



NEW ZEALAND AIR LINE
PILOTS' ASSOCIATION
SUBMISSIONS ON
AUCKLAND ATC TOWER
REPLACEMENT

AIRWAYS CORPORATION OF NEW ZEALAND LTD

(i) Introduction

The New Zealand Air Line Pilots' Association (NZALPA) appreciates the opportunity to make submissions on Airways Corporation of New Zealand Ltd's (Airways') proposal to replace Auckland Air Traffic Control Tower.

NZALPA understands that Airways have provided an extension for these submissions to be received on 26 October 2022.

(ii) Executive Summary

NZALPA has three fundamental submissions:

APPROPRIATE LOCATIONS FOR DIGITAL TOWERS: NZALPA's first concern is that digital towers are a new concept that is largely untested internationally and for which international or New Zealand guidance and regulations have yet to be developed. Therefore, in our view, they are only suitable at this point in time for locations that are (a) physically remote, (b) have a low air traffic footprint, (c) have no major terrain, geographic or meteorological obstacles in the vicinity of the aerodrome.

INFRASTRUCTURE PLANNING REQUIRES CONSULTATION: Our second concern is that for the importance of Auckland Air Traffic Control Tower to New Zealand's aviation network, the amount of consultation and collaboration that has been undertaken to date with stakeholders is inadequate. There needs to be much more clarity from Auckland Airport and from the Civil Aviation Authority about their views on what is required as an air traffic solution for Auckland Airport.

GOVERNMENT FUNDING OF CRITICAL INFRASTRUCTURE: An underlying concern is that infrastructure that has a degree of criticality similar to that of Auckland Air Traffic Control Tower should be eligible for funding directly from central (and local) government. The benefits to New Zealand of having a fully functional and safe air traffic control tower at Auckland are broader than merely benefits to the traveling public.

(iii) About NZALPA

Established in 1945, NZALPA is an independent member driven aviation professional association for New Zealand pilots and air traffic controllers. Our diverse membership includes general aviation and commercial pilots, flight instructors, air traffic controllers, flight service officers and, most recently, drone pilots.

NZALPA represents more than 90% of unionised pilots in New Zealand. NZALPA monitors and influences a wide range of technical, safety, medical, legal and industrial issues within the NZ aviation industry. NZALPA also has a voice internationally at the International Civil Aviation Authority (ICAO) through its membership of the International Federation of Air Line Pilots' Associations (IFALPA).

NZALPA is a founding member of both IFALPA, an organisation that represents the interests of over 100,000 pilots worldwide and the Global Air Traffic Controllers Alliance, representing over 30,000 unionised air traffic controllers and other aviation safety experts. NZALPA is also a member of the International Federation of Air Traffic Controllers' Associations (IFATCA), which represents 50,000 air traffic controllers worldwide.

Membership to NZALPA is on a voluntary basis.

INTRODUCTION

1. The best solution for Auckland and New Zealand would be the one that is the safest, has the lowest risk, complies with regulations, and assures service delivery. In our understanding, the proposal that best meets these requirements is that of a conventional tower. And it would be that proposal that NZALPA would ultimately support.
2. We understand that there are cost constraints on delivery of a conventional tower in this location. However, in our view, the importance of ensuring safety and service provision at Auckland Airport is of such significance that there should be access available to funding from central and local government. We understand that at this point in time the funding environment is not ideal for obtaining such funds but NZALPA continues to work alongside Government agencies to understand how better to structure that environment to enable better access to funding for such important infrastructure. We understand that in the USA, for example, the FAA funds the construction of some air traffic control towers.
3. The alternative proposal for the introduction of a digital tower is a fundamental change to the conventional system and any change must provide an equivalent or increased level of safety to that of conventional tower operations. Safety should not be compromised or reduced under any circumstances (cf CAR 100.3 (a)(3)(ii)).
4. NZALPA supports digital tower technology:
 - 4.1. in appropriate locations (considering airspace classifications, terrain, amount and complexity of traffic, IFR/other approaches);
 - 4.2. that is adequately resourced involving current local operational subject matter experts (in consultation with their respective associations) at all stages of the project;
 - 4.3. with realistic timeframes for implementation;
 - 4.4. with the proper fully funded technical support and safety mitigations in place;
 - 4.5. that complies fully with all regulatory requirements and international best practice.
5. The Proposal relies on the assumption that the physical location will be suitable for installations and operational delivery, however the lack of detail as to proposed sites for the tower or camera masts may invalidate the data supplied.
6. Current international use of digital towers is primarily in non-complex, rural locations. As such, Auckland Airport is not the location to trial such technology in New Zealand.
7. There are limited global guidelines currently in existence to regulate digital towers standards and the current New Zealand regulatory regime is not equipped to be able to support digital towers.

