

Transport Accident Investigation Commission

Final report Tuhinga whakamutunga

Aviation inquiry AO-2023-001 Airbus Helicopters AS350B2 (ZK-IDB) and EC130B4 (ZK-IUP) Reported close air proximity Queenstown Aerodrome 27 December 2022

June 2024



The Transport Accident Investigation Commission Te Kōmihana Tirotiro Aituā Waka

No repeat accidents - ever!

"The principal purpose of the Commission shall be to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future, rather than to ascribe blame to any person."

Transport Accident Investigation Commission Act 1990, s4 Purpose

The Transport Accident Investigation Commission is an independent Crown entity and standing commission of inquiry. We investigate selected maritime, aviation and rail accidents and incidents that occur in New Zealand or involve New Zealand-registered aircraft or vessels.

Our investigations are for the purpose of avoiding similar accidents and incidents in the future. We determine and analyse contributing factors, explain circumstances and causes, identify safety issues, and make recommendations to improve safety. Our findings cannot be used to pursue criminal, civil or regulatory action.

At the end of every inquiry, we share all relevant knowledge in a final report. We use our information and insight to influence others in the transport sector to improve safety, nationally and internationally.

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Notes about Commission reports Kōrero tāpiri ki ngā pūrongo o te Kōmihana

Citations and referencing

The citations section of this report lists public documents. Documents unavailable to the public (that is, not discoverable under the Official Information Act 1982) are referenced in footnotes. Information derived from interviews during the Commission's inquiry into the occurrence is used without attribution.

Photographs, diagrams, pictures

The Commission owns the photographs, diagrams and pictures in this report unless otherwise specified.

Verbal probability expressions

For clarity, the Commission uses standardised terminology where possible.

One example of this standardisation is the terminology used to describe the degree of probability (or likelihood) that an event happened, or a condition existed in support of a hypothesis. The Commission has adopted this terminology from the Intergovernmental Panel on Climate Change and Australian Transport Safety Bureau models. The Commission chose these models because of their simplicity, usability, and international use. The Commission considers these models reflect its functions. These functions include making findings and issuing recommendations based on a wide range of evidence, whether or not that evidence would be admissible in a court of law.

Terminology	Likelihood	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	



Figure 1: Airbus Helicopters AS350B2, ZK-IDB



Figure 2: Airbus Helicopters EC130B4, ZK-IUP



Figure 3: Queenstown Aerodrome – location of incident, when the helicopters were at the point of minimum separation

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1 Executive summary Tuhinga whakarāpopoto

What happened

- 1.1 In the early afternoon of Tuesday 27 December 2022 an Airbus Helicopters EC130B4, ZK-IUP, was cleared to depart from the southern apron, the general aviation (GA) movement area of Queenstown aerodrome. A second helicopter, an Airbus Helicopters AS350B2, ZK-IDB, was cleared to depart number two after ZK-IUP. It was a fine and calm day.
- 1.2 While ZK-IDB was departing it passed above and to the left of ZK-IUP and took the lead out of the southern apron. Both flights continued uneventfully.

Why it happened

- 1.3 The pilot of ZK-IDB did not positively identify the location of ZK-IUP because of the initial orientation of their helicopter, and the location of a hangar between the two helipads.
- 1.4 The pilot of ZK-IDB assumed that ZK-IUP had already departed, given the time since each helicopter had received their clearance to take off.
- 1.5 A reported evasive manoeuvre was found to be a standard turn on departure by ZK-IDB. At their closest point, the helicopters were found to be 44 metres (m) apart.
- 1.6 The Queenstown Aerodrome southern apron layout, requiring all helicopter movements to arrive and depart via the intersection of taxiways Bravo and Yankee, creates a bottleneck for helicopter operations.
- 1.7 The congestion and visibility issues of helicopters operating at Queenstown Aerodrome have been identified by the Queenstown Milford User Group and Queenstown Airport Corporation. Actions are being taken to resolve the issues.
- 1.8 The Commission found one systemic safety issue and, as a result of safety action already taken, has made no recommendation.

What we can learn

- 1.9 Complex and restrictive operating environments can impact a pilot's ability to build an accurate mental model.
- 1.10 Onboard helicopter recording systems provide valuable assistance to safety investigations.
- 1.11 Aerodrome layout and aircraft movements need to be assessed regularly for safety of operations, especially when daily aircraft movement rates increase.

Who may benefit

1.12 Aerodrome operators and planners, air traffic control personnel, helicopter company operators and pilots may all benefit from this report.

