**BEFORE INDEPENDENT HEARING COMMISSIONERS**
**APPOINTED BY THE WAIKATO DISTRICT COUNCIL**

| | |
|---|---|
| **IN THE MATTER** | of the Resource Management Act 1991 (**Act**) |
| **AND** | |
| **IN THE MATTER** | of hearing submissions and further submissions on the Proposed Waikato District Plan. |
| **SUBMITTER** | NZTE Operations Limited |
| | Submitter [No. 823] |

# EVIDENCE-IN-CHIEF OF DAVID PARK ON BEHALF OF NZTE OPERATIONS LIMITED

## (AVIATION)

Dated: 15 February 2021


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## INTRODUCTION, QUALIFICATIONS AND EXPERIENCE

1 My name is David Stewart Park. My qualifications include a Bachelor's Degree in Mechanical Engineering, Master's Degree in aeronautical engineering, and an MBA. I am a UK Chartered Engineer, a member of the Royal Aeronautical Society and the Honourable Company of Air Pilots.

2 I am a Director at Astral Limited, a New Zealand based aviation consultancy servicing a range of airport, airline, and government clients within New Zealand and overseas. I have over 20 years' experience in airport design of aircraft operations and prior to that 20 years' experience in aircraft operations with Air New Zealand and Qantas New Zealand. I have previously held a pilot's licence for light aircraft.

## CODE OF CONDUCT FOR EXPERT WITNESSES

3 I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2011. I have complied with it in preparing this evidence and I agree to comply with it in presenting evidence at this hearing. The evidence that I give is within my area of expertise except where I state that my evidence is given in reliance on another person's evidence. I have considered all material facts that are known to me that might alter or detract from the opinions that I express in this evidence.

## BACKGROUND

4 I was engaged by NZTE Operations Limited (**NZTE**) in November 2017 to provide independent aviation advice throughout the proposed Waikato District Plan (**pWDP**) process in relation to Te Kowhai Aerodrome (**Aerodrome**). I confirm I have read the submission and further submission by NZTE, and the submissions that I refer to in this Evidence-in-Chief as they relate to my discipline. I am also familiar with the district planning documents relevant to the pWDP in my area of expertise.

5 The Aerodrome is subject to the Te Kowhai Airpark Zone (**TKAZ**). The TKAZ, along with the operation of the Aerodrome, allows for the establishment of a complimentary Airpark consisting of commercial and residential precincts (**Airpark**).

## THE SITE AND SURROUNDS

6 The Aerodrome is located some 8km south of Ngaruawahia and 7km west of Hamilton City in the Waikato. It is situated in a rural area just east of the settlement of Te Kowhai.

7 The surrounding area is largely flat, making it an ideal location for an aerodrome. The Aerodrome's runway is oriented east-west which is ideal for the prevailing winds.

8 The areas under the take-off and approach paths at the end of each runway are relatively free from houses. The east take-off and landing flight paths pass over a house approximately 800m from the runway end, and the west flight paths pass over a group of houses located on Horotiu Rd about 270m from the east runway end.

## OPERATION OF THE AIRFIELD

9 Te Kowhai Aerodrome is listed in the New Zealand Aviation Information Publication (**AIP**) as a non-certificated aerodrome available for general use, but with the proviso that commercial operations are subject to the prior approval of NZTE (the listed aerodrome operator). The Aerodrome hosts a range of recreational and general aviation operations including some basic flight training.

10 **Figure 1** shows the layout of the Aerodrome as depicted in the AIP.

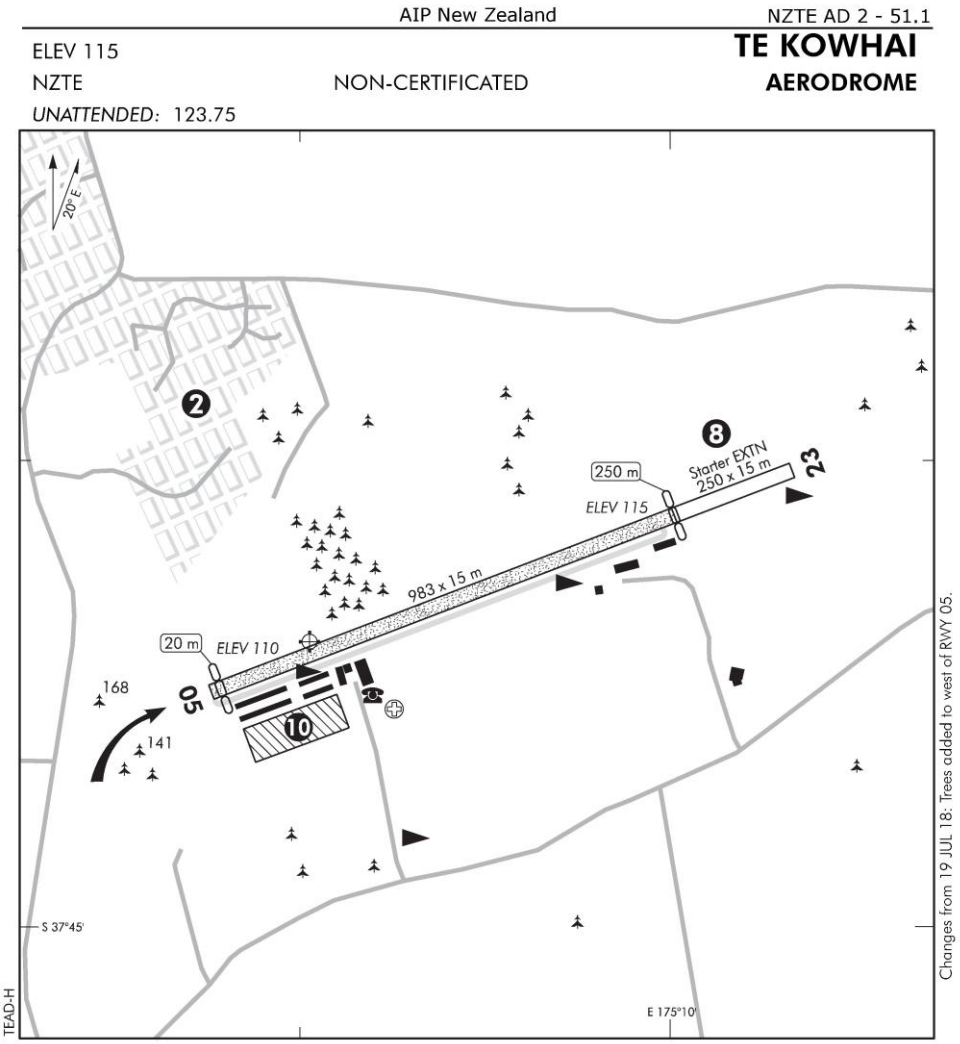


***Figure 1: Aerodrome layout*** *(source NZAIP as at 5 Feb 21).*

11 The Aerodrome is designed for the operation of "light" aircraft, generally taken to mean aircraft with a maximum certificated take-off weight (**MCTOW**) of 5,700kg or lower. However, most of the aircraft operating at the Aerodrome are substantially below this weight and are typically between 1,100-1,600kg.

