

**Before Independent Hearing Commissioners  
In Ngāruawāhia**

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Under the Resource Management Act 1991 (the Act)

In the matter of of a submission by Ambury Properties Limited in respect of the proposed Waikato District Plan pursuant to Clause 6 of Schedule 1 of the Act seeking the rezoning of land at Ohinewai

and Ambury Properties Limited  
(Submitter)

and NZ Transport Agency (Waka Kotahi)  
(Submitter and Further Submitter)

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**Statement of evidence of Robert Swears for Waka Kotahi – Transportation  
Engineering**

13 August 2020

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## **1 Qualifications and experience**

- 1.1 My full name is Robert Clive Swears. I am employed as a Principal Road Safety / Transport Engineer in the Hamilton Office of WSP; I have been in this role for approximately five and a half years.
- 1.2 My qualifications include a New Zealand Certificate in Engineering, a Bachelor of Engineering degree with Honours from the University of Canterbury, and a Master of Engineering Science degree (Transport) from the University of New South Wales. I am a Chartered Member of Engineering New Zealand (CMEngNZ), and a Member of the Engineering New Zealand (EngNZ) Transportation Group.
- 1.3 I have been carrying out professional engineering tasks related to the investigation, design, and construction of roading and highway projects for 30 years. I have worked on a variety of transportation projects throughout my career for various clients including Waka Kotahi NZ Transport Agency (Waka Kotahi) and local authorities.
- 1.4 Examples of land use development projects for which I have recently provided advice to Waka Kotahi include:
- a Oceana Gold New Zealand Limited: proposed extension to Martha Mine at Waihi;
  - b Ward Demolition: proposed clean fill site in Waikato District;
  - c Coombes Sand Quarry: proposed expansion of sand quarry;
  - d Proposed service centre at interchange with the Huntly section of the Waikato Expressway; and
  - e Te Awa Lakes: proposed accommodation, housing, and recreation facilities in Waikato District.
- 1.5 My evidence is given on behalf of Waka Kotahi in relation to the submission by Ambury Properties Limited (the Applicant) seeking rezoning (the Proposal) in respect of the proposed Waikato District Plan.

## **2 Involvement with the Proposal**

- 2.1 Waka Kotahi sought my independent professional advice in relation to this matter in late September 2019. Since that time I have provided extensive feedback to

Waka Kotahi, including attending the joint witness conferencing (transport engineering) on 22 and 23 June 2020. I visited the Site along with representatives of the Applicant, Waka Kotahi, and Waikato Regional Council on 30 January 2020. I also visited the SH1 Waikato Expressway / Ohinewai interchange (the Interchange) on 21 January and 29 July 2020. Since September 2019 I have exchanged numerous emails and other correspondence with Waka Kotahi staff and professional advisers for the Applicant.

### **3 Code of conduct**

- 3.1 I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with it in the preparation of my summary statement (dated 17 June 2020) and this statement of evidence, and during expert witness conferencing. I also confirm that the matters addressed in this statement are within my area of expertise, except where I rely on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

### **4 Scope of evidence**

- 4.1 My evidence addresses the following:
- a Response to the evidence of Cameron Inder on behalf of Ambury Properties Ltd;
  - b Commentary and expansion in relation to the joint witness statement of experts in relation to transportation effects; and
  - c Response to matters raised in the Council Officer's report.
- 4.2 I have read the evidence prepared by the other witnesses presenting evidence on behalf of Waka Kotahi and Mr Kuo on behalf of Waikato Regional Council.
- 4.3 I have structured my evidence (this statement) in the same order as the evidence in chief (EIC) of Cameron Beswick Inder (Mr Inder) dated 9 July 2020. The headings in this statement include in parentheses a reference to the relevant section of Mr Inder's statement.

## **5 Summary of evidence**

- 5.1 In my opinion, the Applicant is proposing a series of compromises to transportation standards, guidelines, and principles in order to accommodate the Proposal. These include, but are not limited to, the following:
- a Using an inter-regional arterial (Waikato Expressway) for local trips.
  - b Creating the potential for active user journeys but positioning the Proposal at a location so these journeys are unattractive (distance to Ohinewai School and Huntly).
  - c Roundabouts where the diameter is too small (both on Tahuna Road).
  - d Lane configurations that are too short (westbound exit from Tahuna / Lumsden intersection).
  - e Sight distances that are inadequate (southbound off-ramp).
  - f Pedestrian facilities where these are not ordinarily appropriate (raised zebra crossing on Tahuna Road).
  - g Promoting heavy vehicle turning movements where the carriageway width is inadequate or barely adequate (left turn from southbound off-ramp).
  - h Uncertainty regarding the applicability of modelling results due to the significant uncertainty associated with some trip generation rates.
- 5.2 The Proposal creates a range of adverse transportation effects and the Applicant is proposing to either not address those effects or to address them in a manner that is inadequate.
- 5.3 While there is appropriate mitigation that could be proposed for several of these issues, the key transport engineering issue that cannot readily be resolved is the distance of the Site from the land use activities necessary to support activities on the Site. That distance results in unresolvable adverse effects that in my opinion are not appropriate from a transportation engineering perspective.
- 5.4 Table 1 in Section 9 of this statement provides a summary of the key transportation engineering issues associated with the Proposal and highlights whether these issues can be addressed and, if so, how they could be addressed.

## **6 Response to evidence of Cameron Inder on behalf of Ambury Properties Limited**

### **Description of the Proposal (Section 3)**

6.1 The location of the Site and the components of the Proposal are described by Mr Inder and others. However, I note that:

- a The primary means of accessing the Site by motor vehicle will be through the Interchange.
- b The Discount Factory Outlet (DFO) component of the Proposal is now not being progressed by the Applicant and is to be replaced with an equivalent land area of industrial zoning.<sup>1</sup>

6.2 For this statement I have adopted the Applicant's labelling convention for intersections and accesses as listed below and shown in the diagram extracted from Mr Inder's evidence (EIC, paragraph 5.14):

- a Intersection 1: left turn in / left turn out (LTI / LTO) intersection on Tahuna Road.
- b Intersection 2: roundabout on Tahuna Road.
- c Intersection 3: give way controlled T intersection on Lumsden Road.
- d Intersection 4: give way controlled T intersection on Lumsden Road.
- e Access A: left turn in slip lane on Tahuna Road between the Tahuna / Lumsden intersection and Intersection 1.
- f Access B: left turn out only slip lane on Lumsden Road.
- g Access C: existing access on Lumsden Road.
- h Access D: private commercial access on Balemi Road.
- i Access E: private commercial access on Balemi Road.

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<sup>1</sup> Transportation-related implications of removing the Discount Factory Outlet (DFO) from the Ohinewai Structure Plan area, memo from Cameron Inder / Rhulani Baloyi (Bloxham Burnett and Olliver (BBO)) to Waikato District Council and Ohinewai rezoning parties, 7 August 2020.

6.3 The locations of the accesses and intersections (listed above) along with the boundaries of the Site and the Lumsden Road / Balemi Road intersection are illustrated in Figure 1 below.

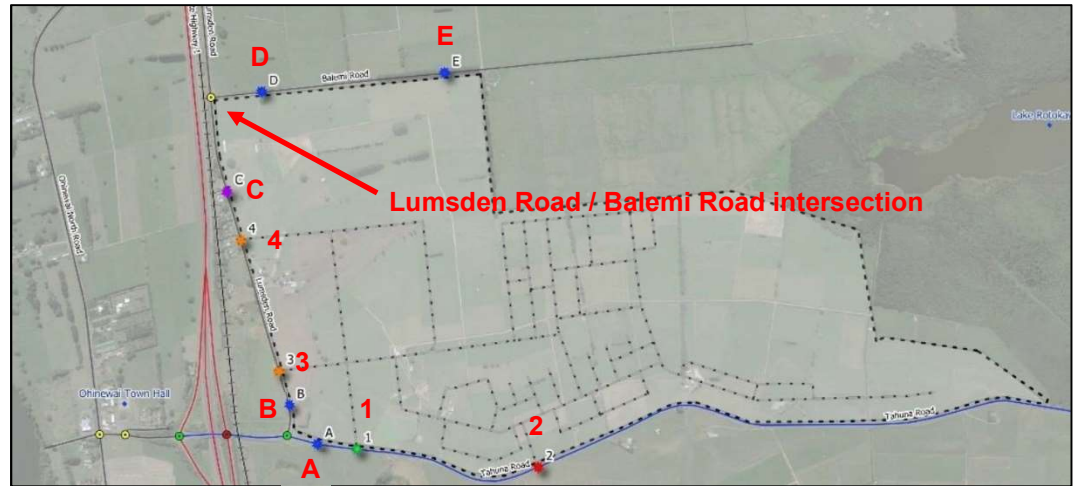


Figure 1: Location of Intersections and Accesses Described in This Statement (image source: Inder, EIC, Figure 11)

6.4 In addition to the intersections and accesses along the boundaries of the Site, I have made various references to existing intersections (some of which the Applicant proposes to relocate and / or reconfigure) including:

- a Tahuna Road / Lumsden Road intersection.
- b Southbound ramps intersection at the Interchange.
- c Northbound ramps intersection at the Interchange.
- d Tahuna Road / Lilley Lane intersection.
- e Ohinewai North Road / Ohinewai South Road / Tahuna Road / Ohinewai Landing Road intersection.

6.5 The location of the existing intersections listed above are illustrated in Figure 2 below.

6.6 In addition, reference is made to the Lumsden Road / Balemi Road intersection, which is illustrated in Figure 1 above.

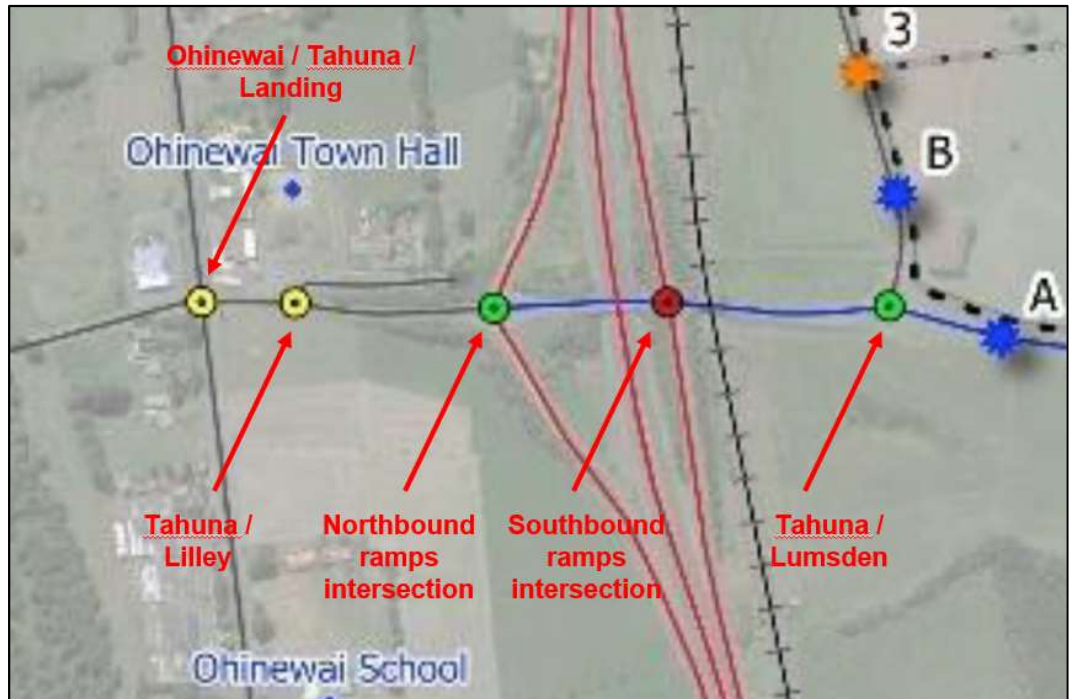


Figure 2: Existing Intersections in Vicinity of the Site (image source: Inder EIC, Figure 11)

#### Existing and Consented Traffic Environment (Section 4)

##### Existing transport infrastructure

- 6.7 Mr Inder refers (EIC, paragraph 4.2 and 4.3) to average daily traffic (ADT) volumes on Tahuna Road and Lumsden Road as identified through surveys conducted in 2019. Mr Inder did not include any information about the annual average daily traffic (AADT) volumes on these roads and whether the conclusions drawn from the analysis based on the ADT values are affected.
- 6.8 An ADT value is an average of the daily traffic measured within a short period of time (typically one week) while an AADT is a calculated value to represent the average daily traffic when the total annual traffic volumes are distributed equally across 365 days. ADT data is collected and multiplied by a factor relative to the time of year at which each ADT was measured; the AADT is derived from the factored ADT data.
- 6.9 The difference between the ADT and the AADT may not be significant, however, the Applicant has not provided information to clarify the situation.
- 6.10 As noted in my summary statement for expert conferencing (17 June 2020), Table 14.12.5.6 of the Waikato District Proposed District Plan (PDP) describes Tahuna Road as an Arterial and (by omission) describes Lumsden Road as being

lower in the hierarchy. In this regard, the Applicant has not taken account of the PDP requirements (Section 14.12.1.1(e)) for sites with legal access to two roads to access the road with the lower classification in the road hierarchy (or where roads have the same classification access should be to the road with the lower average daily traffic movements). While establishing new road intersections with Tahuna Road would mean that access to those properties bordering both Tahuna Road and the new roads would be required to have access from the new roads, the Proposal incorporates an access (Access A) on Tahuna Road, which is not in accordance with the PDP and, in any case, is not appropriate from a transport engineering perspective.

