504 required an owner/operator to identify risks encountered by the crew during key daily tasks specific to the vessel and operation. The risk assessment was to be prepared in consultation with the vessel's crew and include procedures to mitigate identified risk. The risk assessment was also to include the identification of the appropriate crewing for the vessel to operate safely. Marine Order 504 required the Crewing Assessment to consider multiple factors, including:

- Design characteristics of the vessel, including its general arrangements, machinery and equipment.
- Tasks and activities performed in addition to the safe navigation of the vessel, and the demands they impose on the master and crew.

1.136 AMSA published guidelines[23] outlining what an SMS must cover, these included checklists and templates to assist an operator develop their SMS. The guidelines specified that a vessel's SMS be tailored to reflect the size and complexity of individual vessel and operations.

1.137 The crew who operated these vessels were required to hold valid Certificates of Competency under the National Law,[24] and be inducted with the vessel operation and SMS.

Australian Maritime Safety Authority (AMSA)

1.138 The National System for Domestic Commercial Vessels was administered by AMSA, a commonwealth statutory and corporate commonwealth entity, established under the *Australian Maritime Safety Authority Act 1990 (the AMSA act) (Cwlth).* AMSA was the Australian national marine regulatory body at the time of the incident.

1.139 AMSA's principal responsibilities included:

- The promotion of maritime safety and protection of the environment.
- Preventing ship-sourced pollution in the marine environment.
- Providing infrastructure to support the safety of navigation in Australian waters.
- Providing a national search and rescue service to the maritime and aviation sectors.
- Certification of commercial crew competencies.

1.140 AMSA was responsible for ensuring DCVs met minimum standards for safety, design and operation. AMSA regulated vessels and equipment through its survey inspection regime which encompassed vessel design, stability, floatation, navigation, and safety equipment.

[22] Marine order 504 — Certificates of operation and operation requirements — national law (amsa.gov.au)

[23] Guidelines for a safety management system (amsa.gov.au)

[24] Domestic Certificates of Competency (COCs) (amsa.gov.au)

1.141 AMSA documented that:

> A safety management system (also referred to as an SMS) is a systematic approach to managing safety. By following established policies, practices and procedures you ensure the safety of vessels and the people on board.
>
> All domestic commercial vessels must have a safety management system (SMS). This system will demonstrate and document how your vessel meets the mandatory general safety duties.
>
> Your vessel's SMS should be based on a risk assessment of your operations. It should describe how safety, maintenance and operation is managed on your vessel.

1.142 AMSA also documented that 'We may conduct periodic reviews of your safety management system and operations'. AMSA's review of a vessel's operations was consistent with one of AMSA's functions to undertake monitoring activities under the National Law and also supported by their mission statement that included ensuring safe vessel operations.

1.143 AMSA conducted a desktop review of CCC's SMS on 5 December 2018. The review found that CCC met the requirements of Marine Order 504. On 15 March 2022, AMSA also conducted an inspection of *Violet McKenzie* with no deficiencies identified.

Transport for NSW

1.144 At the time of the incident, Transport for NSW (TfNSW) was the lead transport agency of the NSW Government. The *Transport Administration Act 1988* (NSW) set out objectives and functions for TfNSW in connection with the public transport system in NSW. TfNSW's relevant objectives and functions included:

- to plan for a transport system that met the needs and expectations of the public
- to promote the safe and reliable delivery of public transport and freight services
- the planning, oversight and delivery of transport infrastructure
- contracting, on behalf of the State, with public transport agencies or the private sector, for the delivery of transport services, including the setting of performance targets and service standards
- co-ordinating and carrying out the procurement of transport infrastructure and transport vehicles, rolling stock and vessels
- to report to the Minister each year on the performance of operators of transport services in connection with the exercise of their functions relating to the safe operation of those services.

1.145 TfNSW advised their safety management system (SMS) placed a commitment on the organisation to ensure the health and safety of its people, customers and its supply chain. That commitment applied to all of TfNSW and its operating agencies. Safety risk management objectives set out within the TfNSW SMS detailed for TfNSW to optimise health and safety outcomes through integrated processes for identifying hazards and risks, assessing and controlling health and safety risks and reviewing control measures. Relevant required outcomes of the TfNSW SMS detailed that all agencies within TfNSW shall have effective processes for reviewing its control measures. The SMS also detailed examples of how TfNSW may carry out verification to meet the required outcomes, including risk verification and assurance programs that review and report the control profile of risks.

1.146 TfNSW advised its SMS did not contain the risk of passenger fall from gangway into water with TfNSW reporting that risk was to be identified and managed by Ferry Operators such as CCC. TfNSW reported the risk was to be managed by Ferry Operators such as CCC through contractual obligations and the responsibility of those operators under the National Maritime Law.

Ferry Passenger Service and wharf contract arrangements

1.147 TfNSW had a Deed of Licence with the wharf owner, Saint Ignatius' College Riverview Limited (the school), regarding the provision of safety equipment for the wharf e.g. Fire extinguishers, life rings, lighting etc. The deed also contained requirements for the school to ensure that a maintenance plan was implemented for the wharf and that the wharf was kept in a safe and physically suitable condition for carrying out public passenger transport services.

1.148 TfNSW contracted CCC to deliver ferry passenger services to the Lane Cove River. The contract included several clauses relating to safety obligations that TfNSW expected from CCC. These clauses included safety of passengers, ensuring the appropriate supervision of embarking/disembarking at wharves, and that all staff had appropriate experience, qualifications, and training to provide the ferry service.

Wharf information

Regulatory oversight

1.149 The *Marine Safety Act 1998 No 121 (NSW)*, defined a public ferry wharf as *'a wharf or any associated facilities used for the purpose of public passenger services*[25] *provided by ferries'*[26].The legislation also provided powers for TfNSW when carrying out their functions of planning and oversight of transport infrastructure. Under the Act, TfNSW could inspect public ferry wharves and if necessary, issue improvement notices for wharves requiring remedial safety work. TfNSW was also provided with the power to issue a Prohibition Notice to cease operations at a wharf if required to address safety concerns.

1.150 Under the *Transport Administration Act 1988 (NSW)* (TAA), TfNSW was set the objectives of promoting a safe and reliable transport system in NSW. TfNSW set standards defining the safe condition for passenger ferry wharves in NSW. TfNSW conducted a program of annual wharf assessment inspections against those standards.[27] TfNSW also provided feedback on the inspections, with the owner of the wharf obliged to address identified issues.

[25] Public Passenger Service (ferry) is defined as the carriage of passengers for a fare or other consideration by a vessel within any New South Wales waterway, *(Passenger Transport Act 1990) (NSW).*

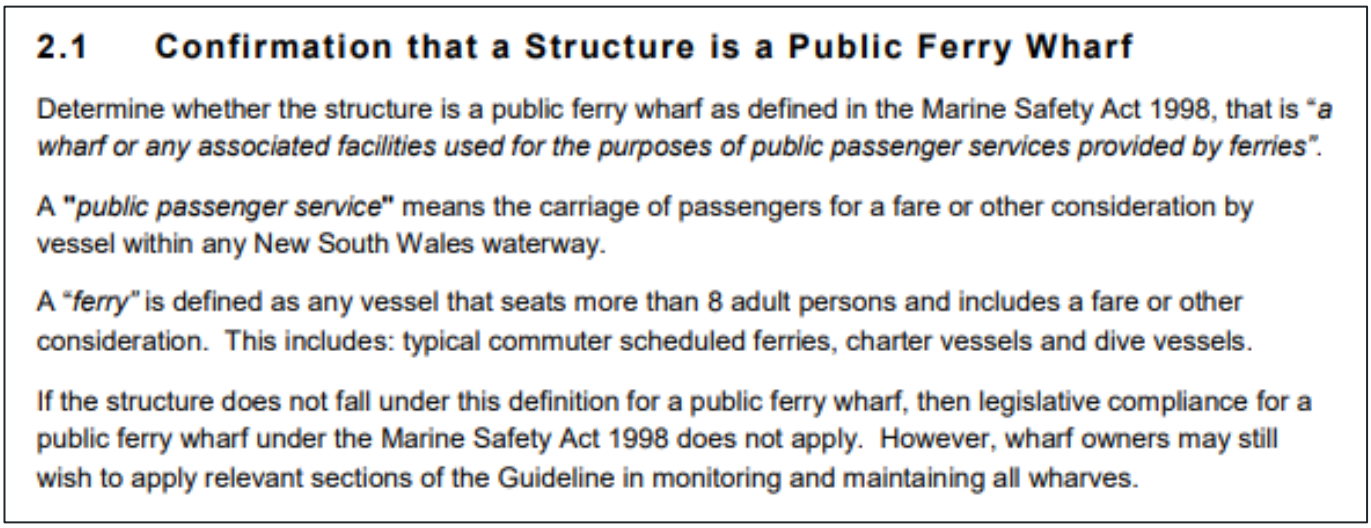
[26] A ferry is defined as a vessel of any class that seats eight or more adult persons, (*Passenger Transport Act, 1990) (NSW)*

[27] The *Guidelines for the Assessment of Public Ferry Wharf Safety* (2016)

1.151 The TfNSW publication *Guideline for the Assessment of Public Ferry Wharf Safety* (2016)[28] was 'prepared to assist owners or persons responsible for the maintenance of public ferry wharves in defining key criteria for safety at public ferry wharves including consideration of safety compliance, structural integrity and risk management'.

1.152 The Guideline documented the definition of a 'Public Ferry Wharf', 'public passenger service' and a 'ferry' (Figure 34) below.

Figure 34: Guideline definitions



2.1 Confirmation that a Structure is a Public Ferry Wharf

Determine whether the structure is a public ferry wharf as defined in the Marine Safety Act 1998, that is "*a wharf or any associated facilities used for the purposes of public passenger services provided by ferries*".

A "*public passenger service*" means the carriage of passengers for a fare or other consideration by vessel within any New South Wales waterway.

A "*ferry*" is defined as any vessel that seats more than 8 adult persons and includes a fare or other consideration. This includes: typical commuter scheduled ferries, charter vessels and dive vessels.

If the structure does not fall under this definition for a public ferry wharf, then legislative compliance for a public ferry wharf under the Marine Safety Act 1998 does not apply. However, wharf owners may still wish to apply relevant sections of the Guideline in monitoring and maintaining all wharves.

Source: TfNSW Guidelines for the Assessment of Public Ferry Wharf Safety (2016)

1.153 The Guideline defined types of wharf structures relevant to OTSI's investigation. The relevant types included Fixed and Floating Pontoon structures.

1.154 The Guideline also provided a general methodology to assist owners with the assessment of the safety of their public ferry wharf. The Guideline provided checklists for use by owners for assessing: safety compliance and the condition of their wharf and whether further works were required such as engineering inspection and assessment, specialist inspections and preparing a maintenance program.

Transport for NSW Wharf Upgrade Program

1.155 TfNSW implemented a Wharf Upgrade Program (WUP)[29] as a part of the NSW Government's Transport Access Program. The program's objective was to improve safety and accessibility on transport infrastructure in NSW by 2022.

[28] https://www.nsw.gov.au/driving-boating-and-transport/using-waterways-boating-and-transport-information/protecting-environment-and-waterways/public-ferry-wharves/public-ferry-wharf-safety-assess

[29] Wharf Upgrade Program | Transport for NSW

1.156 The WUP included a set of wharf design objectives with integrated Human Factors[30] consideration. These included:

- Accessible public transport (compliance with the NSW *Disability Discrimination Act 1992)* (DDA).
- Quicker and efficient boarding and disembarking.
- Customer safety.
- Protection from the environment.
- Sufficient berthing to meet future demand.

1.157 To address these design objectives the WUP identified several wharf design considerations for improved safety. These included:

- When connected to a gangway, a floating pontoon structure (Figure 35) was considered the safest and most efficient design for ferry operations and supported DDA compliance.
- A floating pontoon's ability to move with tidal height changes made for a safer level crossing from ferry to wharf.
- The standard height of a floating wharf above waterline, provided ferry designers with a known height, this allowed them to plan for future vessels, which could safely interface with the pontoons. This would allow for almost level access between wharf and ferry.
- The implementation of a standard wharf design which provided a standardisation of safety equipment, customer information and accessibility improvements.

Figure 35: Mosman Bay wharf and gangway – Floating pontoon structure

Source: TfNSW. Image annotated by OTSI. Note: measurement is approximate.

[30] Human Factors is a scientific discipline that applies knowledge of human capabilities and limitations to the design, operation and maintenance of technological systems.

Lane Cove River public ferry wharves

1.158 At the time of the incident, the structure of all public ferry wharves on the Lane Cove River were identified as a fixed structure (Figure 36). These wharves utilised steps and/or different height landings to meet the challenges of safely embarking and disembarking passengers during tidal changes.

1.159 The design of fixed structure wharves incorporated different height positions to place a gangway. This required a Master aligning their working deck and gangway door with the appropriate step or platform prior to deploying a gangway for passenger transfer.

1.160 When a Master aligned their vessels with a suitable platform or step, it resulted in the ferry position changing with the tide. The effect of this variation in positioning changed the amount of vessel contact with the wharf. As the contact area size reduced and vessel overhang increased, the likelihood of a vessel becoming unstable increased.