12 The Aerodrome has no night lighting and no published instrument approach procedures i.e., navigation procedures that allow a pilot to land (or to take-off) when operating under Instrument Flight Rules (**IFR**). On this basis the Aerodrome (or more specifically its runway) is currently deemed to be a non-instrument day "visual flight rules" (**VFR**) runway.

13 The Aerodrome has a single grass runway 983m long by 15m wide. The easterly direction of the runway is called “runway 05” and the westerly direction is called “runway 23”. The east runway end has a 250m long extension, referred to as a “starter extension”, that is available for aircraft taking off on runway 23, the predominant take-off direction, to commence their take-off run. This places their flight paths higher above the houses on Horotiu Rd.

14 The runway direction a pilot chooses to take-off on, i.e., the 05 or 23 directions, depends on the prevailing wind at the time of take-off. It is normal to take-off into the wind as this shortens the take-off run and is a safer procedure. Similarly, landing is almost always done into the wind, as it shortens the landing run and is safer.

15 Aircraft taking off on runway 05 initially climb on runway heading then, unless departing in that direction, turn right to “circuit” south of the runway to depart or to position for landing on runway 05. Aircraft doing the same on runway 23 turn left to circuit to the south. This circuit pattern, illustrated in **Figure 2**, has been adopted by NZTE to avoid overflying Te Kowhai village.

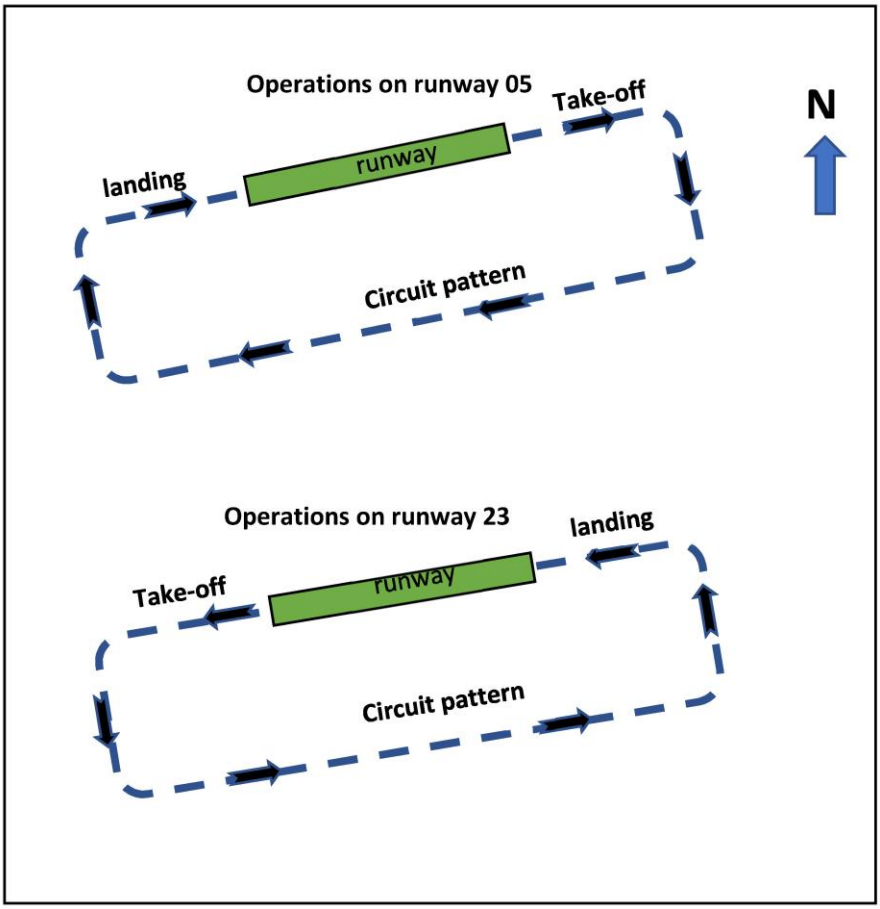


***Figure 2: Te Kowhai runway circuit pattern.***

16 Arriving aircraft must also follow the circuiting direction for the runway direction they intend to land in. The circuit is designed so landing aircraft are aligned with the runway the pilot intends to land on from 500ft above the Aerodrome. This part of the circuit from being aligned with the runway to touchdown is called “final approach”.

17 Consequently, take-off and final approach flight paths are similar near both ends of the runway. This method of operating, which avoids turns at a low level to the ground, is standard piloting practice world-wide and, in the interests of safety, cannot be varied except in the case of agricultural operations for which special rules apply.

18 It is essential pilots, under training, are able to practice take-off and landings following the circuit procedures I described above. This training exercise is called “circuits”.

19 Pilots leaving and arriving at an aerodrome are also required under CAA Rules to comply with the aerodrome's established circuit. Consequently, the circuit is an inherent and essential part of an aerodrome's operation and cannot be carved out as a separate activity. All pilots must gain and retain proficiency in its use.

20 Pilots must also practice the emergency procedure in the event of an engine failure after take-off (**EFATO**). This involves a reduction in engine power to idle shortly after take-off (below 500ft) with the pilot then having to quickly reconfigure the aircraft from climbing to a gliding descent, making slight direction changes left or right to align with the most suitable emergency landing area (e.g. a paddock). This exercise is terminated at height to minimise disturbance to people and stock by restoring engine power and continuing climb out in the runway direction.

21 This exercise results in a lower climb profile and can cause a "startle effect" for people beneath the flight path. However, it is an essential flight training manoeuvre common at the aerodromes throughout New Zealand.

22 An aerodrome operator can impose restrictions as it sees fit, within the bounds of flight safety, on the use of its facility, including, for example, the conducting of training exercises which may increase noise disturbance under aircraft flight paths such as has been done at Ardmore Airport where there is a restriction as below on EFATO training: [1]

> *Simulated engine failure after take-off for single engine fixed wing aircraft shall take place within 20 degrees either side of the extended centreline of the runway and the exercise completed by not below 400 feet AMSL unless the aircraft remains above the runway throughout and after the exercise returns to 600 feet AMSL or above as quickly as possible.*

23 I am advised that at the Aerodrome, hanger owners and users of the Aerodrome are made aware by the Aerodrome operator to minimise EFATO simulation practice directly off the end of runway 23 to reduce nuisance on landowners in that direction.

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[1] Ardmore Airport Noise Management Plan, Sep 2015, paragraph 3.7.5.

**CAA PROVISIONS**

24 The CAA is responsible for setting rules and standards relating, inter alia, to the operation of aerodromes and aircraft.[2] Most civil aviation rules and standards in New Zealand are based on international standards set by the International Civil Aviation Organisation (**ICAO**) which is a body constituted under the United Nations. Some 193 States, including New Zealand, are members of ICAO and all are bound ("contracted") to align with ICAO Standards and Recommended Practices (**SARPS**) under the 1944 "Convention on International Civil Aviation" (**the Chicago Convention**).

25 The rules and standards relating to aerodromes set by the CAA are largely based on corresponding ICAO SARPS as contained in ICAO Annex 6 to the Chicago Convention. These are adopted into New Zealand Civil Aviation Rules (**CAR**) and associated Advisory Circulars (**AC**) that contain standards and guidance material relating to compliance with CAR.