- 6.11 Information is provided by Mr Inder regarding measured 85<sup>th</sup> percentile speeds of vehicles on the Interchange ramps, Tahuna Road, and Lumsden Road (paragraph 4.6, Inder EIC). However, the exact locations at which this information was obtained has not been provided. This needs to be clarified as it may influence any conclusions that have been drawn based on the operating speeds, such as the adequacy of sight distances from the southbound off-ramp of the Interchange.

#### Existing transport modes

- 6.12 I have not considered Mr Inder's analysis of public transport in this statement but rather am reliant on the evidence of Mr Kuo for Waikato Regional Council who goes into detail in relation to existing and proposed bus services.
- 6.13 Mr Kuo notes in his statement that any diversion of public transport to Ohinewai will be kept to a minimum and that the Regional Council's desire is for there to be one service location at Ohinewai. This means the bus stop location would either be on the eastern side of the Expressway or on the western side of the Expressway, but not both; as a result some passengers would have to cross from one side of the Expressway to the other. The shortest journey for this crossing will be via the Interchange overbridges, which do not include any provision for pedestrians. Therefore, unless the Interchange overbridges are widened to accommodate pedestrians, potential passengers would either cross the Interchange bridges walking on the carriageway or those potential passengers would use private motor vehicles instead of public transport. I consider it very unlikely that potential passengers would use the proposed shared path overbridge (in the vicinity of Ohinewai School) to access public transport services.
- 6.14 Mr Inder's evidence notes "[...] the existing volume of pedestrians is very low in the vicinity of the Site." (Inder, EIC, paragraph 4.9). Given the nature and scale



of existing development in the vicinity of the Site this is not surprising, however, the fact there is some pedestrian activity in the vicinity implies that with the Proposal in place there will be more pedestrian activity. Therefore, if the rezoning is confirmed it is appropriate and important that adequate facilities are provided for pedestrians.

- 6.15 Notwithstanding the likely increase in pedestrian activity in the vicinity of the Site, while Mr Inder considers (paragraph 4.11) that “[...] the lack of safe on and off road infrastructure for walking and cycling in the vicinity of the Site, [...] is likely to be the fundamental reasons [sic] for the observed low volume of trips by active modes in the area.”; the low volumes may also be a function of the journey distances that could potentially be undertaken by active modes.
- 6.16 I do not agree with Mr Inder (EIC, paragraph 4.12) that providing infrastructure for walking and cycling journeys will result in active travel modes being “[...] an attractive and viable option for future workers, residents, school children and recreational use.”
- 6.17 As noted in my summary statement for the expert conferencing (Swears, paragraph 5.8), I consider the distances associated with active mode journeys outside the Site create an obstruction to those journey such that it is unlikely there will be a significant uptake in active mode transport beyond the boundaries of the Site<sup>2</sup>.
- 6.18 The walking journey from the Site to Ohinewai School (approximately 2.0 km) is considerably further than the average walking journey children or adults will make (0.92 to 1.2 km respectively). Therefore, I do not consider that the shared path overbridge will adequately mitigate the discouragement to active mode use associated with the Site being on the other side of the Expressway from the School.

#### Road safety environment

- 6.19 Mr Inder observes (EIC, paragraph 4.17) that the existing intersection of the southbound off-ramp with Tahuna Road results in “[...] risk ratings for this intersection [that] are “High” personal risk and “High collective risk.” The high crash rate indicates a need to improve the ability for unfamiliar drivers to recognise the existence of the Compulsory Stop controlled intersection [...]”.

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<sup>2</sup> From my summary statement: Site to School walking distance is approximately 2.0 km (paragraph 5.58) compared with average distances of 0.92 to 1.2 km (paragraph 5.60) for walk to school or work (respectively). Site to Huntly College is approximately 10.5 km, compared with average cycle to work journey of 5.1 km (paragraph 5.63).

- 6.20 I accept Mr Inder's point (EIC, paragraph 4.18) that enhanced advance warning signage may have contributed to a reduced number of crashes at the intersection. However, the Applicant is proposing to increase traffic volumes using the intersection, which will result in an increase in the number of unfamiliar users using the intersection.
- 6.21 Resolving road safety issues is not as simple as installing signs. The reality is that drivers make mistakes and crashes happen. The Applicant is proposing to increase traffic volumes using the Interchange without providing particularly significant mitigation for the increased exposure associated with the Proposal. Because of the configuration of the southbound off-ramp intersection there is relatively little that can be done to highlight the presence of the intersection and the need for vehicles exiting the Interchange to stop at the top of the ramp. Therefore, I consider it undesirable to increase the volume of traffic using the intersection. Alternatively, a safe system intersection (such as a roundabout) could be constructed to replace the existing Stop controlled intersection.
- 6.22 While Mr Inder (EIC, paragraph 4.20(d)) considers that the current 100 km/h speed limit along the Tahuna Road frontage of the Site "[...] is likely to be inappropriate for the road geometry and width." it needs to be kept in mind that simply because there is a 100 km/h speed limit it does not mean road users are travelling at 100 km/h; for many locations the average operating speed will be less than the speed limit. Therefore, reducing the speed limit may not necessarily result in a significant change in average vehicle operating speeds. However, changes to the geometry and / or environment of Tahuna Road in conjunction with a change in speed limit have the potential to reduce the severity of crashes. In that regard, I note that some of the measures the Applicant is proposing along the Tahuna Road frontage of the Site (such as the Intersection 2 roundabout and the establishment of buildings along Tahuna Road) are likely to encourage reduced vehicle operating speeds.
- 6.23 With regard to crashes in the vicinity of the Interchange and the Site, I had a colleague<sup>3</sup> review the crashes to which Mr Inder refers in paragraphs 4.16 to 4.21. There are differences between the crashes identified by Mr Inder and those identified by my colleague, however, those differences may be due to the parameters used for the crash searches. Notwithstanding that, I do not consider the magnitude of the differences in the search results is such that the conclusions drawn in relation to that crash history would be significantly affected.

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<sup>3</sup> Honor Young, Consultant - Transport Safety, WSP, Hamilton.

## Proposed Transportation Infrastructure (Section 5)

### Rail siding access

- 6.24 Mr Inder (EIC, paragraph 5.1(a)) refers to “A rail siding which will connect the proposed industrial area to the NIMT.” This implies the rail siding will be constructed, although, as Mr Mayhew notes, there are no plan provisions to secure this outcome. Provision of the rail siding and the transfer of some freight movements from road to rail will reduce the adverse effects associated with the Proposal. The Applicant has not relied on the rail siding being constructed as mitigation for adverse effects associated with on road traffic. However, given the uncertainty with trip generation rates (as described in paragraphs 6.45 to 6.49 of this statement) it may be that the rail siding is required for mitigation, but there is no certainty in that regard at this stage.
- 6.25 In the first sentence of paragraph 5.2 Mr Inder notes that “[...] the close proximity [...] of the NIMT to the Site is one of the fundamental reasons for this site having been identified by APL [...]”. However, later in the paragraph uncertainty is raised in that “It is presently anticipated that the rail siding will be established at approximately 50% of the proposed TCG factory [...]”.
- 6.26 If the Applicant is relying on the potential benefits of providing the rail siding then I consider the rezoning provisions should clearly define when the rail siding must be provided as well as addressing the following design matters:
- a Sight distances at the Lumsden Road / Balemi Road intersection:  
Construction of the rail siding is reliant on Lumsden Road being realigned to accommodate a level crossing where the angle between the rail siding and Lumsden Road is adequate. Mr Inder notes (EIC, paragraph 5.7) that sight distance is an important component of the reconfigured Lumsden Road / Balemi Road intersection. The Designer’s Response<sup>4</sup> to the same question being raised by the Safety Audit Team (SAT) indicates acceptance of the need to protect sight distance. However, the Applicant has not described the controls that will be placed on development to the north of the Lumsden / Balemi Road intersection to ensure that adequate sight distances are maintained. Therefore, in my opinion, the plan provisions need to ensure adequate sight distance will be maintained.
  - b Design of the Lumsden Road / Balemi Road intersection:  
It is unclear whether this intersection will be designed as an urban

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<sup>4</sup> Lumsden Road Re-Alignment, Ohinewai, Road Safety Audit - Concept Design Stage, 5 May 2020, Traffessionals, Taupo, page 6.

intersection or a rural intersection. My understanding is that the proposed speed limit for Lumsden Road in the vicinity of the intersection is 60 km/h, however, reference is made (Inder, EIC, paragraph 5.7 (c)) to “The rural intersection [...]”. Given the location of the intersection, relative to the proposed change in speed limit, it appears likely that operating speeds on the southbound approach to the intersection may be higher than desirable. This creates issues in relation to the design speed for the reverse curves across the level crossing and sight distances for road users at the intersection. The design speed and speed reduction measures proposed need to be assessed to ensure the suitability of the reconfigured Lumsden Road / Balemi Road intersection to accommodate the Proposal and provide appropriate connectivity for other users of Lumsden Road.

- c Design vehicle for Lumsden Road / Balemi Road intersection:  
It would also be useful for clarification to be provided as to the type of design vehicle for which the Lumsden Road / Balemi Road intersection has been designed. Given the freight related access that will be provided from Balemi, I consider it important for the intersection to be configured to accommodate the movement of design heavy commercial vehicles.
  
- d Certainty from KiwiRail regarding siding and level crossing:  
Mr Inder also notes that a response from KiwiRail was expected at the time he prepared his evidence. With reference to my summary statement (Swears, paragraph 5.50) I understand there are potential adverse effects on the performance of the NIMT if the rail siding is constructed. If the Applicant is relying on the benefits of the rail siding then KiwiRail confirmation that it can be provided should be obtained and the provisions in the District Plan should be amended to require establishment of the rail siding. While I accept that the Applicant has analysed adverse effects based on the rail siding not existing, some of those adverse effects (such as turning movements from the southbound off-ramp) will be partially mitigated if there is a significant reduction in the volume of heavy vehicles associated with the Proposal.

#### Site access proposals

- 6.27 The Applicant has proposed various access locations and configurations for those accesses. As noted in paragraph 6.10 of this statement, based on basic fundamentals of transport engineering and the requirements of the PDP, there should not be any direct access (such as Access A) to the Site from Tahuna Road.

- 6.28 It is unclear how one-way vehicle movements will be ensured for Access A and Access B. While I accept that many road users will comply with signage, some road users will not comply and consideration needs to be given to the implications of road users not complying with that signage. Consideration also needs to be given to the manner in which creative road users will achieve the access solutions they consider appropriate for them, even if we do not anticipate road users will undertake those manoeuvres. The simplest manner in which to avoid unacceptable road user movements at Access A and / or Access B is for those access points to be removed from the Proposal.
- 6.29 **Appendix A** of this statement contains some examples of methods adopted by road users to avoid turning restrictions and an example of the consequences of such restrictions being ignored.
- 6.30 In my opinion, while many road users will comply with the constrictions and limitations applied to their movements, simple methods such as signage will not necessarily eliminate the potential for undesirable vehicle movements to occur. I consider that such undesirable movements will occur at Intersection 1 as road users develop innovative turning manoeuvres to avoid the restrictions associated with the limitations placed on their movements. For example, I consider that some road users will achieve right turn movements at Intersection 1 by driving over the median island or travelling westbound in the eastbound carriageway of Tahuna Road). The likelihood of such undesirable manoeuvres would be significantly reduced if a different intersection form (for example, a roundabout) was provided or alternatively if no intersection was provided at that location.
- 6.31 With regard to Intersection 1, the question that needs to be answered is how right turn movements will be accommodated. The Tahuna / Lumsden roundabout is relatively close (approximately 190 m) to Intersection 1 and the continuous central median between the intersection and the roundabout is likely to discourage many right turn in movements at Intersection 1. However, Intersection 2 is approximately 600 m to the east (and out of sight), therefore, I consider it unlikely road users would travel that far to facilitate the equivalent of a right turn out movement at Intersection 1.
- 6.32 The Applicant proposes (Inder, EIC, 5.13(f)) that vehicle access to the rail siding will be provided from Balemi Road. Greater clarity is required on how access to the rail siding will be controlled in order to allow parties other than TCG to access the rail siding. In my opinion, unless access to the rail siding is attractive and relatively easy, rail will not provide a viable alternative to road transport.