1.161 The Lane Cove River passenger ferry service operated to five ferry wharves on the river, four wharves were publicly owned by TfNSW. The fifth, Riverview College Wharf, was privately owned by St. Ignatius College Riverview. Under the definition in the legislation, all were considered a public ferry wharf, meeting the definition of transport infrastructure that came under the oversight of TfNSW.

1.162 The five wharves on the river varied in size, design, and construction materials. While they all shared a foundation of timber supporting piles, two had main decks of concrete. Two wharves (Hunters Hill and Riverview College) incorporated a timber deck and narrow steps. Hunters Hill had five steps of approximately 0.8 m depth available for berthing operations.

Hunters Hill Wharf

1.163 Hunters Hill Wharf had a berthing face of approximately 7.2 m. Hunters Hill Wharf (Figure 36) included mooring posts[31] for vessels and had nonslip paint and defined edge markings on the deck and steps.

Figure 36: Hunters Hill Wharf – fixed structure

Source: OTSI, annotated by OTSI.

1.164 Hunters Hill Wharf did not have a recovery ladder for persons in the water to utilise. The 0.8 m depth steps where narrower than the gangways utilised by CCC, this increased the risk of the gangway becoming unstable during operations.

Longueville Wharf

1.165 Longueville Wharf was similarly built of timber on a base of timber piles. It differed from the other four wharves on the river as far as it utilised three separate ramps of different height to address various tidal heights (Figure 37). Higher tidal levels were challenging due to highest ramp being significantly lower than a 24 m ferry's deck. This wharf had a berthing face of approximately 12 m due to an additional two dolphin[32] type pile structures at either side of the wharf face.

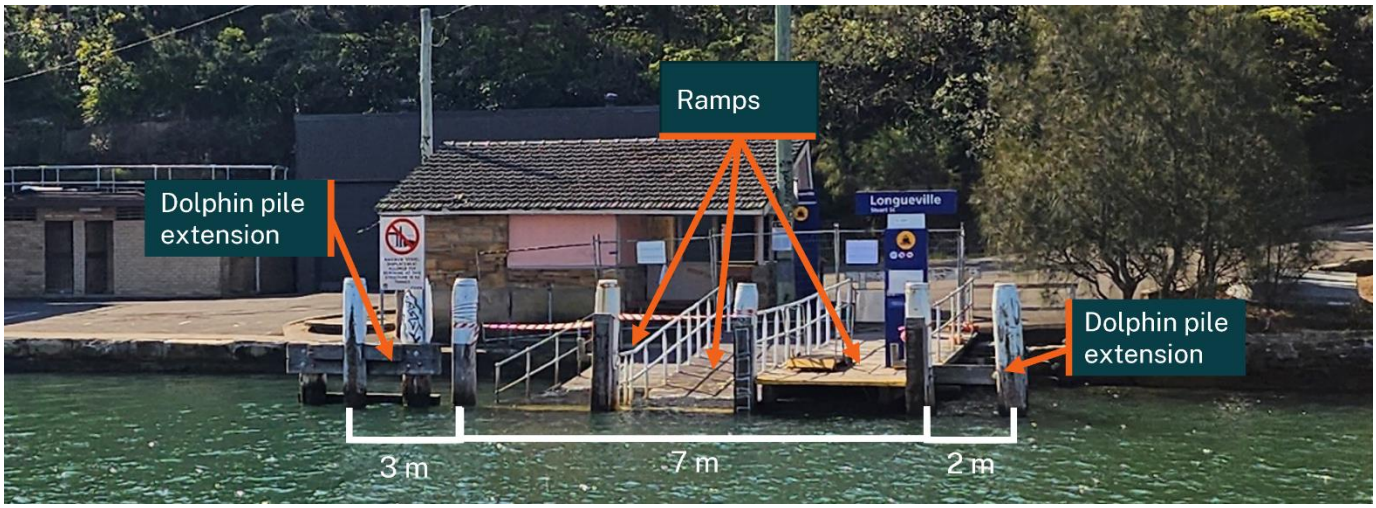
1.166 With only three landing heights for a Master to utilise when deploying a gangway, operations to Longueville Wharf were significantly affected by tidal changes. When the tide allowed for a level gangway, the three ramps offered reasonable safe boarding for passengers. At other times, a crew had to judge which offered the least change of height relative to the ferry deck to minimise gangway angle of incline.

[31] A mooring post, also known as a wharf cleats or bollard, provides for a mooring line to be attached to secure a boat during berthing.

[32] A dolphin is a group of pilings arrayed together to serve variously as a protective hardpoint along a dock, in a waterway, or along a shore; as a means or point of stabilization of a dock, bridge, or similar structure; as a mooring point; and as a base for navigational aids.

1.167 At higher tides such as those above 1.8 m, the three ramps could become inundated with water and not allow access to the ferry without actual movement through water. Attempts to use the wharf in these conditions decreased safety and resulted in steep angles of gangway incline.

Figure 37: Longueville Wharf – fixed structure



Source: OTSI, annotated by OTSI.

Northwood and Bay Street Greenwich Wharves

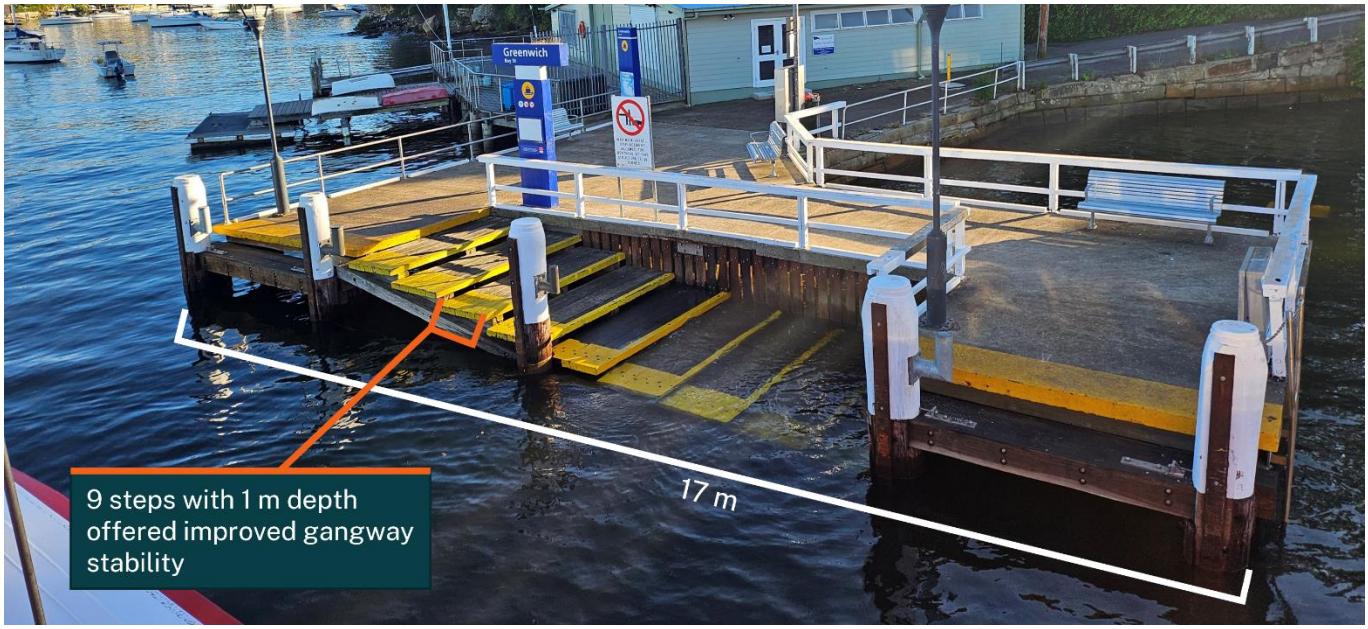
1.168 Northwood (Figure 38), and Bay Street Greenwich (Figure 39) wharves shared similar construction and design to the smaller step wharves (Hunters Hill & Riverview) but were significantly larger in dimensions. Both the larger wharves were built on a foundation of timber piles, but differed in that they had a concrete deck instead of timber planks.

1.169 The larger step wharves were almost identical in size and dimensions to each other and offered a berthing face of approximately 17 m. The larger berthing face offered potentially improved stability for vessels to lay alongside of. Both wharves also had more steps (nine) with a larger depth (1 m), these provided more area for crew to place gangplanks upon, which resulted in improved gangway stability. Northwood wharf had a Person Overboard ladder in the middle of the eastern top platform, the ladder rendered this platform impractical for ferry operations.

Figure 38: Northwood Wharf – fixed structure

Source OTSI, annotated by OTSI.

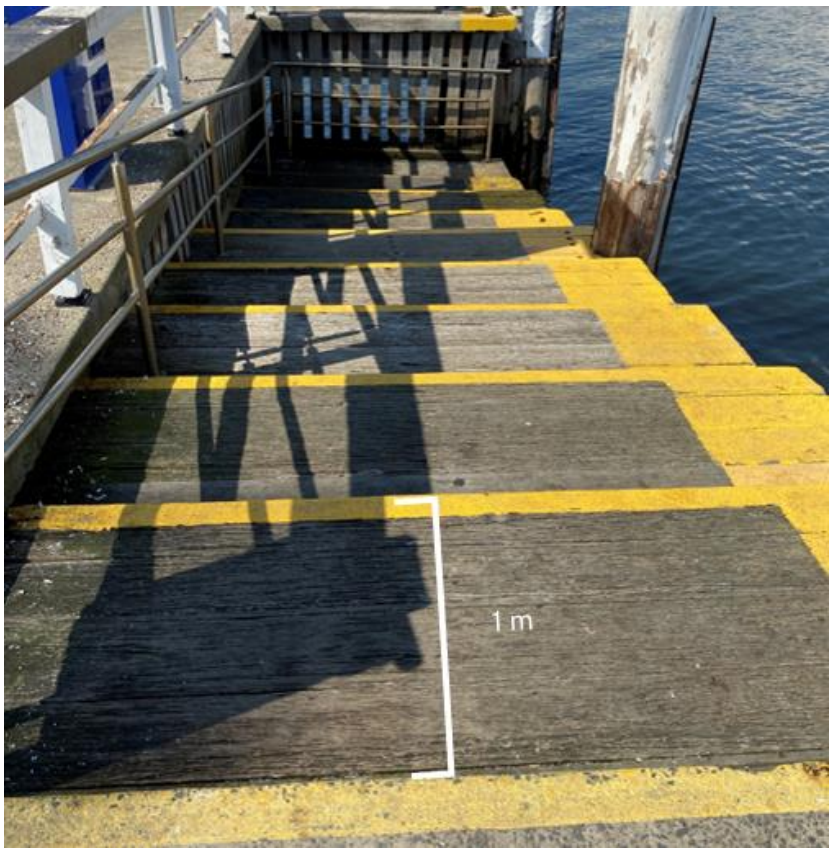
Figure 39: Bay Street Wharf – Greenwich – fixed structure



Source: OTSI, annotated by OTSI.

1.170 The increased size and number of steps provided additional options for crews when securing a ferry and deploying gangways in different tidal conditions. The larger and increased number of steps, allowed for the stable placement of a gangway with a decreased angle of incline. This resulted in improved access for passengers, across a larger tidal range (Figure 40).

Figure 40: Bay Street Wharf steps.



Source: OTSI, annotated by OTSI.

1.171 TfNSW provided information to OTSI detailing wharf condition assessments for Riverview College Wharf carried out by TfNSW prior to the incident. The assessments identified some non-conformances including loose deck planks, missing knee rail guards and a need to refurbish the anti-slip surface on wharf steps. TfNSW noted Saint Ignatius' College rectified the identified non-conformances. An independent report, commissioned by CCC, carried out on 15 August 2023, against the TfNSW *Guideline for the Assessment of Public Ferry Wharf Safety* (2016), found all wharves on the Lane Cove River were non-compliant with one or more of the guideline's checklist items. For example, Riverview College Wharf did not meet the guideline requirements relating to safety ladders, lighting, markings, and anti-skid treatment.

1.172 The post incident assessment also reported that all the Lane Cove River wharves did not meet the desired outcomes of the *Disability Discrimination Act 1992 (Cwlth)*, and its associated *Disability Standards for Accessible Public Transport 2002*.

Related occurrences

1.173 OTSI recorded 66 notifications of Persons Overboard (POB) from 2006 to February 2023. Of these notifications, 18 occurred during embarking /disembarking operations.

1.174 While no POB gangway incidents occurred at the Lane Cove River wharves prior to the time of the incident, nine occurred at fixed structure type design wharves.

Part 2 — Analysis

Introduction

2.1 The investigation focussed principally on the factors that contributed to the loss of the gangway and passengers from the ferry: the interaction between wharf and ferry, and crew training. The investigation also considered aspects how the Captain Cook Cruises (CCC) SMS was applied to manage the risk of passengers falling from the ferry due to the gangway falling, and human factors associated with the vessel design.

Operator's Safety Management System

2.2 OTSI conducted a review of the involved operator's fleet wide generic and Super Rocket Class sections of their Safety Management System (SMS) against the requirements of Marine Order 504 and AMSA guidelines. The review focused on the operator's risk management approach for passenger disembarkation/embarkation risks and Lane Cove River ferry service operations.