2 Factual information Parongo pono

Narrative

2.1 At 1316¹ on Tuesday 27 December 2022, the pilot of ZK-IUP (IUP), an Airbus Helicopters EC130B4 operated by Over the Top Helicopters, contacted Queenstown Delivery² (Delivery) in preparation for departure from their helipad on the southern apron³ (*see* Figure 4). Intending to depart to the north of the aerodrome with only the pilot on board, they were notified by Delivery of a significant delay because of inbound traffic.



Figure 4: AIP Queenstown ground movements (2), showing location of helipads (Credit: CAA/AIP New Zealand)

¹ Times in this report are in New Zealand Daylight Time (Universal Coordinated Time +13 hours) expressed in the 24-hour format

² A dedicated air traffic service ground station used for the issuing of aircraft clearances to reduce communications on the control (tower) frequency

³ The local name for the general aviation (GA) manoeuvring area, defined as an area on a land aerodrome intended to accommodate aircraft for the purpose of loading or unloading passengers or cargo, refuelling, parking, or maintenance (Civil Aviation Rules Part 1)



Figure 5: Timeline

- 2.2 At 1323 the pilot of ZK-IDB (IDB), an Airbus Helicopters AS350B2 operated by The Helicopter Line with the pilot and five passengers on board, contacted Delivery in preparation for departure, also to the north of the aerodrome.
- 2.3 At 1325:40 IUP contacted Queenstown Tower⁴ (Tower) as instructed by Delivery.
- 2.4 At 1326:19 IDB contacted Tower as instructed by Delivery, advising that they were 'ready in turn' and waiting on an inbound helicopter.
- 2.5 At approximately 1327 both helicopters proceeded to take off and depart the southern apron.
- 2.6 The pilot of IDB made a radio call on the Tower frequency, stating they had IUP in sight and had now taken the number one position. The pilot of IUP acknowledged the radio call and followed IDB out of the southern apron area.
- 2.7 At 1327:31 the helicopters were at their closest point after IDB passed above and to the left of IUP. The flights then continued uneventfully. *See* Figure 5 for the full timeline.
- 2.8 Six days later, on 2 January 2023, an occurrence report was submitted to the Civil Aviation Authority (CAA). The Commission was notified by CAA on 12 January 2023.

Personnel information

2.9 Both pilots were locally based. For a summary of their flight experience *see* section 8 Data summary. The Commission did not identify any medical or personal health issues with the pilots during the investigation.

Meteorological information

2.10 The weather was fine and calm with good visibility.

Aerodrome information

- 2.11 Queenstown Aerodrome is a certificated aerodrome located four nautical miles (nm) east of Queenstown. The aerodrome is located within the Queenstown Control Zone, which is designated as Class C airspace⁵.
- 2.12 Air traffic services at Queenstown are separated into a tower frequency and a delivery frequency. The tower frequency is used for control of aircraft in the immediate vicinity of the aerodrome as well as ground movements. The delivery frequency is used to facilitate aircraft clearance requirements to reduce congestion on the tower frequency.
- 2.13 Aerodrome control services were not provided for the southern apron area at Queenstown Aerodrome (*see* Figure 4 and Figure 6). Aeronautical Information Publication New Zealand for Queenstown specifically stated that air taxiing was restricted to 100 feet (ft) above ground level (AGL) or below and not exceeding

⁴ Tower provides the air traffic control service for the area on and in the immediate vicinity of the aerodrome

⁵ In Class C airspace, visual flight rules (VFR) flights are separated from instrument flight rules (IFR) flights and receive traffic information in respect of other VFR flights



60 knots (kt) indicated airspeed (IAS)⁶. This differs from the definition of taxiing in Civil Aviation Rules (CARs) Part 1⁷ and air taxiing in AIP Gen 2.2⁸.

Changes from 17 JUN 21: Control service line amended, Intermediate Holding Position added on apron.

Figure 6: AIP Queenstown ground movements (1), showing area not covered by aerodrome control service

(Credit: CAA/AIP New Zealand. Mark up by TAIC)

Recorded data

- 2.14 IUP was fitted with Automatic Dependent Surveillance Broadcast (ADS-B)⁹ in and out, which provided a traffic advisory via audio prompt and via a screen in the cockpit. It was also fitted with an Eye In The Sky onboard video recorder system.
- 2.15 IDB was fitted with ADS-B out only.
- 2.16 Airways Corporation of New Zealand Limited (Airways) provided the Commission with recorded surveillance data from the ADS-B system and audio recordings from Queenstown air traffic control (ATC).