- 6.33 The central island diameter of the Intersection 2 roundabout on Tahuna Road is illustrated as being 20 m (Inder, EIC, Figure 13), and an 80 km/h speed limit is proposed (Inder, EIC, Figure 20). If we assume that the design speed is the same as the speed limit<sup>5</sup>, Austroads<sup>6</sup> indicates that the minimum radius for the central island of a single lane circular roundabout should be 14 m (that is, 28 m diameter) and the desirable radius should be 22 m (that is, 44 m diameter). The Applicant is proposing a 20 m diameter, which is less than the minimum diameter described by Austroads. In my opinion, the Applicant should demonstrate at this stage that an appropriately designed roundabout can be provided and I recommend that provisions are included in the District Plan to require such a roundabout to be constructed.
- 6.34 Clarification also needs to be provided as to the measures that will be put in place to limit the potential for development on the Site to obstruct the sight distance to the north along Lumsden Road from Intersection 3. While matters such as the adequacy of the length of the right turn lane can be determined at resource consent stage, in my opinion controls on development should be established at the rezoning stage.
- 6.35 Figure 16 of Mr Inder's EIC includes the proposed location of "raised platform zebra pedestrian crossings". In relation to the crossings, I note the following from the NZ Transport Agency Pedestrian Planning and Design Guide 2009:
- a "Do not use zebra crossings on roads with speed limits over 50 km/h unless approval is obtained [...]"<sup>7</sup>.
  - b "Do not use zebra crossings for locations with fewer than 50 pedestrians per hour."<sup>8</sup> On this basis it may not be appropriate for a zebra crossing to be provided on Tahuna Road.
  - c Notwithstanding that raised intersections have been installed in some locations where the speed limit is greater than 50 km/h, raised pedestrian platforms should be sited in locations where the speed limit is 50 km/h or less.<sup>9</sup>
- 6.36 However, the approach to road safety has changed since 2009 through the introduction of the Safe System and Vision Zero. With regard to pedestrian

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<sup>5</sup> Noting that as a rule of thumb the design speed is often taken as being 10 km/h greater than the speed limit.

<sup>6</sup> Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Table 4.1.

<sup>7</sup> NZ Transport Agency, Pedestrian Planning and Design Guide, 2009, NZ Transport Agency, Wellington, page 6-20.

<sup>8</sup> NZ Transport Agency, Pedestrian Planning and Design Guide, 2009, NZ Transport Agency, Wellington, page 6-20.

<sup>9</sup> NZ Transport Agency, Pedestrian Planning and Design Guide, 2009, NZ Transport Agency, Wellington, Table 15.6.

safety Austroads<sup>10</sup> notes that “Treatments that target speed reduction (safety platforms, constraining geometry) show much promise when used at pedestrian conflict points”. However, a raised platform does not address the issues associated with the zebra crossing proposed by the Applicant.

- 6.37 Austroads also notes<sup>11</sup> that 30 km/h is the aspirational operating speed for interaction between vulnerable road users and passenger vehicles. While the Applicant is appropriately proposing to create a safe speed environment for pedestrians, there is not alignment between the proposed approach and current practice.
- 6.38 Therefore, in my opinion, the raised pedestrian crossings proposed by the Applicant to accommodate pedestrian movements across Tahuna Road are inappropriate for this location. Mr Inder’s assumption (EIC, paragraph 5.16(e)) that eastbound traffic on Tahuna Road will be slowed to approximately 30 km/h is not realistic. The limitations associated with constructing raised pedestrian crossings at this location will adversely affect accessibility for pedestrians to areas beyond the Site.
- 6.39 The other matter that arises in relation to the proposed pedestrian crossing is that to access the crossing, pedestrians are required to cross the proposed left turn in access for the service centre (Access A). Road users accessing the service centre may not expect pedestrians to be walking in this area and therefore there is potential for conflict between vehicle movements into the service centre and pedestrian movements across the proposed access. The solution to this issue is for Access A to be removed from the Proposal.
- 6.40 In his EIC Mr Inder states that visitors to the DFO on the Site are expected to use Intersection 1 and the majority of this traffic is expected to come from the Expressway (Inder, EIC, paragraph 5.16(b)). However, I understand that the DFO component of the Proposal is to be replaced with an equivalent area of industrial zoning. Mr Inder<sup>12</sup> indicates that the trip generation associated with the additional industrial zoning will be less than the trip generation that would have been associated with the DFO portion of the Proposal. Specifically, he notes

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<sup>10</sup> Section 7.1, Austroads, 2018, Towards Safe System Infrastructure: a Compendium of Current Knowledge, Austroads, Sydney, Australia.

<sup>11</sup> Section 4.5.1, Austroads, 2018, Towards Safe System Infrastructure: a Compendium of Current Knowledge, Austroads, Sydney, Australia.

<sup>12</sup> Transportation-related implications of removing the Discount Factory Outlet (DFO) from the Ohinewai Structure Plan area, memo from Cameron Inder / Rhulani Baloyi (Bloxham Burnett and Olliver (BBO)) to Waikato District Council and Ohinewai rezoning parties, 7 August 2020.

(Section 3.1) “Replacing the DFO with industrial is therefore expected to reduce AM and PM peak hour trips by approximately 220 and 540 trips respectively.”

- 6.41 With regard to the AM peak trip generation in particular, it seems counterintuitive that the DFO would generate more traffic than the industrial zoning. While I expect there would be DFO staff and delivery traffic in the AM peak, it is likely that customer traffic would not peak until later in the day. I acknowledge the reduction in employment numbers described in the memo (Section 2), however, this does not resolve the question of the time of day at which DFO employees would be travelling compared with employees in the replacement industrial area.
- 6.42 While I anticipate there will be visits to the additional industrial land by road users unfamiliar with the Site, I consider the adverse effects associated with those unfamiliar users will be less than would have been associated with visitors to the DFO. Visitors to the extended industrial zone are likely to use Intersection 1 to enter the Site; the Applicant proposes they will be guided from the Site using signage. While I consider that many of these unfamiliar visitors will be able to navigate from the Site using the signage, I am concerned that some of these unfamiliar visitors will seek to exit at Intersection 1; this extends to all visitors to the Site that use Intersection 1, not just those visiting the additional industrial area.
- 6.43 Regardless of the land use being accessed from Intersection 1, my concern is that the left turn only configuration of the intersection creates issues in association with the equivalent right turn out movements. Such movements may resemble a left turn out from Intersection 1, followed by a U-turn on Tahuna Road. Depending on the characteristics of the vehicles being used, Tahuna Road may be too narrow to accommodate U-turns, which may in turn result in three point turns being carried out. I consider that such manoeuvres would be undesirable, therefore, Intersection 1 should either not be provided or, if the intersection is necessary, it should be constructed as a roundabout.

### **Predicted Traffic Generation (Section 6)**

#### Indicative development areas

- 6.44 I agree with the approach taken by Mr Inder (EIC, paragraph 6.4(c)) to adopt a conservatively low average lot size for the residential area.<sup>13</sup> The result of this assumption is that if the average lot size is greater than assumed there will be

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<sup>13</sup> Inder, EIC, paragraph 6.4(c), “As a conservative estimation, an average lot size of 380m<sup>2</sup> for general density residential dwellings and 250m<sup>2</sup> for medium density residential dwellings was applied for this assessment. This equates to an average net residential density of 33 dwellings per hectare.”



fewer residential dwellings, which will result in fewer people living on the Site. This reduces the potential for internal trips between the residential and industrial portions of the Proposal because there are fewer dwellings available. With regard to external trips, the reduction in dwellings on the Site is likely to reduce Proposal related journeys on the Expressway because the land use activities (such as employment, schooling, shopping, et cetera) that would otherwise have been accessed from the Site will be accessed from elsewhere.

#### WRTM trip generation

- 6.45 I have not cross checked the trip generation determined from the WRTM with that from other standard industry sources. However, I understand that the land use trip generation for the WRTM is more reliable than the traffic volumes assigned to some portions of the road network. Therefore, for the purposes of the analysis at this stage, I consider it reasonable to apply the trip generation determined from the WRTM.
- 6.46 However, in this regard, the question arises regarding trip generation associated with the Sleepyhead Factory and that associated with the General Industrial. Table 8 of the ITA refers to 67 workers per hectare for the Sleepyhead Factory and 27 workers per hectare for the General Industrial. It appears that the employee density for the Sleepyhead Factory is based on an estimate by TCG “[...] that it will employ between 1000 and 1500 workers once the factory is fully developed.”<sup>14</sup> The significant differences in trip generation are highlighted in Table 4 of the August memo where 160,150 m<sup>2</sup> gross floor area (GFA) generates 671 vehicle movements in the PM peak while 100,000 m<sup>2</sup> GFA of Sleepyhead Factory generates 565 vehicle movements.
- 6.47 If the actual trip generation for the Sleepyhead Factory is based on the same density of employees per hectare as the General Industrial trip generation then the overall trip generation will be significantly less than described by the Applicant. However, if the General Industrial trip generation is similar to the trip generation associated with the Sleepyhead Factory, the overall trip generation will be significantly more than described by the Applicant.
- 6.48 At this rezoning stage we do not have certainty regarding the nature of the General Industrial activities, therefore, we do not have certainty regarding the trip generation for the Proposal. Notwithstanding that, based on the range of employment density described by the Applicant<sup>15</sup>, it is conceivable that the trip

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<sup>14</sup> ITA, Section 6.1.2.

<sup>15</sup> ITA, Table 8.

generation for the General Industrial could be about 250% ( $67 / 27 = 2.48$ ) of that described in the ITA.

- 6.49 Ms McMinn highlights this uncertainty in her review of submissions where she refers to “Typical floor areas for manufacturing activities of 60-90 m<sup>2</sup> per employee [... compared with] The submitters [sic] assumption of 1 employee per 200 m<sup>2</sup> for light industrial land use [...]”<sup>16</sup>
- 6.50 Mr Inder refers (EIC, paragraph 6.6(b)) to “[...] communities located within a 30km [sic]<sup>17</sup> radius from the Site, e.g. Pokeno, Pukekohe, South Hamilton [...]”. However, as illustrated in Figure 3 below, it is only the very northern suburbs of Hamilton that are within a 30 km radius of the Site, while Pukekohe is outside that 30 km radius. In addition, it is important to note that road transport journeys ordinarily follow alignments that are not in a straight line, therefore, a 30 km radius from the Site is not necessarily a 30 km journey from the Site<sup>18</sup>.
- 6.51 There is nothing particularly relevant about a 30 km radius from a transport engineering perspective. However, Mr Inder’s EIC illustrates that the Site is relatively remote from major centres of population and essential services that would support the residential development proposed.
- 6.52 It appears one of the Applicant’s underlying assumptions is that housing on the Site “[...] will be targeted at providing quality living and long-term home ownership for workers and their families [...]”<sup>19</sup>. From a transport engineering perspective, the basic principle behind this aspect of the Proposal has merit through its potential to decrease the number of home to work trips that rely on the wider road network (and in particular the Waikato Expressway) for those trips. However, locating housing remote from many other services (such as supermarkets, medical centres, other employment, high schools, et cetera) will result in local trips being made on the Expressway. In addition, unless there are planning provisions that require the housing (or at least substantial proportions of the housing) to be occupied by workers on the Site, there are limited transportation benefits in having the housing on the Site. Through Mr Olliver’s evidence the Applicant has indicated that the majority of the housing will be for sale on the open market. In my opinion, even if there are relatively high levels of Site worker

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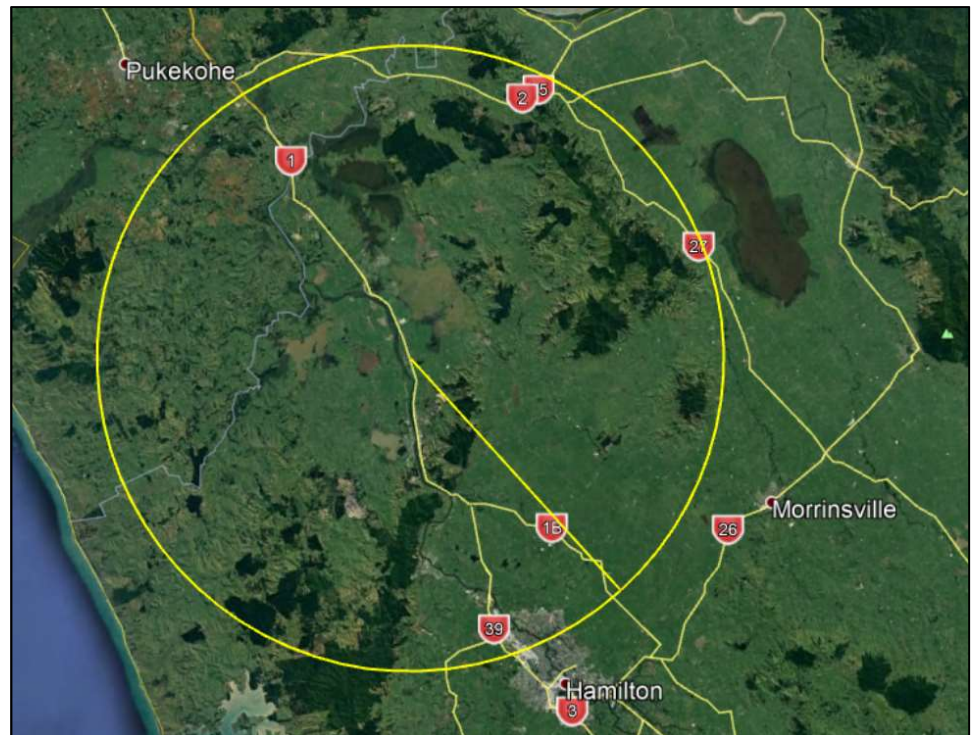
<sup>16</sup> Section 3.2.2, Ohinewai Rezoning Requests, Transportation Review of Submissions, Waikato District Council, prepared by Naomi McMinn of Gray Matter, 9 March 2020.

<sup>17</sup> In this statement (including its appendices) I have included various quotations from the work of other parties associated with this matter; many of these quotations include reference to quantities such as this. In most cases the quantities presented in those quotations are not in the correct SI format. However, rather than highlighting every case, I have included this footnote to clarify that any incorrect use of the SI convention that is contained within quote marks in this statement is an accurate representation of the original.