Risk Assessment

2.3 The operator's Super Rocket Class risk assessment identified risks and control measures (SMS procedures) associated with safe passenger transport operations on this class of vessel. The risk of 'Person Overboard' was included in the Super Rocket Class risk assessment and subsequently reviewed post incident.

2.4 Before mitigation, the risk of Person Overboard was rated as an extreme risk which CCC considered unacceptable and required treatment/mitigation. While CCC identified various control measures to mitigate the extreme rating of the untreated risk, the control measures did not account for the following (see *Safety Management System Procedures*):

- How two crew should manage crowd control during a person overboard incident.
- Vessel design challenges the master may experience with the restrictions on their direct line of sight to monitor gangway and berthing operations.
- Passenger cabin door management during gangway operations.
- Specific instructions for berthing at the relatively small, fixed wharves on the Lane Cove River.

2.5 While CCC recognised the risk rating of Person Overboard was reduced to 'High' and required further treatment, there was no further details provided in the risk assessment as to how this was to be achieved.

2.6 OTSI observed the risk of passengers carrying luggage while moving across a gangway was not identified in CCC's Super Rocket Class Operational Risk assessment. The risk was also not identified in the related CCC SMS procedures. The incident highlighted this risk when student 18 fell into the water wearing a backpack over their shoulders that hindered their ability to escape from the overturned gangway. Wearing a weighted backpack over both shoulders would also have restricted a student's ability to swim.

Safety Management System Procedures

2.7 A Master faced significant challenges to meet the operational requirements detailed in the Safe Gangway Usage procedure on the Super Rockets. This was due to the design limitations of the vessel which included; a Master's lack of clear line of sight to the wharf and gangway, and restricted verbal communication between the crew. The Master also had limited visibility of the working deck and gangway via the CCTV monitor on the wheelhouse console.

2.8 The line of sight limitations resulted in the Master having to rely on the ability of their Deckhand to assist and warn of potential hazards. Such hazards included the ferry not maintaining a stable position against the wharf resulting in the potential for the gangway falling into the water. The vessel design limitations placed a reliance on effective crew communication and teamwork in order to meet the procedure requirements of maintaining passenger safety on the gangway.

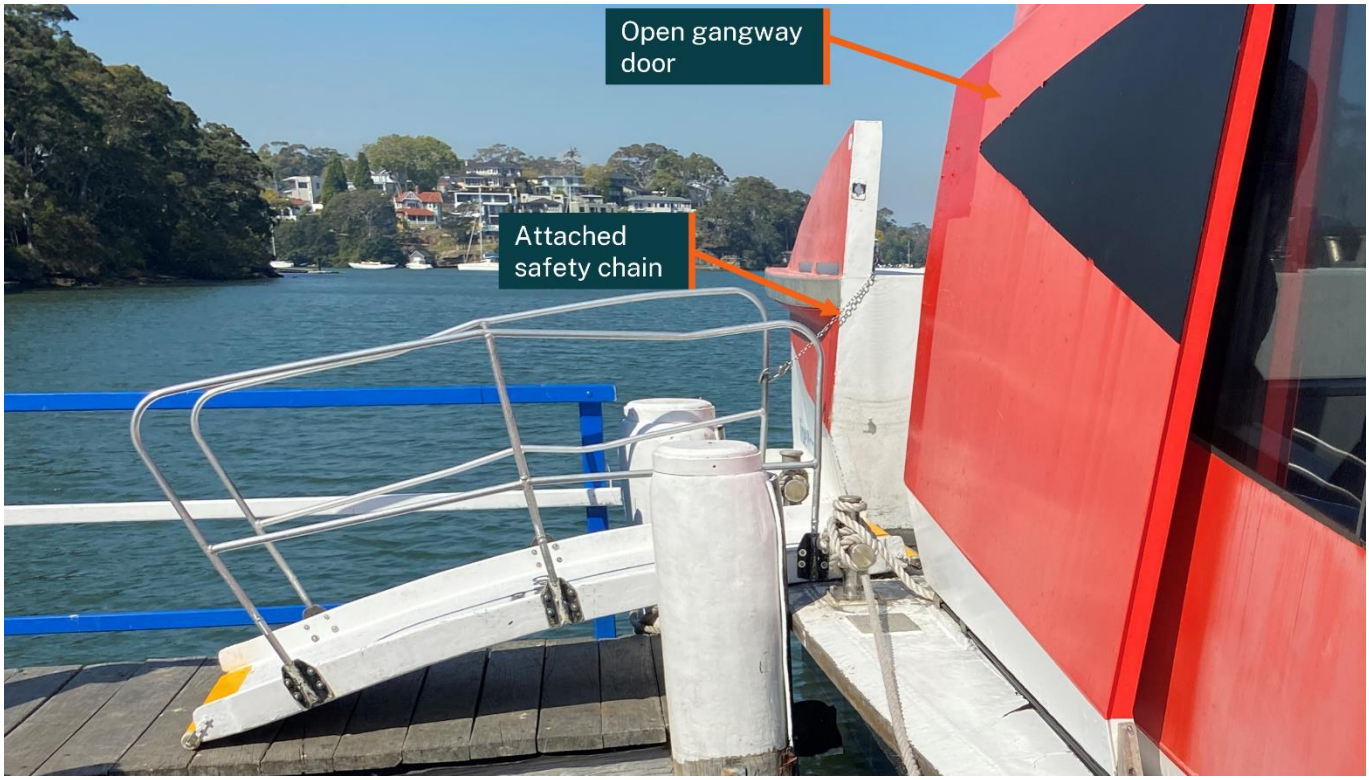
2.9 Verbal communication between the crew was restricted by the layout of the wheelhouse windows, which did not open at the point the crew faced each other. To help address that issue the crew utilised a voice communication system to communicate when berthing. When activated, the system allowed the Deckhand to communicate with the Master without having to press any buttons. The Deckhand could just talk towards the two way speakers and the message was transmitted to a speaker in the wheelhouse.

2.10 The use of the voice communication system was not without challenges. When in use the speakers could pick up most sounds and transmit them to the Master. Such sound could include nearby passenger voices or wind that may be transmitted as white noise (interference) to the Master. Noise transmitted to the wheelhouse could impede communication between the crew. When the deck was empty the Master and Deckhand could communicate clearly.

2.11 The Safe Gangway Usage procedure also provided instructions for the Deckhand. These instructions included that a Deckhand instruct passengers to keep clear of the gangway until it was secure. A Deckhand was also instructed to attach a safety chain[33] (Figure 41) when deploying the gangway and manage the flow of passengers across the gangway. The procedures did not specifically instruct the crew to keep the cabin doors shut while they were securing the vessel during berthing.

[33] The safety chain was intended to reduce the likelihood of the gangway moving and falling in the water from the ferry.

Figure 41: Gangway with safety chain attached



Source: OTSI, chain is secured to gangway handrail at one end, with the other tethered to the vessel.

2.12 On the day of the incident, it was noted that the safety chain was not attached from vessel to gangway. It was also noted that during the berthing and POB recovery operations, the passengers were not kept clear of the forward working deck. On both occasions, the port cabin door remained open which allowed students to gather around the open gangway area. The lack of control of students on the working deck, permitted the student 19 to step into the open gangway door and jump into the water while the Deckhand went to obtain the recovery ladder.

2.13 OTSI assessed how the unfastened safety chain and open cabin door affected the incident. The safety chain was intended to connect to the gangway handrail at one end, and to the vessel at the other. The chain would most likely have supported the weight of the gangway alone. However, the chain was not designed to support the weight of the gangway and three children with luggage. At best, the gangway would have remained attached to the ferry, but the children would still have fallen. If the chain were attached and then did not break, the gangway would not have fallen into the water and overturned on top of the children, but also would not have been available as a floatation device for the children to hold on to.

2.14 While the Embarkation and Disembarkation Procedure included an instruction to secure sliding gates and doors after a vessel departed a wharf, it was silent on what was to occur during berthing and gangway operations. A specific instruction to keep the cabin door closed while the Deckhand focused on berthing the vessel, would have reduced the likelihood of passengers entering the working deck and the need for the Deckhand to monitor passengers. A closed cabin door would have also helped to provide the Deckhand with a clear safe work area to concentrate on securing the vessel and deploying a gangway.

2.15 The Person Overboard procedure identified crowd control responsibilities, assigned to a third crewman (the commentator[34]) if onboard. The SMS did not identify how crowd control was to be addressed when the vessel was operated by two crew.

2.16 On the day of the incident, the forward cabin door was open which allowed passengers to enter the working deck and negatively impact on the berthing operation, by hindering voice communication between Master and Deckhand. The cabin door remained open during the POB recovery operation, allowing students to remain uncontrolled on the working deck. The students on the working deck at that time were subsequently exposed to crowding hazards and a risk of themselves falling into the water through the open gangway door. During the POB recovery, the presence of the students hindered the Deckhand as they retrieved equipment in preparation for the recovery of those in the water. As the Deckhand focused on deploying equipment for recovery, they did not maintain effective passenger control at the gangway door (Figure 10 on page 16). The absence of passenger control on the working deck, permitted Student 19 to jump into the water.

2.17 Whilst the passenger control was ineffective on the working deck, OTSI recognised that it was likely the assistance provided by Student 19, after jumping into the water, to Student 16 ensured they were able to surface from under the overturned gangway.

2.18 CCC's procedures relating to safe berthing, gangway operations and person overboard response identified practices generally accepted and recognised in the maritime industry. However, none identified or provided mitigation for specific operational limitations presented by the Super Rocket class operating on the Lane Cove River. Those limitations were consistent with OTSI's assessment of CCC's Super Rocket class risk assessment (see Risk Assessment on page 57).

Crew training

2.19 OTSI's review of the CCC competency assessment documents identified tasks that had to be demonstrated by a trainee prior to being considered competent. However, they did not include details of how these tasks were to be demonstrated to be considered competent. For example, the Fast Ferry Deckhand Training Checklist (Figure 32) included a requirement to demonstrate rope work methods and techniques. One of the rope work assessment categories included the requirement for the trainee to secure a vessel. The elements required to safely perform securement of the vessel were not described. Such elements included; keeping a Deckhand's hands and feet clear from pinch/entanglement hazards, method of mooring line attachment to crucifix bollards, and keeping passengers clear of the working area.

2.20 The absence of detailed assessment elements was likely to result in individual trainers using their personal experience to form an opinion on what they considered to be appropriate. This system increased a risk of inconsistent competency outcomes of trainees, as training was left to individuals to determine how a task was to be carried out in a competent manner.

[34] A third crewman was carried during offshore operations, and a commentator could be carried on CCC services to provide a commentary on sight seeing journeys.

2.21 OTSI is aware of the generally accepted marine practices covering berthing and gangway operations. Those included:

- The establishment of a mutual crew plan for berthing the vessel.
- Keeping the working deck clear of obstructions (gangway/rope) to avoid trip or entanglement hazards.
- Correctly judging mooring line length and the vessel securing method.
- Control of a safe number of passengers over the gangway.
- Monitoring of vessel position against the wharf to establish and maintain safe gangway securement.

2.22 A review of the incident CCTV recording highlighted that the crew made several unsuccessful attempts to correctly position the ferry alongside the wharf. During these attempts, the crew exhibited several actions that would not have met the general marine practices.

2.23 The absence of detailed competency assessment elements in the training documents removed the opportunity for the ferry operator to reliably identify and confirm a Deckhand's competency to carry out the desired methods. A similar absence of detailed competency assessment elements for the Master's role was also identified.