26 The relevant CAR for aerodromes is CAR Part 139 and applicable aerodrome standards for aerodromes used by light aircraft are contained in Advisory Circular AC139-7.[3] For the purpose of this evidence I describe aerodromes covered by AC139-7 as "small aerodromes".

27 AC139-7 contains specifications for the "physical characteristics" required for small aerodromes. "Physical characteristics" includes the dimensions of runways, the clear areas required around runways (runway strip), the dimensions of taxiways and their separation from runways and, importantly, the requirements for flight path protection at runway ends and around an aerodrome.

28 The CAA, in line with ICAO practice, categorise aircraft in terms of their speed and size using a number-letter code; the number part (from 1 to 4) being a measure of the aircraft's speed based on its take-off runway length requirement and the letter part (from A to F) being a measure of its wing-span. The aircraft code for the most demanding aircraft type regularly operating at the aerodrome becomes the aerodrome reference code used

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2 "Aerodromes" is the generic CAA term for facilities for take-off and landing of fixed wing aircraft, irrespective of the size of the facility i.e. an aerodrome can be anything from a simple grass airstrip to a full international airport.

3 The current version of this document is Revision 4 dated 18 December 2009.

for aerodrome design purposes. The higher the number and letter, the bigger and faster the aircraft is.

29 **Table 1** below lists the aerodrome reference codes covering the smallest propeller aircraft up to the largest wide body air transport jet aircraft:

| **Code element 1** | | **Code element 2** | | |
|---|---|---|---|---|
| **Code number (1)** | **Aeroplane reference field length (2)** | **Code letter (3)** | **Wing span (4)** | **Outer main gear wheel span[a] (5)** |
| 1 | Less than 800m | A | Up to but not including 15m | Up to but not including 4.5m |
| 2 | 800m up to but not including 1,200m | B | 15m up to but not including 24m | 4.5m up to but not including 6m |
| 3 | 1,200m up to but not including 1,800m | C | 24m up to but not including 36m | 6m up to but not including 9m |
| 4 | 1,800m and over | D | 36m up to but not including 52m | 9m up to but not including 14m |
| | | E | 52m up to but not including 65m | 9m up to but not including 14m |

[a] *Distance between the outside edges of the main gear wheels.*

***Table 1: CAA Aerodrome reference codes.***

30 The aerodrome design code proposed by NZTE for the Aerodrome is Code 1A, i.e. the code appropriate to the small single or twin engine aircraft. However, the Code A wing span upper limit of 15m does not cover all small aircraft that may operate at the Aerodrome, for example the Cessna C208 Caravan which has a span of 15.88m. For this reason, NZTE proposes an upper wingspan limit of 18m, referred to in this report as Code “1A+” i.e.

accommodating aircraft with a required take-off field length of less than 800m and wing span of up to 18m, which is effectively Code A but with an upper wing span limit of 18m instead of 15m.

31 This recognises the fact that aircraft wing spans are generally increasing to obtain aerodynamic efficiencies and the larger aircraft types previously at the top end of Code A now have spans placing them just inside Code B.

32 In fact, the letter part of the code makes little difference to airport design except in relation to ground manoeuvring space including separations between taxiways and buildings.

**OBSTACLE LIMITATION SURFACES**

33 Flight path protection is provided by protecting the OLS specified in AC139-7 for the runway(s) at an aerodrome. As stated earlier, the requirement for OLS and their specification derives from the SARPS of ICAO Annex 14. However, there are some local (New Zealand) differences that have arisen for historic reasons, as the international SARPs have been progressively updated but the CAA has not considered it necessary to update the corresponding local standard.

34 The AC139-7 design standards for small aerodromes depend on:

(a) The wingspan of the largest aircraft regularly using the aerodrome (the “design aircraft”).

(b) Whether aircraft operations are to occur at night.

(c) Whether aircraft operations are under VFR or IFR.

35 When operating under VFR the pilot must be able to see the ground and surrounding terrain at all times. When operating under IFR the pilot can rely on flight instruments and aircraft navigation systems to determine their position with respect to the aerodrome and its runways to be able to safely and accurately position the aircraft for approach and landing, and after take-off. The ability to operate at night and under IFR enables take-offs and landings to be made in a much wider range of flying conditions and greatly improves the safe operation of aircraft.

36 I am advised by NZTE that its intention is to upgrade the Aerodrome to allow enhanced private aircraft operations of small single or twin-engine propeller powered aircraft during daytime hours, or, under managed circumstances, at night, to navigate under IFR. In the past, private small aircraft operations have been under VFR, and IFR operations required very expensive ground-based radio navigation equipment to be installed at each airfield at which IFR operations were sought.

37 It should be noted that the aerodrome OLS design requirements for IFR and night operations are the same under AC139-7, consequently achieving the OLS requirements for IFR also allows night operations, subject to having the required runway lighting.

38 With the advent of aviation precision satellite-based navigation systems for light aircraft, commonly known as Spaced Based Augmentation Systems (**SBAS**) and the implementation of the necessary SBAS ground infrastructure by central government, it is possible for small aircraft to conduct IFR operations at any aerodrome, even simple grass runways such as the Aerodrome.

39 This greatly improves the safety and reliability of aircraft operations. However, it does require a higher standard of aerodrome design to ensure sufficient clear ground and airspace exists for safe operations in the reduced visibility conditions of IFR.

40 SBAS operations by small aircraft occur routinely in the USA.[4] While similar SBAS systems are used by large air transport aircraft, I am advised and have prepared this evidence on the basis that no operations of large aircraft will occur at the Aerodrome. The design requirements described in the following sections, together with the recommendations in this report are intended primarily to cover small aircraft IFR operations at the Aerodrome.

41 Key requirements under AC139-7 are the runway strip width and length (being the dimensions of the level grassed area surrounding the actual

[4] In the US, the equivalent system to SBAS is called Wide Area Augmentation System (WASS). According to the US Federal Aviation Administration there are over 80,000 aviation WAAS users in the US.
https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/waas/benefits/ (Refer as at 3 Feb 2020).

runway) and the geometry of the runway's OLS. The OLS is a series of protection surfaces arising upwards and outwards from the ends and edges of the runway strip intended to protect aircraft taking off, landing and circling the Aerodrome.

42 The minimum runway strip width that is required to be provided for IFR operations of small aircraft is 60m, with the strip extending 30m beyond the actual runway length at each end.[5] This is illustrated in Figure 3.