⁶ Aeronautical Information Publication (AIP) NZQN AD 2 – 35.5 Queenstown Helicopter VFR arrival/departure procedures (1)

⁷ Taxi means movement of an aircraft on the surface of an aerodrome or on water, excluding take-off and landing, but including, in the case of helicopters, operation over the surface of an aerodrome within a height band associated with ground effect and at speeds associated with air taxiing

⁸ Air taxiing: movement of a helicopter/VTOL above the surface of an aerodrome, normally in ground effect and at a ground speed normally less than 37 km/h (20 kt). Note: The actual height may vary, and some helicopters may require air-taxiing above 8 m (25 ft) AGL to reduce ground effect turbulence or provide clearance for cargo sling loads.

⁹ Aircraft location system that uses precise location technology to provide live updates (on a display similar to traditional radar) to air traffic control and other aircraft fitted with the appropriate receiving equipment

- 2.17 The Commission obtained CCTV video footage from Queenstown Airport Corporation (QAC).
- 2.18 The Commission obtained video footage and flight data from IUP's Eye In The Sky onboard video recorder.

Organisational information

CAA rules for aerodromes

- 2.19 The requirements for aerodromes are contained in Civil Aviation Rules (CARs) Part 139 Aerodromes Certification, Operation and Use.
- 2.20 CARs Part 139 is further expanded in several CAA Advisory Circulars (ACs),¹⁰ with *AC139-8 Aerodrome Design Heliports* containing the requirements for helicopters.

Queenstown Airport Corporation (QAC)

- 2.21 QAC was incorporated in 1988 and was responsible for the management of Queenstown Aerodrome on behalf of its shareholders. QAC was governed by a Board of Directors.
- 2.22 At the time of the incident the corporation had two shareholders: Queenstown Lakes District Council (75.01%) and Auckland International Airport Limited (24.99%).

Queenstown Milford User Group (QMUG)

- 2.23 The QMUG was formed in 1990 to promote safety for those aircraft operators operating within the Queenstown Flight Information Region¹¹ according to the QMUG operations handbook (Queenstown Milford User Group, 2016).
- 2.24 QMUG members primarily consisted of:
 - Queenstown Airport Corporation
 - Civil Aviation Authority of New Zealand
 - Airways Corporation of NZ (Queenstown)
 - Local aircraft operators
 - Local sport aviation operators
 - Ministry of Transport
 - Department of Conservation.

¹⁰ CAA advisory circulars contain guidance on standards, practices and procedures that the Director has found to be acceptable means of compliance with the associated rules and legislation

¹¹ a defined airspace area established by an aviation authority to provide flight information services and ensure the safe and efficient flow of air traffic

3 Analysis Tātaritanga

Introduction

- 3.1 When this incident was notified, it was reported that IDB had taken evasive action to avoid IUP. An aircraft taking evasive action raises safety concerns for the Commission.
- 3.2 The following section analyses the circumstances surrounding the event to identify those factors that increased the likelihood of the event occurring or increased the severity of its outcome. One safety issue that had the potential to adversely affect future operations was identified.

Reported close-proximity event

- 3.3 A previous incident in December 2021 between an arriving helicopter and an aeroplane departing from runway 32 resulted in changes to helicopter arrival and departure procedures at Queenstown Aerodrome. The new procedures grouped helicopters together for departure or arrival to ensure they were adequately separated from other traffic. The changes came into effect in December 2022 and often resulted in delays for helicopters waiting to depart.
- 3.4 For IUP, the time from first calling Delivery until they received a clearance to take off was approximately 10 minutes (see Figure 5) while they waited for inbound aircraft to land.



Figure 7: View from ZK-IDB helipad towards the ZK-IUP helipad

3.5 Before take-off, the pilot of IDB could not see IUP because of the orientation of IDB and the location of a hangar between their respective helipads (*see* Figure 7). The pilot of IDB recalled that they had assumed that IUP had already departed, and that

they had expected to see IUP passing the white half-round hangar¹² by the time IDB had lifted off the helipad and turned around.

- 3.6 The pilot of IDB recalled looking along IUP's expected flight path, but they did not see IUP until they were in view of IUP's helipad. The pilot of IDB noted that IUP was on a low take-off profile and made a radio call on the Tower frequency, taking the number one position. The pilot of IUP acknowledged the radio call and followed IDB out of the southern apron area.
- 3.7 ADS-B tracking data and CCTV recordings show that, at their nearest point, the helicopters were separated laterally by about 44 m and were over parallel taxiways at their closest point (*see* Figure 3).
- 3.8 Because of altitude rounding¹³ by the ADS-B system, the exact vertical separation cannot be confirmed. However, CCTV footage shows vertical separation between the two helicopters in the southern apron area (*see* Figure 8 and Figure 9) with no excessive or obvious avoiding manoeuvre by the pilot of IDB.