Wheelhouse design

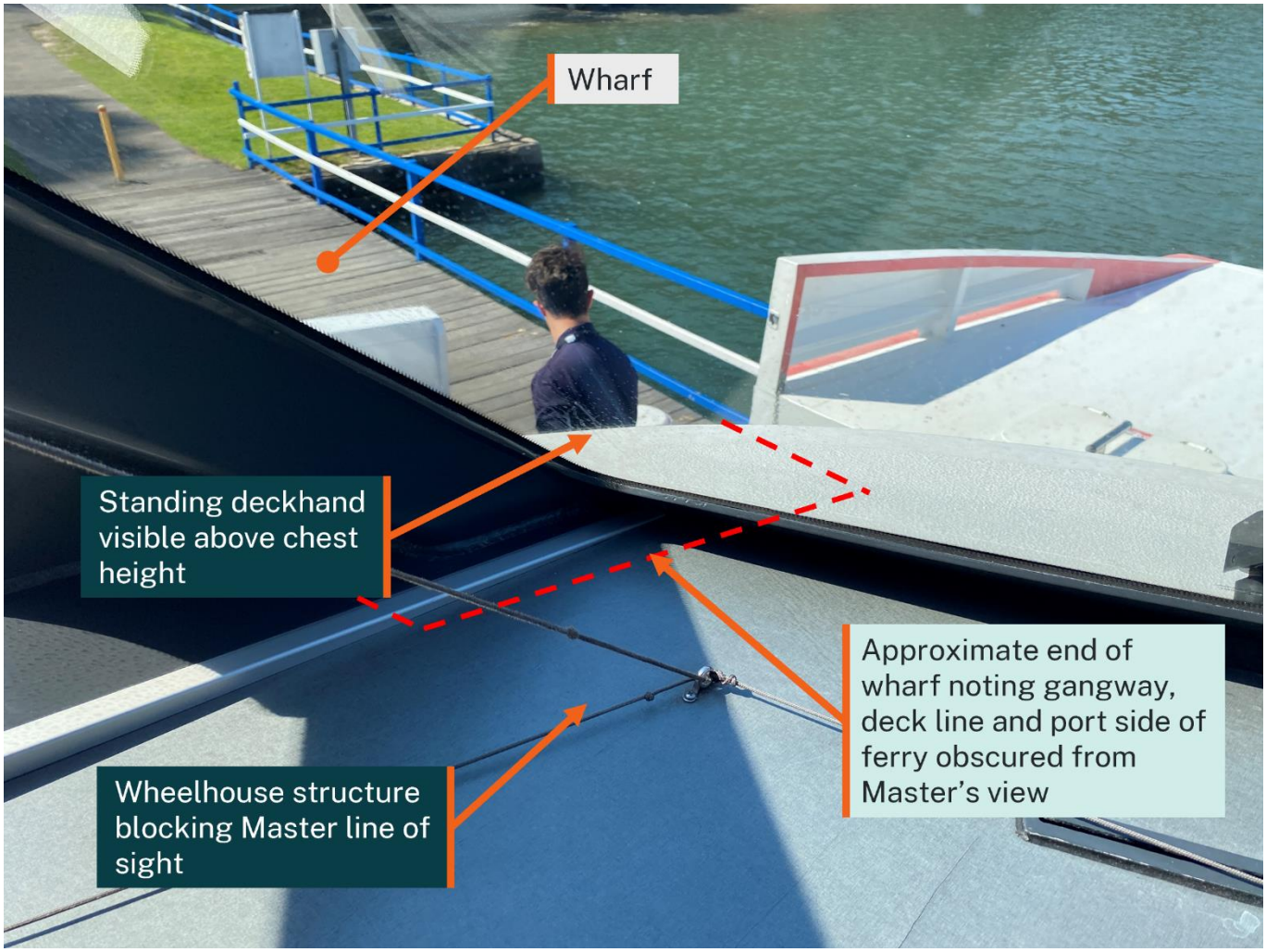
2.24 A review of the SMS procedures emphasized that for the crew to achieve safe passenger operations on *Violet McKenzie,* effective teamwork was necessary. The crew faced several challenges in carrying out the berthing and gangway instructions contained in the SMS when operating the Super Rocket class of ferry. As discussed above, several factors worked against the crew in achieving the SMS instructions.

2.25 On the involved vessel class, the Master's position in the wheelhouse did not have clear line of sight with the forward gangways doors, gangway, the wharf face or vessel crucifixes (Figure 42). As such, the Master faced significant challenges to comply with the Safe Gangway Usage procedure on the Super Rocket Class. These significant challenges included a Master being able to achieve the following:

- actively supervising the boarding area
- directing passengers and crew
- ensuring the gangway was safe without excessive incline while maintaining vessel position.

2.26 The line of sight restrictions resulted in the Master having to rely on CCTV and their Deckhand to assist and warn (via hand signals and voice communication) the Master of potential hazards. Such hazards included the ferry not maintaining a stable position against the wharf resulting in the potential for the gangway falling into the water.

Figure 42: View of working deck from Master's position

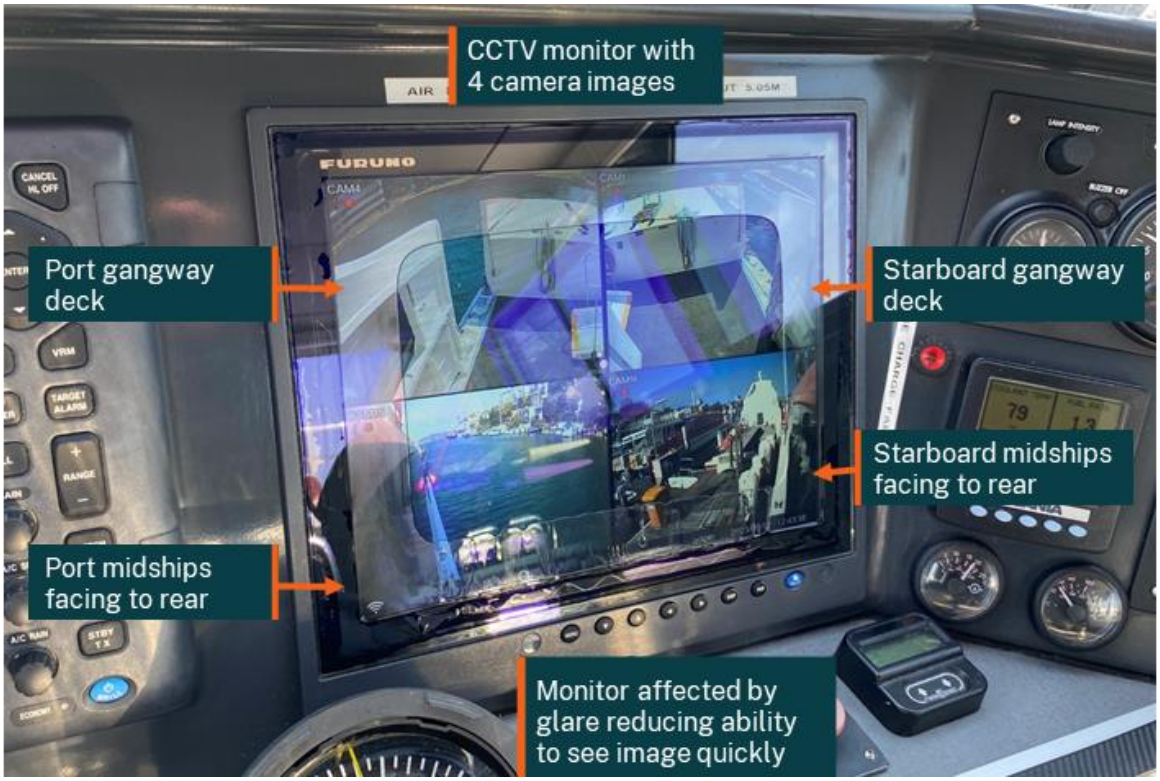


Source: OTSI, annotated by OTSI.

2.27 *Violet McKenzie's* CCTV cameras provided limited visibility to the Master. In addition, not all of the CCTV camera streams were shown to the Master on the wheelhouse console monitors. Of note in this incident the default monitor setting did not provide a view of the port side of the vessel where it interacted with the wharf (Figure 3 on page 10). The selection of CCTV camera views to be displayed at the wheelhouse console could be changed using a computer mouse located near the floor of the wheelhouse. That interaction could lead to the detriment of maintaining a proper lookout during a ferry journey or at the time of berthing operations.

2.28 When a Master utilised any CCTV monitor, their concentration was focused on the monitor, and away from the forward working deck where the berthing and gangway operations were undertaken. Several challenges could arise in using the CCTV monitors as configured at the time of the incident. These challenges included glare affecting the clarity of the monitor's image during daylight, hindering the Master's ability to quickly glance at it (Figure 43). In addition, the partitioning of the monitor into 4 small camera streams potentially further increased the amount of concentration and time a Master utilised when viewing the monitor.

Figure 43: CCTV monitor showing images from 4 cameras with reflections from other sources



Source OTSI. Image annotated by OTSI. Note: screen images and reflections not indicative of conditions at time of incident

2.29 Without direct visual reference cues of the vessel's position relative to the wharf, a Master could lose situational awareness when attempting to monitor operations looking at screens located inside the wheelhouse. The likelihood of distraction also increased as a Master attempted to carry out multiple tasks requiring a change of focus on multiple items. While utilising the CCTV screen, a Master's attention was focused away from the gangway location. When a Master focused their attention on the internal CCTV screens, they risked of a reduction of their situational awareness to external factors. At such a time, a potential loss of situational awareness increased the likelihood that external factors (wash from passing vessels, high wind gusts, vessel position, gangway monitoring, passenger crowding etc.) could potentially affect the berthing process before the Master recognised and reacted to their existence.

2.30 The Master advised that at the time of the incident, they were making announcements for passengers and monitoring CCTV. On the day, the vessel microphone used to make announcements was located on the opposite side of the wheelhouse to the wharf, further adding to the Master's difficulty in managing the port side berthing operation. While this would be a challenge for a Master familiar with the vessel class and Lane Cover River service, it was a further challenge that a Master with limited experience on the Super Rocket Class operating their first school service to the Riverview College Wharf had to manage.

2.31 OTSI noted that while the CCTV screens potentially aided a Master in monitoring the berthing process and transfer of passengers, their use was not without risk. A clear line of sight to the gangway would have removed the need for aids such as CCTV during the gangway operation and likely improved crew teamwork.

2.32 As highlighted above, the default set up of camera angles shown on the CCTV screens were such that none of the images clearly showed the vessel position in relation to gangway and wharf interface. OTSI observed that two large CCTV monitors on the wheelhouse console displayed rearward facing images (Figure 25). These images, while beneficial in providing visibility during a reversing manoeuvre, could not assist the Master during berthing and gangway operations.

2.33 As a consequence of those limitations the Master primarily relied on a less reliable control of communication from the Deckhand regarding the safe securement of the gangway and vessel to the wharf.

Vessel crewing assessment

2.34 The vessel crewing assessment conducted prior to *Violet McKenzie* starting operations resulted in the minimum crew of two being assessed as suitable for normal harbour operations. This minimum number of two crew was permissible under National Law guidelines (see Regulatory information and Operator information).

2.35 The operator's crewing assessment was based on two crew working together to safely operate the ferry during passenger operations. While the assessment identified risks such as vessel positioning against the wharf, Person Overboard and Crowd Control, it did not identify how the crew would mitigate such risks during berthing, recognising the Super Rocket Class ferry design constraint risks (Master line of sight and crew communications). As such, the SMS did not contain clear procedures relevant to *Violet McKenzie* to mitigate those design constraints.

2.36 Had the design constraint risks been identified, then suitable procedures for two crew to manage safe gangway operations could have been included in the SMS.

Crew actions during berthing and emergency response operations

2.37 Effective teamwork based on clear communication and an understanding of individual roles can minimise errors resulting from distraction during high task load[35] operations. During safety critical periods, such as berthing and gangway operations, ineffective crew communication and teamwork can increase the likelihood of incidents occurring. Factors such as inadequate line of sight between a Master and the working deck, and obstructed vision to the wharf/vessel interface, act to reduce a Master's overall situational awareness and hazard identification ability.

2.38 The incident sequence of events highlighted that the crew did not have an agreed plan for securing the vessel at Riverview College Wharf. This resulted in the crew not having a shared understanding or mental model of how the vessel would be positioned, or which part of the platform would be used.

[35] Task load refers to the level of difficulty an individual encounters when performing a task. It encompasses various elements such as time required to complete the task, the complexity of a task and the number of tasks involved.

2.39 The berthing conditions (environmental, vessel and wharf interaction) that were present at the time, combined with the passenger management challenges created by the time pressure of the late running service, created a circumstance that required clear and coordinated crew management.

2.40 Ferry passenger transport requires a ferry to berth and load/unload passengers, often multiple times per trip. When considering the frequency a ferry conducts these operations, vessel design plays a key role in the management of a safe outcome. Vessels which offer a Master unobstructed visibility, and facilitate clear crew communication, assists a crew to deliver safe berthing/gangway operations.

2.41 On the day of the incident, the crew attempted to berth the ferry, while passengers grouped uncontrolled on the working deck. Once the Deckhand placed the gangway on the wharf, the Master turned their attention down into the wheelhouse and onto their dash CCTV. At the same time the Master made announcements informing passengers to make their way to disembark. The ineffective management of passengers during the berthing process negatively impacted clear communications between the crew.

2.42 The school children carrying bags and assorted sporting equipment moved quickly over the gangway, while the Deckhand concentrated on counting those disembarking the ferry. At no point prior to the incident did the Deckhand attempt to slow the passengers across the gangway.

2.43 Both the crew were focused on individual aspects of the berthing process, and neither identified that the ferry was moving away from the wharf. At interview, the crew identified that they were running behind schedule as they approached Riverview College Wharf. The berthing took several attempts, all observed by the noisy students. Following each unsuccessful attempt to berth, the students became noisier, this resulted in the Deckhand recalling that they could not clearly understand what the Master was saying over the intercom.

2.44 OTSI recognised the crew had limited experience working together carrying out their respective roles on the Super Rocket Class operating the student service on the Lane Cove River to the Riverview College wharf. In particular OTSI also recognised the master had limited experience in managing the incident circumstances considering the following:

- It was the first occasion the Master was in command of a Super Rocket Class Vessel operating to the Riverview College Wharf for a school student service. The Master had completed 60 hours in command of the vessel class with eight of those hours on the Lane Cove River (out of school service).
- The Super Rocket Class line of sight restrictions a Master would experience of the gangway position during gangway operations.
- Maintaining the gangway in a safe position for a period of time to facilitate the high volume of passengers (school students) disembarking from the vessel on that first occasion.
- The Master operating astern during gangway operation with that method presenting challenges to maintain the vessel position alongside the wharf (see *Examination of the interaction between vessel and wharf*).