<sup>18</sup> As an example, the on-road journey distance from the Tahuna / Lumsden intersection to the Te Rapa Road / Base Parade intersection is approximately 31.6 km by road (based on Google Maps directions), but 29.2 km in a straight line.

<sup>19</sup> Cameron Inder, EIC, paragraph 6.6 (c)(ii).

occupancy, the transportation disbenefits associated with the on-site housing are likely to outweigh the benefits.



**Figure 3: Map showing 30 km radius about the Tahuna / Lumsden intersection (image source: Data SIO, NOAA, US Navy, NGA, GEBCO, Google, Image Landsat / Copernicus, accessed on 29 July 2020)**

- 6.53 Notwithstanding my point above, I note that the Applicant has modelled vehicle movements associated with the Proposal on the basis that there is not a skew to reduce external trip generation on the basis that housing on the Site is occupied by workers on the Site (Inder, EIC, paragraph 6.6(e)).

#### Predicted traffic distribution

- 6.54 The key point in Mr Inder's EIC (paragraph 6.8(b)) in relation to the predicted traffic generation is that "[...] the Site [...] will form part of the larger Huntly community. On this basis, a larger proportion of the trip [sic] generated by the proposed development will travel south to Huntly."
- 6.55 This confirms my understanding that although the Site will not physically be part of Huntly (because it is separated by a short section of the Waikato Expressway and local roads beyond that), it is intended to function as part of Huntly. In my opinion (which is aligned with traffic engineering practice) it is undesirable for an inter-regional arterial to be used for local trips to connect a location such as the Site with a separate location such as Huntly. Ms Loynes explains the strategic importance of the Expressway in her statement.

## Traffic Effects Assessment and Proposed Mitigation Measures (Section 7)

### State Highway 1 Ohinewai Interchange

- 6.56 Notwithstanding the trip generation that Mr Inder considers (EIC, paragraph 7.4) is conservative and the reduced trip generation associated with the change in land use from DFO to industrial, Mr Inder (EIC) considers that the performance of the southbound off-ramp intersection at the Interchange will operate “[...] at acceptable levels of service in the peak periods [...] Level of Service D (“LOS”) [...] during the AM peak and E in the PM peak [...]”. However, Mr Inder also notes that “[...] LOS D and E are reasonably low levels of service [...] and] are fairly typical levels of operation during peak flow periods for an intersection serving development [...]”.
- 6.57 The subsequent analysis through which the implications of removing the DFO from the structure plan area states “All critical movements at the [Eastern Ramp] intersection are expected to operate at acceptable levels of service (LOS D and better) during the peak periods [...] with minimal delays and queuing.”<sup>20</sup>
- 6.58 The points to consider in this regard include:
- a While relatively low levels of service are not uncommon at interchanges close to large urban areas, they are less common at rural interchanges such as the one at Ohinewai. Austroads<sup>21</sup> notes “It is desirable that interchanges should be designed to achieve LOS B and LOS C in the design year for interchanges as a whole in rural and urban areas respectively. [...] In some cases it may be necessary to adopt a lower LOS for particular movements within an interchange (e.g. LOS D).” However, the Applicant is proposing a low level of service for a particular movement not because it is necessary but because they are seeking to establish the Proposal at an inappropriate location without adequate mitigation.
  - b As levels of service (and associated delay) deteriorate, road users tend to accept smaller gaps at intersections. Mr Inder has already identified there are road safety issues at the Interchange, which will be exacerbated by the increased traffic. However, the Applicant is proposing nothing is done to improve the levels of service and potentially reduce the incremental road safety effects that may arise as a result of the traffic associated with the

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<sup>20</sup> Transportation-related implications of removing the Discount Factory Outlet (DFO) from the Ohinewai Structure Plan area, memo from Cameron Inder / Rhulani Baloyi (Bloxxham Burnett and Olliver (BBO)) to Waikato District Council and Ohinewai rezoning parties, 7 August 2020, page 11.

<sup>21</sup> Section 1.7, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

Proposal. That is, a situation with identified safety issues will be made less safe as a result of the Proposal.

- c While Mr Inder concludes that the intersection appears to have capacity for the associated traffic volumes, the WRTM modelling that he relies on may not be sufficiently robust to support those conclusions. I am not aware of a better practicable methodology the Applicant could have adopted, however, because of the uncertainty associated with the results from the WRTM and intersection modelling I consider a cautious approach should be applied. This uncertainty could be addressed through staged development of the Site with detailed analysis of the cumulative transportation effects of development on the Site undertaken before any subsequent stages are confirmed.
- d Noting that there is no certainty at this time, trip generation potentially associated with Ohinewai Lands Ltd (OLL) and / or Shand is likely to further reduce levels of service. However, there is not a linear relationship between increased traffic and increased delays given that at higher levels of delay (lower levels of service) relatively small increments in traffic volumes can result in relatively large increments in queuing and delay.
- e If a capacity increase is required (with or without OLL and / or Shand) at the Interchange the associated works (such as widening bridges at the Interchange) that may be required have the potential to be complex. However, I do not consider that the complexity of the solution should remove the requirement for a suitable solution to be provided in the event mitigation is required to address adverse effects.

6.59 Notwithstanding the relatively low levels of service, as discussed in Section 16 of Appendix B of this statement, it appears the length of the southbound off-ramp is adequate for the modelled trip generation identified by the Applicant.

#### Walking and cycling

6.60 I agree with Mr Inder (EIC, paragraph 7.29(e)) that there are safety risks associated with having pedestrians and cyclists crossing the ramps at the Interchange (Option 1). I also accept that installing signals at the Interchange will affect the level of service. While the Applicant is proposing walking and cycling facilities for movements across the Expressway between the Site and the School, the associated trip distance for pedestrians is unlikely to make the journey attractive. The School is not the only trip attractor on the western side of the

Expressway, however, because of the distances involved, journeys to other trip attractors are unlikely to be completed by active modes.

- 6.61 I also agree (Inder, EIC, paragraph 7.33) that the northern overbridge (Option 2) does not meet the likely active mode desire line between the Site and Ohinewai School (and locations to the south) as well as the southern overbridge (Option 3) does. However, as noted in this statement (paragraphs 6.17 and 6.18), the distance between the Site and the School is longer than typical for walking journeys. Similarly, the distance between the Site and Huntly is greater than typical for cycling journeys.
- 6.62 Reference is made to maintenance of the overbridge (Inder, EIC, paragraph 7.33 (c)), however, it is unclear which party would be responsible for maintenance of the overbridge and the paths connecting with each end. This is a matter that needs to be resolved between the Applicant and other parties such as Waka Kotahi.
- 6.63 I agree with Mr Inder's statement (EIC, paragraph 7.36) that if only one active mode "[...] overbridge is provided then the position to the south is the better location of the options considered." However, this should not be taken to mean that it is a good option, but rather, given the location of the Site relative to trip attractors, the identified location is the best of a range of options that result in journey lengths likely to be unattractive for active mode users.
- 6.64 With regard to active mode journeys to Huntly, I accept that a riverbank option may be more attractive than a roadside option, however, the attractiveness of the route does not influence the fact that the journey distance (8 to 10 km) is too great for it to be used by many active mode users.
- 6.65 While Mr Inder considers (EIC, paragraph 7.43) that the effects of not providing the overbridge at the very start of the development are negligible, not providing the overbridge reinforces that motor vehicles are the most appropriate travel mode for journeys to and from the Site.

## **Joint Witness Statement (Section 9, Inder EIC)**

### **7 Overview**

- 7.1 Mr Inder notes (EIC, paragraph 9.2) that "[...] the disagreements are somewhat academic in [... his] opinion as further assessments of effects to confirm the details of mitigation and timing will be required [...]". That is, Mr Inder recognises there may be issues in the future associated with the Proposal. However, rather

than determining whether there are practicable solutions for those issues at the rezoning stage, he considers they should be deferred to the future. In my opinion, the rezoning should not go ahead unless there are confirmed practicable solutions for the potential issues that may arise and appropriate rules to ensure that mitigation is implemented where necessary.

- 7.2 In **Appendix B** I have provided commentary in relation to the matters discussed through the joint witness conferencing. In the paragraphs below I have summarised my opinion on the key outstanding issues arising from the Joint Witness Statement.
- a Issue 1 - Transportation Models: caution should be applied to transportation model results due to the uncertainty regarding the reliability of the model.
  - b Issue 2 - Trip Generation Rates: caution should be applied to conclusions based on trip generation rates because of the uncertainty with trip generation for the Sleepyhead Factory and the general industrial areas.
  - c Issue 6 - Impact on the Surrounding Road Network
    - i Waikato Expressway: I disagree with Mr Inder's view that the spacing between the Ohinewai Interchange and the Huntly Northern interchange is adequate. Although not all of the interchange spacings on the Waikato Expressway comply with the Austroads guidelines, the table in Appendix B demonstrates that these less than idea spacings are still approximately twice that provided in relation to the Ohinewai Interchange.
    - ii Surrounding Road Network: I remain of the view that the width of Tahuna Road to accommodate heavy vehicles on the NIMT overbridge is very constrained and will result in the encroachment of heavy vehicles into the opposing lane. I also agree with Ms McMinn's concerns regarding the safety risk to cyclists due to the lack of extra space or shoulder on the overbridge. These risks cannot be adequately mitigated by signage.
  - d Issue 8 – Capacity Related Upgrades: Given that the WRTM outputs need to be treated with caution, in my opinion the planning provisions should provide for reassessment of the traffic effects in terms of the need for capacity improvements at and / or affecting the Interchange.

- e Issue 9 – Sight Distances at the Ohinewai Interchange: sight distance to the east from the southbound off-ramp is restricted due to parapets on the NIMT overbridge and the sag curve on Tahuna Road. The Applicant is reliant on low vehicle operating speeds on Tahuna Road to address these shortcomings, however, there is no certainty in relation to those operating speeds. Widening of the NIMT overbridge and raising the sag curve on Tahuna Road are likely to adequately increase the sight distance.
  
- f Issue 21 – Proposed Mitigation for Tahuna Road / Lumsden Road Roundabout: there is uncertainty regarding the trip generation for the Sleepyhead Factory and the general industrial area that may result in two right turning lanes being required from Lumsden Road onto Tahuna Road. There is not enough distance between the Tahuna Road / Lumsden Road roundabout and the NIMT overbridge to accommodate a suitably designed roundabout in the location proposed by the Applicant. There are two potential solutions to this issue – either reposition the roundabout further to the east or widen the NIMT overbridge to accommodate an adequate merge with a run out area.
  
- g Issue 22 – Implications of the Development of Ohinewai Lands Limited Land Zoning – I am concerned that the assessment of the Proposal in isolation from other development such as Ohinewai Lands Limited and Shand means that these developments will also be assessed in isolation without any consideration of what the best overall transportation solution should be in this location. This approach runs the risk of resulting in unmitigated cumulative adverse effects because the magnitude of incremental adverse effects does not justify the mitigation that would be required.
  
- h Issue 23 - Implications of the Shand Properties Limited Land Zoning: because of the distance from the Shand site to the applicant site via grade separated active mode use of facilities I am concerned there will be at grade pedestrian movements across the Expressway. I recommend appropriate mitigation measures are put in place through the planning provisions to strongly discourage such pedestrian movements.

## **8 Response to the Council Officer's report**

- 8.1 I have reviewed the 9 March 2020 Ohinewai Rezoning Requests, Transportation Review of Submissions, Waikato District Council, prepared by Naomi McMinn of Gray Matter and note the following matters with which I agree and disagree.



- 8.2 Agree: there is a risk that development of the Site (and possibly other activities in the area) will result in cumulative adverse effects that are not addressed because of the incremental manner in which the Proposal develops (McMinn, page 2).
- 8.3 Agree: there may be more trips on the wider road network than anticipated by the Applicant if there is not a high level of uptake of the on-site housing for on-site workers (McMinn, Section 3.2.2).
- 8.4 Agree: in relation to the ITA potentially underestimating trip generation for components of the Proposal (McMinn, Sections 3.2.2 and 3.3.2). As noted in this statement, there is very significant uncertainty in relation to the trip generation rates associated with the Sleepyhead Factory and the General Industrial area.
- 8.5 Agree: revised analysis based on updated validated WRTM models should be completed as soon as possible (McMinn, Section 4.1.2). In this regard, it may be appropriate to defer confirming the rezoning until such time as there is more certainty regarding the modelling on which the analysis is based.
- 8.6 Agree: in relation to the risk that upgrades may be triggered earlier than the ITA anticipates (McMinn, Section 4.3). In this regard, I consider that the walking and cycling overbridge should be provided at the earliest opportunity.
- 8.7 Agree: that it can be challenging to rely on trip generation triggers for infrastructure improvements (McMinn, Section 6.1).
- 8.8 Disagree: that staging infrastructure improvements should be based solely on staging or area development (McMinn, Section 6.1); while I agree that this allows for easier monitoring it does not necessarily address adverse transportation effects.
- 8.9 Agree: that there is an existing safety issue at the southbound off-ramp intersection with Tahuna Road (McMinn, Section 6.2). However, the Applicant is proposing to increase traffic volumes and increase delay without providing any mitigation, which is likely to result in the existing safety issue being exacerbated.
- 8.10 Agree: that if passengers are expected to walk from the Site to a bus stop on the western side of SH1 a footpath is needed. However, I do not consider the proposed pedestrian overbridge is a suitable route for pedestrians seeking to walk to the existing bus stop.