Figure 8: CCTV footage from apron towards ZK-IUP helipad and hangar (Credit: Queenstown Airport Corporation)

- 3.9 The pilot of IDB recalled that they did not take evasive action, and instead were already in a turn as a normal part of their departure flight path. From the perspective of IUP's pilot, who saw IDB momentarily when they looked in their direction, it appeared IDB was conducting an evasive manoeuvre.
- 3.10 The Commission found that neither pilot took evasive action, nor was it required.
- 3.11 The Commission considers that while the defence of 'see and avoid' has its limitations, as detailed in the Commission's report AO-2019-006,¹⁴ it remains a critical element for

¹² visible behind ZK-IDB in Figure 7

¹³ ADS-B altitude data is rounded up or down to the nearest 100 ft when it is recorded, so two aircraft that are separated by 100 feet vertically could show the same altitude in their ADS-B data

¹⁴ Transport Accident Investigation Commission investigation <u>AO-2019-006 Cessna 185A, ZK-CBY and Tecnam</u> <u>P2002, ZK-WAK Mid-air collision, near Masterton, 16 June 2019</u>

ensuring safety. It is the primary method for separation of aircraft in the visual flight environment, particularly in uncontrolled airspace and during low-level flight.



Figure 9: CCTV footage of the apron towards runway 14/32 (Credit: Queenstown Airport Corporation)

Queenstown Milford User Group

3.12 As a result of this reported close-proximity event, the QMUG met on 3 January 2023 and discussed this incident and any related concerns, including any follow-up actions required by the members. Following the 2 January 2023 mid-air collision between two helicopters in Queensland, Australia,¹⁵ there was heightened sensitivity around this event and a desire for QMUG members to be proactive around aircraft close-proximity events.

Other investigations and follow-up action

- 3.13 As a result of the reported close-proximity event, both Airways and CAA undertook their own internal investigations.
- 3.14 Airways identified that the layout of the southern apron had created a bottleneck at the intersection of taxiways Bravo and Yankee and that some hangars were obstructing the line of sight of departing helicopters. These helicopters could be flying at heights and speeds more associated with flight than normal air taxiing. This is discussed further in the Safety Issue in paragraph 3.31.
- 3.15 Before this occurrence, Airways controllers used sequencing numbers to assist with multiple helicopter departures.¹⁶ After the occurrence, Airways implemented a procedural change to require pilots to report sighting the previous aircraft as part of any clearance when following another aircraft.¹⁷ This requires the pilot of the trailing

¹⁵ Australian Transport Safety Bureau investigation <u>AO-2023-001 Mid-air collision, Gold Coast, Queensland on</u> <u>2 January 2023</u>

¹⁶ For example: "cleared number 2 behind the EC130"

¹⁷ For example: "cleared to follow EC130 IUP, report sighting"

helicopter to visually identify the preceding helicopter before complying with their clearance.

3.16 CAA raised similar concerns that helicopters could be operating at flight speeds near other aircraft over the southern apron without being subject to a full ATC service. CAA reported that:

The CAA Aeronautical Services Unit will liaise with Airways NZ to ensure that helicopters operating at up to 60 kt and 100 ft AGL in the airport environs, including above the apron, will be provided with a full ATC service.

Historical close-proximity events at Queenstown Aerodrome

- 3.17 A review of incident data from Queenstown between 2017 and 2023 shows several close-proximity events involving runway 14/32 and the Bravo taxiway arrival and departure procedures. These events had prompted a change in procedures in December 2022. As a result of these procedural changes, there was a reported increase in delays because of the requirement to group arriving and departing helicopters.
- 3.18 The data did not appear to show any patterns concerning close-proximity events over the southern apron.

Aerodrome layout and design

- 3.19 The Commission undertook further analysis of the layout of Queenstown Aerodrome, with a focus on changes to the southern apron over time. It considered the assessment of risks to the safety of aviation versus commercial considerations.
- 3.20 Review of historical imagery of Queenstown aerodrome shows ongoing development with significant changes to the southern apron and expansion of the main apron. These changes have progressively reduced the space available for helicopters and light aeroplanes to operate. *See* Appendix 1 for a comparison of the apron areas in October 2004 and June 2022.