The lack of passenger control, repeated berthing attempts, design challenges (both vessel and wharf) combined with the crew's limited experience with the operational conditions on the day,

increased the likelihood that an error would occur when attempting to carry out concurrent tasks. For example, as the Deckhand focused on securing the vessel, the management of passengers deteriorated, and they moved onto the working deck and later crowded onto the gangway. Subsequently, when the Deckhand changed their focus to counting the passengers, the monitoring of the vessel position in relation to the wharf was overlooked. The SMS procedures relating to gangway, at the time of the incident, did not detail how the crew were to manage the multiple concurrent tasks safely.

2.45 The Deckhand advised that they were focused on counting passengers as they disembarked and did not notice the vessel was drifting away from the wharf. That focus was indicative of the Deckhand's inexperience in not prioritising their role to assist the Master in monitoring safe gangway securement over counting passenger numbers.

2.46 OTSI consider the limited operational experience of the crew and their pairing were unlikely to have the skills and knowledge to effectively identify and manage risks that presented during the disembarkation of students to Riverview College Wharf while running astern. That was particularly evident given the crew were subject to; challenging berthing conditions present at the time of the incident, line of sight vessel design limitations, training and competency system limitations, and SMS related risk management limitations.

2.47 The actions and decision making of the involved crew, who had not worked together on this ferry service or vessel class before the incident, were likely influenced by limited operational experience in their roles, crew pairing, time pressure and berthing conditions.

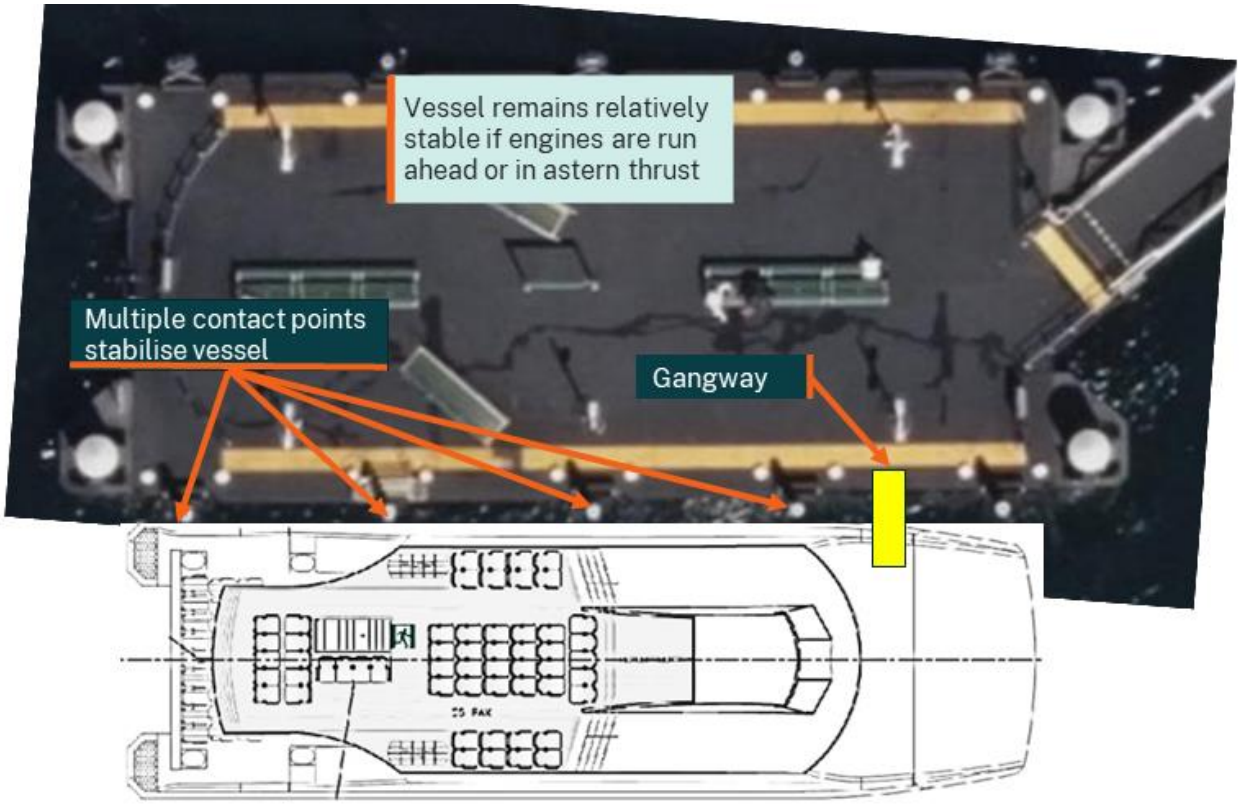
2.48 During the berthing and POB recovery processes, the ineffective passenger control displayed by the crew resulted in increased risk resulting in student 19 jumping through the open gangway door into the water. However, parts of the POB recovery were undertaken effectively. OTSI recognised the crew response to manoeuvre the vessel to the students in the water and the actions they undertook during the recovery were timely and efficient.

Examination of the interaction between vessel and wharf

2.49 Passenger ferry transport incorporates several associated risks to safety. To ensure a successful and safe service, these risks must first be identified then managed. One of the most significant risks encountered in passenger ferry operations is during the boarding and disembarkation of passenger at wharves.

2.50 A significant influence on passenger transfer safety is the vessel/wharf interface, how well a vessel/wharf interact with one another. A large wharf berthing face and level deck height offer increased stable options for gangway placement and superior surface area for a vessel to lay alongside. The larger surface offered by the berthing face improves vessel stability with the engines engaged in ahead or astern (Figure 44).

Figure 44: Image showing vessel alongside a large floating pontoon type wharf

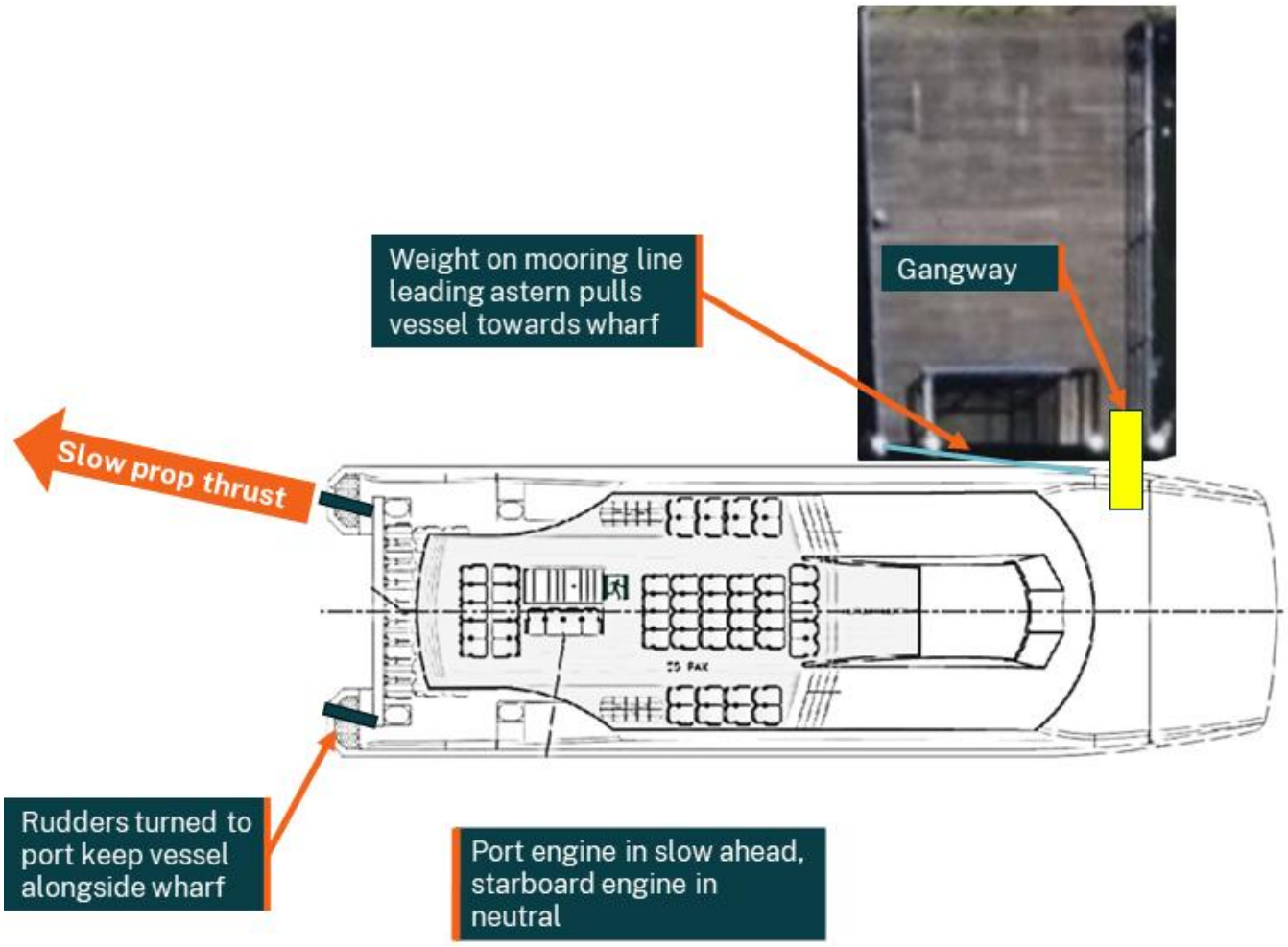


Source: Six maps and CCC annotated by OTSI. For illustrative purpose only not to scale

2.51 As wharf berthing face length decreases, the amount of vessel that can be supported by the wharf is also reduced. The reduced support provided by the wharf requires a Master to utilise engine thrust to stabilise the vessel alongside the wharf. When a Master engages forward thrust (running ahead), the vessel is pulled alongside the wharf by the mooring line deployed by their crew. Any subsequent movements by the vessel can be corrected by small movements of the steering (Figure 45).

2.52 In calm to moderate conditions, common practise in the marine industry is to engage one engine ahead, to maintain the vessel position alongside a wharf. When one engine is utilised a reduced force on the mooring line occurs, lessening the likelihood of it breaking and reducing wear. If conditions (tide and wind) require both engines to maintain position, a Master will often instruct crew to place a second line on the wharf to maintain position.

Figure 45: Image showing vessel berthed alongside wharf, using engine thrust and rudders to stay alongside running ahead



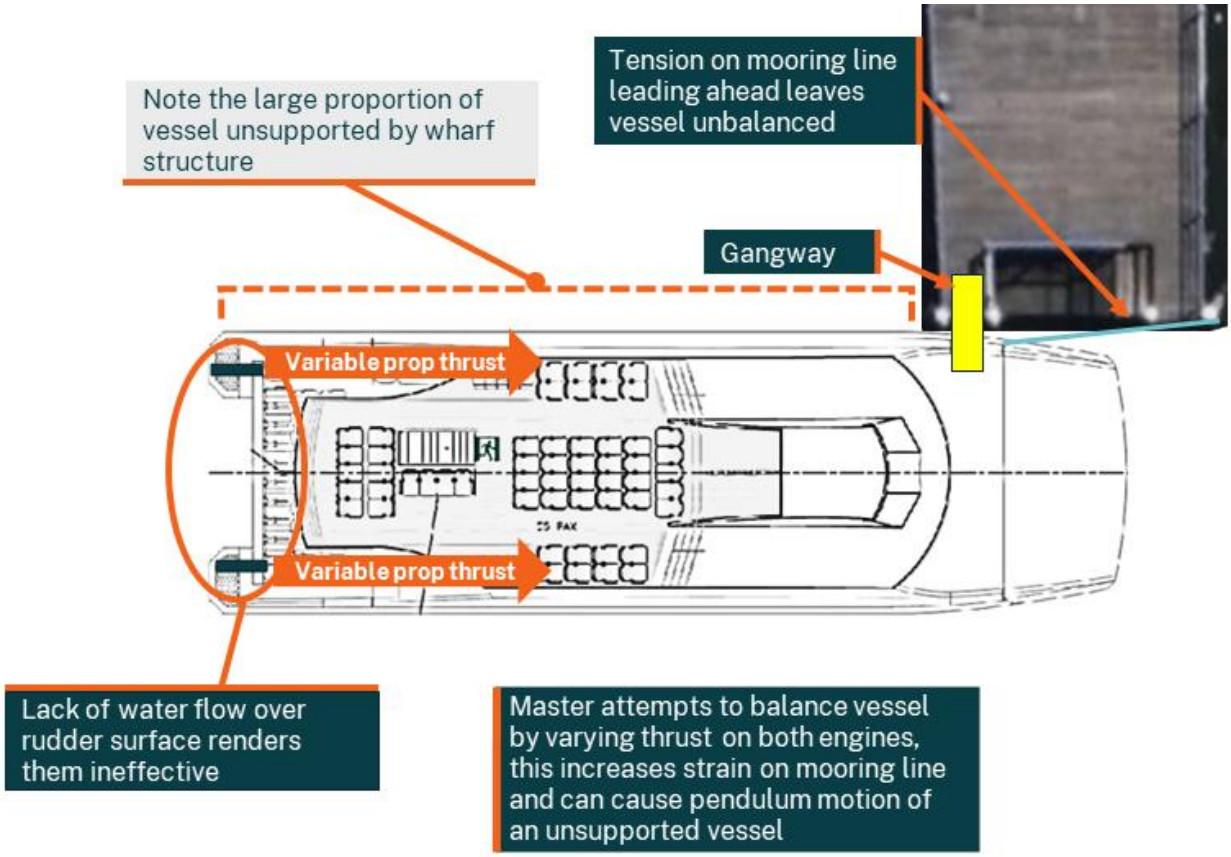
Source: Six Maps and CCC annotated by OTSI. For illustrative purpose only not to scale

2.53 When engines run ahead, water is pushed by the propeller towards the stern and flows over the rudder surface allowing a Master to make small rudder adjustments to keep the vessel stable. When combined with the natural tendency of the mooring line to pull the vessel towards a wharf, a vessel is likely to remain in a stable position using that berthing technique.