- 8.11 Agree: that development of the OLL site (McMinn, Section 10.1) could result in adverse road safety and transport efficiency effects. This potential exacerbates the concern I identified in Appendix B paragraph 14.2 of this statement.
- 8.12 Agree: use of the Waikato Expressway for short local trips is not consistent with its function as a nationally significant transport corridor (McMinn, Section 10.1).
- 8.13 Agree: that it is reasonable to be concerned about the lack of walking and cycling facilities on Ohinewai North Road that would be needed to serve residents of the Shand site if that is developed (McMinn, Section 10.2.2). In this regard, I note with concern the assertion provided in the Traffic Impact Assessment (TIA) associated with the Shand development that familiarity with the southbound off-ramp / Tahuna Road intersection would reduce the likelihood of crashes.
- 8.14 Agree: more information (McMinn, Section 10.3) is needed to provide a better understanding of the potential transport effects and mitigation required in association with land-use development in the vicinity of Ohinewai that includes, but is not limited to, the Proposal.
- 8.15 Agree: the lack of viable alternatives for walking and cycling means that a high proportion of travel associated with the Proposal will be by private vehicle (McMinn, Section 11).
- 8.16 Agree: that the potential safety impacts of the changes associated with the Proposal require further investigation (McMinn, Section 12.5).
- 8.17 Agree: regarding concerns raised with sight distance from the southbound off-ramp and, more particularly, that the Applicant is not proposing mitigation to address this visibility issue (McMinn, Section 12.5).
- 8.18 Agree: in relation to concerns about intersection form, particularly on Tahuna Road (McMinn, Section 12.6). While the intersection forms presently proposed are different from those initially proposed, I consider that the roundabout diameters are inadequate and there are shortcomings with the proposed left turn in / left turn out intersection (Intersection 1).

## **9 Overview of concerns**

- 9.1 The table below provides a summary of the key transportation engineering issues associated with the Proposal and highlights whether these issues can be addressed and, if so, how they could be addressed.

**Table 1: Summary of key transportation engineering issues**

<b>Issue<sup>22</sup></b>	<b>Possible methods to address</b>
<b>Location of Site</b>	
1. Distance between Site and Ohinewai School too great for walking journeys.	None.
2. Distance between Site and Huntly too great for cycling journeys.	None.
3. Using Waikato Expressway inter-regional arterial for local trips.	Construct alternative route between the Site and Huntly; otherwise no solution available to address issue.
4. Inadequate spacing between Ohinewai Interchange and Huntly Northern interchange.	Construct alternative route between the Site and Huntly; otherwise no solution available to address issue.
<b>Housing</b>	
5. No requirement for housing on the Site to be occupied by workers on the Site.	<p>Planning provisions to require Site housing to be occupied by Site workers to reduce the number of trips external to the Site.</p> <p>Remove housing from the Proposal to eliminate all journeys associated with household trips external to the Site.</p>
<b>Interchange</b>	
6. Sight distance from southbound off-ramp inadequate.	Ensure reduced operating speeds on Tahuna Road or widen NIMT overbridge and remove vertical sag curve between overbridge and Tahuna / Lumsden roundabout.
7. Safety issues at southbound off-ramp intersection.	Change intersection form to a safe system solution such as roundabout.
8. Pedestrians crossing the Interchange overbridges to access public transport facilities	Widen overbridges to accommodate pedestrian movements.

<sup>22</sup> The numbers assigned to these issues do not correlate with the numbering of the issues discussed through the transportation joint witness conferencing.

<b>Tahuna Road Intersections</b>	
9. Tahuna / Lumsden roundabout diameter too small.	Design for adequate diameter. Repositioning of roundabout may be required or property purchase to accommodate full-size roundabout.
10. Unacceptable road user movements associated with Intersection 1.	Eliminate Intersection 1 or replace with a roundabout.
11. Intersection 2 roundabout too small.	Design for adequate diameter. Repositioning of roundabout may be required or property purchase to accommodate full-size roundabout.
12. Lane configurations too short.	Relocate Tahuna / Lumsden intersection to the east or widen NIMT overbridge.
<b>Lumsden Road Intersections</b>	
13. Sight distance constraints from Intersection 3.	Sight distance covenant over land to the north.
14. Uncertainty regarding design of Lumsden / Balemi intersection.	Confirm applicability of design vehicle used for the design.  Confirm adequacy of measures proposed to reduce approach speeds on Lumsden so that operating speed is aligned with design speed.
15. Sight distance constraints from Lumsden / Balemi intersection.	Sight distance covenant over land to the north that is not owned by the Applicant.
<b>Accesses</b>	
16. Unacceptable road user movements associated with Access A.	Eliminate Access A.
17. Inappropriate access for service centre.	Eliminate Access A.
18. Risk of exiting movements at the Access A entry to the service centre.	Signage to discourage exiting movements.  Eliminate Access A.
19. Risk of entering movements at the Access B exit from the service centre.	Signage and / or physical features to discourage entering movements.  Eliminate Access B.
<b>Heavy Vehicles</b>	
20. Heavy vehicle turning movements encroaching into opposing lane on Tahuna Road.	Widen NIMT overbridge.

<b>Walking and Cycling</b>	
21. Mode choice being private motor vehicle focused.	Establish grade separated active mode crossing early in development of the Site.  Remove housing from the Proposal so that journeys, which would otherwise be external to the Site, occur closer to trip attractors so that active modes are more likely to be adopted.
22. Raised platform pedestrian crossing on Tahuna Road inappropriate.	Traffic signals.  Grade separated structure.  Identify alternative location for crossing.
23. Grade separated active mode facility does not accommodate all likely desire lines.	Widen NIMT overbridge and Expressway overbridge to better accommodate active mode users; particularly cyclists.
24. Potential for pedestrians crossing Expressway between Shand site and the Site.	Planning provisions to avoid development of the Shand site and / or barriers to desire line constructed and / or construct active mode crossing to the north of the Interchange.
25. Some public transport passengers will need to cross the Expressway to access bus stops.	Obtain funding to allow for bus stops on both sides of the Expressway to be serviced.  Widen Expressway overbridges to accommodate pedestrian movements.
<b>Rail Siding</b>	
26. Uncertainty regarding rail siding.	Planning provisions to require provision.
<b>Modelling</b>	
27. Uncertainty regarding scale and nature of adverse effects as Site develops.	Additional modelling and analysis at various stages of development.
28. Effect of trip adjustment factors on assessing effects of the Proposal.	Allow a mechanism in planning provisions for reassessment of the modelled effects of the Proposal.
29. Uncertainty regarding data used in traffic modelling.	Update WRTM to ensure accuracy.  Stage development of the Proposal to allow accuracy of modelling to be compared with reality.

Robert Clive Swears

13 August 2020

## Appendix A: Methods and consequences of road users avoiding turning restrictions

- 1 The following images illustrate road user solutions to overcome road traffic rules and turning constraints in order to perform the movements they wish to perform. Figure 4 illustrates a vehicle that has turned right from Burger King at Te Rapa (Hamilton) and is travelling in the wrong direction along Te Rapa Road before completing a U-turn to join the northbound through lane.



Figure 4: Right turn out exit from Burger King Te Rapa (Hamilton) into opposing left turn slip lane (vehicle circled) for northbound left turn from Te Rapa Road onto Wairere Drive

- 2 Figure 5 below illustrates clear signs (tyre marks) that the attempts made to discourage right turn entry movements to the exit from the McDonald's Rotorua site (SH30A), through the provision of a solid median, have not been altogether successful. Some road users will go to considerable efforts to undertake the manoeuvres they desire.
- 3 A scenario similar to the one below could arise at the Access B exit. The potential for this will increase if Access A is removed. Therefore, I consider further assessment is required in relation to this matter and it may be appropriate for the plan provisions to not allow for Access A or Access B.



Figure 5: SH30A exit from McDonald's Rotorua (red arrow), with SH30A entry (blue arrow), and tyre marks across central median (green arrow). The green dashed line illustrates the assumed path of a road user

- 4 Figure 6 below illustrates a southbound driver turning right into the Thirsty Liquor site, on Willoughby Street in Hamilton, despite the presence of a median island to discourage the movement and a “no right turn” sign to prohibit the movement.

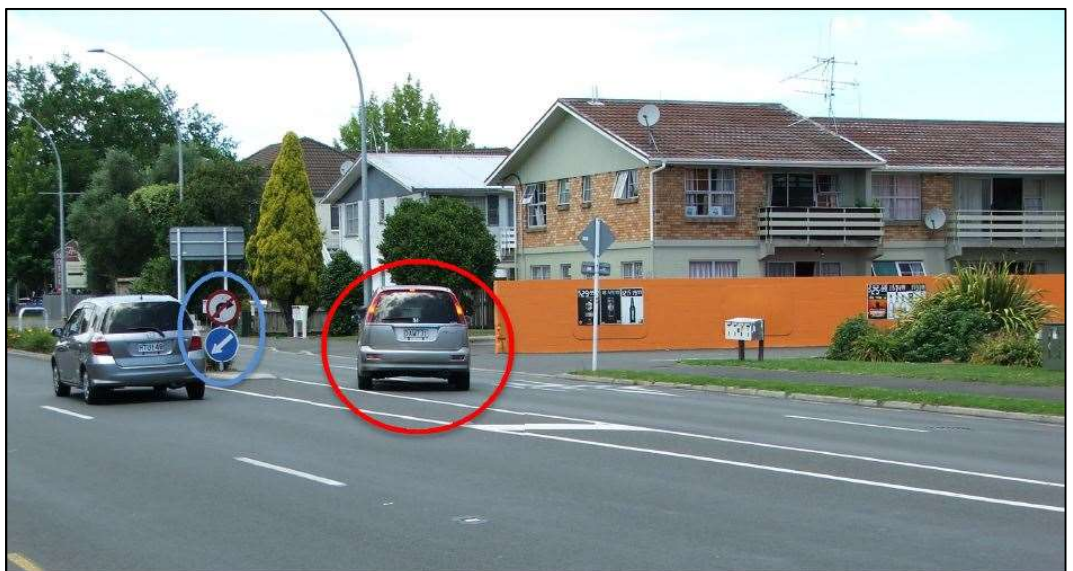


Figure 6: Southbound vehicle (red circle) on Willoughby Street (Hamilton) turning right into property despite presence of solid median and “no right turn” sign (blue circle)

- 5 As an example of issues that can arise with unacceptable road user movements at accesses, on 14 June 2020 there was a fatal crash on the Christchurch motorway involving a male driver who “[...] left the BP service station on Russley

Road by driving over a kerb and grass verge knocking over a sign. He then [...] entered the motorway on the wrong side of the road.”<sup>23</sup>

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<sup>23</sup> Source: <https://www.stuff.co.nz/national/300034208/mother-devastated-and-heartbroken-after-son-killed-in-double-fatal-crash>, accessed on 7 August 2020.



## **Appendix B: Joint Witness Statement Commentary**

### **1 Issue 1 – Transportation Models**

- 1.1 I confirm the opinion I expressed through the JWS that the WRTM is generally appropriate and that there is no better tool available.
- 1.2 However, just because the WRTM is the best tool available it does not mean that the WRTM will provide reliable results. It is not unusual for results from the WRTM not to match reality. In the Modelling Report (ITA Appendix C, page 2) BBO notes that “[...] the 2013 [WRTM] base year model is not well calibrated for the Ohinewai area.” They also note that “[...] a 2018/19 “pseudo“ base year model was developed for the [... Ambury] rezoning project.”
- 1.3 While I consider the approach adopted by the Applicant is reasonable, I consider that caution should be applied in relation to determining whether specific mitigation is required (or not required) based solely on the results of modelling derived from WRTM traffic volumes. It may be that the Applicant’s results are conservative as suggested by Mr Inder (JWS, paragraph 2.2), however, because of the uncertainty involved, I consider that mitigation which may in future be necessary<sup>24</sup> is not identified as being unnecessary at this early stage based solely on results derived from the WRTM.

### **2 Issue 2 – Trip Generation Rates**

- 2.1 The trip generation rates and the associated sensitivity testing needs to be considered against the factors applied to WRTM results.
- 2.2 As noted in paragraphs 6.45 to 6.49 of this statement there is significant uncertainty in relation to trip generation for the Sleepyhead Factory and general industrial portions of the Proposal.
- 2.3 The WRTM as a whole needs review and probable amendment because there are various occasions where it has been identified the WRTM predicts future traffic volumes lower than existing traffic volumes where it is implausible there would be a reduction. The modelling report (ITA Appendix C) makes reference to such implausible results and notes that modifications were made to the WRTM inputs and outputs to produce more realistic results in relation to the Proposal.

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<sup>24</sup> Such as widening the NIMT overbridge to accommodate additional lanes as may be required in conjunction with a signalised intersection for the southbound off-ramp.