Digital Technologies v Digital Towers

8. The simplest way of comparing digital tower technology to conventional tower technology is 'looking out the window' ("OTW") versus 'looking at a screen'. The method of getting the view from the camera to be presented on screen is where all the technology is involved and most of the risk is incurred.

9. It is also important to distinguish between “digital technologies” versus “digital towers” as many digital technologies are also able to be implemented in a conventional tower environment. It is unclear at this stage, what work has been done by Airways on the value and cost of incorporating digital technologies into a new conventional tower. Other digital technologies can (and should) also be implemented in conventional tower environments. These technologies include but are not limited to: Advance Surface Movements Guidance and Control Systems (A-SMGCS), runway incursion monitoring, drone/FOD detection, collaborative decision making (CDM), flow control, arrivals/departures management and scheduling, advanced electronic flight progress boards (ATRICs) and more.
10. The benefit of conventional tower incorporating the above digital technologies is that it should provide for solution that costs less over the long term. Ideally, this should enable a longer amortisation period.
11. On the other hand, “Digital tower” technology refers to replacing an OTW view with fixed camera arrays and pan-tilt-zoom camera, cables/fibre, WLAN/LAN communication equipment, video processing/transmission systems and video screens. This comes with an associated increase in complexity and risk.
12. One aspect of the complexity and risk that arises in relation to digital towers is their reliance on fibre optic and microwave links to communicate between the camera masts and the digital tower module (DTM). Previous events have demonstrated that there are vulnerabilities that arise in a New Zealand environment on relying on underground cables to provide communication or other infrastructure links.
13. Assertions that digital towers increase safety, flexibility, and capacity with a reduction in cost cannot be substantiated yet are common sales pitches supporting moving away from building physical towers. This is particularly so when digital towers are compared to conventional towers that use digital technologies. Any improvements are almost always due to other digital technologies and physical aerodrome improvements implemented alongside digital tower technologies.
14. Whilst digital towers technology may be appropriate for other environments, NZALPA maintains that Auckland is not one of them. NZALPA is not aware of a single installation of a digital tower globally that bears similarities with Auckland’s traffic mix, IFR approach and departure routes, airspace classification (traffic separation requirements), whilst also being New Zealand’s primary port for international arrivals and departures.
15. Paragraph 2.6 of the Proposal outlines broad support for the Auckland digital contingency tower initiative to replace the current contingency from airlines and NZAA. NZALPA questions the validity of this statement in that we understand there was little support for the project by operational controllers who, by and large, were excluded from participation due to chronic staffing shortages.

Question 1: Do you have any feedback on the Auckland ATC Tower replacement options outlined?

16. NZALPA notes the number and significance of the assumptions made in the Proposal (paragraph 3.1). All options assumed physical locations suitable for installation and operational delivery (mast/tower positions) which severely limits our ability to comment on the replacement options outlined and may have hampered operational controllers' ability to fully assess the risk. This may also be misleading in that there was no confirmation that these locations would be acceptable to Auckland International Airport Limited (AIAL).
17. The only documents seen by the operational SMEs involved in the workshops are concept drawings of future International Terminal development that suggests a site for a conventional tower somewhere north of the current International Terminal in the vicinity of the Novotel.
18. Resource availability is a major risk. AA Tower is currently understaffed for day-to-day operations and will be for some time to come. Surplus operational staff are required to be included in all stages of the project with involvement increasing as implementation approaches. At present, AA Tower staffing levels are barely "treading water" as retirements keep pace with new staff training.

Option 1: Conventional Physical Tower

19. Airways appear to have disregarded this option due to the length of time required to implement and the cost, despite it scoring higher in People/Human Factors, Risk/Regulatory, and Service Delivery.
20. NZALPA disagrees with the assertion at 3.2 that there are risks relating to future flexibility and adaptability with this option because future flexibility and adaptability could be designed into whatever structure is built. It is NZALPA's concern that safety and risk are being disregarded in favour of cost.
21. It would be useful to know whether Airways have investigated further options to enable this option to succeed, such as extending the lease expiry date, thus allowing the implementation timeframe to align with AIAL future terminal development.

Option 2: Hybrid Physical Tower

22. It appears the major risk is time available. NZALPA has concerns Airways are positioning themselves to be 'forced' into a purely digital solution.
23. Our main concern is that this option is dependent on the location of the proposed hybrid tower. Based on feedback we have heard for potential sites for the different options - a 35m hybrid tower being located behind the Air New Zealand Hangar One (end of C5 taxiway) and possibly significantly further north than the current tower, may limit its ability to view traffic on the current domestic apron and is significantly further away from the Runway 05R threshold.
24. NZALPA has the following Safety concerns in relation to the hybrid model:

- Training/certification/licensing;
- Maintenance responsibilities;
- Equipment reliability, resilience, redundancy;
- Contingency (in case of hardware malfunctions, system downgrades and unplanned disruption);
- Visual quality, frame rate;
- Lack of global regulation from ICAO and local regulation from NZCAA;
- Increased fatigue due to prolonged exposure to artificial light/air and digital prompts;
- Cybersecurity.

