IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of a submission in respect of the **PROPOSED WAIKATO DISTRICT PLAN** by **AMBURY PROPERTIES LIMITED** pursuant to Clause 6 of Schedule 1 of the Act seeking the rezoning of land at Ohinewai

STATEMENT OF EVIDENCE OF CAMERON BESWICK INDER

1. INTRODUCTION

1.1 My name is Cameron Beswick Inder. I am a transportation engineer and the Transportation Engineering Manager at Bloxam Burnett & Olliver ("BBO"), a firm of consulting engineers, planners and surveyors based in Hamilton. I have been employed by BBO since 2004.

Qualifications and experience

1.2 I hold a Bachelor of Engineering (Honours) degree in Civil Engineering from the University of Auckland (1999). I am a Member of Engineering New Zealand (MEngNZ), a Chartered Professional Engineer (CPEng) and a member of the Engineering NZ Transportation Group.

1.3 I have 20 years' experience in the field of transportation and traffic engineering gained through 16 years of employment in New Zealand and approximately four years employment in the United Kingdom.

1.4 I have experience in transportation and traffic engineering matters associated with resource management, including effects assessment for resource consents, plan changes and structure plans. I also have experience in the design of traffic infrastructure and facilities, road safety engineering, traffic calming, urban design, subdivision design, and traffic modelling.

1.5 I have appeared as expert witness on numerous occasions, the most relevant to this proposal being:

(a) Rings Scenic Tours for a private plan change to the Matamata Piako District Plan (Hobbiton, 2019);

(b) Waikato Regional Airport Limited for a private plan change to the Waipa District Plan (Hamilton Airport, 2018);

(c) Waikato Kindergarten Association for a resource consent application to operate a childcare facility for 120 children (Hamilton, 2018).

(d) Otorohanga District Council at the Board of Inquiry in relation to an alteration to designation for Waikeria Prison expansion (2017)

Involvement in the Ohinewai project

1.6 I was engaged by Ambury Properties Limited ("APL") in 2019 to provide traffic engineering related input and advice in relation to its submission on the Proposed District Plan ("PDP") for the rezoning of approximately 178ha of land located at 52-58 Lumsden Road, 88 Lumsden Road and 231 Tahuna Road, Ohinewai ("Site") from the current rural zoning to a mix of industrial, business and residential zoning.

1.7 I was involved in the development of the rezoning proposal from the development of the first draft Masterplan and Structure Plan. I have visited the Site on numerous occasions in relation to the transportation aspects of the proposal. My first visit was conducted on 29 August 2018.

1.8 Since then, I have managed the preparation of the Integrated Transport Assessment reports ("ITA"), overseeing and reviewing the work of my colleague Ms Rhulani Baloyi as she progressed with the traffic investigations, data collection and analysis work.

1.9 The first draft ITA report was provided to Waikato District Council ("WDC") on 6 December 2019 (attached as Attachment L to the Assessment of Environmental Effects Report and section 32AA Evaluation dated December 2019). Revision 1 was provided to WDC in May 2020 (dated 20 May 2020). The final ITA report will be provided to the Hearings Panel prior to the hearing in September 2020, once further discussions with representatives of WDC, Waikato Regional Council ("WRC") and New Zealand Transport Agency ("NZTA") in relation to traffic and transportation matters are concluded. The matters for further discussion are discussed in the joint witness statement ("JWS") and in the relevant sections of my evidence.

1.10 My role also included consultation on transportation matters with representatives of WDC, WRC and NZTA. This included appearing as

atechnical expert during expert conferencing in respect of the Ohinewai Rezoning held on 22 and 23 June 2020 in relation to traffic and transportation matters.

1.11 I have also:

(a) Reviewed the Initial Transport Assessment Review (dated 9 March 2020) for WDC by Ms Naomi McMinn of Gray Matter Ltd and have reviewed the submissions on the application that raise concern relating to my area of expertise.

(b) Participated in the expert witness conferencing for transportation matters, on 22 and 23 June 2020, and signed the resulting JWS dated 26 June 2020.

(c) Provided advice to APL and prepared technical information to support subsequent resource consent applications relating to the rezoning proposal. (i.e. Earthworks Consent and Stage 1 Sleepy Head Factory Consent applications ("Stage 1")).

1.12 I have visited the Site and inspected the surrounding road network on several occasions, most recently on Thursday, 30th January 2020.

Purpose and scope of evidence

1.13 The purpose of my evidence is to provide an overview of the transport characteristics of the rezoning proposal, the potential effects of the proposal on the transport environment, the mitigation measures that I recommend to address potential adverse effects and the other measures proposed to ensure a safe and efficient transportation network for pedestrians, cyclists, motorists and public transport.

1.14 This evidence provides a summary of the ITA report and conclusions reached, and whether I consider that those conclusions remain valid in light of the outcomes from the JWS, the s42A Report and submissions that have been received in relation to transportation matters.

1.15 Specifically, my evidence will:

(a) Provide a brief summary of the proposal (Section 3);

(b) Provide a summary of the existing and consented traffic environment on the surrounding transport network (Section 4);

(c) Provide an overview of the transport infrastructure investments that are included to support and provide mitigation of effects of the proposed rezoning (Section 5);

(d) Provide an overview of the predicted traffic generation as a result of the proposed rezoning (Section 6);

(e) Provide a summary of the recommended upgrades to the existing transport network to mitigate the potential traffic effects of the proposed rezoning (Section 7);

(f) Provide an overview of consultation undertaken with key stakeholders (Section 8);

(g) Discuss the impact of other rezoning submissions within the Ohinewai area on the provision of transport infrastructure required for the rezoning proposal (Section 9);

(h) Address the issues of disagreement in the JWS between the transportation engineering experts, dated 26 June 2020. (Section 10);

(i) Comment on issues raised by submitters relevant to my area of expertise (Section 11);

(j) Comment on the Council Officer's Report and proposed amendments to plan provisions (Section 12);

(k) Provide a brief conclusion (Section 13).