2.54 Prior to the incident, CCC had not identified the ferry interaction with small wharves as a risk and their SMS did not contain detailed procedures specific to operating at these smaller wharves. As a result of this Masters operating on the Lane Cove River service had developed their own informal preference of berthing practice.

2.55 The Masters that ran astern would approach a wharf as normal, and then engage the engines astern (in reverse) and lay back on a mooring line. The Master would then vary reverse thrust on either engine to maintain vessel angle and wharf position (Figure 46). The reverse thrust pushed water flow away from the rudders, rendering them ineffective. Crew had favoured this approach as the placement of the crucifix bollards on the ferries at the time of the incident were easier for the Deckhand to secure the mooring line (Figure 22 on page 28).

Figure 46: Image showing vessel running engine thrust astern and pulling back on a mooring line



Source: Six Maps and CCC, annotated by OTSI. For illustrative purpose only not to scale

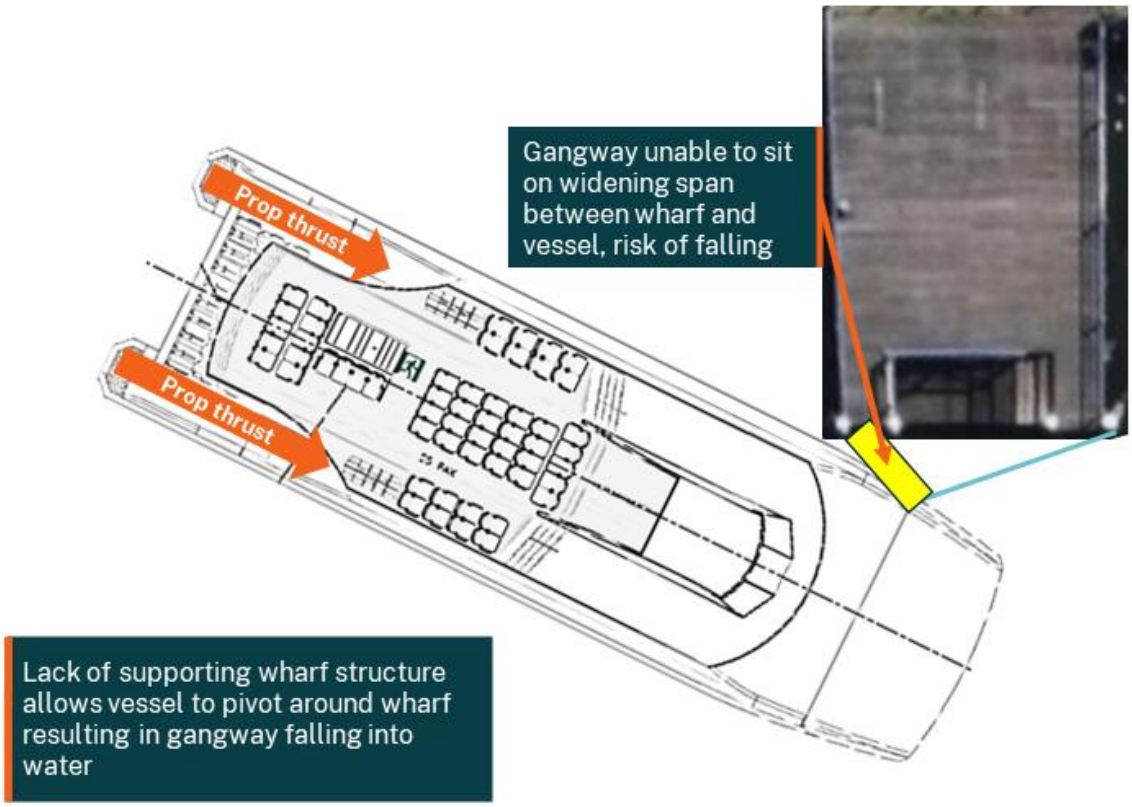
2.56 Several forces on the vessel such as wind and tide (external) and the amount of thrust (internal), affect the Master's ability to maintain a stable position alongside a wharf. The stronger the force applied by the external factors, the greater the thrust a Master must utilise to compensate and maintain a safe berthing position.

2.57 When a Master increased or varied astern thrust, an unsupported stern was likely to swing like a pendulum, resulting in the Master further increasing or varying thrust to compensate. Varying the engine thrust would result in a mooring line alternately stretching and contracting (Figure 47).

2.58 If care were not taken a mooring line, especially if relatively long, could allow the vessel bow to move away from the wharf. Keeping a mooring line as short as possible could mitigate that somewhat by limiting bow movement.

2.59 When a bow moves away from the vicinity of the wharf, a gangway could quickly become unstable and eventually fall off either the wharf or vessel (Figure 47).

Figure 47: Image showing vessel with thrust engaged astern, directing water flow away from rudders rendering them ineffectual



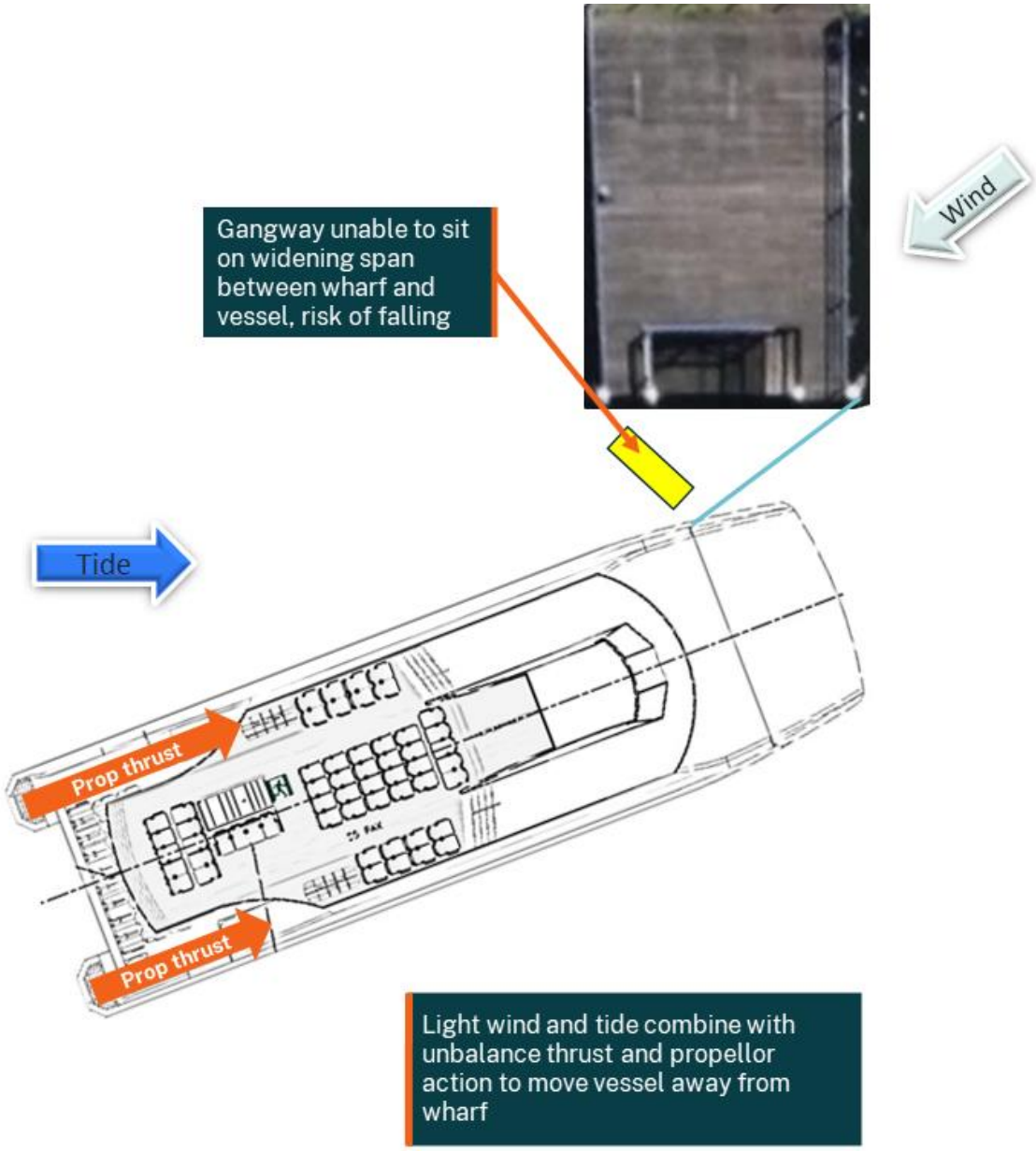
Source: Six Maps and CCC. Image annotated by OTSI. For illustrative purposes only, not to scale

2.60 A Master requires significant concentration to maintain a vessel in position considering the result of external and internal forces acting on it. If the Master fails to respond effectively to the vessel's pendulum motion, a risk of the gangway becoming dislodged significantly increases. On the day of the incident, both wind and tide, while not strong, acted upon the vessel to move it away from the wharf (Figure 48 on page 71). These factors highlight that the practice of running astern presented significant challenges to maintain safe vessel berthing for gangway operations on small wharves.

2.61 The risk of a vessel moving out of position was further increased when a Master could not directly see the gangway or wharf from their wheelhouse position. On the day of the incident a Master with limited experience attempted to maintain their vessel's position relative to the wharf while running astern, making announcements, and monitoring the gangway through a CCTV screen on the dashboard due to the wheelhouse providing poor visibility of the working deck. The risk increased as there was a significant number of students disembarking the vessel, which increased the time the Master was required to manage concurrent tasks.

2.62 By the time the Deckhand, who was required to count passengers off the vessel, realised the gangway was at risk of falling from the wharf, it was too late to relay that fact to the Master for them to take corrective action.

Figure 48: Image showing the vessel and influence of wind and tide at time of incident, with pendulum motion resulting in the bow moving away from the wharf

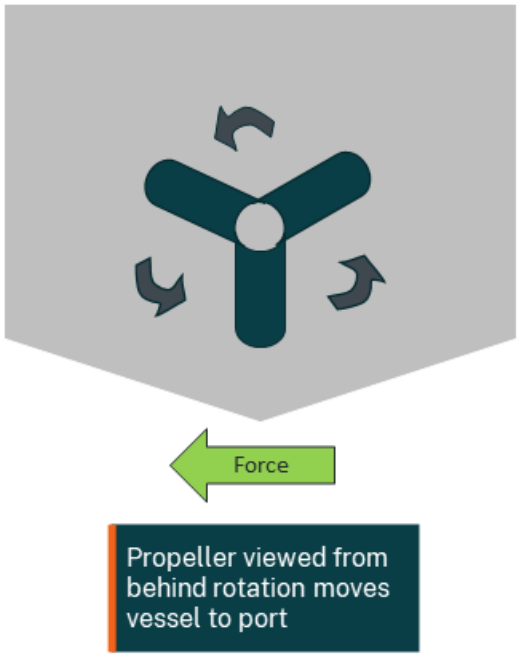


Source: Six Maps and CCC. Image annotated by OTSI. For illustrative purposes only, not to scale

2.63 As can be seen in Figure 48, the absence of an effective supporting wharf structure length allowed the ferry stern to swing in a pendulum motion. When a Master attempted to balance a ferry alongside a wharf with astern (reverse) thrust, factors such as engine speed and the direction of propeller rotation, combined with wind and tide, could combine to affect the success or failure.

2.64 The direction of propeller rotation created a sideways force known as transverse thrust, commonly referred to as 'propeller action or walking' in the maritime industry. Transverse propeller thrust has the effect of placing a sideways force on the propeller shaft moving the propeller (and stern of a vessel) in the direction of propeller rotation. When that effect is viewed from behind a vessel a propeller turning in an anticlockwise rotation will move a vessel stern to port (Figure 49: Transverse thrust effect).