Aircraft movements

- 3.21 In 2018 there were reported to be 42,924 GA movements at Queenstown aerodrome, dropping to 35,222 in 2022.¹⁸ About two-thirds of those movements were helicopters. These movements are projected to increase again to about 43,000 by 2032 (Queenstown Airport Corporation, 2023).
- 3.22 Although the number of movements per day will naturally fluctuate, the average in 2018 was about 117, reducing to an average of about 96 in 2022. The consensus of current users of Queenstown Aerodrome spoken to by investigators was that the layout of the southern apron at Queenstown Aerodrome at the beginning of 2023 was not ideal for the mix of GA aircraft and the number of helicopter movements.

¹⁸ the COVID-19 pandemic has affected aircraft movement numbers since early 2020

Aeronautical studies

- 3.23 An aeronautical study was defined in CAA's *AC 139-15 Aeronautical Studies for Aerodrome Operators* as "a tool used to review aerodrome and airspace processes and procedures to ensure that safety criteria in place are appropriate".
- 3.24 CARs Part 139.131 Aeronautical Study stated that:
 - (a) A holder of an aerodrome operator certificate must monitor operations and conduct an aeronautical study for any significant change or significant changes that may affect the safety of aerodrome operations.
 - (b) For the purpose of paragraph (a), a significant change includes:
 - (1) a significant increase in aerodrome aircraft traffic volumes; or
 - (2) a significant change in type of aircraft operations; or
 - (3) a significant change in the aerodrome physical characteristics; or
 - (4) an increase in accidents or incidents at or in the vicinity of the aerodrome; or
 - (5) when annual aircraft movements at the aerodrome are forecast to exceed, for 3 consecutive years,—
 - (i) 40,000 or more combined VFR and IFR movements; or
 - (ii) 7,500 or more IFR movements; or
 - (iii) 60,000 or more combined VFR and IFR movements of which 9,000 or more are IFR movements; or
 - (iv) 15,000 or more IFR movements; or
 - (v) 100,000 or more combined VFR and IFR movements.
 - (c) The holder of an aerodrome operator certificate must, immediately after completing an aeronautical study—
 - review the operation of the aerodrome and, if necessary, make any changes that are required in the interests of aviation safety, to the operator's exposition, in accordance with the procedure for amending the exposition; and
 - (2) provide the results of the aeronautical study to the Director.
 - (d) If practicable, the holder of an aerodrome operator certificate must conduct the aeronautical study prior to the significant change.
 - (e) If it is not practicable for the holder of an aerodrome operator certificate to conduct an aeronautical study prior to the significant change, then the certificate holder must conduct the aeronautical study as soon as practicable after the change.
- 3.25 Aeronautical studies have existed for many years on a voluntary basis. They have only been required by CAA since 2015 and the requirement has not been applied retrospectively.
- 3.26 CAA supplied the Commission with copies of the aeronautical studies undertaken for Queenstown Aerodrome since 1997. The most recent study provided to the Commission was dated June 2019.

- 3.27 In a 1997 study done for Queenstown Airport Corporation, it was recommended that moving helicopter operations to the area north of the main runway (05/23), and east of the cross runway (14/32) would have several benefits given the projected increases in aircraft movements at the time.
- 3.28 There have been several different proposals for the relocation of the GA area at Queenstown Aerodrome since 1997. While some helicopter operators have relocated to the northeast of the aerodrome, the rest remain in the current location in the southwest of the aerodrome.

Future plans

- 3.29 In May 2023 QAC announced a major expansion plan with the release of their draft *Queenstown Airport Master Plan* (Queenstown Airport Corporation, 2023). This included moving helicopter operations to a new northern aviation precinct and the fixed-wing and corporate-jet operators to a precinct south of the main terminal.
- 3.30 The Master Plan¹⁹ aims to address the challenges of the current layout of Queenstown Aerodrome, including separation of aeroplane and helicopter operations. CAA advised the Commission that aerodrome changes of this nature would require QAC to undertake an aeronautical study and submit it to CAA as part of the approval process under CARs Part 139.

Management of aircraft transitioning into controlled airspace

Safety Issue: The layout of the southern apron, including how aircraft transitioning into controlled airspace are managed, has resulted in situations where uncontrolled aircraft can be flying in close proximity to other aircraft. This increases the likelihood of conflict between aircraft and may lead to an increased risk of collision.