1.16 A summary of my evidence is contained in Section 2.

1.17 My evidence should be read in the context of the evidence of Jonathan Broekhuysen, who provides an overview of the Sleepyhead Estate masterplan ("Masterplan") and Ohinewai Structure Plan ("OSP"), including the design philosophy behind the internal transport connections and layout adopted for the site. The Masterplan information provided the basis for the land use extents and activities used to assess the transportation effects of the rezoning.

Expert Witness Code of Conduct

1.18 I have read the Code of Conduct for Expert Witnesses, contained in the Environment Court Consolidated Practice Note (2014) and I agree to comply with it. I can confirm that the issues addressed in this statement are within

my area of expertise and that in preparing my evidence I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

2. SUMMARY OF MY EVIDENCE

Background to the rezoning proposal

2.1 APL seeks to change the zoning of approximately 178ha of land located in Ohinewai from the current rural zoning to a mix of industrial, business and residential zoning. This is predicted to employ approximately 2,600 people and accommodate up to 1,100 households when completed.

2.2 The site is located east of the State Highway 1 Waikato Expressway ("Expressway"), between Balemi Road, Lumsden Road and Tahuna Road and adjacent to the North Island Main Trunk Railway (NIMT). Traffic will access the Site primarily from State Highway 1 through the existing grade separated interchange at Ohinewai ("Interchange"). The Interchange is a "full diamond" layout with north and south facing on- and off-ramps to the Expressway. Traffic volumes are very low for this style and size of intersection, with 920 vehicle per day ("vpd") and 15% heavy commercial vehicles ("HCV") on the southbound off-ramp and 445 vpd with 9% HCV on the northbound off-ramp. Sightlines are constrained from the southbound off-ramp due to bridge parapets on the Expressway overbridge and adjacent railway overbridge.

2.3 Balemi Road, Lumsden Road and Tahuna Road are all presently rural district roads. Balemi Road is an unsealed no exit road providing access to a farm. Lumsden Road is a no exit road, carrying approximately 555 vpd and 16% HCV. Tahuna Road is a district arterial road with 2,250 vpd and 16% HCV in 2019. A roundabout exists at the intersection of Lumsden Road and Tahuna Road.

2.4 Existing public transport provision consists of two services, each with very limited frequency per day (i.e. morning and night only, five days per week). Walking and cycling infrastructure is non-existent on the Interchange and the district roads.

Proposed rezoning trip generation predictions

2.5 The proposed land use zoning includes a mix of industrial, business and residential activities. The industrial area includes general industrial and manufacturing to accommodate the proposed new 100,000m^2 The Comfort Group Ltd ("TCG") factory. A new rail siding is proposed to connect to the

existing NIMT railway located between Lumsden Road and the Expressway. KiwiRail are supportive of the new rail siding and necessary new level-crossing on Lumsden Road.

2.6 The overall predicted trip generation of the completed APL development has been modelled using the Waikato Regional Transportation Model ("WRTM") and separate SIDRA intersection models. The WRTM predicts 75-80% of total trip generation will be external to the Site, with peak hour trip totals of 1,420 and 2,190 during the AM and PM peak hours respectively. The WRTM predicts the split of external traffic to be approximately 40% north and 60% south, which reflects the attraction due to the size and relatively close distances of Huntly and Hamilton over Auckland. The WRTM trip volumes are assumed to be all traffic related trips as there is no rail, public transport or walking and cycling components in the model. This creates a somewhat conservative prediction of the traffic volumes on the network.

Proposed key transport infrastructure

2.7 The following key transport infrastructure components are proposed to facilitate transport amenity for the rezoning proposal:

(a) Rail siding – The new rail siding connection to the NIMT, including a localised realignment of Lumsden Road for safety at the level crossing, will enable significant volumes of freight to be transported to and from the Site without generating traffic trips on the adjacent road network. APL predicts that the rail siding will remove approximately 10 HCV trips per day for the TCG factory, and that figure will increase with rail use by other industrial activities.

(b) Four new access intersections are proposed for the Site, two on Tahuna Road and two on Lumsden Road together with associated speed limit reductions to 60km/h from the existing 100km/h, in line with the safe and appropriate speed for the road type.

(c) The internal road network consists of different road cross-sections for the industrial, business and the residential precincts. Speed management, safety and ensuring the appropriate use (whether it is predominantly access or movement based) is at the core of the network layout and cross-section designs. For example, Residential Street 3 (or "Road Type 6" in the OSP) is narrower at 16m reserve width and a 5.5m traffic width, than both the operative Waikato District Plan ("ODP") and the PDP allow for, but it is consistent with

NZS 4404:2010 standards and intention to control vehicle speeds to no greater than 30km/h.

(d) A high level of amenity is provided for walking and cycling with on and off-road paths internally throughout the Site connecting the residential and employment areas. Additionally, a new separate shared path bridge over the NIMT and Expressway is proposed to safely connect the community to Ohinewai Primary School and to Huntly. Safe walking and cycling paths cannot feasibly be added to the existing Interchange or rail overbridge.

Recommended transportation infrastructure improvements to support the rezoning

2.8 The overall transportation effects of the APL rezoning on the adjoining road network are likely to be moderate to significant without any transport mitigation measures, due to the limited infrastructure that exists. However, with the following recommended infrastructure upgrades relating to capacity, safety, connectivity and accessibility for all anticipated vehicle and active travel modes, I consider that the transportation effects of the rezoning will be sufficiently mitigated to an acceptable level, which is generally no more than minor.

2.9 The following are the recommended infrastructure upgrades and triggers for staged implementation as development occurs:

(a) Tahuna Road:

(i) Reduction to 60km/h posted speed limit from Ohinewai South Road to east of Access 1, then 80km/h from this point to the eastern extent of the development in line with the identified safe and appropriate speed for the rural section of Tahuna Road. It is also recommended that WDC investigates reducing the speed limit of Tahuna Road east of the Site to 80km/h.

(ii) Tahuna Road should be upgraded in general accordance with the semi-urban Cross Sections A-A, B-B and C-C in Appendix B, and Figure 17 of the ITA.