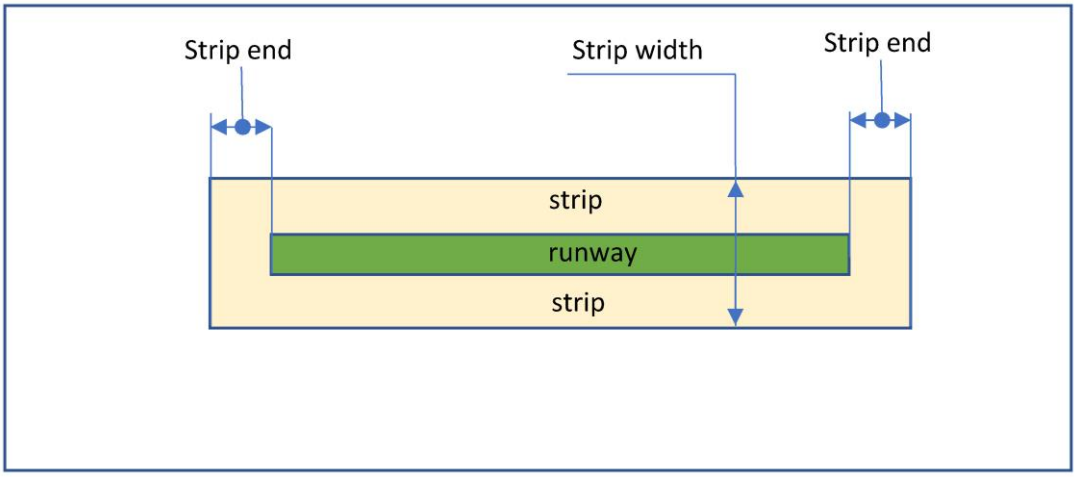


***Figure 3: Strip width and ends.***

43 In accordance with CAA requirements, the OLS that is required to be protected for night and IFR operations by small aircraft are:[6]

(a) The take-off and approach surface. This is a geometric surface centred on the extended runway centreline that commences at the strip ends, and slopes upwards at a rate of 1 vertical to 40 horizontal (1v:40h). The edges of the surface splay outwards at 10% of the distance travelled along the extended centreline. The surface extends outwards to a distance of 2,500m from the strip end.

(b) The transitional surface. This surface extends upwards and outwards from each side of the runway strip at a vertical gradient of 1v:5h to a height of 10m above the runway level, then vertical to a height of 45m.

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5 AC139-7 paragraphs 2.2.2(b) and 2.2.4.

6 AC139-7 Section 3.3.

(c) The inner horizontal surface. This surface lies at a height of 45m above the runway and extends outwards to a distance of 2,500m from the runway centreline and strip ends.

44 These surfaces are illustrated in **Figure 4**.


***Figure 4: OLS surfaces.***

45 To ensure an area free from obstructions for aircraft to manoeuvre close to an aerodrome, the OLS is protected in local authority district plans, either in the plan itself or via a designation. Rules in the plan or designation prevent property owners below the OLS from having structures or vegetation on their property that protrude through the OLS surfaces, unless specific written approval is obtained from the local authority or the aerodrome operator.

46 All New Zealand aerodromes that I am familiar with have their OLS protected in this manner.

47 Currently the Aerodrome has smaller-sized OLS protected in the Waikato District Council Operative District Plan (**ODP**). This smaller OLS is intended

for day VFR operation of aircraft with a maximum wing span of 12m and is not adequate to protect IFR operations (to allow landings in inclement weather) or operations of larger aircraft with wing spans up to 18m that are to be used at the Aerodrome. Therefore, the OLS shown in **Figure 4** above is appropriate to be included in the pWDP as it will enable the use of the Aerodrome in accordance with the type of aircraft it is certified for and utilise technology that will ensure the safe and efficient operation of the Aerodrome into the future.

**COMMENTS ON NZTE'S SUBMISSIONS**

48 I have read the NZTE Submission on Stage 1 of the proposed pWDP as it relates to my area of expertise. I support the changes proposed by NZTE to Rules 16.3.3.3P1, 17.3.1.2P1, 20.3.3P, 22.3.4.3P1, 23.3.4.2P1, 24.3.3.2P1 and 25.3.1.2P1, and their associated D1 sub-sections to enable the height of trees to be controlled such that they do not penetrate the OLS. This is consistent with CAA Advisory Circular AC139-10 which contains requirements for the control of obstacles beneath an aerodrome's OLS. At paragraph 2.4.1 this AC states:

> *The objective of height zoning is to protect the aerodrome obstacle limitation surfaces from intrusion by manmade objects and natural growth <u>such as trees</u>.*
>
> *(Emphasis added)*

49 This confirms the expectation of the CAA that trees will be included along with man-made structures in controls to protect OLS.

50 I have read the further submission of NZTE on Stage 1 of the pWDP as it relates to my area of expertise.

**RESPONSE TO SUBMITTERS**

51 NZTE addresses a number of submitters in its further submissions. I respond to NZTE's further submissions below.

52 I note NZTE's submission seeking that the submissions 664.1 and 664.2 of Waikato Regional Airport Limited (**WRAL**) be disallowed. I have reviewed

these two WRAL submissions and note that they do not appear to oppose the OLS per se but rather the possibility that faster and higher performance aircraft will be attracted to the Aerodrome due to its development to a facility capable of accommodating Code 1A+ IFR aircraft, and that this will be detrimental to the safety of aircraft operating at Hamilton Airport.

53 I do not share this concern because the aircraft using the airspace surrounding Hamilton Airport must communicate with, and take instructions from, the Airport's Air Traffic Control (**ATC**) Tower when close to the flight paths used by aircraft operating at the Airport. Aircraft operating standard flight patterns to arrive, depart and circuit at the Aerodrome are well away from Hamilton Airport which is located south of Hamilton City.

54 Any IFR aircraft operating at Te Kowhai would need to be under the control of ATC until established on approach to the Aerodrome, ensuring their separation from IFR aircraft operating at Hamilton Airport.

55 I note the submissions 419.113 and 695.57 from Lucy Deverall and Sharp Planning Solutions respectively. I support NZTE's further submission in response that the definition of "airfield" should be aligned with the CAA definition of "Aerodrome" for the sake of consistency.

56 With regard to submissions 602.2, 602.13, 494.1, 832.3, 941.2, 943.58 and 987.1 from various parties relating to the OLS, I endorse NZTE submission in support of the OLS as proposed in the pWDP and Variation 1. It is essential in the interests of safety that the OLS be that specified in AC139-7 for IFR aircraft if those aircraft are to operate. It is also essential that the runway strip width, which influences the extent of the take-off/approach OLS and the transitional OLS is increased to accommodate Code 1A+ aircraft. The reasons for this are set out in paragraphs [33] to [48] above.

**VARIATION *1***

***The OLS does not address landform - submitter 1(P&J Gore)***

57 This appears to relate to the provision in the Napier City Plan which allows structures / vegetation up to a certain height above local ground level in areas where terrain penetrates the OLS. I am aware of other district plans

and designations which contain similar provisions. However, I do not agree with such a "blanket" approach with regard to new development.

58 Instead, I consider there should be a general control on the height of structures and vegetation such that the OLS is protected, but flexibility is retained to allow new development where it will not present a hazard to aircraft operations.

59 OLS protrusions are mostly an issue where they occur in the take-off and approach OLS, especially within 3,000m of the runway ends. Terrain or vegetation penetrating through the inner horizontal surface (where established) is less of a concern and can usually be managed.

***Link between district plan and plane safety – submitter 1(P&J Gore)***

60 The preamble to CAA Advisory Circular AC139-10 – Control of Obstacles states:

> *This AC contains guidance for compliance with the Part 139 requirements for obstruction limitation surfaces at certificated aerodromes. The same guidance can be used by the operator of a non-certificated aerodrome to ensure that the use of the aerodrome is not affected by obstacles.*
>
> *Obstacle limitation surfaces are specified in AC139-6, Aerodrome design, aeroplanes above 5,700 kg MCTOW, and in AC139-7, Aerodrome design, aeroplanes at or below 5,700 kg MCTOW. An instrument approach runway will also have established obstacle-free surfaces as a basis on which the instrument procedure was designed and the minima established.*

61 This confirms that OLS are intended to protect aircraft flight paths from protrusions in the interests of flight safety. District plans are the means by which OLS are defined and obstacles are controlled around airports in New Zealand. I consider this clearly establishes the link between a district plan and "plane safety".