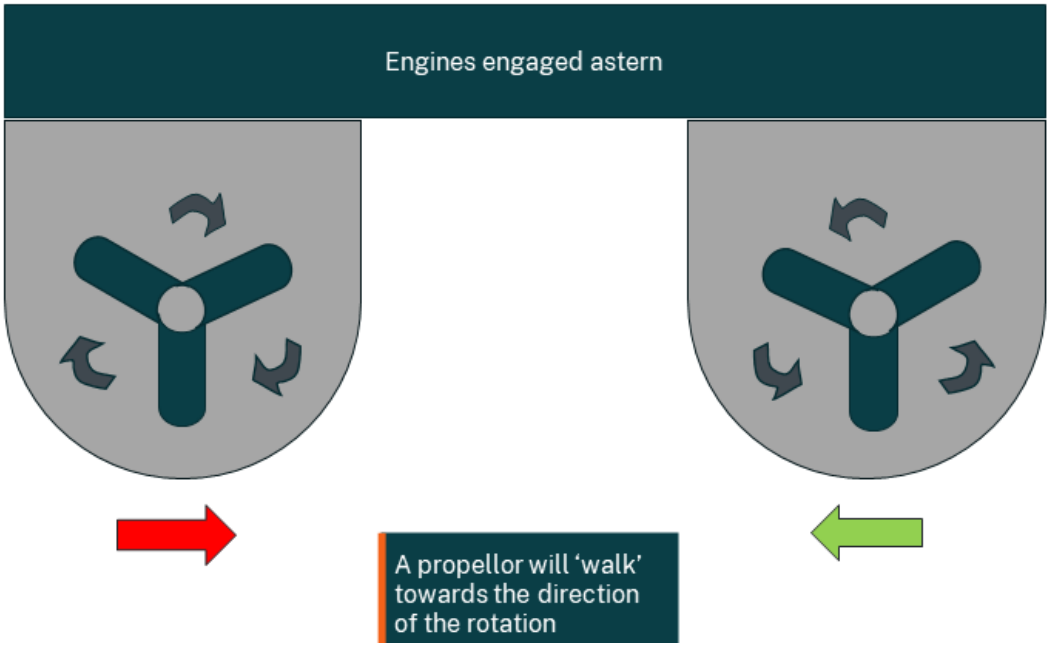
Figure 49: Transverse thrust effect



Source OTSI

2.65 *Violet McKenzie* was a catamaran (twin Hull) vessel and had two propellers: one at the rear of each hull. When viewed from behind and engaged in astern thrust, the propellers turned inwards in opposite directions, with the transverse forces in balance if the propellor speeds were the same. The resulting transverse force from the propellers would vary, dependant on the speed each propeller rotated. Successful management of the net transverse force presented a challenge for the Master to manoeuvre using astern thrust.

Figure 50: Catamaran in astern viewed from behind



Source OTSI

2.66 When *Violet McKenzie's* Master attempted to keep the ferry in position at Riverview Wharf, the tide, wind, propeller action and lack of supporting wharf structure destabilised the ferry, with it slowly moving away from the wharf.

2.67 Running astern requires a high percentage of the Master's attention to ensure the vessel is stable alongside the wharf. On *Violet McKenzie*, this task load would compete with the Master meeting the challenges faced with line of sight design issues that did not permit the Master to easily monitor vessel position and gangway operation.

2.68 Applying the practice of running ahead reduces a Master's task load by enabling a simple movement of the rudder and constant engine thrust to maintain vessel position alongside the wharf. At wharves such as those found on the Lane Cove River the running ahead practice would have more likely facilitated the crew to establish, maintain and monitor safe gangway operations.

Safety Assurance for Ferry Operations at the wharves

2.69 The safe transportation of passengers by ferries included the mitigation of risks associated with the transfer of passengers between vessels and wharves. The designs of both wharf and ferry impact upon the safe movement of passengers from one to another.

AMSA

2.70 While AMSA carried out a vessel inspection of *Violet McKenzie* in March 2022, it did not carry out any proactive monitoring inspection of the CCC ferry operation on the Lane Cove River prior to the incident.

2.71 On 20 February 2023, AMSA attended the vessel as part of their investigation into the incident and observed a Super Rocket vessel berthing operation at Riverview College Wharf. As a result of their observation AMSA issued an improvement notice on the same day. This notice required CCC to carry out a full risk assessment of Riverview College Wharf operations (passenger and vessel), and to develop and implement any identified controls.

Transport for NSW

2.72 TfNSW advised that they relied upon the contractual obligations on CCC to discharge their safety obligations under the TAA Act. TfNSW reported they did not carry out any proactive audits of the CCC ferry operation on the Lane Cove River to provide assurance those operations met their contractual safety obligations. Further, TfNSW advised that they relied upon the fact that Domestic Commercial Vessel Operators, such as CCC, were required to identify and put into place action plans to mitigate marine operational risk under National Law.

2.73 TfNSW advised that its SMS detailed objectives to identify hazards and risks, and review control measures. The SMS also detailed how TfNSW may carry out verification to meet the required outcomes, including risk verification and assurance programs. However, TfNSW could not detail evidence as to how it assured itself the contractual and regulatory safety obligations of CCC were being met. Consideration of that view was made taking into account of the following:

- TfNSW contracted CCC to provide public passenger ferry services to fixed structure wharves on the Lane Cover River that did not meet the Wharf Upgrade Plan (WUP) desired objectives.
- TfNSW did not support their contractual arrangement through any direct monitoring of CCC operations at those wharves.
- TfNSW's WUP identified that pontoon structure wharves offered the safest operational outcomes for passenger ferry operations (see paragraph 1.157).
- The TfNSW decision to contract CCC to provide public passenger ferry services was carried out without any risk assessment of how the operator was to meet the contractual safety obligations. TfNSW was of the view that CCC was responsible to identify and mitigate localised operational risks related to vessels and wharves.

2.74 OTSI recognised that TfNSW proactively monitored wharf asset condition and regularly monitored ferry operational incidents, including those incidents that occurred during berthing. However, TfNSW did not carry out any proactive monitoring activities of CCC ferry operations on the Lane Cover River, such as undertaking monitoring of those operations against the ferry operator's SMS procedures.

Vessel operator

2.75 CCC carried out annual reviews of their SMS documentation. Those reviews included updating operational procedures where improvements were identified. CCC's assurance review of its ferry operations against the SMS procedures did not identify any deficiencies with their operating procedures for the Lane Cove River Service prior to the incident.

Combined assurance review

2.76 Random inspections among target groups have been shown to have the effect of making people and enterprises that are normally law-abiding constantly aware of the existence of enforcement activities and tend to reduce the likelihood of future non-compliance. OTSI has considered the extent to which AMSA, TfNSW and CCC carried out monitoring of vessel operations as a part of providing a level of assurance that risks to safety were being mitigated. That review identified an opportunity for the organisations to carry out a risk based approach in identifying a program for proactive monitoring of the Lane Cove River ferry operations. The objective of that program would aim to provide a level of assurance that safe berthing and gangway operations at the fixed structure wharves were being achieved.

Riverview College Wharf

2.77 At the time of the incident, the involved wharf did not have several safety features, such as a ladder for emergency egress from the water, clearly marked visual delineations of the steps/wharf face and mooring points for vessels to secure on (Figure 51).

Figure 51: Involved wharf layout at time of incident

Source: OTSI

2.78 While the absence of these items did not contribute to the incident or influence the recovery of the students from the water, there were identified safety improvement opportunities which OTSI discussed with the wharf owner, Saint Ignatius' College, Riverview, after the incident.

Review of similar public ferry wharves

2.79 OTSI's review of the wharves in Sydney Harbour focused on public ferry wharves located in Lane Cover River (area of incident) noting they were fixed structures. OTSI's review incorporated an assessment of the ferry operation to the wharves, and reference to an independent assessment commissioned by the involved operator of the Lane Cove River wharves.

2.80 The independent assessment of the wharves reported that none of the fixed structure wharves met the design objectives of the TfNSW WUP (see paragraph 1.157). Further, none of those wharves met the desired outcomes of the *Disability Discrimination Act 1992* (Cwlth) and associated *Disability Standards for Accessible Public Transport*. OTSI recognised that there would be instances where passenger ferry operations could not be conducted to those wharfs safely for passengers with impaired mobility. Those instances would include when tidal conditions require the use of the steps for embarkation.

2.81 Fixed wharf structures with steps may present certain challenges to ferry operators, due to wharf design and environmental conditions (such as tidal flows). However, the application of effective risk management processes, and identification of control measures to address those challenges, could adequately manage risks for safe passenger operations (with the exclusion of operation that would not meet the DDA requirements).

Safety actions taken

Captain Cook Cruises (CCC)

2.82 Following the incident CCC conducted an internal incident investigation. The operator identified issues with crew hazard awareness and competency. In addition, the operator's investigation report documented that the crew did not control the high flow of passengers during disembarkation, did not recognise the unsafe situation developing, and there was congestion on the foredeck of the vessel.

2.83 The operator also identified:

- The Master had restricted visibility of the gangway position from the vessel cameras in the wheelhouse due to the foredeck passenger congestion on the vessel.
- The Master gained competency on this class of Rocket Vessel five weeks prior to the incident, but it was their first shift since schools resumed from holidays on the Lane Cove service.
- The company's training procedure specified typically two to four shifts paid training but the Deckhand had only received one training shift on this class of rocket.
- Procedures were in place; however more robust risk assessment was required.
- Multiple tasks expected of crew at one given time.

2.84 Key actions documented by the operator included:

- Reviewing the company procedures which outline the Master's responsibilities when a vessel is alongside a wharf (completed).
- The implementation and installation of signage 'Crew only, no passengers past this point until gangway is secured' on the rocket fleet forward cabin doors to aid crowd control (completed 17 February 2023).
- The implementation of an immediate change in process for the Deckhand, by removing the passenger counting procedure to ensure focus is on the passengers and the gangway's position during boarding/disembarking (completed 17 February 2023).
- Passenger count to be maintained during deck patrols in between wharves (completed 17 February 2023).
- To ensure vessel cameras are free from obstructions to aid in the safe operation of the vessel, equipment and personnel (implemented and ongoing).
- To ensure all employees receive the required training in line with their ability along with the company's documented procedures (ongoing).

2.85 An outcome of the operator's internal incident investigation was the identification that there was a need to assess the individual wharves on the Lane Cove River Service. Each wharf was subsequently assessed by the operator with consideration given to develop procedures to mitigate against identified risks. CCC also identified the need to reposition the forward gangway door crucifix bollards on the Super Rocket class vessels, to facilitate berthing with the engines running ahead. This was completed on *Violet McKenzie* in May 2023. Further CCC commissioned an assessment of the Lane Cove River wharves, against the TfNSW *Guideline for the Assessment of Public Ferry Wharf Safety* (2016).

2.86 As an outcome of the wharf risk assessments, CCC developed procedures compiled into a single document titled '*Lane Cove Operational Manual'*. This Manual included individual

procedures for berthing at each of the wharves in the Lane Cove River Service (completed 15 March 2023).

2.87 The Manual identified that the service was popular with school children and that crew had to carry out extra tasks to ensure passenger safety. These extra tasks included:

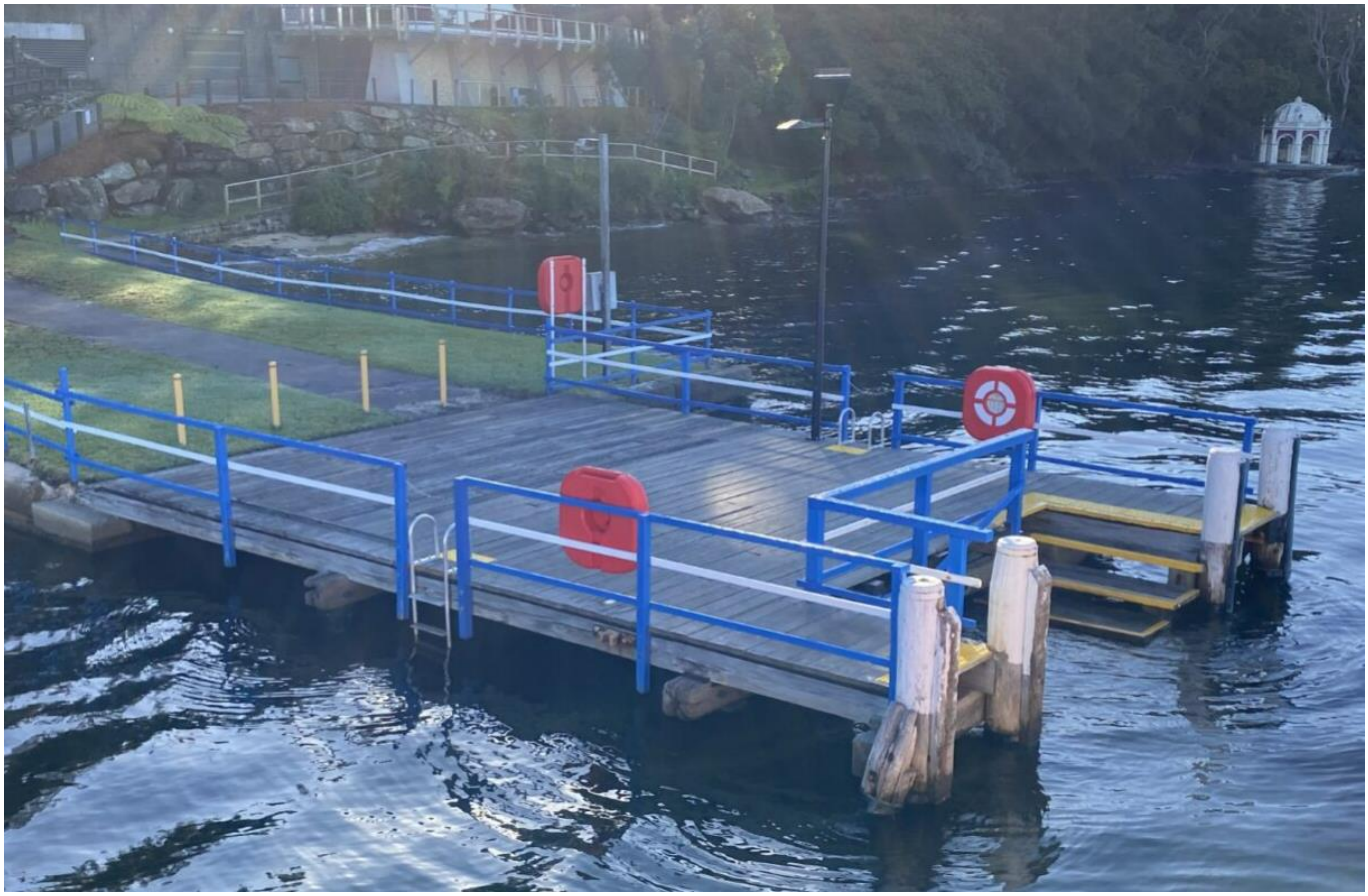
- Children to remove their back packs from their backs before crossing the gangway.
- The working deck to be kept clear of children by ensuring the cabin doors remain closed until the vessel was secure and gangway in place.
- A reminder that crew were to remain extremely vigilant during passenger embarkation or disembarkation, halting passenger progress if overcrowding or unsafe.
- Master not to run the vessel in astern propulsion unless in extreme circumstances.
- Vessels to be secured with two mooring lines where possible.
- The use of handheld portable radios for crew issued for the purpose of improving communication.