- 2.4 Essentially, it will be necessary for the ITA to be updated every time consideration is given to land use development at the Site for which a resource consent is required. Along with that update of the ITA it will be necessary to review the WRTM results (or the results from whatever strategic regional traffic model is available at the time) to determine whether the modelling results reflect reality. Although the plan provisions allow for the ITA to be updated for industrial development, the residential components of the Proposal have potential to generate significant volumes of traffic. Therefore, I consider the plan provisions should also require the ITA to be updated to consider the effects and required mitigation (if any) associated with staged release of the residential land.
- 2.5 While the WRTM is the best model available, there are shortcomings with the WRTM. Therefore, caution needs to be applied in concluding certain mitigation is required (or not required) based on the modelling results. Consequently, caution also needs to be applied if conclusions are drawn that land use development can proceed without mitigation, which may be costly (or impractical), being required. With regard to the Proposal, that caution needs to take account of the complexity associated with significant upgrades being required at the Interchange and the need for any such upgrades to be assessed at a later stage.
- 2.6 I confirm the opinion I expressed at the conferencing (JWS, paragraph 3.6) that transport upgrades not currently identified as necessary can be identified and required at resource consent stage. However, in developing those plan provisions it is important to recognise that the upgrades considered necessary may include (for example) replacing bridges at the Interchange. In this regard, I have significant concerns that incremental adverse effects identified on a resource consent by resource consent (or stage by stage) basis may allow the Applicant (or other parties) to present an argument that the incremental adverse effects do not warrant mitigation of the magnitude of bridge replacement. Therefore, I consider the plan provisions need to ensure that appropriate mitigation is provided for the cumulative transportation effects associated with development of the Site at each stage of its development and should not allow the effects and associated mitigation for any stage of the development to be evaluated for that stage only. Applying this approach will ensure that the transportation effects of the Proposal are mitigated based on the cumulative effects rather than only on the incremental effects associated with any stage.

### **3 Issue 3 – Trip Adjustment Factors**

- 3.1 Notwithstanding my comments regarding the reliability of the WRTM, I confirm my opinion that allowing a mechanism in planning provisions for reassessment of the

effects of the Proposal (which will be partially attributable to the number of internal trips) is an appropriate mechanism.

- 3.2 However, I also consider that unless there is a mechanism that encourages internal trips (for example, requiring a specified portion of the housing on the Site to be occupied by workers on the Site) the proportion of internal trips is unlikely to be significantly different to land use development elsewhere for which many of the facilities (including retail, services, education, and employment) required by occupiers of that land are outside the boundaries of the Site.
- 3.3 Therefore, the residential component of the Proposal may not provide any benefits in relation to reducing trip generation for activities associated with the Proposal. Although removing housing from the Proposal would eliminate the potential for internal trips to the industrial portions of the Site, it would also resolve the issues associated with trips from the residential area of the Site to other locations such as the School and Huntly. In my opinion, several of the traffic issues associated with the Proposal would cease to exist if the residential components of the Proposal were removed.

#### **4 Issue 6 – Impact on the Surrounding Road Network**

##### **Waikato Expressway**

- 4.1 While there is some uncertainty regarding the exact timing of the design of the Interchange, it is agreed that at the time it was designed the Applicant's proposal was not anticipated.
- 4.2 Mr Inder noted (JWS, paragraph 7.4) that interchange spacing alone is not a strong reason to oppose the Proposal; in this regard, I agree with Mr Inder. However, the combination of inadequate interchange spacing and the significant change in the volumes of traffic using the Interchange is one of several shortcomings associated with the Proposal that I consider highlights the Site is unsuitable for the Proposal.
- 4.3 Because of the timeframes between preliminary design and completion of construction there has not been any recent expressway design that has led to construction. However, there are sections of expressway constructed relatively recently that provide an indication of what is currently acceptable. For the comparisons listed in Table 2 below<sup>25</sup> I have considered the distance from the end of the gore area for an on-ramp to the start of the gore area for the closest

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<sup>25</sup> The information in the table was prepared by Leon Piedade, graduate road safety engineer (WSP, Auckland) and reviewed by Aidan Misquita, graduate traffic engineer (WSP, Auckland).

off-ramp (and vice versa). As a result, the list does not include all interchanges because some of these are half diamond interchanges where a useful on-ramp to off-ramp comparison cannot be made. Notwithstanding that, Table 2 below describes approximate interchange ramp spacings for constructed portions of the Waikato Expressway. In some cases the source data was not sufficiently clear to allow a precise dimension to be determined, however, where there was uncertainty we adopted the shortest identified distance between interchange ramps.

**Table 2: Distances between interchange ramps**

<b>Expressway Section</b>	<b>From / To</b>	<b>To / From</b>	<b>Direction</b>	<b>Length (m)</b>
Tamahere / Cambridge	Cambridge North	Tamahere	Northbound	<b>5385</b>
			Southbound	<b>5045</b>
Hamilton	Tamahere	Hamilton South	Northbound	<b>1300</b>
			Southbound	<b>1435</b>
	Ruakura	Greenhill	Northbound	<b>3305</b>
			Southbound	<b>3280</b>
	Greenhill	Resolution	Northbound	<b>6370</b>
			Southbound	<b>6150</b>
Hamilton / Ngaruawahia	Resolution	Lake Road	Northbound	<b>2920</b>
			Southbound	<b>3135</b>
Ngaruawahia	Horotiu	Taupiri	Northbound	<b>8780</b>
			Southbound	<b>8965</b>
Huntly	Huntly North	Ohinewai	Northbound	<b>1645</b>
			Southbound	<b>1285</b>
Ohinewai	Ohinewai	Rangiriri	Northbound	<b>6685</b>
			Southbound	<b>6130</b>
Long Swamp to Rangiriri	Rangiriri	Te Kauwhata	Southbound	<b>1310</b>
	Te Kauwhata	Hampton Downs	Northbound	<b>6990</b>
			Southbound	<b>6780</b>

4.4 The green values in the table highlight ramp spacings greater than the spacing between the Ohinewai ramps and the Huntly North ramps. The red values in the table highlight spacings less than, or about the same as, those for Ohinewai and Huntly North. With regard to the red values:

- a The separation between the Tamahere and Hamilton South ramps is somewhat less than the 5 km to 8 km spacing to which I referred in my summary statement (Swears, paragraph 6.32). However, that spacing reference is in relation to interchanges in rural areas whereas the Tamahere and Hamilton South ramps are in close proximity to a large urban area. In that regard, Austroads<sup>26</sup> notes the minimum spacing in urban areas is about 2 km on four-lane expressways. While the spacing is less than desirable, it

<sup>26</sup> Page 15, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

was essentially unavoidable because the Tamahere interchange already existed as did the southern boundary of Hamilton.

- b The spacing between Rangiriri and Te Kauwhata is clearly less than desirable, however, because of the relatively low levels of use of the two interchanges is not of significant concern. Arguably, the situation is not dissimilar to the separation between Ohinewai and Huntly if the Proposal does not exist.

- 4.5 Mr Inder considers (EIC, paragraph 9.12) that less than desirable spacing of interchanges is “[...] a strategic ideal that is rare to achieve on much of the network [...]”. He is correct that the Austroads 5 km to 8 km spacing between rural interchanges has not been achieved in several locations along the Waikato Expressway. However, the less than ideal separations elsewhere on the rural portions of the Expressway are typically around twice the distance between the Interchange and the Huntly Northern interchange.
- 4.6 Austroads<sup>27</sup> notes “The spacing of interchanges is important because it can result in issues associated with the overlapping or insufficient separation of entry ramps and exit ramps. [...] More importantly, it may result in problems associated with traffic weaving between interchanges.” Weaving is the movement of vehicles that cross from an entry ramp to a through lane and from a through lane to an exit ramp. An inadequate length for weaving can result in collision risk and weaving turbulence that adversely affects the level of service for a section of expressway.
- 4.7 Mr Inder’s view is that the spacing between the interchanges is adequate, however, his view is contrary to the Austroads guidance on which transportation design in New Zealand is based. The inadequate spacing is a factor in support of my opinion that the Site is unsuitable for the Proposal.

### **Surrounding Road Network**

- 4.8 There was not agreement through the JWS in relation to the impact of design heavy vehicles turning left from the southbound off-ramp onto Tahuna Road. I accept that not all turning movements associated with the Proposal will be design heavy vehicles, however, it appears that the width of Tahuna Road to accommodate design heavy vehicles is very constrained, at best, or inadequate. The implications of the constrained width include turning vehicles encroaching

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<sup>27</sup> Page 14, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

into opposing lanes and inadequate width being available for cyclists on the Interchange bridges.

- 4.9 I accept there are numerous locations on the transport network where a design heavy vehicle is unable to complete a turn without entering into an opposing lane. However, the increased volume of heavy vehicles turning from the southbound off-ramp onto Tahuna Road will be a direct result of the land use activities associated with the Proposal. Acknowledging that it would be difficult to prohibit certain vehicle sizes from accessing the Site, I consider that the encroachment of heavy vehicles into the opposing lane is another example of the compromises the Applicant is seeking to have made to accommodate having the Proposal established at an unsuitable location. A simple (albeit costly) solution to this issue would be to widen the NIMT overbridge.
- 4.10 In the JWS (paragraph 7.7) Ms McMinn raised concerns regarding the “[...] significant safety risk including to cyclists because there is no extra space or shoulder on the overbridge.” Mr Inder proposes that the risk is addressed through signage to alert other road users to the potential presence of cyclists. However, Ms McMinn’s concerns were not limited to cyclists alone. In my opinion, if road safety risks could be addressed effectively through the provision of signage to warn road users of risk, we would not have any deaths on the road network. Clearly, this is not the case and I do not consider that signage alone will address the risks likely to be associated with vulnerable road users attempting to use the Interchange to cross from one side of the Expressway to the other.
- 4.11 The Applicant is proposing to create risks associated with additional design heavy vehicles using the Interchange and mitigate those risks through signage alone. I consider this is inadequate and inappropriate from a transportation engineering perspective. In my opinion, the primary practical option for addressing these risks is to provide additional width on the Interchange overbridges.

## **5 Issue 8 – Capacity Related Upgrades**

- 5.1 Further to the JWS, I agree with Ms McMinn that, based on the ITA assessment, capacity related upgrades to the Interchange are unlikely to be required. However, I also confirm my previous statement that we do not have sufficient information to draw a firm conclusion. As noted previously in this statement, I consider that outputs from the WRTM should be treated with caution. I also consider that the planning provisions should provide for reassessment of the traffic effects in terms of the need for capacity improvements being required at the Interchange, either as a direct result of the Proposal or as a direct result of

the Proposal combined with other potential land-use development at this location. I understand that the Interchange was not designed with land-use activity of the type associated with the Proposal being anticipated, therefore, some of the design shortcomings with the Interchange were anticipated to affect a relatively small number of vehicle movements. The Applicant is proposing a significant change to what was anticipated, but is not proposing significant works to address the broader implications of the rezoning.

## 6 Issue 9 – Sight Distances at the Ohinewai Interchange

6.1 On the afternoon of 29 July 2020 I visited the Ohinewai Interchange to measure sight distances from the southbound off-ramp. The results of those observations are described in Table 3 below.

**Table 3: Sight distances from southbound off-ramp**

<b>Observer position (distance back from continuity line)</b>	<b>3 m</b>	<b>5 m</b>
Sight distance to west (towards Ohinewai).	100 m	68 m
Sight distance to east (towards Site).	78 m	68 m
Distance at which vehicle on westbound approach to the ramp is lost due to vertical alignment on Tahuna Road.	305 m	310 m
Distance over which a westbound vehicle on approach to the ramp “disappears”.	227 m	242 m

6.2 I agree with Mr Inder (EIC, paragraph 9.36) that vegetation to the west of the southbound off-ramp has the potential to affect the sight distance, however, I consider that the parapet along the northern side of the Expressway overbridge is a more significant constraint to sight distance.

6.3 It was difficult to identify the precise point at which visibility to the east is lost due to the vertical alignment of Tahuna Road. However, from both the 3 m and 5 m positions I noted that sight distance to a vehicle approaching from the east was “lost” for about 230 m. While the length of lost visibility would reduce for a higher vehicle, the length described is based on a 1.25 m high design vehicle.

6.4 With regard to the sight distance to the east, I have recorded 78 m from the 3 m position while Mr Inder (EIC, paragraph 9.44) has measured a distance of 110 m, however, the methods used by Mr Inder and me are different. His measurements were between the off-ramp and the centre of the westbound lane on Tahuna Road, while mine were between the off-ramp and the position of a westbound driver on Tahuna Road.

- 6.5 Because of the slightly different lateral positions used for the “target” on Tahuna Road I expect my sight distance measurements to be slightly shorter than those identified by Mr Inder. However, I do not have an explanation for the relatively significant difference in the distances measured.
- 6.6 Mr Inder (EIC, paragraph 9.45) notes that “A sight distance of 110m aligns with an operating speed of 55km/h, for a minimum desirable reaction time of two seconds [...]”.
- 6.7 By comparison, the 78 m I identified is aligned with an approach speed of approximately 42.1 km/h for a driver reaction time of 2 seconds and approximately 44.8 km/h for a driver reaction time of 1.5 seconds<sup>28</sup>.
- 6.8 Notwithstanding that the dimensions identified by Mr Inder and me are different, the debate in relation to sight distance indicates the available sight distance is marginal for the operating speed and acceptability (or close to acceptability) of the sight distance is likely to require a compromise in the driver reaction time (that is, adopting minimum criteria) and the position from which sight distance is observed. In my opinion, this demonstrates the inadequacies associated with the sight distance.
- 6.9 The loss of sight distance from the southbound off-ramp to vehicles approaching from the east exacerbates my concerns regarding the adequacy of the sight distance from the ramp.
- 6.10 Mr Inder refers to sight distance being measured from the minimum (3 m) setback from the continuity line<sup>29</sup> and also refers to minimum driver reaction times. It appears that the adequacy of the sight distance from the southbound off-ramp (to the east in particular) is marginal at best when based on measurements from appropriate design locations. However, the Applicant proposes that both the observer position and the reaction time are taken to their minimum values (or below) in order to accommodate the Proposal.
- 6.11 The Applicant also proposes that the acceptability of the sight distances is based on the operating speed measurements they have commissioned. As a rule of thumb, design speeds are often taken as being 10 km/h above the posted speed limit. The possible future speed limit for Tahuna Road at the Interchange is 60 km/h, therefore, an adopted design speed of 70 km/h is not unrealistic. While I accept Mr Inder’s arguments in relation to factors that affect operating speeds at

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<sup>28</sup> Table 3.2, Austroads, 2017, Guide to Road Design Part 4A Unsignalised and Signalised Intersections, Austroads, Sydney, Australia.