***Shielding - submitter 1(P&J Gore)***

62 AC139-10 at paragraph 2.8 discusses obstacle shielding and provides further references. Shielding is described as:[7]

> *An object should be considered shielded if it is lower and behind an object which is already considered to be a hazard to air navigation and has been marked by standard obstacle marking or lighting, or both.*
>
> *The permanency of an immovable obstacle which is to be considered as shielding an area should be given careful review. An object should only be classed as immovable only if, when taking the longest view possible, there is no prospect of removal being practicable, possible or justifiable, regardless of how the patter, type or density of air operations might change.*

63 Shielding is a legitimate factor in considering whether an object can penetrate an OLS. It is usual to include some flexibility in the rules in a district plan to permit obstacles to penetrate OLS (usually limited to only the inner horizontal OLS) subject to approval in writing by the aerodrome operator. I support this as it then enables shielding to be assessed on a case-by-case basis. This is done in a later process after the establishment of the OLS in the pWDP, for example when instrument flight procedures are being designed, or when there is a proposal from a utility operator to erect a tall structure or a landowner to establish a plantation of trees.

***Size of aircraft - submitters 1, 5, 8, 10, 16, 17, 18 (Gore, Linnet Watson, McBride, Houlbrooke, Strangwick, Fowler)***

64 Under CAA rules, an aerodrome that is designed under AC139-7 standards cannot accept aircraft larger than 5,700kg maximum take-off weight. This sets an upper limit of around 15 passenger seats on an aircraft.

65 The effects of larger aircraft are best managed by noise controls. There is nothing inherently unsafe about the operation of larger aircraft so long as the aerodrome design is appropriate.

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[7] Section 4.4 of CAA Advisory Circular AC139-6 - Aerodrome design requirements (Aircraft over 5700kg MCTOW and aircraft on air transport operations.

66 Just because an aerodrome design is suitable for larger aircraft does not mean they will be attracted there. For example, the availability of fuel and aircraft parking, plus the recreational of commercial demand for such aircraft at the aerodrome's location are all relevant factors in establishing the desirability of operating.

***Vegetation greater than 45m should be exempt or not controlled by the OLS - submitters 1, 4, 9, 19, 21, 22 (Gore, Stead, Barnes, Young, berry, Young)***

67 Unfortunately, the higher the vegetation generally the greater the risk it presents to aviation safety. There is no flight safety reason why vegetation above a certain height could be exempted or not controlled.

68 What can be done is to address vegetation on a case-by-case basis to determine the operational significance. For example, if it is at the outer extremity of the horizontal surface well away from the runway extended centreline, it may well be able to be exempted. As with the shielding, this is done in a later process in consultation with Aerodrome operator.

***Inner horizontal OLS should be reduced to 2,000m or OLS of ODP 2013 should be adopted - submitters 2, 4, 9, 10, 18 (Yapp & Barnes, Stead, Barnes, Houlbrooke, Fowler)***

69 ODP 2013 OLS does not control the height of vegetation. This was an omission which needs to be corrected in order for the Aerodrome to comply with CAA requirements.

70 AC139-10 at paragraph 2.4.1 states:

> *The objective of height zoning is to protect the aerodrome obstacle limitation surfaces from intrusion by manmade objects and natural growth such as trees.*

71 The inner horizontal OLS requirement for a night or instrument runway under AC139-07 clearly states that the OLS must extend outwards for 2,500m from the runway centreline and the end(s) of the strip. Consequently, there is no basis for a reduction to 2,000m.

***The CAA allows protrusions, existing protrusions [do not] make the OLS unsafe - submitters 2, 8 (Yapp & Barnes, McBride)***

72 The CAA may allow protrusions of OLS depending on where the penetration is located in relation to aircraft flight paths for a specific runway.

73 AC139-10 contains some guidance but specifically in relation to approach OLS (which are also the take-off OLS in the opposite runway direction), AC139-10 para. 2.1(a) states:

> *Objects which penetrate the approach surface are critical since they represent an erosion of the clearance between the final approach path, usually 3 degrees, and fixed or mobile obstacles on the ground. On an approach where the approach surface is significantly obstructed, the safe operation of aircraft is ensured by raising the aerodrome approach meteorological minima. If the object penetrates into the approach surface, the landing threshold is displaced, effectively reducing the available landing distance. This can have an adverse effect on the regularity of aircraft operations and could impose payload penalties on landing aircraft.*

74 This confirms the safety and operational concerns that arise with uncontrolled protrusions of the OLS, particularly on the approach and take off surfaces.

***Use of the term "airport" - submitters 2, 4, 5, 8, 10, 16, 17, 18, 25***

75 There is no definition of "airport" in the CAA Rules. Civil Aviation Rule Part 139 and the associated Advisory Circulars use the generic term "aerodrome", which is defined as:

> *… any defined area of land or water intended or designed to be used either wholly or partly for the landing, departure, and surface movement of aircraft.*

76 I have used the term "aerodrome" in my evidence as this is the correct term even for a smaller facility. My recommendation for the pWDP is to use the term "aerodrome", however I don't consider that the use of the term "airport"

would bestow any more restrictive conditions on surrounding landowners as it is not recognised in the CAA aerodrome design standards.

77 The pWDP's rules and standards in relation to the size, OLS design, and operation of the facility will not vary irrespective of whether the facility is termed an "aerodrome", "airstrip", "airfield" or "airport".

***Houses under OLS to be removed - submission 2 (Yapp & Barnes)***

78 The submitter expresses concern that CAA and/or Waikato District Council will require houses under OLS to be removed.

79 I am not aware of any aerodrome in New Zealand where houses have been removed simply because they are beneath an OLS. At some larger aerodromes (e.g. Rotorua and Queenstown) the facility owner has acquired houses at the ends of runways due to high aircraft noise levels.

80 The primary purpose of an OLS is to protect aircraft in flight. So long as a house does not penetrate an OLS in a critical location (e.g. on approach close to the runway end) there is no requirement to remove it for OLS protection.

***Aircraft flight paths lower - submissions 4, 5, 13, 24 (Stead, Linnet Watson, Barnes, Maxwell)***

81 Aircraft flight paths will not be lower due to the extension of the inner horizontal OLS from 2,000m out to 2,500m.

82 The OLS extent was incorrectly specified as 2,000m in the planning map attached to the pWDP Stage 1, but I note the correct extent of 2,500m was used in the text of Appendix 9 of the pWDP. Its height was correctly specified as 71.6m above the Moturiki Datum (45m above aerodrome elevation). There is no change to this height due to the map correction to 2,500m, which only corrects an error in the depiction of the OLS on the relevant planning map.

83 The height of the inner horizontal OLS is lower than aircraft flight paths. It provides a safety margin between normal aircraft heights and the lowest height that an aircraft could be expected to be in a non-normal situation such

as the need to abort a landing at a very low height, or circle to land after take-off in the event of a malfunction on take-off.