(iii) Provision of a 2.5m wide shared walking and cycling path with street lighting should be provided along the northern berm of Tahuna Road, from Lumsden Road to a point approximately

150m east of Access 1, to connect to the path into the Site adjacent to the business zone.

(iv) The timing of these upgrades corresponds to Stages 2A, 2C and 2D in the staging plan (Table 31 of the ITA).

(b) Lumsden Road:

(i) Reduction to 60km/h from the existing 100km/h speed limit, from Tahuna Road to 280m north of Balemi Road. In line with the identified safe and appropriate speed for Lumsden Road. It is also recommended that WDC investigates reducing the speed limit along the "rural" section of the road to 80km/h.

(ii) Lumsden Road should be upgraded in general accordance with the semi-urban Cross Sections D-D, E-E and F-F in Appendix B, and Figure 17 of the ITA.

(iii) Provision of a 2.5m wide shared walking and cycling path with street lighting should be provided along the eastern berm of Lumsden Road, from Tahuna Road to Access 4.

(iv) Timing of this upgrade corresponds to Subdivision Stage 2B (Table 31 of the ITA, first stage of industrial subdivision).

(c) Balemi Road

(i) Reduction to 60km/h from the existing 100km/h speed limit (over full length) in line with the identified safe and appropriate speed.

(ii) Upgrade to semi-urban design in general accordance with Cross Sections G-G, in Appendix B and Figure 17, to the easternmost access of the Site.

(iii) Timing of this upgrade corresponds to Factory Stage F3 plus the construction of the proposed rail siding (Table 31 of the ITA report).

(d) Lumsden Road Rail Crossing:

(i) Localised road alignment changes to Lumsden Road in general accordance with Drawings 145860-06-1200-B to 145860-06-1203-B in Appendix B of the ITA, and subject to

design stage road safety audit and KiwiRail safety and operations audits.

(ii) In addition, warning signs, bells and flashing lights in accordance with KiwiRail level crossing design requirements. The installation of barrier arms is to be confirmed at detail design stage.

(iii) The timing of these upgrade works corresponds with installation of the rail siding and level crossing construction works.

(e) Ohinewai Interchange Safety Improvements (these works are to be part of Stage 1 development on site):

(i) Remove all vegetation that is obstructing sight lines at the top of the southbound off-ramp.

(ii) Relocate the Stop Line on the southbound off-ramp 0.5 m towards the edge line on Tahuna Road.

(iii) Install static cyclist warning signs on the approaches to the Expressway and Rail overbridges on Tahuna Road, and the off ramps of the interchange.

(iv) Install an electronic flashing cycle warning sign (solar powered) at the southbound off-ramp intersection with Tahuna Road, with activation by appropriate detector systems when cyclists are present at the top of the off-ramp or cycling over either of the overbridges.

(f) Local Road Intersection Upgrades and Access to the Site:

(i) Tahuna Road and Lumsden Road intersection capacity improvement in general accordance with Drawing 145860-08-0219-C in Appendix B of the ITA report.

(ii) The timing of this upgrade is likely to correspond to completion and operation of Stage 5 as set out in Table 31 of the ITA, but should be confirmed by an ITA by a suitable qualified traffic engineer before detailed design or construction is commenced.

(iii) Balemi Road and Lumsden Road intersection upgrade in accordance with Drawing 145860-06-1200-B to 145860-06-1203-B in Appendix B of the ITA.

(iv) The rural intersection should be formed in line with the requirements set out in the District Plan and the Regional Infrastructure Technical Specifications ("RITS").

(v) This upgrade will be triggered by the construction of the proposed rail siding.

(vi) A new left turn slip lane connection from Great South Road (north of Huntly) to Ohinewai South Road in accordance with the concept design Drawings 145860-08-1200-B to 145860-08-1203-B in Appendix B of the ITA.

(vii) Timing of this connection corresponds to Factory Stage F3 plus Subdivision Stage 5A.

(viii) The four access intersections to the site, one property access to the TCG Factory site on Lumsden Road, two property accesses to the service centre on Lumsden Road and Tahuna Road, and two property accesses on Balemi Road shall be in general accordance with the form and location described in the ITA (as identified in Figure 18, Table 11 and Drawings 145860-08-0219-C to 0221-C, and 0222-B to 0224-B in Appendix B of the ITA). Locations and layout details shall be subject to confirmation through further design as part of future resource consents for the staged development, and all designs shall obtain WDC engineering approval before being constructed.

(ix) The staged timing of each of the access is associated with the Stage of development as set out in Table 31 of the ITA.

(g) Walking and Cycling Infrastructure:

(i) Provide, in staged implementation, the extensive internal network of footpaths and shared paths in general accordance with the OSP, illustrative Masterplan and typical road cross sections. This includes the shared paths on Lumsden Road and Tahuna Road in accordance with the typical cross sections in Appendix B and Table 10 of the ITA. Timing of the

staged implementation of the walking and cycling paths relates to development stages as set out in Table 31 of the ITA.

(ii) Provide a separate purpose-built shared walking and cycling bridge spanning the NIMT and SH1 Expressway, at a location approximately 315m south of the SH1 Ohinewai Interchange, together with shared path connections to Tahuna Road and Ohinewai South Road to connect the Site to the existing Ohinewai Village, school and ultimately through to Huntly for walking and cycling. The location and alignment of the path and bridge should be in general accordance with "Option 2B" as illustrated in Figure 33 of the ITA.

(iii) The timing of construction commencement for the shared path from the south side of Tahuna Road to Ohinewai South Road, including the pedestrian and cyclist overbridge, corresponds with completion of the first 100 dwellings in the rezoned Site.

(iv) Provide a segregated shared walking and cycling path on Ohinewai South Road to connect to the future path on the Waikato River stop bank, in general accordance with the concept design Drawings 14586-08-1200 to 14586-08-1203-B in Appendix B of the ITA.

(v) Connect the shared path facility on Ohinewai South Road to a shared walking and cycling path on top of the eastern stop-bank of the Waikato River, through to Huntly. This is already shown in the Waikato Blueprint as an ambition of WDC for the district. Timing to be confirmed through collaboration with WDC and other relevant stake holders.