Option 3: Digital Tower

25. The Proposal states on page 7 that the schedule for implementation of this option was evaluated to be similar to that of the hybrid physical tower option.

26. The Proposal assumes that regulatory compliance and support from NZCAA would be forthcoming to enable the use of digital tower technology in the NZ jurisdiction. To ensure use of digital tower technology (including in the hybrid option or as a contingency) significant changes would be required to CAR Part 172. This may include introduction to Part 172 of rules to govern minimum standards for safe and efficient use of surveillance technology for visual separation. It is worth noting that ICAO Doc 4444 states,

*7.1.1.2 Aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring area. Watch shall be maintained by **visual observation**, augmented when available by an ATS surveillance system. Traffic shall be controlled in accordance with the procedures set forth herein and all applicable traffic rules specified by the appropriate ATS authority. If there are other aerodromes within a control zone, traffic at all aerodromes within such a zone shall be coordinated so that traffic circuits do not conflict.*

*7.1.1.2.1 Visual observation shall be achieved through **direct out-of-the-window observation**, or through indirect observation utilizing a visual surveillance system which is specifically approved for the purpose by the appropriate ATS authority.*

Lowering the current safety level is simply not an option. There would also need to be a commitment to an ongoing review process that allows input from and considers the needs of all stakeholders.

27. There is a need for adequate contingency procedures in event of a technology failure. In our view, digital towers should not be used for visual separation. This hasn't been done anywhere in the world globally yet and needs time, a conclusive and longitudinal safety study and agreed changes to the above ICAO SARPs.

28. The Proposal outlines Airways' lack of experience with digital towers. We would suggest that a digital tower would be better placed in a smaller airport with minimal traffic and no significant terrain obstacles in the vicinity. Such a location would provide a better opportunity to trial the concept and gain experience in its operation. Paragraph 4.2 provides a number of considerations that are provided as being balanced alongside the purported benefits of a digital towers solution. NZALPA suggests that the significant number of considerations listed here should count

carefully against any proposal that might have a tendency to rush decision-making in relation to a digital towers proposal. For example, digital towers have a heavy reliance on fibre optic and microwave links. It is a known fact with some digital towers around the world, that when a large event is held fibre optic or microwave bandwidth can struggle to cope with the traffic demands and this can lead to blackouts. There are also limitations to the amount of data that can fit through a fibre optic cable. In our view, these are additional reasons why Auckland is the wrong place to trial it.

29. A digital tower approach could provide benefits for smaller, non-complex rural airports. However, we concur with the Proposal's conclusion that digital ATC is still in its infancy and for the reasons stated above, Auckland is not the right place to test such technology for the first time in New Zealand.

Question 2: Do you have any feedback on Airways' preferred approach for the replacement of the Auckland ATC Tower?

30. NZALPA is concerned with Airways' preferred approach in that it appears to have discounted building a replacement conventional tower primarily due to cost and the time required to implement this option.
31. The minimum safety level must be no less than the current tower systems. Civil Aviation Rules require that operators take steps to ensure the continuous improvement of safety management systems. This is inconsistent with the introduction of technology that reduces or has a lower safety profile and/or increased risk factor. The most significant consideration for NZALPA is that any changes must provide at least an equivalent or increased level of safety.
32. Auckland Airport is the major gateway to NZ and merits a full 70m conventional tower.
33. NZALPA suggests that local knowledge from current air traffic staff is essential to determining the placement of sensors and cameras on the airfield. We suspect that the ideal location would be equidistant from the thresholds of all current and planned runways. This should be a primary consideration in the land use planning processes of the aerodrome. Chapter 5 of the FAA Order 6480.4B (Airport Traffic Control Tower Siting Process) provides for a siting team composed of relevant stakeholders including local air traffic controllers that would work to determine the ideal placement of a tower.
34. It is also not entirely clear why Airways proposes to have a conventional tower available for visual observation of the current runway whereas the proposed northern runway may not be able to be observed to the same standard. We do not believe it is safe to make any assumptions at this stage regarding future service demands or procedures at the proposed northern runway when it is not clear what Auckland Airport or CAA's position in that regard is.

Digital tower

35. All digital equipment and technologies should be protected to the highest standard possible from hacking, data manipulation and malware with consideration for the introduction of targeted data protection legislation or regulation, or the amendment of existing provisions where necessary.
36. The placement of camera masts would need to be agreed by stakeholders and comply with good practice and international guidelines. Previous studies into digital towers at Auckland relied on proposed sites for camera masts that had not received the agreement of AIAL.
37. Industry training must be developed and delivered, prior to implementing any digital solutions. A separate air traffic controller rating and endorsements would be required for operating a digital tower. This would require the development of separation procedures for digital towers.
38. The comment at paragraph 4.3 and 4.5 in relation to assessing “whether a full digital solution would offer a superior solution” in or about July 2024 is concerning, as it has assumed the ability to determine fundamental questions at a point where the process has already begun and which might be too late to enable effective decision-making.