***VFR or non-commercial flights only - submissions 4, 7, 8, 10, 12, 14, 16, 17, 25 (Stead, Kane Lee, McBride, Anderson, Lang, Houlbrook, Strangwick, Maxwell)***

84 Under AC139-7 a runway serving only day VFR flights does not require an inner horizontal OLS at all.

85 Under AC139-7 a runway serving night VFR operations requires an inner horizontal OLS extending out to 2,500m.

86 As the intention is to utilise emerging GPS IFR technology to enhance flight safety during inclement weather, and to permit limited night operations, then it is appropriate that the OLS extend out to 2,500m. Whether night flights are VFR or IFR does not alter this requirement.

87 I understand NZTE Operations does not intend to allow commercial operations from the Aerodrome, and, as noted previously, it has the ability to control this via the restriction in the AIP. I understand that the provision of the ability to operate with IFR is to also utilise the improvement in GPS technology to improve the ability for rescue operations to occur at the Aerodrome, when required. I confirm that this is an appropriate use of the technology now available and will, in my opinion, improve the value of the Aerodrome to the community.

***Runway should be moved to the centre of the site - submission 4 (Stead)***

88 I understand the submitter, whose property is on the Aerodrome's northern boundary, considers NZTE should have moved the runway from the northern boundary to the centre of the development site with the runway being in the middle or centred on the site to minimise the effect of transitional OLS on its property. This would have required a complete re-notification of all the OLS as the approach, take-off and inner horizontal OLS locations as well as the transitional OLS location are all tied to the location of the runway. Additionally NZTE has considerable infrastructure in the form of established hangars and buildings on the south side of the runway which

would need to be moved and would become very constrained due to the side separation they require from the runway.

89 Consequently, I do not consider it is practical to move the runway as suggested by the submitter.

***No aeronautical study done - submissions 4, 8, 10, 16, 17(Stead, McBride, Houlbrook, Strangwick)***

90 For a non-certificated (under CAR Part 139) aerodrome such as Te Kowhai, CAR Part 157 requires the aerodrome operator to apply to the Director of CAA if the operator proposes to:

> *Construct, re-align, alter, or activate any runway or other aircraft landing or take-off area of an aerodrome or heliport to which this Part [157] applies.*

91 On receipt of the application the Director will perform an assessment ("aeronautical study") to:

> *…consider the effects that the proposed action would have on the safe and efficient use of airspace by aircraft, and on the safety of persons and property on the ground.*

92 A list of factors the Director would consider also is specified.

93 NZTE would need to make the Part 157 application to the Director once it is ready to develop the Airpark or commence IFR operations. It cannot realistically do this ahead of ensuring the necessary OLS and other planning provisions are in place under the pWDP.

***Fuel dumping - submitter 5 (Linnet Watson)***

94 No aircraft that use NZTE are equipped with a fuel dumping system. Fuel dumping is only used in large commercial transport aircraft, typically Code D and above.

***OLS unworkable in implementation - submitter 8 (McBride)***

95 I understand this submission relates to mature trees on the submitter's property that already infringe the OLS and have done for some years without being challenged by the CAA or the Aerodrome operator, and also that past planning decisions have awarded such trees existing use rights. This has led the submitter to consider the OLS to be both unenforceable and unworkable.

96 Implementation of an OLS is required by the CAA under AC139-7. All airports I am involved with do this via rules or a designation under the district plan, as is the case for the Aerodrome. Once established, it is not up to the CAA to check whether the OLS is infringed, i.e. if there are obstacle protrusions into it. That is the aerodrome operator's responsibility and is typically done by commissioning surveys of tree and structure heights within the OLS area, updated every 5 years. Any protrusions found are usually dealt with amicably by discussion between the aerodrome operator and the affected property owner.

97 In the event agreement cannot be reached and the protrusions remain, the aerodrome operator should calculate the runway length available with the required OLS gradient just clearing the obstacle (if the obstacle is in the approach or take off surface). For example, if the infringement is 10m height and the OLS upslope is 1:40 then the runway length available for both take-off and landing should be reduced by 10m x 40 = 400m. This is a substantial reduction if the runway is only 983m long, as is the Aerodrome's, and may result in the runway being too short for some aircraft types it is intended to serve. If an infringement is within the Inner Horizontal Surface, then flexibility is available provided the safe operation of the Aerodrome is not affected

98 I do not consider the OLS to be "unworkable". It functions very well in the great majority of NZ aerodromes to protect aircraft flight paths.

***OLS should not apply to electricity distribution network poles and equipment – submitter 26 (Karleen Broughton for Wel Networks Ltd)***

99 The submitter requests that its existing poles and equipment should be excluded from the OLS height requirements.

100 I do not believe this exclusion is necessary for reasons discussed later in my evidence in relation to the Section 42A report. Instead I recommend that a flexible approach is taken to the need to remove vegetation or other obstacles protruding into the OLS in the inner horizontal surface.

***Fig 2, 10m pWDP threshold height limits - submitters 10, 16 and 24 (Houlbrook, Houlbrook, Maxwell)***

101 I understand Figure 2 was prepared by Waikato District Council (**WDC**) to provide guidance to landowners on areas where the OLS is less than 10m above local ground level of land, potentially affecting the development of the land, i.e. Figure 2 is intended for information purposes only. Deleting the Figure will not remove the OLS.

***Limits on flight number, hours of operation, training manoeuvres etc - submitters 16 and 25 (Houlbrook and Maxwell)***

102 These are not issues that relate to Variation 1 or to the OLS. These issues relate more to aircraft noise, disturbance and amenity value which are dealt with through other methods in the pWDP.

***Trees are not in the way of the runway - submitter 21 (Berry)***

103 The inner horizontal OLS surrounds the runway to protect visual circling by VFR and IFR aircraft having to abort their approaches at low level.

104 The submitter does not specify where the Kahikatea are located. If they are within the inner horizontal OLS there is some flexibility in accepting existing protrusions depending on where the protrusions are located. This is dealt with through under another process involving the CAA and Aerodrome operator and I recommend some flexibility be incorporated into the rules of the pWDP.

***Amend Figure 1 to bend flight path - submitter 24 (Maxwell)***

105 IFR aircraft on approach should be lined up with the runway from at least 3km from the runway end, corresponding to 152m (500ft) above ground level. As the OLS length is only 2,500m there is no scope to bend the approach OLS under the CAA aerodrome design standards.

***Change in start of OLS point in Variation 1 - submitter 25 (Maxwell)***

106 The submitter seems to be requesting that the OLS commence at the end of the runway, not the end of the runway strip, which is 30m further out. I understand this is based on a statement in a one-page information sheet on the OLS prepared by my company (Astral Ltd) on behalf of NZTE for public information purposes.

107 In that information sheet I state:

> *The size and shape of OLS varies depending on the length of the runway and size of aircraft using it. International airports used by jet aircraft have OLS that cover a large area, typically out to 15km from each runway end, up to 2.5km wide and with very shallow 1:62.5 upslopes from the runway ends (i.e. 16m per 1,000m distant from the runway ends). OLS for runway side protection are also required, extending out to 465m from the runway centreline.*
>
> *(Emphasis added)*

108 The wording “from the runway ends” was a simplification to avoid the need to explain the difference between runway end and runway strip end. Most people in my experience taking the end of the grassed area in which a grass runway sits to mean the “runway end”. In fact, generically the end of the grassed area is technically the runway strip end, the actual runway end being inset a defined distance from this is specified in AC139-7, and is typically 30m.