- 3.31 Helicopters were operating at speeds and heights more associated with flight when compared to taxiing, in close proximity to other passenger transport and private aircraft over the southern apron. This was influenced by the size and layout of the southern apron and how aircraft entered and exited the area. The range in operating speeds over the southern apron, and the absence of a height limit for the area, also had the potential for different expectations and practices between pilots and controllers.
- 3.32 The potential for differing practices also stemmed from the way air taxi was defined in the Queenstown AIP (*see* paragraph 2.13). Airways deemed this to be a grey area in terms of responsibilities. The southern apron was an uncontrolled area, regardless of the height and speeds that aircraft were flying within that area. The term used to describe the flight profile of the aircraft (i.e., air taxi or airborne) does not change whether the southern apron was subject to an aerodrome control service.
- 3.33 While this was not considered a factor in this incident, as both aircraft were subject to a clearance; it is another factor that has the potential to affect safety of operations.
- 3.34 It was detailed in local ATC procedures that controllers would be expected to include the southern apron in their scan, despite it being an uncontrolled area.

¹⁹ The Final Master Plan was published in December 2023.

- 3.35 Airways reported that they would liaise with local stakeholders to ensure the respective responsibilities of pilots and controllers are understood when helicopters are operating over the southern apron.
- 3.36 At the time of the incident there was no mechanism in place for the positive identification of preceding aircraft. See paragraph 5.3 for action taken to address this.
- 3.37 All locally involved organisations recognised the limitations of the layout of the southern apron at the time of the occurrence, and that the long-term solution requires relocation of the southern apron GA area.

Summary

- 3.38 After reviewing the evidence and analysing the circumstances of the reported incident, and reviewing operations at Queenstown Aerodrome in general, the Commission found one systemic safety issue, regarding the management of the southern apron.
- 3.39 All locally involved organisations involved have been proactive in identifying latent barriers to safety and have taken steps to improve conditions, even when those improvements can involve a financial cost.

4 Findings Ngā kitenga

- 4.1 The pilot of IDB did not positively identify the location of IUP before they commenced their departure and assumed that IUP had already departed.
- 4.2 When the pilot of IDB sighted IUP near IUP's helipad, IDB was overtaking IUP's position. The pilot of IDB made a radio call to IUP as they took the lead out of the southern apron area.
- 4.3 Neither pilot took evasive action, nor was it required.
- 4.4 At their closest point, the helicopters were about 44 m apart laterally.
- 4.5 Hangars in the southern apron area can obstruct visibility between helipads.
- 4.6 Queenstown Aerodrome's southern apron layout, requiring all movements to arrive and depart via the intersection of taxiways Bravo and Yankee, creates a bottleneck for helicopter movements.
- 4.7 While not contributory to this occurrence, there was potential for differences in how helicopters were managed and flown over the southern apron, and this raised questions as to whether some aircraft were under ATC control or not within the southern apron area.
- 4.8 The congestion and visibility issues of helicopters operating at Queenstown Aerodrome have been identified by the Queenstown Milford User Group and Queenstown Airport Corporation. Actions are being taken to resolve the issues.
- 4.9 An aeronautical study is to be conducted as part of the proposed developments for Queenstown Aerodrome.

5 Safety issues and remedial action Ngā take haumaru me ngā mahi whakatika

General

- 5.1 Safety issues are an output from the Commission's analysis. They may not always relate to factors directly contributing to the accident or incident. They typically describe a system problem that has the potential to adversely affect future transport safety.
- 5.2 Safety issues may be addressed by safety actions taken by a participant. Otherwise, the Commission may issue a recommendation to address the issue.

Safety Issue

The layout of the southern apron, including how aircraft transitioning into controlled airspace are managed, has resulted in situations where uncontrolled aircraft can be flying in close proximity to other aircraft. This increases the likelihood of conflict between aircraft and may lead to an increased risk of collision.

- 5.3 CAA and Airways investigations have led to a change in procedures to require pilots to report sighting the previous aircraft as part of any clearance when following another aircraft. This will help to ensure aircraft depart in the correct sequence, as intended. It is **very likely**, had this been in place at the time of this incident, that it would have assisted the pilots to remain in the correct sequence.
- 5.4 CAA stated that they had implemented the following safety actions:

The CAA Aeronautical Services Unit will liaise with Queenstown Airport Company to ensure the phrase 'air taxi' is removed from the QN AIP (Helicopter VFR Arrival/Departure Procedures).

The CAA Aeronautical Services Unit will liaise with Airways NZ to ensure that helicopters operating at up to 60 kt and 100 ft AGL in the airport environs, including above the apron, will be provided with a full ATC service.