Contingency

39. NZALPA agree the current contingency plan for AA TWR is less than ideal. The Proposal suggests a digital contingency to allow normal operations under all of the proposed options. Money would be better spent on ensuring a safer conventional contingency tower enhanced by the use of digital technologies as described at [9] above.
40. Dependent on the reason for shifting to any contingency site, considerable time would still be required to relocate from the new facility (wherever that may be) to the contingency site. For example, there would be a requirement to source off-duty controllers. Further, a digital contingency tower may increase capacity over the current contingency site, but it cannot be expected to approach that of the day-to-day operations as it could be a very different environment to that with which controllers are familiar.
41. It would be prudent, in this case, for an ATCO to restrict workload until familiar with the differences when working in a contingency environment. Currently, ATCOs are required to be in “Current Operating Practice” (COP) in order to exercise his/her licence. An ATCO is “out of COP” when they haven’t worked in 28 consecutive days. It is likely that the time period between periods of operating the contingency tower could extend significantly past 28 days. For example, there are no controllers that have operated at the Auckland contingency tower for a number of years.
42. NZALPA supports the development of the current conventional contingency tower through enhancement with digital technologies. NZALPA does not support a digital contingency tower at Auckland Airport.

Collaboration

43. IFATCA policy states that “operational controllers shall be involved in the design, development and implementation of new ATM systems” and “that separation standards and procedures need to be developed or adapted and implemented based on a robust safety case and the demonstrated capabilities of the system.”
44. It is important to ensure that a high degree of collaborative identification and mitigation of risk is achieved amongst stakeholders. Enabling this to occur will ensure that high quality information is available for the purposes of safety risk management planning.
45. Key indicators of performance must be agreed to amongst all stakeholders, implementation performance tracked against these key indicators, and ongoing systems performance transparent and available to all users.

Question 3: Do you have any feedback on the changes highlighted to the Capital Plan in 5.1?

46. When comparing costings for a conventional as opposed to a digital tower we believe the digital towers costs have been underestimated, whilst cost for a conventional tower are overestimated. Estimated costing for a conventional tower in Auckland appears significantly more than the recent cost of building Wellington tower and yet the hybrid option doesn't appear to have taken into account the requirement for building both a physical tower and the substantial masts required to house camera arrays, which, if intended to be used as a contingency, cannot be co-located.
47. Even for a digital contingency, other considerations may include:
 - technicians on site 24/7 to maintain the integrity of digital equipment – servers, computers, screens (for example, camera lenses must be kept clean). This should be considered at the planning phase and factored into any cost assessment.
 - appropriate consideration of the ongoing maintenance and replacement costs of digital towers.
 - we understand licensing/warranty time of technology to be at max 2-5 years and best practice is not to use items that are out of warranty.

Conclusion

48. It is a regulatory requirement for Auckland Airport to have an air traffic control tower (CAR Part 172.7) and NZALPA supports Airways' conclusion that Auckland is the wrong place to trial a full digital tower. NZALPA's main concern is that Airways are being forced into the hybrid model due to funding concerns and the timeframe required to implement this critical infrastructure.
49. NZALPA recognises the benefits of digital towers at appropriate location. However, we also insist on the need for phased trials of digital towers at appropriate and safe locations. Improved safety and efficiency, and not just cost savings, would need to be demonstrated before the implementation of even a hybrid tower using digital technology. Auckland is probably never going to be an appropriate location for a digital tower.

50. NZALPA is seriously concerned about the apparent absence of collaboration between stakeholders. Airways, CAA, Auckland Airport, NZALPA and other key SMEs need to be provided opportunities to work together to develop a reasonable solution that will address their diverging but relevant concerns and interests. The whole project team has not heard from CAA or Auckland Airport. Critical SMEs need to be embedded in the testing and implementation teams and fully consulted on the proposal before it begins.

51. The location of the proposed tower and its contingency are critical. In NZALPA's view, further consultation and appropriate safety assessments involving all stakeholders are essential before implementation of any proposed changes.

Resources:

[Remote Tower Services- living document \(itfglobal.org\)](#)

[Remote Towers - IFATCA Position Paper on Remotely Operated Towers | \(ifatca.wiki\)](#)

[Technical & Professional Secretary, IFATCA](#)

[Microsoft Word - Doc.4444.alltext.en.docx \(ops.group\)](#)

[Part 172 Consolidation.pdf](#)

[FAA Order 6480.4B](#)