109 In the specific case of the west end of the runway at the Aerodrome, there is a 1m high fence at the end of the grassed area. As this constitutes an obstruction and should be below the OLS, NZTE elected to inset the runway

strip end by 1m x 40m (for the 1:40 OLS) = 40m. The actual runway end, which has no significance for the OLS, is 30m further inset from this.

110 I can confirm that the OLS is, under AC139-7, required to start at the end of the runway strip and is therefore correctly located in the pWDP documentation including Variation 1.

**SECTION 32 REPORT**

111 I have reviewed the Section 32 report as it pertains to my evidence.[8]

112 The report supports the adoption of the OLS on the basis that it will "future proof" the aerodrome by providing OLS provisions for future IFR operations.

113 I particularly support the report's statement:[9]

> *The new OLS has the potential to be both efficient and effective in supporting Objective 9.2.2, because it promotes a safer, obstacle free airspace to meet the changing needs of the aviation community. On balance, the safety benefits of the OLS are considered to outweigh the costs.*

**SECTION 42A REPORT**

114 I have reviewed the Section 42A report as it pertains to my evidence, in particular paragraphs 150 to 185 and 257 to 359.

***OLS***

115 The Section 42A report recommends reverting to the ODP OLS rather than adopting the pWDP OLS which had already been agreed (supported by the Section 32A analysis) by WDC for inclusion in the pWDP. For the reasons discussed below, I consider the OLS recommended in the Section 32A report and notified in the pWDP to be more consistent with CAA regulations and be in accordance with the use of the Aerodrome.

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8 Section 32 report-Part 2, Te Kowhai Airpark Zone July 2018.

9 *Ibid*, page 57 6th bullet point.

116 I consider the Section 42A report to be flawed in that the report's author misunderstands the purpose of the OLS in relation to flight safety and the practical effect of the OLS on property owners.

117 The purpose of OLS is simply to provide a means of controlling obstacles, whether tall buildings, structures, or vegetation around the airport which could affect the safety of aircraft operations. As stated earlier in my evidence, the use of geometrically defined OLS that increase in extent depending broadly on the size of aircraft operating at an aerodrome and the type of operations being conducted is the internationally recognised means of providing this protection.

118 OLS do not "attract" aircraft or alter an aircraft's flight path. Having an inner horizontal surface 45m above the aerodrome level does not mean aircraft will start circling at this height for every take-off or landing. Conversely, if there is no horizontal surface, then aircraft will not ever circle in that area.

119 Similarly, neither does having an approach OLS of 1:40 upslope compared to 1:20 mean every aircraft will start flying a lower approach profile. It simply means aircraft on IFR operations, where the pilot does not have visibility of all flight path obstructions, require greater amount of flight path protection, i.e. vertical clearance above obstacles they pass over when aligned with the runway on approach.

120 The Section 42A author's misunderstanding is evidenced in particular at paragraph 350 of the report which cites her reasons for recommending rejection of the OLS, as notified in the pWDP and Variation 1, as including flight safety issues with the OLS so close to the ground and low flying aircraft scaring stock. I do not consider these to be relevant issues, either at the Aerodrome or at any of the 25 or more New Zealand aerodromes that have OLS with similar geometry.

121 As a result of this misunderstanding, I consider the Section 42A findings in relation to low flying aircraft, and aircraft flight paths changing as a result of the Variation 1 OLS location and extents to be "fatally flawed", thereby undermining the value of the report to Commissioners in making a decision. For the reasons set out in my evidence above, I support the OLS as notified in the pWDP and Variation 1.

122 I do accept that the widespread removal or topping of trees, especially native species with strong cultural significance such as Kahikatea, is undesirable on a variety of grounds. As discussed above, protrusions within the inner horizontal surface can be afforded some flexibility provided the safety of the Aerodrome is not compromised. Accordingly, I recommend, should the pWDP OLS (with Variation 1) be adopted, that a flexible approach is taken to the need to remove vegetation or other obstacles protruding into the OLS in the inner horizontal surface.

123 This is typically done by wording the relevant rule in a district plan or designation to the effect that no obstructions (buildings, structures or vegetation) are permitted to infringe the OLS without the written approval of the aerodrome operator. This enables protrusions to be assessed on a case-by-case basis (at no cost to the property owner). My experience at other airports, particularly those where terrain infringes the inner horizontal OLS, suggests that a number of areas could be excluded on the basis that they are "shielded" or otherwise present a very low risk to flight safety.

***Circuit Training***

124 Paragraphs 150 to 185 of the Section 42A report addresses flight schools and circuit training in relation to a submission by Greig Metcalf (602.9) that these should be classed as non-complying activities in all precincts.

125 For the reasons set out below I do not agree with this.

126 Firstly it needs to be understood what the purpose of the circuit is. As I have explained earlier in my evidence, the circuit provides an orderly traffic pattern for aircraft to arrive and depart from an aerodrome. Every departure or arrival from an aerodrome will involve the aircraft flying all or part of a circuit. Consequently, the circuit is fundamental to both the aerodrome and pilots using it, and in the interests of flight safety its use cannot be constrained.

127 Flying circuits are an essential part of pilot initial training and continued competency as required under CAA Rules. For example, pilots transitioning onto a new aircraft type will fly circuits to become familiar with the specific take-off and landing characteristics of the aircraft, pilots undergoing a

regular competency check to maintain their licences will fly several circuits and pilots will fly circuits to remain "current" under CAA Rules.[10]

128 To improve their skills in the interests of safety, pilots will often practice flying circuits in adverse conditions, for example on days when winds are strong and gusty, or blowing across the runway. While this would appear to an observer as circuit training, it is actually about building proficiency in operating the aircraft in adverse conditions, an essential part of building flying skills.

129 Consequently, even if there is no dedicated pilot training organisation based at the Aerodrome, there will still be a need for circuits to be flown, and this should not be restricted other than via agreed noise controls consistent with NZS 6805, as described by Ms Smith throughout her evidence.

130 I am not aware of any aerodrome that has controls on circuits as non-complying activities. I am aware that some aerodrome operators restrict circuit training by hours of the day. For example, Ardmore Airport does not allow night circuit training between the hours of 10pm to 7am, and 8pm to 7am on Sunday evenings.

***Definitions***

131 The Section 42A report at paragraphs 162 to 185 proposes definitions for "aircraft operations", "flight training school" and "circuit training". I do not disagree with the proposed definition of "aircraft operations", or "circuit training". However, for the reasons set out above and below, I do not consider defining "circuit training" is necessary in the pWDP as there is no reason to separate out this activity from general flying and it should only be controlled through noise controls. The definition of "flight training school" seems very confused and potentially, or intentionally, includes checks on aircraft, flight training in the air and aircraft maintenance training.

