

**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]

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**EVIDENCE-IN-CHIEF OF JAMES ARMITAGE ON BEHALF OF NZTE  
OPERATIONS LIMITED**

**(INFRASTRUCTURE)**

Dated: 15 February 2021

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## **INTRODUCTION, QUALIFICATIONS AND EXPERIENCE**

- 1 My name is James Terrance Armitage. I am a Senior Civil Project Engineer for Holmes Consulting Group. I have 19 years' civil engineering experience, including 2 years with Holmes Consulting Group.
- 2 I hold a Professional Engineer License in the State of Washington, U.S.A (WA #54235) and am a Chartered Professional Engineer with Engineering New Zealand (CPEng #1159366) in the Civil field.

## **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 Holmes Consulting was engaged by NZTE Operations Limited (**NZTE**) in 2017 to provide independent three waters engineering advice throughout the proposed Waikato District Plan (**pWDP**) process in relation to Te Kowhai Aerodrome (**Aerodrome**).
- 5 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 national, regional and district planning documents relevant to the pWDP.
- 6 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**).

## INFRASTRUCTURE SUMMARY

- 7 Holmes Consulting provided two reports in 2017:<sup>1</sup>
- (a) Three Waters Feasibility Report (**TW Report**).
  - (b) Wastewater Recommending Report (**Wastewater Report**), specifically focused on on-site Wastewater treatment and disposal.

### *Water supply*

- 8 The TW Report states that there are no reticulated services available within Te Kowhai Village. The nearest water supply is 2km east of the Aerodrome, and the nearest wastewater discharge location with capacity is 5km to the east.<sup>2</sup>
- 9 Water supply for the development was considered in the TW Report for residential, commercial, and firefighting purposes.<sup>3</sup> It was determined that the commercial precinct will require a daily water supply demand of 4,200 litres and the residential precinct will require 540 litres per dwelling day (including wastewater demands).
- 10 The water supply solution was reached by considering monthly rainfall and comparing the volumes required by the forecast uses together with the anticipated total roof area runoff. The overall rainfall patterns show that both the commercial and residential areas of the Airpark can be supplied using rainwater storage tanks on each lot, with little to no supplemental supply required. Firefighting storage would be met by incorporating 45m<sup>3</sup> of reserved storage into the water supply storage tanks. Having the firefighting supply protected in reserved storage means any shortfalls due to extended drought (which could result in tanker top ups being required for high users) would not affect the Firefighting supply. Firefighting storage tanks can be combined for several lots, provided the maximum and minimum distances required by SNZ PAS4509:2008 are satisfied.

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<sup>1</sup> Both reports were included in the section 32 Report for the Te Kowhai Airpark Zone as Appendix 24.4 – Three Waters Feasibility Report, dated 27 June 2017 and 24.5 – Wastewater Recommending Report, dated 27 June 2017.

<sup>2</sup> Sections 5 and 3.4.1 of the Three Waters Feasibility Report.

<sup>3</sup> Sections 5.1, 5.2 and 5.3 of the Three Waters Feasibility Report.

- 11 If a reticulated water supply were to become available in the future, water demand would likely increase. New reticulated infrastructure could be installed to utilise the main for topping off storage tanks, permanent firefighting flow, and permanent supply for any additional growth of the Airpark development.

### ***Wastewater***

- 12 It is predicted that peak day total wastewater production from the Airpark development will be approximately 70,000 litres. In reality, the total wastewater production may be less than this. This includes wastewater generated by the use of the runway and operations precinct, public hangers, commercial precinct, and the residential households.
- 13 The Wastewater Report found the site can accommodate on-site wastewater treatment and disposal in accordance with AS/NZS1547:2012. A high level of treatment will be required. This will be provided by utilising individual lot septic tanks, combined with a Packed Bed Reactor (**PBR**), and dispersal to the ground using conventional trenches.
- 14 The on-site collection tanks for each lot act as the primary treatment of the wastewater, as they will retain the majority of the solids and sludge. This will be pumped out every 5 – 10 years.<sup>4</sup> A small diameter pressure sewer network (or Septic Tank Effluent Pumping (**SEPT**) System) is preferred over a gravity system to connect to a secondary treatment plant. This SEPT system is more ideally suited to the Airpark, due to the potential staging of development and available areas of green space. It also has the benefit of no significant inflows and infiltrations, removing the need to factor in wet weather peaking and being more resilient through use of a polyethylene pipe.<sup>5</sup>
- 15 The Wastewater Report considered four options for secondary treatment, including the PBR, Submerged Aerated Filtration, Sequencing Batch Reactor, and Membrane Bioreactors. The PBR was evaluated against the other options that would provide the best treatment, value, load handling, and maintenance requirements. The PBR was assessed as the optimal

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<sup>4</sup> Section 4.2.2 of the Waste Water Recommending Report.

<sup>5</sup> Section 4.2.1 of the Waste Water Recommending Report.

choice due to the high level of treatment and lower operational costs.<sup>6</sup> The PBR is a biological treatment process that provides a high level of treatment with an enhanced nitrogen reduction, making it suitable for an on-site treatment option.