<sup>29</sup> Figure 3.2, 2017, Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections, Austroads, Sydney, Australia.



the Interchange, I am concerned the Applicant is proposing that every factor associated with sight distance from the southbound off-ramp is compromised so the existing situation can be regarded as acceptable. In this regard, it would be useful to have clarified the westbound operating speeds on Tahuna Road to the east of the southbound off-ramp intersection given that in paragraph 4.6 of his EIC Mr Inder describes this as being 59.8 km/h, however, in paragraph 9.45 he refers to westbound operating speeds of 54 km/h and 60 km/h.

## **7 Issue 12 – Walking and Cycling Infrastructure**

- 7.1 I confirm the comments I made through the JWS (paragraph 13.2) in relation to the walking distance between the Site and the School being too long to make the journey attractive. As noted in paragraph 6.18 of this statement, that distance (2.0 km) is roughly twice as far as the average distance walked by children to school (0.93 km) and adults to work (1.2 km).
- 7.2 I also confirm my opinion (JWS, paragraph 13.9) that the proposed shared path overbridge is in the most appropriate position (if only one overbridge is to be provided). However, as noted in the JWS I consider that the Site is fundamentally in the wrong location for encouraging multimodal transport.
- 7.3 In the following paragraph of the JWS (13.10), Mr Inder noted there were no suitable alternative sites nearer Huntly. However, it is also worth noting that he did not disagree with my opinion (and that of Ms McMinn) that the Site “[...] is fundamentally in the wrong location for encouraging multi-modal transport.”.

## **8 Issue 13 – Local Trips on the Expressway**

- 8.1 As noted in the JWS (paragraph 14.3), I agree with Mr Inder that providing the northbound left turn slip lane from the old SH1 on to Ohinewai South Road will remove some vehicle movements from the Expressway. The key movements that I anticipate would be addressed are those associated with movements from Huntly to Ohinewai School to the Site. That is, after-school pick-up movements.
- 8.2 However, the slip lane will not address the fundamental issue that there will be local trips on the Expressway. As stated elsewhere in this statement, the Expressway is intended as an inter-regional arterial not a suburban arterial to provide for vehicle movements between a location such as the Site and a separate location such as Huntly. In this regard, it is important not to compare the Expressway with urban motorways such as SH1 in Auckland where the city is built around the motorway.

## **9 Issue 15 – Speed Limit Proposals**

- 9.1 Refer to paragraph 6.33 in the main body of this statement, and paragraphs 13.7 and 13.8 in Appendix B, regarding my concerns with the design speed for facilities associated with the Tahuna Road / Lumsden Road intersection.
- 9.2 In paragraph 16.7 of the JWS, Ms McMinn notes that the distance between the Tahuna Road / Lumsden Road roundabout is “constrained”, but that “It may be acceptable to depart from design guidelines [...]”.
- 9.3 It is not unusual for there to be compromises to design guidelines to address “one-off” type situations where the cost associated with achieving strict alignment with design guidelines is out of proportion with the benefits of meeting those design guidelines. However, this is another example of the manner in which the Applicant is seeking to compromise best practice in terms of the transportation provisions for the Proposal.
- 9.4 In paragraphs 13.3 to 13.5 in Appendix B of this statement I have commented on the preliminary design safety audit that was undertaken in relation to the distance from the Tahuna Road / Lumsden Road roundabout and the NIMT overbridge.

## **10 Issue 17 – Lumsden Road Realignment**

- 10.1 As noted in the JWS and in this statement, I consider it important that planning provisions are included in the rezoning to protect sightlines at the Lumsden Road / Balemi Road intersection.
- 10.2 In my summary statement for the joint witness conferencing (Swears, paragraph 5.50) I provided information regarding the shortcomings associated with the rail siding. However, the Applicant has correspondence from KiwiRail confirming the acceptability of the level crossing and (I understand) specialist railway designers have provided input to the design for the siding. Notwithstanding that, I acknowledge the modelling completed for the Applicant has assumed there will not be any rail traffic, which presents a conservative outcome in the event the rail siding is established. However, if the rail siding is not an integral part of the Proposal, the question arises as to whether the Proposal should be located on the Site given that it could be sited at a more suitable location where the effects on the transport network would be less.

## **11 Issue 18 – Triggers for Transportation Infrastructure Upgrades**

- 11.1 From a transport engineering perspective, the appropriateness of any triggers for identifying transportation infrastructure upgrades is not a function of the scale of development but rather a function of the scale of vehicle movements. While I accept Mr Inder's view (JWS, paragraph 19.6) concerning the difficulty of using traffic volumes as triggers, I consider that traffic related parameters (such as volumes, queuing, delay, etc) are a better effects-based trigger mechanism than land-use development. Accepting that traffic related parameters are not as easy to determine as land area development, it may be appropriate for the planning provisions to allow for staged development based on land area subject to demonstration that the mitigated traffic effects will fall within acceptable bounds.
- 11.2 Notwithstanding that land-use development is easier to monitor than traffic volumes, queuing, delay, and / or adverse road safety effects, I consider it desirable for traffic effects to be the triggers for any transport upgrades.
- 11.3 As noted elsewhere in this statement, I have concerns regarding the proposed left turn in / left turn out facility at Intersection 1 on Tahuna Road.

## **12 Issue 20 – Proposed Intersection / Accesses**

- 12.1 The JWS describes the alternative views expressed in relation to proposed intersections and accesses for the Site, however, the only things on which there was agreement are the following:
- a “[...] Service Centre accesses [need] to be assessed and confirmed at resource consent stage.” (JWS, paragraph 21.4).
  - b “[...] if plan provisions require the road intersections to be provided in general accordance with the Structure plan, [...] the detail can be determined at later resource consent stage [...]” (JWS, paragraph 21.10).
  - c “[...] vehicle crossings for direct vehicle movements between properties and Lumsden Road should be assessed [...] at resource consent stage.” (JWS, paragraph 21.10).
  - d “[...] vehicle crossings for direct vehicle movements between Tahuna Road and private properties should not be allowed apart from the Service Centre one, which is to be assessed on its merits [...]” (JWS, paragraph 21.10).
- 12.2 In my opinion, the conclusions described in the JWS demonstrate that access could be provided on Tahuna Road, however, as noted in this statement I

consider there are fundamental shortcomings with the access provisions illustrated in the drawings provided by the Applicant. While the Structure Plan provisions could include reference to those diagrams, my concern is that those reviewing the provisions in the future may not understand the basis behind the limitations with those access provisions that have been identified through this rezoning process.

- 12.3 I consider there are several transportation related issues that indicate the Site is not suitable for the Proposal. However, if the rezoning proceeds I consider it preferable that either more analysis is undertaken at this stage and agreement reached regarding the access provisions for the Proposal or less detail is provided in the Structure Plan so that the specifics of intersection location and configuration are analysed afresh at resource consent stage.

### **13 Issue 21 – Proposed Mitigation for Tahuna Road / Lumsden Road Roundabout**

- 13.1 Notwithstanding my previous comments regarding the caution that should be applied to mitigation determined as being necessary (or as unnecessary) based on outputs from the WRTM, I confirm the view I expressed in the JWS (paragraph 22.1) that the distance between the proposed location of the Tahuna Road / Lumsden Road roundabout and the NIMT overbridge is inadequate.
- 13.2 In my summary statement<sup>30</sup> (Swears, paragraphs 6.20 to 6.25) I discussed Austroads<sup>31</sup> design guidance in relation to merging two lanes exiting a roundabout into a single lane. As noted in that statement, the ITA illustrates two southbound lanes on Lumsden Road to accommodate right turn movements onto Tahuna Road. Those lanes exit westbound onto Tahuna Road for travel towards the Interchange. The diagrams provided by the Applicant indicate the full length of the two westbound lanes will be 52 m followed by a 56 m taper.
- 13.3 Mr Inder (EIC, paragraphs 9.58 - 9.65) refers to the Road Safety Audit (RSA) conducted by Campbell and Constable that specifically considered the design of the Tahuna Road / Lumsden Road roundabout. As noted by Mr Inder, they identified two moderate concern items, one minor concern, and three comments in relation to the design of the roundabout.

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<sup>30</sup> Summary Statement Robert Swears - Transport Engineering in Preparation for Expert Conferencing, 17 June 2020.

<sup>31</sup> Page 17, Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Austroads, Sydney, Australia.

- 13.4 I note the following (inter alia) from Section 2.4 of the RSA<sup>32</sup>:
- a Tahuna Road has a slight uphill gradient towards the west.
  - b “The Austroads acceleration lane distance for a 60 km/hr speed environment is 125m, adjusted upward by a factor of 30% for an uphill gradient of 3-4% [...]”.
  - c The safety audit team (SAT) considers the proposed merge length is satisfactory.
  - d Estimated speed of vehicles turning right from Lumsden Road into Tahuna Road is “[...] no greater than 30 - 40 km/hr as they depart the circulating lanes of the roundabout.”
  - e “Lane markings are shown for some 30m west of the roundabout which leaves over 70 m of unmarked roadway to merge and is considered acceptable for the situation.”
  - f The SAT does not consider the westbound merge layout will present any safety issues of significance.
- 13.5 I agree with the conclusions of the SAT regarding the need to protect the embankment along the southern side of Tahuna Road that slopes away from the carriageway. In this regard, the designer (BBO) accepts that a barrier will need to be provided from near the Tahuna Road / Lumsden Road roundabout through to the NIMT rail overbridge.
- 13.6 As noted in my summary statement with regard to merging two lane exits from a roundabout down to one lane, Austroads<sup>33</sup> states “It is desirable that the two lanes extend from the exit a distance equivalent to six seconds of travel time (absolute minimum of four seconds), followed by a merge length based on 0.6 m/s lateral shift. It is also desirable that a run out (e.g. a shoulder) area be provided as an escape path in the event of potential conflict between merging vehicles.”
- 13.7 While there is presently some uncertainty regarding the intended speed limit and design speed for the Tahuna Road / Lumsden Road roundabout, the table below describes the length required to accommodate four seconds (absolute minimum)

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<sup>32</sup> Tahuna Road / Lumsden Road Proposed Intersection Upgrade, Ohinewai: Road Safety Audit - Preliminary Design Stage, Traffessionals Limited, 3 July 2020

<sup>33</sup> Page 17, Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Austroads, Sydney, Australia.

and six seconds (desirable minimum) of travel time and an adequate length over which a 3.5 m wide lane can be merged into another lane.

**Table 4: Length required for merge of two lanes on exit from Tahuna / Lumsden roundabout**

Design speed	Two lane length (m)		Merge length (m)	Total length (m)	
	Desirable	Minimum		Desirable	Minimum
40 km/h	67	44	65	131	109
50 km/h	83	56	81	164	137
60 km/h	100	67	97	197	164
70 km/h	117	78	113	230	191
80 km/h	133	89	130	263	219

13.8 The distance from the eastern end of the design splitter island on the Tahuna Road exit from the roundabout to the eastern abutment of the NIMT railway overbridge is about 120 m. Noting that it would not be good practice to have the single lane portion commencing at the abutment of the bridge, it appears there is insufficient length between the roundabout and the bridge to allow for a two-lane westbound exit from the Tahuna Road / Lumsden Road roundabout. The green value in Table 4 above illustrates the absolute minimum distance required for a 40 km/h design speed is less than the 120 m available; the red values in the table illustrate the required distances that are greater than the 120 m available. However, none of these dimensions allow for a run out area as recommended by Austroads.

13.9 With regard to the conclusions of the SAT, several questions arise:

- a Reference is made to an acceleration lane length, however, neither of the two westbound lanes that are intended to merge into a single lane is an acceleration lane.
- b The SAT focus appears to be on two right turning vehicles merging while travelling at similar speeds, however, the roundabout design allows a westbound through vehicle on Tahuna Road to use the left hand lane and a right turning vehicle from Lumsden Road to use the right-hand lane. Therefore, even if the speed of two right turning vehicles at the commencement of the merge is 30-40 km/h, as suggested by the SAT, that does not represent one of the likely scenarios involving right turning traffic and through traffic merging to the west of the roundabout.
- c While the hazard associated with the unprotected embankment on the southern side of Tahuna Road has been identified by the SAT, they do not

appear to have considered the Austroads<sup>34</sup> requirement for a run out area to be provided as an escape path in the event of potential conflict between merging vehicles.