132 Checks on aircraft are an essential part of ensuring an aircraft is airworthy for flights. Such checks, including the pre-flight inspection of an aircraft a

[10] The regular competency check is known and a 'biennial flight review" and is required every two years for a pilot licence to remain valid; all pilots are required to do a minimum of three take-offs and landings in the previous 90 days in a particular aircraft type to remain qualified to fly that type of aircraft with passengers.

pilot is about to operate, are required under CAA Rules. Consequently, I consider it totally inappropriate that they be regarded as part of flight training.

133 Also, as I have explained, quite apart from learning to fly, flight training is an essential part of developing pilot skills, transitioning onto other aircraft types, and retaining competency and currency. In this regard, all pilots, including owners of aircraft based at the aerodrome require it.

134 I consider the proposed application of the definitions and the establishment non-complying activities, to be extremely problematic. For example, it is simply not practical or reasonable to make circuit training a non-complying activity because it is:

(a) an everyday occurrence at an aerodrome;

(b) essential in the interests of flight safety; and

(c) required under CAA Rules.

135 I am not aware of any other aerodrome in New Zealand where this approach has been taken.

136 Similarly making a “flight training school” a non-complying activity would, with the definition proposed, require a resource consent for activities that again are part of the everyday aviation activities occurring on an aerodrome. They ought to be permitted under the Aerodrome’s planning regime. Certainly, the potential requirement for a resource consent for a pilot to conduct a pre-flight airworthiness check on an aircraft, as required by CAA Rules, is simply not workable or appropriate.

137 If the Section 42A author’s intention is to require controls on large scale flight training, for example a flight school of the scale of the LS operation at Hamilton Airport, from becoming established at the Aerodrome, then a far more precise control should be proposed rather than the extremely blunt and inappropriate control proposed in paragraph 185 of the report.

**IFR Operations**

138 The pWDP provides for an OLS appropriate to a small non-certificated aerodrome having, or intending to have, IFR operations. If the Aerodrome was limited to VFR operations the OLS would be less extensive and less stringent in terms of height limits over land beneath them.

139 I support the NZTE's intention to provide for IFR operations at the Aerodrome for the following reasons:

(a) IFR operations are inherently safer in inclement weather conditions than VFR operations as the aircraft is separated from terrain and other aircraft by Air Traffic Control and the design of the instrument approach, departure and enroute flight tracks and altitudes used. Under VFR there is total reliance on the pilot seeing and avoiding terrain and other aircraft which is much more difficult in inclement weather.

(b) IFR operations by small aircraft are becoming much more commonplace with the advent of SBAS navigation systems able to be fitted to and utilised by small aircraft owners.

(c) Many of the aircraft based at the Aerodrome are able to be fitted, or are already fitted, with the on-board equipment required for IFR operations, including IFR flight training.

(d) IFR operations by small aircraft will become increasingly common as the cost of SBAS equipment falls and becomes available for a wider range of aircraft. For example, most helicopters and all fixed wing aircraft used for Emergency Medical services are IFR equipped. To quote Matthew Zuccaro, President and CEO of the Helicopter Association International:[11]

> *We are big believers in operating IFR whenever we possibly can, because of the built-in protection it provides in terms of simple things like terrain avoidance and clearance, reliability and dependability of mission completion. It gives you the protected*

[11] Quote from Wing and Rotor International magazine, refer https://digitaledition.rotorandwing.com/january-february-2019/single-engine-ifr/.

> *environment of being under surveillance and direction of air traffic control.*

140 Consequently, “future proofing” the Aerodrome to allow IFR operations reflects best practice in regards to aviation safety and will futureproof the overall operation of the facility once IFR becomes standard for all light aircraft .

**PEET AVIATION BRIEFING NOTE**

141 A briefing note (**the PA Note**) prepared by Peet Aviation for Waikato District Council is appended at Appendix 4C to the Section 42A report. I have also reviewed the PA Note in relation to my evidence and I consider there are significant errors in it which may confuse the assessment of the notified OLS, as contained in the pWDP and Variation 1.

142 At page 2, 3rd paragraph, the PA Note states that the Variation 1 proposal is an OLS enabled for IFR operations. This is incorrect. The pWDP as notified already included the OLS for IFR operations. All Variation 1 did in effect was to correct a plan drafting error in the depiction of the OLS in the pWDP.

143 At page 2, last paragraph, the PA Note states that the IFR OLS is based on ICAO Procedures for Air Navigation Services – Aircraft Operations (**PANS-OPS**) surfaces. This is not technically correct. The IFR OLS is based on the requirements of CAA AC139-7, not on ICAO PAN-OPS which have quite different geometry and are not part of the pWDP or Variation 1. References in the PA Note to PANS-OPS or IFR OLS are thus irrelevant to this hearing. This includes the statement halfway down page 3 of the note stating:

> *With the IFR OLS, no objects may penetrate the OLS, therefore it is more restrictive.*

144 For the reasons set out in my evidence above, this statement is incorrect in relation to the OLS as notified in pWDP and Variation 1.

145 At page 6, penultimate sentence, the PA Note states:

> *An IFR OLS will not enable aircraft to operate lower over affected properties than aircraft currently operate.*

146 I agree with this statement in relation to the OLS notified in the pWDP and Variation 1, compared to the OLS currently in the ODP.

**CONCLUSION**

147 The Aerodrome is a non-certificated Code 1A+ Aerodrome under CAA regulation AC139-7, which accommodates aircraft with a required take-off field length of less than 800m and a wing span of up to 18m.

148 In order to ensure the Aerodrome can utilise the latest IFR technology that, when available, will allow aircraft to land at the Aerodrome in inclement weather conditions and at night (in controlled circumstances), the OLS as notified in the pWDP and Variation 1 is recommended.

149 This OLS will ensure the safe and efficient operation of the Aerodrome and will accord with best practice throughout New Zealand. As discussed, the Section 42A Report has misunderstood the purpose of the OLS and, for the reasons set out above, I do not recommend the retention of the OLS as currently defined in the ODP.

150 It is important that the surfaces of the OLS are protected from protrusions to ensure safety of aircraft, particularly on the approach and take- off surfaces. However, CAA standards do allow some flexibility, particularly in the horizontal surface, provided that consent is obtained from the aerodrome operator and safety is not compromised. Therefore I recommended the rules in the pWDP provide some flexibility in order for OLS protrusions to be managed on a case by case basis.

151 Flying circuits is an everyday aviation activity that is an essential part of pilot training and continued competency, and provides an orderly traffic pattern for aircraft to arrive and depart the Aerodrome. In the interests of flight safety and existing aircraft use of the Aerodrome it cannot be constrained and in my opinion should be permitted under the Aerodromes' planning regime. I am not aware of any other aerodrome similar to Te Kowhai in New Zealand that controls circuits as a non-complying activity.

152 Similarly, the definition for flight training school and classification as a non-complying activity will have the effect of requiring resource consent to carry out activities that are part of the everyday operation of an aerodrome. This

should be deemed a permitted activity within the rule framework with a more targeted rule pertaining to large flight schools, if that in fact is the concern.

153 The relief sought by NZTE will provide for the safe and efficient operation of the Aerodrome through the implementation of IFR operations that reflect best practice, futureproof the overall operation of an existing aerodrome facility and ensure the safest outcome for the surrounding community.

**Dave Park**

**Dated 15 February 2021**