- 5.5 The Commission welcomes the safety actions taken and as a result no safety recommendation was made.
- 5.6 The Commission identified no further safety issues.

6 Recommendations Ngā tūtohutanga

General

- 6.1 The Commission issues recommendations to address safety issues found in its investigations. Recommendations may be addressed to organisations or people and can relate to safety issues found within an organisation or within the wider transport system that have the potential to contribute to future transport accidents and incidents.
- 6.2 In the interests of transport safety, it is important that recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.
- 6.3 Following the reporting of this incident, the operators and Airways carried out their own internal investigations. CAA undertook a desktop investigation based on those investigations and, along with other members of the QMUG, took action to address any safety issues that they had identified.
- 6.4 The Commission notes the actions taken by all parties and has not issued any further safety recommendations.

7 Key lessons Ngā akoranga matua

- 7.1 Complex and restrictive operating environments can impact a pilot's ability to build an accurate mental model.
- 7.2 Onboard recording systems provided valuable assistance to safety investigations.
- 7.3 Aerodrome layout and usage changes over time need to be assessed regularly for suitability.

8 Data summary Whakarāpopoto raraunga

Aircraft particulars

	Aircraft registration:	ZK-IDB	ZK-IUP
	Type and serial number:	Airbus Helicopters AS350B2 serial number 7208	Airbus Helicopters EC130B4 serial number 4118
	Number and type of engines:	1x Safran Arriel 1D1	1x Safran Arriel 2D
	Operator:	The Helicopter Line	Over the Top Helicopters
	Type of flight:	Commercial	Commercial
	Persons on board:	six	one
Crew	particulars		
	Pilot's licence:	Commercial Pilot Licence (Helicopter)	Commercial Pilot Licence (Helicopter)
	Pilot's age:	35	56
	Pilot's total flying experience:	about 2900 hours	about 7750 hours
	Pilot's flying experience on type:	about 1200 hours	about 520 hours
Date	and time	27 December 2022, 1227	
		Queenstown Aerodrome	
Loca	tion	latitude: 45° 01.430′ sc	buth
		longitude: 168° 44.527´ e	east
Injuries		nil	
Damage		nil	

9 Conduct of the Inquiry Te whakahaere i te pakirehua

- 9.1 On 12 January 2023 CAA notified the Commission of the occurrence. The Commission subsequently opened an inquiry under section 13(1) of the Transport Accident Investigation Commission Act 1990 and appointed an Investigator-in-Charge.
- 9.2 On 18 January 2023 Commission investigators travelled to Queenstown to conduct interviews with the pilots and witnesses. Investigators gathered aerodrome and pilot related documentation and undertook further interviews.
- 9.3 The final analysis of this investigation was presented to the Commission on 26 July 2023.
- 9.4 On 13 December 2023 the Commission approved a draft report for circulation to seven parties for their comment.
- 9.5 One interested party provided a detailed submission and six interested parties replied that they had no comment. Any changes as a result of the submission/s have been included in the final report.
- 9.6 On 23 April 2024, the Commission approved the final report for publication.

Abbreviations Whakapotonga

AC	CAA advisory circular
ADS-B	Automatic Dependent Surveillance – Broadcast
AGL	above ground level
ATC	air traffic control
CAA	Civil Aviation Authority (of New Zealand)
CARs	Civil Aviation Rules
CCTV	Closed-circuit television
ft	feet
GA	general aviation
IAS	indicated airspeed
IFR	instrument flight rules
kt	knot
nm	nautical mile
QAC	Queenstown Airport Corporation
QMUG	Queenstown Milford User Group
VFR	visual flight rules

Citations Ngā tohutoru

Queenstown Airport Corporation. (2023, May). *Queenstown Airport Draft Master Plan.* Retrieved from Official Queenstown Airport Website: https://www.queenstownairport.co.nz/media/File Resource/231207-qac-masterplan.pdf

Queenstown Milford User Group. (2016, April 01). *Queenstown Milford User Group Operations Hand book*. Retrieved from Ministy of Transport: https://www.transport.govt.nz/assets/Uploads/Paper/Queenstown-Milford-User-Group-Operations-Handbook.pdf

Appendix 1 Queenstown aerodrome changes 2004–2022



Figure 10: Queenstown aerodrome apron, October 2004



Figure 11: Queenstown aerodrome apron, June 2022

Appendix 2 Queenstown aerodrome proposed layout from the Master Plan



Figure 12: Queenstown aerodrome proposed layout (Credit: Queenstown Airport Corporation)