(h) Public Transport Infrastructure:

(i) Long Term: enable the efficient running of Public Transport ("PT") services to the site by WRC through the design of the road network and access intersections to accommodate the bus stop facility adjacent to the proposed business precinct, in general accordance with the OSP network and Illustrative Masterplan. The design of the long-term bus stop facility should include provision for secure, weatherproof bicycle / scooter storage for PT users and bus shelters. This should be

included in the staging plan with an indicative timeframe, subject to agreements with WRC and WDC.

(ii) In the interim period until the long-term PT facility is required, a basic bus stop facility adjacent to the westbound lane of Tahuna Road, between the interchange and Lumsden Road, shall be enabled through provision of the safe crossing facility for pedestrians across Tahuna Road together with the shared paths on either side, in general accordance with Drawing 145860-08-0221-C in Appendix B of the ITA. The staged timing of this is associated with the upgrade of the Tahuna Road cross-section to the urban / industrial standard in accordance with cross section A-A in Appendix B of the ITA.

3. DESCRIPTION OF THE PROPOSAL

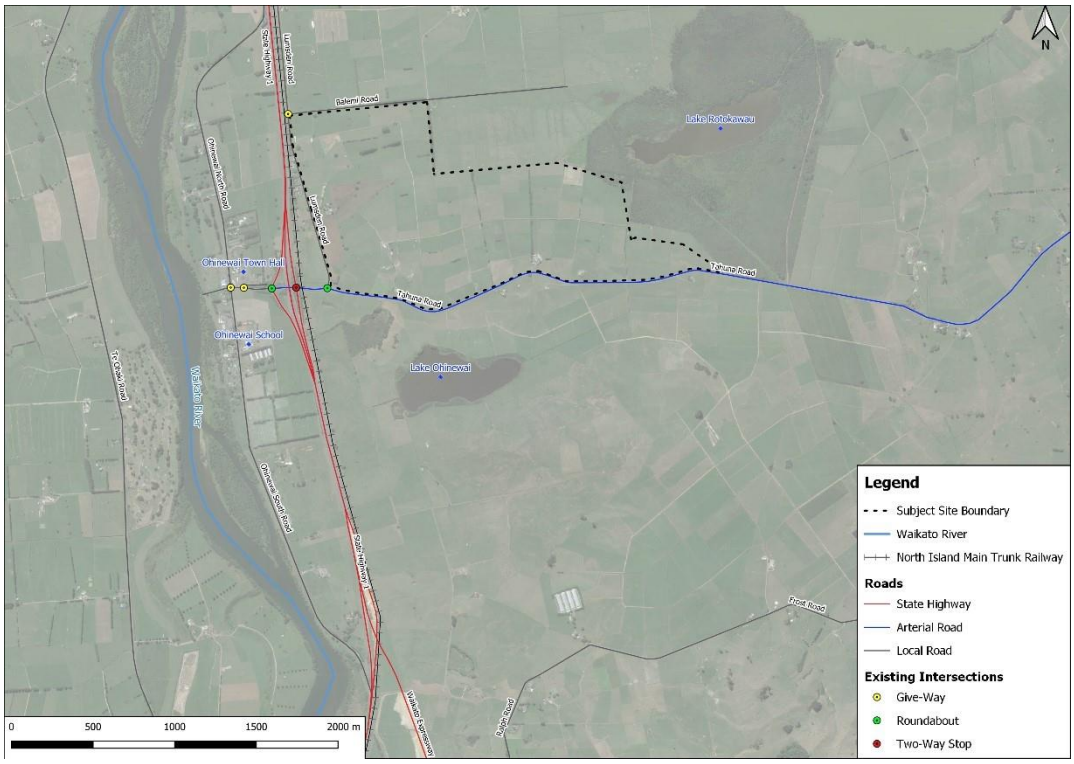
Overview

3.1 APL seeks, though submissions to the PDP, to rezone approximately 178ha of land located in Ohinewai from the current rural zoning to a mix of industrial, business and residential zoning. Development of the Site will be guided by the OSP and a Zoning Plan that sets out the framework for the development.

Site description and location

3.2 **Figure 1** shows the locality and extent of the Site. The Site is bordered by Tahuna Road to the south, Lumsden Road to the west and Balemi Road to the north. The NIMT and Expressway are adjacent to and west of Lumsden Road.

Figure 1: "Sleepyhead Estate" Locality Map



3.3 The Site is accessible via a grade separated interchange on the Expressway, known as the Ohinewai Interchange (as noted, referred to in this statement as the "Interchange"). The Interchange is located approximately 200m west of the south-western boundary of the Site. Ohinewai Village (hereon referred to as Ohinewai West) is located further west of the site between SH1 and the Waikato River.

3.4 The majority of the Site currently operates as a dairy farm, with the remainder of the Site containing three large lot residential and lifestyle ranging from 1,500m^2 to 10ha in size.

3.5 Access to the existing properties within the Site is by private vehicle accesses on Tahuna Road and Lumsden Road. No public roads exist through the Site.

3.6 The land adjacent to the Site is zoned rural with several rural residential and lifestyle block properties located directly opposite the Site on Lumsden Road, as well as a number of commercial and industrial properties, including timber processing yards and a house removal yard, are located approximately 2km north of the Site on Lumsden Road.

Land use zoning

3.7 APL has developed an illustrative Masterplan showing how the Site is intended to be developed to accommodate industrial, business and residential activities while minimising adverse effects. This provided the basis for the OSP (illustrated in **Figure 2**) and the Zoning Plan (illustrated in **Figure 3**). The illustrative Masterplan is included for reference in **Figure 4**.