- 13.10 Essentially, there is not enough distance between the Tahuna Road / Lumsden Road roundabout and the NIMT overbridge to accommodate a suitably designed roundabout. There are two potential solutions to this; either reposition the roundabout further to the east or widen the NIMT overbridge to accommodate an adequate merge with a run out area.
- 13.11 Another matter that arises in relation to the RSA is that the SAT does not appear to have considered the diameter of the central island of the roundabout. The Applicant's drawings indicate that the diameter of the central island will be 24 m, however, Austroads<sup>35</sup> indicates that for a 60 km/h desired driver speed on the fastest leg prior to the roundabout, the minimum radius for a two lane roundabout is 14 m and the desirable minimum is 16 m. That is, the central island of the Tahuna Road / Lumsden Road roundabout should have a desirable minimum diameter of 32 m, rather than 24 m as proposed by the Applicant.
- 13.12 Austroads<sup>36</sup> notes that "The desirable central island radius provides an optimum safety outcome, [...]".
- 13.13 Acknowledging that the Applicant may argue the proposed speed platform on the eastern leg of the Tahuna / Lumsden intersection will reduce westbound vehicle speeds, it needs to be kept in mind that there is no certainty regarding the speed platform. Therefore, there is no certainty that approach speeds will be reduced to the extent that a presently inadequate preliminary design roundabout will provide a suitable solution at the intersection.
- 13.14 In relation to removing the DFO from the Proposal, the Applicant concludes<sup>37</sup> that the Tahuna / Lumsden roundabout "[...] will not require upgrading to increase its capacity as concluded in the May 2020 ITA report." [emphasis in original]. However, that conclusion is based on uncertain trip generation values for the Sleepyhead Factory and the general industrial area. The conclusion also does not consider the implications of other potential land use development that may result in a capacity upgrade being required.

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<sup>34</sup> Page 17, Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Austroads, Sydney, Australia.

<sup>35</sup> Table 4.1, Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Austroads, Sydney, Australia.

<sup>36</sup> Page 17, Austroads, 2015, Guide to Road Design Part 4B: Roundabouts, Austroads, Sydney, Australia.

<sup>37</sup> Transportation-related implications of removing the Discount Factory Outlet (DFO) from the Ohinewai Structure Plan area, memo from Cameron Inder / Rhulani Baloyi (Bloxxham Burnett and Olliver (BBO)) to Waikato District Council and Ohinewai rezoning parties, 7 August 2020, page 8

13.15 In my opinion, the rezoning is partially reliant on having design criteria for the Tahuna Road / Lumsden Road roundabout compromised to accommodate the shortcomings associated with this component of the Proposal.

**14 Issue 22 – Implications of the Development of Ohinewai Lands Limited Land Zoning**

14.1 I confirm my opinion (JWS, paragraph 23.2) that the Proposal (and associated mitigation) does not adequately allow for the adverse effects and incremental mitigation likely to be required if the OLL and Shand developments proceed.

14.2 I accept there is no certainty in relation to OLL or Shand, I also accept that the Applicant cannot reasonably be expected to know the scale and timing of other potential developments. However, the matter being considered is rezoning of the Site as opposed to resource consent for activities on the Site. Therefore, I consider the decision-making associated with the Proposal should allow for its effects and associated mitigation to be assessed within the context of the bigger picture that incorporates OLL, Shand, and / or other developments of a similar character proposed for the area.

14.3 Notwithstanding my view that from a transportation perspective the Proposal is inappropriately located, I consider that if the Commissioners decide to approve the rezoning it would be desirable for the Commissioners to consider the implications of wider growth in this area (noting this is indicated in Waikato 2070) to ensure there is a clear plan to define the infrastructure upgrades likely to be required to allow the other growth to take place.

14.4 As noted in this statement, I consider there are various shortcomings associated with the Proposal and the mitigation for the adverse effects. Those shortcomings will be exacerbated if further urban growth and other forms of land use intensification occur in the vicinity. The Applicant has identified various mitigation measures, however, the Applicant is not proposing to undertake some of the higher cost mitigation (for example, widening the Interchange bridges) that may be required if OLL and / or Shand develop in the vicinity. My concern is that the incremental adverse effects associated with OLL and Shand may be such that it is difficult to argue those incremental adverse effects are commensurate with the scale of mitigation that would be required to address those effects. Therefore, I am concerned that if the rezoning proposal is accepted, the long-term result will be unmitigated adverse effects. As pointed out by Ms Loynes, these concerns highlight the benefits of undertaking a strategic assessment of growth areas and integrating that growth with the provision of transportation infrastructure.



## 15 Issue 23 – Implications of the Shand Properties Limited Land Zoning

- 15.1 Further to my concerns regarding unmitigated adverse effects (as described in Section 14 in Appendix B of this statement), I am concerned that land-use development in the north-western quadrant of Ohinewai may result in vulnerable road user movements across the Expressway at grade.
- 15.2 The Applicant proposes a grade separated vulnerable road user crossing of the Expressway and the NIMT approximately 350 m to the south of the Interchange. However, I consider that if the Proposal proceeds and residential related land-use development occurs in the north-western quadrant, there will be trip attraction between the eastern and western sides of the Expressway. In my opinion, many of those trips will be undertaken by motor vehicle, however, I am concerned that pedestrians will endeavour to cross the Expressway at grade to move between the (potential) Shand site (north-western quadrant) and the Applicant's site.
- 15.3 Pedestrians that do not use the shared path overbridge would have the choice of either using the Interchange bridges or crossing the Expressway at grade. While neither route is suitable for pedestrians, I consider it likely that these unsuitable routes would be used in preference to the proposed shared path overbridge route. As an example, the journey across the Expressway from the approximate centroid of the Shand Properties site to Lumsden Road (approximately midway between Balemi Road and Tahuna Road) is 0.72 km (as illustrated in Figure 7 below). The route via the Interchange is approximately 2 km, while the route via the shared path overbridge is approximately 2.7 km.



Figure 7: Potential pedestrian route from Shand Properties site to Ambury site<sup>38</sup>

<sup>38</sup> Image source: Google Earth and Maxar Technologies, accessed from Google Earth 3 June 2020.

- 15.4 Although the Shand site could be configured to make at grade crossings of the Expressway less attractive, pedestrians will tend to find the route they regard as suitable. Figure 8 below provides an example of pedestrians identifying the route they regard as suitable compared with the route “designed” to meet their needs.
- 15.5 Therefore, I recommend that appropriate mitigation measures are put in place through the planning provisions to strongly discourage pedestrian movements across the Expressway at grade. While I also consider it desirable for active mode journeys across the Interchange overbridges to be strongly discouraged, it appears unlikely this could be achieved through planning provisions.



Figure 8: Design route for pedestrians compared with desire line route (User experience) for pedestrians<sup>39</sup>

## 16 Issue 25 – Adequacy of the On and Off-Ramp Lane Lengths at the Interchange

- 16.1 Waka Kotahi has established a speed limit of 110 km/h for the Cambridge Section of the Waikato Expressway. Waka Kotahi has also commissioned reports to describe analysis for the suitability of other sections of motorway and Expressway for the establishment of a 110 km/h speed limit. I was a co-author of those reports.
- 16.2 Acknowledging that the Ohinewai Section of the Expressway presently has a 100 km/h speed limit, the length of highway has been identified<sup>40</sup> as suitable for a 110 km/h speed limit, subject to various relatively minor works being carried out.

<sup>39</sup> Image source - <https://99percentinvisible.org/article/least-resistance-desire-paths-can-lead-better-design/>, accessed on 6 June 2020

<sup>40</sup> Tranche 1, Assessment of Motorways and Expressways for 110 km/h Speed Limit, Opus International Consultants (now WSP), Hamilton, 2016.

Therefore, I consider that transportation engineering analysis of the Proposal needs to take into account the likelihood that the Ohinewai Section will have a 110 km/h speed limit in the future.

- 16.3 The Proposal is being considered at a time when a 110 km/h speed limit may be established on the Expressway. However, at the time the Interchange was designed neither the Proposal nor 110 km/h speed limits were likely to have been considered by the designers. Therefore, I consider that evaluation of the Proposal should take account of any shortcomings with ramp lengths, based on 2020 criteria, rather than criteria and assumptions that were regarded as acceptable at the time of design of the Interchange (about 20 years ago).
- 16.4 To consider the adequacy of the ramps at the Interchange, we need to first determine the nature of the Interchange.
- 16.5 Austroads<sup>41</sup> refers to “system interchanges” and “service interchanges”; in that regard, the Interchange is a service interchange. This means it is an interchange between a major road (the Expressway) and a road of lesser importance (Tahuna Road). It is important to clarify the difference because this influences the factors to be considered in relation to the design of the Interchange.
- 16.6 While the Interchange is in a rural location, it does not have a spread diamond configuration, which is usual in rural areas, but instead has a closed diamond configuration, which is more usually associated with urban locations. Therefore, the Interchange contains elements not normally associated with a rural interchange.
- 16.7 From an acceleration perspective, Austroads<sup>42</sup> notes “[...] it is preferable that the alignment and length of the on-ramp is sufficient to enable cars to be travelling at the design speed of the through road when they are at the nose [of the ramp...]”.
- 16.8 Austroads<sup>43</sup> also notes “At all interchanges on high-speed roads (operating speed > 80 km/h) it is good practice to provide an auxiliary lane to enable entering traffic to travel parallel to and at the same operating speed as the through carriageway whilst searching for a gap in the adjacent lane.” The operating speed of the Expressway is likely to be greater than 80 km/h at present and I anticipate the 85<sup>th</sup> percentile operating speed will increase if / when the speed limit on the Ohinewai Section is increased to 110 km/h.

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<sup>41</sup> Section 8.3, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

<sup>42</sup> Section 11.3.3, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

<sup>43</sup> Section 11.3.1, Austroads, 2015, Guide to Road Design Part 4C: Interchanges, Austroads, Sydney, Australia.

16.9 Rather than entering a protracted discussion regarding the design of entry and exit ramps, I have included in Table 5 below<sup>44</sup> a comparison of some relatively recently constructed entry and exit ramps with the ramps at the Interchange. While I acknowledge that the approach is simplistic, it provides an indication of current (or recent) ramp design considerations.

**Table 5: Length and gradient of interchange ramps**

<b>Interchange</b>	<b>Ramp</b>	<b>Length (m)</b>	<b>Slope (%)</b>
Cambridge (Victoria Road)	Entry ramp (increasing) <sup>45</sup>	415	0.4
	Entry ramp (decreasing)	425	0
	Exit ramp (increasing)	385	0
	Exit ramp (decreasing)	378	-0.5
Tamahere	Entry ramp (increasing)	350	4.7
	Entry ramp (decreasing)	244	3.4
	Exit ramp (increasing)	352	-2.9
	Exit ramp (decreasing)	175	-3.2
Taupiri	Entry ramp (increasing)	343	Downhill
	Entry ramp (decreasing)	407	-3.9
	Exit ramp (increasing)	346	4.6
	Exit ramp (decreasing)	238	3.7
Ohinewai	Entry ramp (increasing)	325	-3
	Entry ramp (decreasing)	292	0
	Exit ramp (increasing)	378	0
	Exit ramp (decreasing)	364	4
Te Kauwhata	Entry ramp (increasing)	521	Downhill
	Entry ramp (decreasing)	599	Uphill
	Exit ramp (increasing)	501	Uphill
	Exit ramp (decreasing)	492	Uphill
Hampton Downs	Entry ramp (increasing)	237	0
	Entry ramp (decreasing)	260	-5.9
	Exit ramp (increasing)	341	1.4
	Exit ramp (decreasing)	328	4.9

16.10 The gradient information in Table 5 above has been determined from a midpoint along each ramp, however, in some cases it was not practicable to obtain gradient information and in those cases the relative slope of the gradient is described. Length values highlighted in green represent ramp lengths greater than those at Ohinewai, while those in red highlight ramp lengths shorter than those at Ohinewai.

16.11 In general the shorter ramps are located on older interchanges. The obvious exception to this is the exit ramps at Taupiri, however, these ramps also have relatively steep positive gradients which assists with vehicle deceleration.

<sup>44</sup> The information in the table was prepared by Leon Piedade, a graduate road safety engineer (WSP, Auckland)

<sup>45</sup> For simplicity, I have referred to "increasing" and "decreasing" travel directions. These are nominally northbound and southbound respectively, however, that does not apply in every case. Notwithstanding that, the labels provided for the travel direction does not have a significant effect on the conclusions drawn from the data.

- 16.12 My conclusion is that there is nothing particularly remarkable about the Ohinewai ramps compared with other Waikato Expressway interchange ramps.
- 16.13 Mr Inder states (EIC, paragraph 9.7) that for the southbound (increasing direction) off-ramp the “[...] length is 312m from the stop line to the nose of the gore area of the ramp.”, whereas the length described in Table 5 above is 378 m. It appears Mr Inder has measured from the solid island on the off-ramp whereas my measurements are from the painted markings at which the full width of the off-ramp is developed. Therefore, there is conservatism in Mr Inder’s measurement.
- 16.14 The maximum queue length described by Mr Inder (Table 2) for the southbound off-ramp is 76.6 m. Based on his 185 m deceleration distance for cars on a level grade (EIC, paragraph 9.7), with which I agree, there is adequate length on the ramp for deceleration by cars.
- 16.15 Austroads<sup>46</sup> notes that it is generally accepted that deceleration for trucks commences in the through lane. However, Austroads states that “[...] consideration should be given to providing a longer deceleration lane in situations where there is a high volume of trucks turning.” Given the nature of the Proposal, it may be necessary at resource consent stage to review the adequacy of the southbound off-ramp, however, at this stage the length appears to be adequate.

## **17 Issue 26 – Interchange Spacing**

- 17.1 Refer to Section 14 of this statement for my discussion in relation to the spacing between the Ohinewai Interchange and the Huntly Northern Interchange.

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<sup>46</sup> Section 5.2, Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections, 2017, Austroads, Sydney, Australia.