Kōwhaiwhai - Māori scroll designs

TAIC commissioned its four kōwhaiwhai, Māori scroll designs, from artist Sandy Rodgers (Ngāti Raukawa, Tūwharetoa, MacDougal). Sandy began from thinking of the Commission as a vehicle or vessel for seeking knowledge to understand transport accident tragedies and how to avoid them. A 'waka whai mārama' (i te ara haumaru) is 'a vessel/vehicle in pursuit of understanding'. Waka is a metaphor for the Commission. Mārama (from 'te ao mārama' – the world of light) is for the separation of Rangitāne (Sky Father) and Papatūānuku (Earth Mother) by their son Tāne Māhuta (god of man, forests and everything dwelling within), which brought light and thus awareness to the world. 'Te ara' is 'the path' and 'haumaru' is 'safe' or 'risk free'.

Corporate: Te Ara Haumaru - the safe and risk free path



The eye motif looks to the future, watching the path for obstructions. The encased double koru is the mother and child, symbolising protection, safety and guidance. The triple koru represents the three kete of knowledge that Tāne Māhuta collected from the highest of the heavens to pass their wisdom to humanity. The continual wave is the perpetual line of influence. The succession of humps represents the individual inquiries.

Sandy acknowledges Tāne Māhuta in the creation of this Kōwhaiwhai.

Aviation: Ngā hau e whā - the four winds



To Sandy, 'Ngā hau e whā' (the four winds), commonly used in Te Reo Māori to refer to people coming together from across Aotearoa, was also redolent of the aviation environment. The design represents the sky, cloud, and wind. There is a manu (bird) form representing the aircraft that move through Aotearoa's 'long white cloud'. The letter 'A' is present, standing for a 'Aviation'.

Sandy acknowledges Ranginui (Sky father) and Tāwhirimātea (God of wind) in the creation of this Kōwhaiwhai.

Maritime: Ara wai - waterways



The

sections of waves flowing across the design represent the many different 'ara wai' (waterways) that ships sail across. The 'V' shape is a ship's prow and its wake. The letter 'M' is present, standing for 'Maritime. Sandy acknowledges Tangaroa (God of the sea) in the creation of this Kōwhaiwhai.

Rail: rerewhenua - flowing across the land



The

design represents the fluid movement of trains across Aotearoa. 'Rere' is to flow or fly. 'Whenua' is the land. The koru forms represent the earth, land and flora that trains pass over and through. The letter 'R' is present, standing for 'Rail'.

Sandy acknowledges Papatūānuku (Earth Mother) and Tāne Mahuta (God of man and forests and everything that dwells within) in the creation of this Kōwhaiwhai.



Recent Aviation Occurrence reports published by the Transport Accident Investigation Commission (most recent at top of list)

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- AO-2022-002 Robinson R22, ZK-HEQ, loss of control inflight, Karamea, West Coast, 2 January 2022
- AO-2021-003 Airbus Helicopters AS350 B3e, ZK-ITD, loss of control in flight, Lammerlaw Range, 40 km northwest of Dunedin Aerodrome, 16 September 2021
- AO-2020-002 Glider, Schleicher ASK21, ZK-GTG, Impact with Terrain, Mount Tauhara, Taupō, 31 May 2020
- AO-2022-001 Ultramagic Balloons, N-250, ZK-MET, pilot ejection from basket on landing, Lyndhurst, near Methven, 1 January 2022
- AO-2021-001 Kavanagh Balloons E-260, ZK-FBK, hard landing and ejection of occupants, Wakatipu Basin, near Arrowtown, 9 July 2021
- AO-2019-007 Air traffic services outage, 30 September 2019
- AO-2019-005 BK-117-C1 ZK-IMK controlled flight into terrain (water), Auckland Islands, 22 April 2019
- AO-2020-003 Eurocopter EC120-B, ZK-HEK, Loss of control in flight and collision with terrain, Kekerengu, 50 kilometres northeast of Kaikoura, 15 December 2020
- AO-2019-006 Cessna 185A, ZK-CBY and Tecnam P2002, ZK-WAK, Mid-air collision, near Masterton, 16 June 2019
- AO-2019-002 Bombardiers DHC-8-311, ZK-NEH, and ZK-NEF, 'Loss of seperation' near Wellington, New Zealand, 12 March 2019
- AO-2020-001 Pacific Aerospace Cresco 08-600, ZK-LTK impact with terrain Kourarau Hill, Masterton, 24 April 2020

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