Figure 2: Proposed Ohinewai Structure Plan

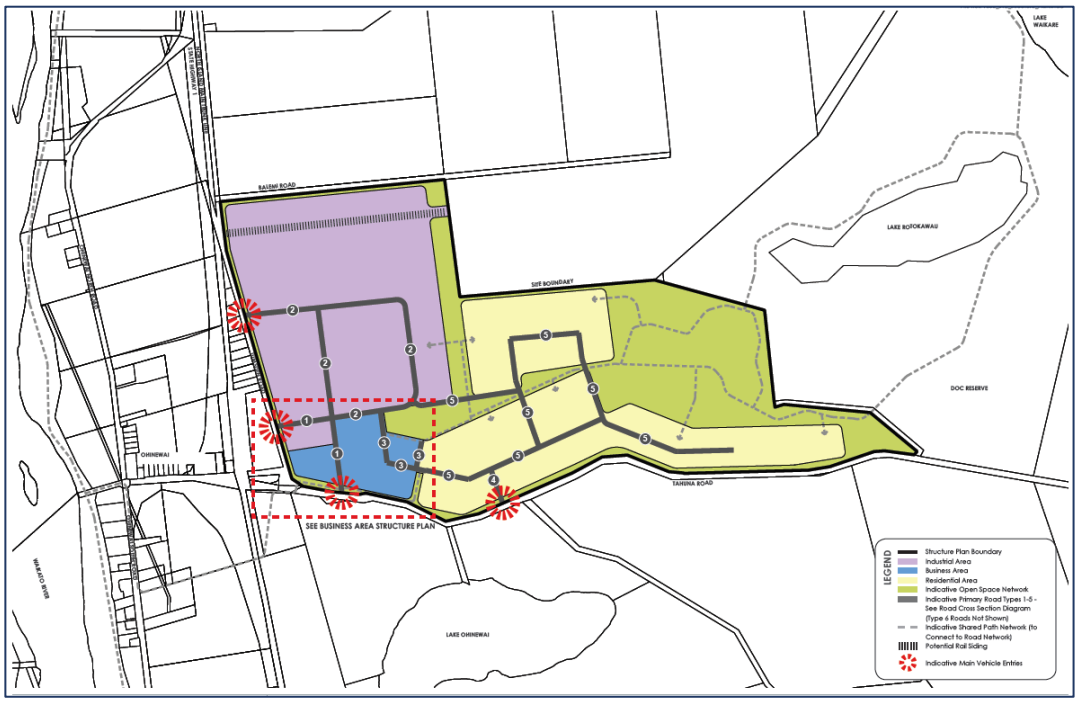


Figure 3: Proposed Ohinewai Zoning Plan

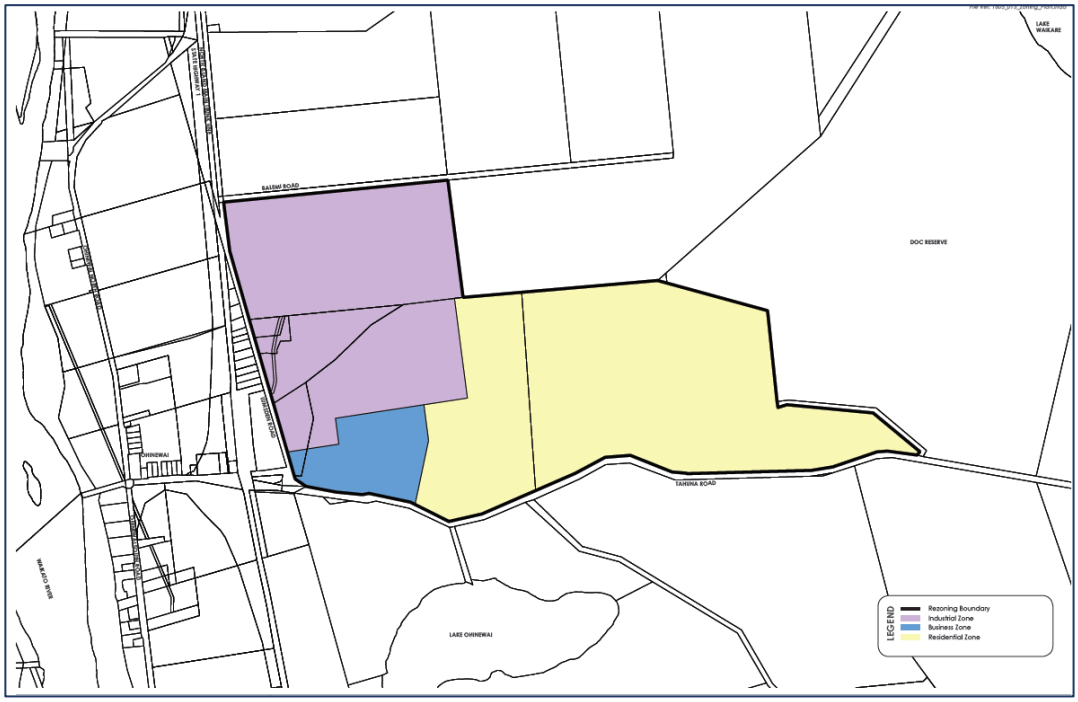


Figure 4: Sleepyhead Estate Illustrative Masterplan

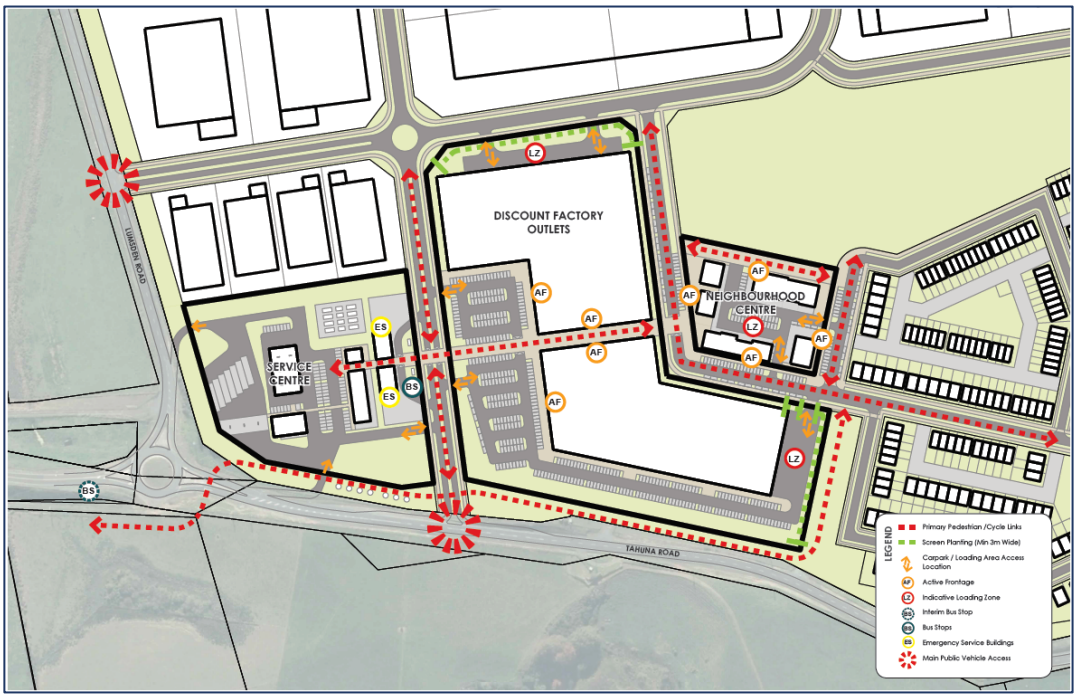
3.8 In addition to the mixed-use development activities, a significant part of the development will be open space including stormwater management provisions, community facilities and ecological enhancement areas.

3.9 The following provides a summary of the land use areas proposed in the OSP:

(a) An approximately 61ha industrial hub, including 22ha for the proposed TCG factory and 7.5ha for a proposed rail siding and container storage area.

(b) Approximately 10ha of commercial development for a service centre, discount factory outlet stores ("DFO"), and a small amount of convenience retail in the form of a neighbourhood centre and corner shop to support the Ohinewai community. A Structure Plan developed for the Business Area is illustrated in **Figure 5**.

Figure 5: Proposed Ohinewai Business Area Structure Plan



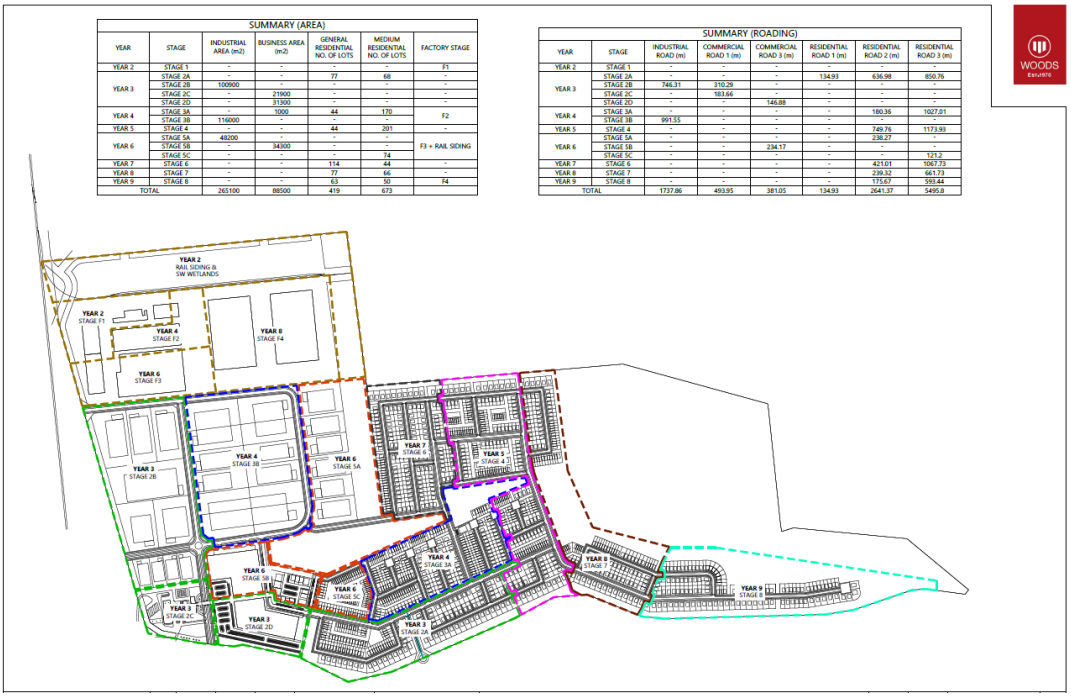
(c) Approximately 52ha for approximately 900 to 1,100 new homes for employees of the TCG factory and the wider community.

(d) Approximately 55ha of public open space including stormwater management areas, recreational opportunities, and ecological enhancement.

Land use and development staging

(e) The Site is envisaged to be developed in eight stages over approximately ten years, subject to economic conditions. The proposed staging plan is illustrated in **Figure 6.**