Saint Ignatius' College Riverview

2.88 Following the incident, the owner of the involved wharf conducted a wharf upgrade program which resulted in the following changes (Figure 52):

- addition of two ladders (one either side of the wharf) for emergency egress/access (no ladders on wharf at time of incident)
- addition of life rings onto wharf (no life ring in close proximity to wharf face at time of incident)
- lighting upgrade
- repainted the yellow markings on the wharf face and steps.
- installation of mooring points

Figure 52: Image of involved wharf (Riverview) post addition of safety upgrades



Source: OTSI

2.89 Further Saint Ignatius College reported that they implemented several additional risk controls including:

- The orientation of new students to expectations associated with the use of the ferry services, with a particular lens on safety.
- School bags being carried on one shoulder when embarking and disembarking the ferry on the wharf.

- The appointment of senior students to the role of Student Monitors, who will hold responsibility for monitoring behaviour and safety concerns, and reporting them to senior staff at the College should they emerge.

2.90 Saint Ignatius College also reported that they were considering additional risk controls including:

- Consideration of wharf improvements to achieve compliance with the Disability Discrimination Act 1992 (DDA) standards and codes of practice
- Parent webinars to provide education/safety awareness on the ferry service/operation.
- The addition of dolphin pylons to facilitate vessel berthing.

Transport for New South Wales

2.91 TfNSW reviewed the CCC Lane Cove River wharf assessment report producing a wharf maintenance and upgrade program in response to the identified deficiencies. TfNSW reported that remedial action was undertaken on all wharves under their management.

Part 3 — Findings

From the evidence available, the following findings are made with respect to the children overboard incident at Riverview College Wharf, involving the vessel *Violet McKenzie,* that occurred on the Lane Cove River, NSW on 16 February 2023.

Contributory factors

3.1 The interface between the Super Rocket Class vessel and Riverview College Wharf, during berthing in the conditions present at the time of the incident, was not effectively managed by the involved crew. The crew's management did not have full consideration of the tidal conditions present at the time of the incident, the berthing method of running engines astern and the limited ability of the Master to maintain the vessel stability on the small berthing face offered by Riverview College Wharf.

3.2 The involved crew did not effectively manage the disembarkation of students at Riverview College Wharf, with ineffective crowd management and late identification of the movement of the vessel away from the wharf, resulting in gangway displacement and students falling.

3.3 The actions and decision making of the involved crew on the day was likely influenced by limited operational experience in their roles, crew pairing, time pressure, competing task priorities and the local conditions (tidal and wharf interface).

3.4 The vessel operator paired together a crew with limited experience on a public passenger ferry service to fixed wharves on the Lane Cove River. This when combined with the limitations of the training and competency process resulted in a crew pairing unlikely to have the skills, knowledge and experience to effectively manage the disembarkation of students to Riverview College Wharf in the local conditions present at the time of the incident.

3.5 The vessel operator did not adequately identify and subsequently control risks associated with Riverview College Wharf ferry operations for the Super Rocket Class vessels. The risks included; limitations of the Master's line of sight from the vessel wheelhouse that impacted on safe berthing, gangway and person overboard recovery operations. The ineffective risk controls included; a communication system to facilitate clear verbal communication between the crew during berthing and POB recovery operations, berthing and gangway procedures for short fixed structure wharves, a crew training and competency assessment system, and the monitoring system of those controls.

Other safety factors

3.6 Whilst the action of student 19 jumping into the water to assist student 16 exposed student 19 to inherent risks, the action to render assistance likely enhanced the Person Overboard recovery response and outcome for student 16.

3.7 The involved crew did not effectively manage the Person Overboard recovery with uncontrolled students remaining on the working deck area. The presence of students on the working deck resulted in their exposure to an unattended open gangway door, and the unmanaged entry of student 19 into the water.

3.8 Students disembarking across a gangway, wearing backpack straps over both shoulders, may limit their ability to quickly remove a weighted bag. In the event of a student falling into water a weighted bag would increase the risk of being trapped under an overturned gangway and limit their ability to swim.

3.9 Transport for NSW relied on contractual safety obligations with the involved operator and the operator's responsibilities to comply with the National Maritime Law as their means to provide assurance that safety risks of operating passenger ferry services to Riverview College Wharf were effectively managed. Transport for NSW missed an opportunity to carry out their own monitoring of those safety risks through applying a risk based approach. Monitoring of the operator's ferry service using a risk based approach would have been consistent with the TfNSW safety management system requirements.

3.10 While the Australian Maritime Safety Authority reviewed the involved operator's safety management system, the absence of wharf risk assessments for ferry operations on the Lane Cove River, including Riverview College Wharf, was not identified. This reduced the opportunity for the absence of a fundamental risk management requirement and rectification process to be identified that could have considered the wharves operations risks before the incident.

Part 4 — Recommendations

Noting that some remedial safety actions have already been implemented, it is recommended that the following additional safety actions be undertaken by the specified responsible entity.

Captain Cook Cruises

4.1 Review its SMS crew training and competency assessment requirements to further detail the competency assessment elements of its practices and techniques necessary to carry out safe berthing and gangway operations.

4.2 Consider a further review of the remaining sections of its SMS crew training and competency assessment requirements to further detail any additional competency assessment elements of other marine practices and techniques.

4.3 Review fleetwide SMS related procedures to consider the risks posed to passengers wearing backpacks over both shoulders whilst traversing gangways.

4.4 Review a Master's capability for monitoring berthing and gangway operations on Super Rocket class vessels. The review should consider a Master's line of sight restrictions and the supporting CCTV system to assess if any additional improvements in the monitoring system could be achieved.

4.5 Identify a program of monitoring its ferry operations on the Lane Cover River using a risk based approach. The program should consider ongoing monitoring of its crews to provide a level of assurance that safe berthing and gangway practices are consistent with the safety management system procedures. This program should consider a review of the crew's; management of the running ahead practice, communication with each other, monitoring of gangway stability during the berthing, passenger control on the working deck, passenger safety over the gangway and management of any other risks associated with fixed structure wharves.

Ferry operators

4.6 Ensure that the hazards and risks associated with the berthing and embarkation/disembarkation of passengers at wharves on individual operators' services are identified and assessed, and effective risk control measures implemented to ensure safe passenger operations.

4.7 Consider human factors and ergonomics in the design of vessels for ferry operations to ensure that wheelhouse visibility supports effective management of safety in the target operating environment (including berthing and gangway operations).

Saint Ignatius College Riverview

4.8 Finalise its proposed safety review and assessment of wharf and berthing operational risk controls that have been identified to cover;

- consideration of wharf improvements to achieve compliance with the Disability Discrimination Act 1992 (DDA) standards and codes of practice
- parent webinars to provide education/safety awareness on the ferry service/operation
- consider the installation of dolphin pylons to facilitate vessel berthing at Riverview College Wharf.

Transport for New South Wales

4.9 Using a risk based approach, assess if additional means of obtaining assurance that safe berthing and gangway practices are being achieved for the Lane Cove River public passenger ferry service are practicable. The assessment should consider how the known risks associated with fixed structure wharves have been addressed by the ferry operator.

4.10 Consider the outcomes of its risk based assurance review of ferry services operating on the Lane Cove River for all contracted public passenger ferry services. Taking into account the TfNSW Health and Safety Risk Management system that requires the review of control measures to determine if they are implemented and working as planned. The risk based assurance review should also consider if the wharves are upgraded or replaced, improved berthing arrangements and full compliance with the *Disability Discrimination Act (NSW)* is included.

4.11 Consider requiring the designers of future vessels intended for public passenger ferry services take account of human factors and ergonomics, to ensure that a Master's line of sight from a wheelhouse supports effective management of safe operations (including berthing of vessels and gangway use).

Australian Maritime Safety Authority

4.12 Review its criteria for the assessment of a ferry operator's safety management system using a risk based approach. This review should consider if that criteria could be improved to further detail the extent to which a ferry operator has risk assessed their specific vessels and operating environment.

4.13 AMSA should consider whether targeted risk based random inspections of vessels carrying out public passenger ferry services could improve compliance outcomes in line with established principles of deterrence.

Part 5 — Appendices

Appendix 1: Sources, submissions, and acknowledgements

Sources of information

- Australian Maritime Safety Authority
- Bureau of Meteorology
- Captain Cook Cruises
- Saint Ignatius' College Riverview
- Transport for NSW

References

- Australian Maritime Safety Authority 2022-23 and 2024 Corporate Plans
- Marine Order 504
- *Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cwlth)*
- *Marine Safety Act 1998 No 121 (NSW)*
- Transport for NSW Guideline for the assessment of Public Ferry Wharf Safety (2016)
- *Transport Administration Act 1988* (NSW)

Submissions

The Chief Investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- Captain Cook Cruises
- Saint Ignatius' College Riverview
- Transport for NSW
- Australian Maritime Safety Authority

Submissions were received from all the DIPs.

The Chief Investigator considered all representations made by DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the final report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.

About the Office of Transport Safety Investigations

The Office of Transport Safety Investigations (OTSI) is the independent transport safety investigator for NSW.

The role of OTSI is to improve safety and enhance public confidence in the safety of the NSW transport network through:

- independent investigation of transport incidents and accidents
- identifying system-wide safety issues and their contributing factors
- sharing safety lessons and making recommendations or highlighting actions that transport operators, regulators and other stakeholders can take to improve the safety of bus, ferry and rail passenger and rail freight services.

OTSI is empowered under the *Transport Administration Act 1988* to investigate rail, bus, and ferry accidents and incidents in accordance with the provisions of the *Passenger Transport Act 1990* and *Marine Safety Act 1998*. It also conducts rail investigations under the provisions of the *Transport Safety Investigation Act 2003* (Cth) and a Collaboration Agreement with the Australian Transport Safety Bureau (ATSB).

The aim of an OTSI investigation is to enhance transport safety by sharing safety lessons and insights with those organisations that can implement actions to improve safety. OTSI uses a 'no-blame' approach to identify and understand contributing safety factors and underlying issues. It does not assign fault or determine liability in relation to the matters it investigates.

An OTSI investigation is independent of any investigation or inquiry that a regulator, NSW Police or the Coroner may undertake.

OTSI is not able to investigate all transport safety incidents and accidents or matters that are reported. The Chief Investigator focuses the agency's resources on those investigations considered most likely to enhance bus, ferry or rail safety by providing new safety lessons and insights that may be shared.

Many accidents result from individual human or technical errors which do not involve safety systems so investigating these in detail may not be justified. In such cases, OTSI will not generally attend the scene, conduct an in-depth investigation, or produce an extensive report.

OTSI may request additional information from operators or review their investigation reports which may lead to several activities, such as the release of a Safety Advisory or Alert to raise industry awareness of safety issues for action.

OTSI investigators normally seek to obtain information cooperatively when conducting an investigation. However, where it is necessary to do so, OTSI investigators may exercise statutory powers to conduct interviews, enter premises and examine and retain physical and documentary evidence.

Publication of the investigation report

OTSI produces a written report on every investigation for the Minister for Transport, as required under section 46BBA of the *Passenger Transport Act 1990*.

Investigation reports strive to reflect OTSI's balanced approach to the investigation, explaining what happened and why in a fair and unbiased manner. All Directly Involved Parties in the investigation are given the opportunity to comment on the draft investigation report.

The final investigation report will be provided to the Minister for tabling in both Houses of the NSW Parliament in accordance with section 46D of the *Passenger Transport Act 1990*. The Minister is required to table the report within seven days of receiving it.

Following tabling, the report is published on the OTSI website — www.otsi.nsw.gov.au — and information on the safety lessons promoted to relevant stakeholders.

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