- 16 Methods of dispersal to land of the wastewater were considered in the Wastewater Report, with a conventional trench disposal system being preferred due to the smaller area required when compared to drip irrigation. The wastewater dispersal solution was determined through an assessment of the soils, groundwater depths, consideration of maximum loading allowed by the Waikato Regional Plan, and the various methods available to treat wastewater effluent. Section 4 of the Wastewater Report outlines the options in more detail and compares the impact of each system.<sup>7</sup>
- 17 The results of the assessment recorded in the Wastewater Report determined that the soils at the site were free draining and that winter groundwater levels were close to the surface. For the conventional trench disposal system to be most effective, suitable soils would need to be imported into the area required for drainage trenches to raise the base of the trench the minimum distance above the groundwater level. This will require the ground surface to be locally raised by at least 1.05m to allow for a minimum of 0.6m unsaturated soil below the base of the trench. This can be achieved by scarifying / ploughing the ground surface prior to installation of the base of the trench within the top 100mm of soil. The standard trench profile can then be constructed with the final topsoil layer being graded at a 1V:3H line from the edge of the trench.<sup>8</sup>
- 18 The wastewater solution described above will require a discharge consent from Waikato Regional Council because the discharge volume will exceed the permitted activity conditions stated in Rule 3.5.7.5 of the Waikato Regional Plan. This is something that can be attained during the detailed design stage of the Airpark development.

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<sup>6</sup> Section 4.2.3.5 of the Wastewater Recommending Report.

<sup>7</sup> Section 4.2.3.5 Table 2 of the Wastewater Recommending Report.

<sup>8</sup> Section 4.2.4.2 of the Wastewater Recommendation Report.

- 19 If a municipal wastewater network were to become available, the pressure sewer network could instead discharge to the municipal network with some reconfiguration.

### ***Stormwater***

- 20 The TW Report concluded that stormwater soakage to ground is feasible. Again, due to the high winter groundwater levels, a storage solution (tanks, etc) may be required, but this need is reduced due to the use of tanks for both domestic and commercial water use and to supply static firefighting storage.

### **COMMENTS ON SUBMISSIONS**

- 21 Four submissions included comments on issues associated with infrastructure.
- 22 Submission 378.5 from Fire and Emergency NZ (**FENZ**) requests adequate firefighting water storage for all residences, and all commercial and industrial uses. Static firefighting tanks have been included in the TW Report and are intended to be provided for all uses within the TKAZ. Storage tanks may be incorporated into water supply tanks for each lot, or may be combined to provide firefighting storage for several lots. The static supplies and access to those supplies will meet the requirements of SNZ PAS4509:2008, as requested in the FENZ submission.
- 23 Submission 602.33 from Grieg Metcalfe looks to revise the definitions around wastewater treatment plants and reticulation to allow for greater density of development when privately owned wastewater networks are available. I agree that density of development should not only be enabled by publicly owned wastewater networks. Suitably designed and consented systems for wastewater treatment and dispersal can accommodate growth without connection to publicly owned reticulation.
- 24 Submission 697.48 from Waikato Regional Council (**WRC**) requests the ability for sites to be connected to municipal wastewater networks if they become available. The WRC requests conditions requiring sufficiency of supply for firefighting. Both of these requests are able to be accommodated within the infrastructure strategy proposed.

- 25 Submission 606.13 from Bill Wasley requests limits to growth in Te Kowhai until adequate infrastructure servicing is available. The provision of suitably designed and consented infrastructure, as provided by the strategy for TKAZ, should not preclude growth or density. The wastewater solution provided is scalable because of the decentralised individual lot tanks and efficiency of the dispersal methods. Water supply is also scalable because of the same individual tank strategy. All future growth would be suitably designed and consented in order to ensure the relevant conditions are met.

#### **COMMENT ON SECTION 42A REPORT**

- 26 The Section 42A report determines that for the smaller lot sizes, a reticulated water supply is required to provide for both potable and firefighting purposes. There are feasible solutions for the smaller lot sizes which do not require a fully reticulated supply. Based on the average rainfall data, the driest month provides 74mm of rain. Assuming 85% of the rainfall is captured, to provide 540 litres/day (on average), a minimum roof area of 242m<sup>2</sup> is required, with no buffering between months. Allowing for buffering between months (which is usual practice for domestic rainwater tanks), a smaller roof area would also be feasible. For the smaller 450m<sup>2</sup> sites, which allow for up to 60% building coverage, this is easily achievable.
- 27 As noted above, SN PAS4509:2008 allows for alternative water supplies for firefighting. One option is a static supply within 90m of the fire hazard, but not closer than 6m. These can be buried or above ground. There are options for static supplies at the Airpark. These include the road reserve of Precinct C, fed by either roof water overflows or manual top up (noting that static supplies do not need to be regularly refreshed). Combined community firefighting tanks in non-reticulated areas are provided in developments near Gisborne, as well as for other discrete developments around New Zealand. There are also examples in New Zealand of tertiary treated, disinfected wastewater being stored in communal tanks to provide a firefighting supply.
- 28 I consider that requiring a private reticulated water supply will add significant cost to the development of the Airpark and require the Airpark developer to become a water supplier under the current water reforms, adding a further layer of cost and complexity that is, in my opinion, not required to meet the relevant design standards for potable water and firefighting supply.



- 29 I therefore conclude that the recommendations within the Section 42A report for a reticulated supply are not necessary. I agree that provisions should be made for firefighting supplies, but these do not need to be a reticulated supply.

### **CONCLUSION**

- 30 The infrastructure strategy proposed for the TKAZ will enable the proposed land uses and density of development envisaged at the Airpark.
- 31 The proposed wastewater solution is suitable for the Airpark development, meets the requirements of AS/NZS1547:2012, and has the ability to be connected to any future public reticulation system. Further, the requirement for a resource consent from Waikato Regional Council for the wastewater system will ensure robust consideration of environmental effects at the detailed design stage of the development.
- 32 The water supply solution will provide for adequate firefighting storage (in accordance with SN PAS4509:2008), potable use, and has the ability to be connected to any future public water supply. A private reticulated water system is therefore not required to meet the relevant standards.
- 33 The stormwater solution is deemed feasible for the development.

**James Armitage**

**Dated 15 February 2021**