Figure 6: Proposed Staging Plan



4. EXISTING AND CONSENTED TRAFFIC ENVIRONMENT

Existing transport infrastructure

4.1 The existing network of roads surrounding the Site includes Tahuna Road, Lumsden Road and Balemi Road. Access to the Site is proposed from these WDC roads. The significant majority of trips to the external wider network will be via the Interchange. A very minor proportion of daily trips will be to and from the eastern extents of Tahuna Road, which is consistent with existing network travel patterns.

4.2 Tahuna Road is situated along the southern boundary of the Site. It is classified as an Arterial Road in the PDP and provides east-west connectivity through the district, between State Highway 1 and State Highway 27. It is identified as a state highway detour route by the NZTA. It is a two-lane rural road with an 8m wide sealed carriageway with 0.5m wide sealed shoulders. According to traffic survey data collected in August 2019, the section of Tahuna Road between the Interchange and Lumsden Road has an average daily traffic volume ("ADT") of 2,250 vpd with 16% HCV.

4.3 Lumsden Road is a no-exit road which runs along the western boundary of the Site and is accessed via Tahuna Road in the south. It is classified as a Local Road in the PWDP and has two 3.3m wide sealed traffic lanes. Lumsden Road currently provides access to a number of residential properties to the

west of the Site, as well as a number of commercial and industrial activities to the north of the Site. According to 2019 traffic survey data, Lumsden Road has an ADT of 555 vpd with 16% HCV.

4.4 Balemi Road is a 4.5m wide unsealed no-exit road that runs along the northern boundary of the site. It connects to Lumsden Road and provides access for a single farm property. It is classified as a Local Road in the PDP.

4.5 Automatic traffic tube counters were installed on the Interchange ramps for two weeks from 12 to 28 August 2019. The traffic volume records indicate a 65%:35% northbound southbound split for existing traffic. Traffic counters were also installed on Tahuna Road between the rail overbridge and Lumsden Road, and on Lumsden Road between Balemi Road and Tahuna Road roundabout.

4.6 The tube counters also record vehicle speeds and vehicle classification (into 13 classes under the Transit New Zealand ("TNZ") 1999 scheme) at the position of the tubes. During the two week period, the 85th percentile speeds of Classes 11 to 13 HCV (B-Trains, A-Trains and Semi-Trailer trucks) vehicles on the Interchange on-ramps was 51.8 km/h on the northbound ramp and 43.2km/h on the southbound ramp. The 85th percentile speed of all vehicles along the section of Tahuna Road between the Ohinewai Interchange and Lumsden Road was 62.6km/h eastbound and 59.8km/h for westbound vehicles), and similarly for all vehicles on Lumsden road, 81.0km/h. This automatic counter speed information is referred to again later in my evidence.

4.7 Speed measurements were also recorded by radar speed gun at various other locations near the Site although the low volume of vehicles results in small sample sizes with this method of measurement. The operating speeds for the section of Tahuna Road to the east of Lumsden Road were found to vary due to the winding road alignment; an 85th percentile speed of 95km/h was recorded just east of the Lumsden Road intersection, while nearer the south-eastern boundary of the Site (further away from Lumsden Road) an 85th percentile speed of 77km/h was recorded. However, all recorded speeds were below the 100km/h posted speed limit of local road network.

Existing transport modes

4.8 Two public bus services currently operate within and through the Ohinewai area, both of which stop at an informal bus stop located at Ohinewai Town Hall to the west of the Expressway. The bus services are the Northern Connector which operates between Hamilton and Te Kauwhata, and a local

school bus service operated by GoBus Transport Limited which operates between Ohinewai Primary School and the wider Ohinewai rural area. Both services currently only operate on weekdays.

4.9 Given the current rural zoning in the area, there are no existing pedestrian facilities in the area on Tahuna Road or Lumsden Road. Also, no footpath exists on Tahuna Road at the rail overbridge or the Interchange overbridge and no pedestrian crossing facilities exist across the on and off ramps of the Interchange. From my observations, the existing volume of pedestrians is very low in the vicinity of the Site.

4.10 Cyclists are also uncommon in the area at present. There are no formal facilities for cyclists on Tahuna Road or Lumsden Road and there are no on or off-road facilities for cyclists on the Interchange overbridge and rail overbridge on Tahuna Road. However, cyclists are accommodated on the wide shoulders of the Expressway in both north and south directions, with some lane markings and crossing facilities provided at the merge and diverge areas of the on and off ramps of the Interchange.

4.11 The rural environment together with the lack of safe on and off road infrastructure for walking and cycling in the vicinity of the Site, including safe connectivity across the railway line and Expressway to the primary school, is likely to be the fundamental reasons for the observed low volume of trips by active modes in the area.

4.12 In my opinion, this presents one of the key transportation challenges (and opportunities) for rezoning the Site, given the proposed level of employment and residential land-use. This will create the need for a high quality, safe connection serving the predominant walking and cycling desire line across the Expressway, so that active mode travel is an attractive and viable option for future workers, residents, school children and recreational use.

Significant new transport infrastructure

4.13 The Huntly Section of the Expressway, has recently been completed, connecting to the existing Ohinewai Section of the Expressway. The Huntly section of Expressway provides a bypass for State Highway 1 of Huntly and Taupiri townships, significantly reducing congestion within the townships and improving safety and amenity for the communities that live there. It also provides significant travel time savings, trip reliability and safety improvements for State Hgihway 1 traffic between Auckland and Hamilton, and the townships in between.

4.14 Some changes in the current observed travel patterns within the local and wider road network were expected with the opening of the Huntly section of Expressway. It is my opinion that these changes, although minor, may affect the current volume of traffic using the Ohinewai Interchange. The WRTM's 2031 and 2041 baseline traffic demand projections confirm a decline in traffic volume is likely on the Ohinewai interchange ramps and on Tahuna Road (with no APL development).

Road safety environment

4.15 The ITA provides a detailed analysis of crash data for the previous ten-year period (2008 to 2019) that was sourced from the NZTA's Crash Analysis System ("CAS"). **Figure 7** provides heat-maps indicating the location and severity of crashes recorded on the network of roads within the vicinity of the Site over the previous ten-year period. The most pertinent road safety issues are summarised below.

Figure 7: Crash locations within the vicinity of the proposed development site (2008 to 2019)

4.16 As shown in **Figure 7,** a significant number of crashes were recorded at the Interchange eastern ramp intersection in the last ten years. A total of 14 crashes were recorded at this location, one of which was a serious crash, seven were minor crashes and the rest were non-injury crashes. Thirteen of the 14 crashes were caused by drivers travelling on the southbound off-ramp

that failed to stop at the stop-controlled intersection, and either colliding with a moving vehicle travelling on Tahuna Road or with the roadside barriers as drivers lost control trying to turn at speed.

4.17 On the basis of the NZTA High Risk Intersection Guide ("HRIG") assessment, the risk ratings for this intersection 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 at the top of the off-ramp. Warning signs of the Compulsory Stop already exist 200m in advance of the intersection but it is possible the open backdrop at the top of the ramp, due to the position of the opposite on-ramp could lead to drivers expecting the intersection is further away than it is. The following street-view screenshots show the warning signs and the existing back drop (March 2020 Google Street View).

Figure 8: Southbound Off-Ramp at Ohinewai (Source: Google Street View)

Figure 9: Southbound Off- Ramp intersection with Tahuna Road (Source: Google Street View)

4.18 Interestingly, just four of the 13 crashes where drivers failed to stop at the intersection occurred during the period between 2015 and 2020 (checked at the time of writing this evidence). The remaining nine crashes all occurred pre 2015. **Figure 9** above shows enhanced retro-reflective backing boards fitted to the Stop signs. These are intended to make the signs more conspicuous from further away than standard Stop signs and may be proving effective by significant reduction in crashes recorded for the recent 5-year period (2015 to 2020) compared to the five years prior to that (pre 2015).

4.19 Another crash location indicated in **Figure 7** is the Tahuna Road and Lumsden Road intersection. Two crashes were recorded at this location in the last ten years; both crashes were caused by drivers losing control while navigating the roundabout during inclement / severe weather conditions. Only one person sustained minor injuries as a result of the crashes recorded at this location. On the basis of the NZTA HRIG assessment, the risk ratings for this intersection are "Medium-High" personal risk and "Low-Medium" collective risk.

4.20 A total of 19 crashes were recorded along the section of Tahuna Road between the Interchange and the south-eastern boundary of the Site, all of which were related to the winding alignment of this section of the road. I note that:

(a) 13 of the 19 crashes were single vehicle crashes where a driver lost control of the vehicle while navigating a bend.

(b) Of the six remaining crashes:

(i) Two crashes occurred as a result of a driver attempting to overtake/ being overtaken in an area with limited sight;

(ii) Two crashes occurred during inclement weather conditions were visibility was poor and poor drainage on the road surface;

(iii) One crash resulted in a rear-end collision while a vehicle had stopped to pick-up a lost load; and

(iv) The sixth crash occurred as a result of a driver colliding with a stationary vehicle which had stopped on the road shoulder.

(c) Of the 19 crashes, two resulted in serious injuries while seven resulted in minor injuries; the remaining ten crashes were non-injury crashes. On the basis of the NZTA HRIG assessment, the risk ratings for this road section are "Medium-High" personal risk and "Medium-High" collective risk.

(d) The high crash rate along the section of Tahuna Road fronting the Site indicates that the current 100km/h speed limit along this section of the road is likely to be inappropriate for the road geometry and width.

4.21 Just one crash was recorded along the section of Lumsden Road between Tahuna Road and Balemi Road over the last ten years; the crash occurred at the horizontal curve located approximately 190 m south of the Balemi Road intersection. The crash was caused by a driver losing control of their vehicle while navigating the bend. The driver only sustained minor injuries. On the basis of the NZTA HRIG assessment, the risk ratings for this road section are "Low" personal risk and "Low" collective risk.

4.22 Findings from the road safety assessment indicate the need for safety improvements at the Interchange eastern ramp intersection and along Tahuna Road. These are discussed in Sections 5 and 7.

5. PROPOSED TRANSPORTATION INFRASTRUCTURE

5.1 The following transport infrastructure is proposed to support and provide mitigation of effects of the OSP development:

(a) A rail siding which will connect the proposed industrial area to the NIMT.

(b) Realigning Lumsden Road and Balemi Road so that the proposed rail siding crosses Lumsden Road at a safe speed and safe angle that is acceptable to both KiwiRail and WDC.

(c) Speed management measures on Lumsden Road and Tahuna Road adjacent to the Site to reflect the more urbanised environment and to increase safety for active travel modes (refer to Paragraphs 7.16 to 7.23).

(d) Several new intersections along Tahuna Road and Lumsden Road for access into the development, including several new private accesses along Tahuna Road, Lumsden Road and Balemi Road for access into the service centre, the TCG factory area, as well as the proposed rail

siding and container storage area (refer to Paragraphs 5.13 to 5.22); and

(e) Providing safe, convenient and attractive walking and cycling connectivity to Ohinewai West, Ohinewai School and enabling access to Huntly (refer to paragraphs 7.26 to 7.39).

Rail siding access

5.2 A key attribute of the Site is the close proximity to the NIMT for freight movements; the proximity of the NIMT to the Site is one of the fundamental reasons for this site having been identified by APL for the proposed rezoning. It is presently anticipated that the rail siding will be established at approximately 50% of the proposed TCG factory and 50% of the light industrial land is developed. At this point, the road environment of Lumsden Road will effectively be urbanised. The urbanisation works (as discussed in paragraphs 7.16 to 7.23) and industrial development will support lower operating and speed limits on the section between Balemi Road and Tahuna Road from that which currently exists.

5.3 APL has gained the support and approval in principle from David Brinsley, KiwiRail National Manager, for provision of a rail siding from the NIMT railway line into the proposed TCG manufacturing facility site (see the email attached as Attachment G to the evidence of David Gaze). The proposed track alignment has been designed with input from KiwiRail rail / freight operations staff. The alignment crosses Lumsden Road at-grade but due to the close proximity of the NIMT to Lumsden Road the rail siding will be on a curve through the level crossing; the proposed rail alignment is identified in the OSP (as illustrated in **Figure 2**) in the northern part of the Site.

5.4 Accordingly, with the implementation of the rail siding, it is proposed that Lumsden Road be realigned with a series of horizontal bends (known as 'S' bends) to ensure that the road crosses the rail at a safe angle (i.e. between 70 degrees and 110 degrees as per KiwiRail's Engineering Services Standard document, and slows traffic on the approaches to the level-crossing).

5.5 I have been liaising with rail design consultants Vitruvius since August 2019 to identify an appropriate geometric alignment for the level crossing that meets KiwiRail's specifications and is safe for traffic to the satisfaction of WDC. The work with Vitruvius resulted in the concert design layout illustrated in **Figure 10**. This involves Lumsden Road being locally realigned by two 160m radius horizontal curves, one to the north and south of the proposed level crossing and a 50m radius to the immediate north of the proposed level

crossing. Additionally, the following speed reduction measures are recommended as part of the re-alignment of the road:

(a) A speed limit of 60km/h with a gated speed limit sign threshold treatment on the northern (southbound) approach to the 'S' bend on Lumsden Road;

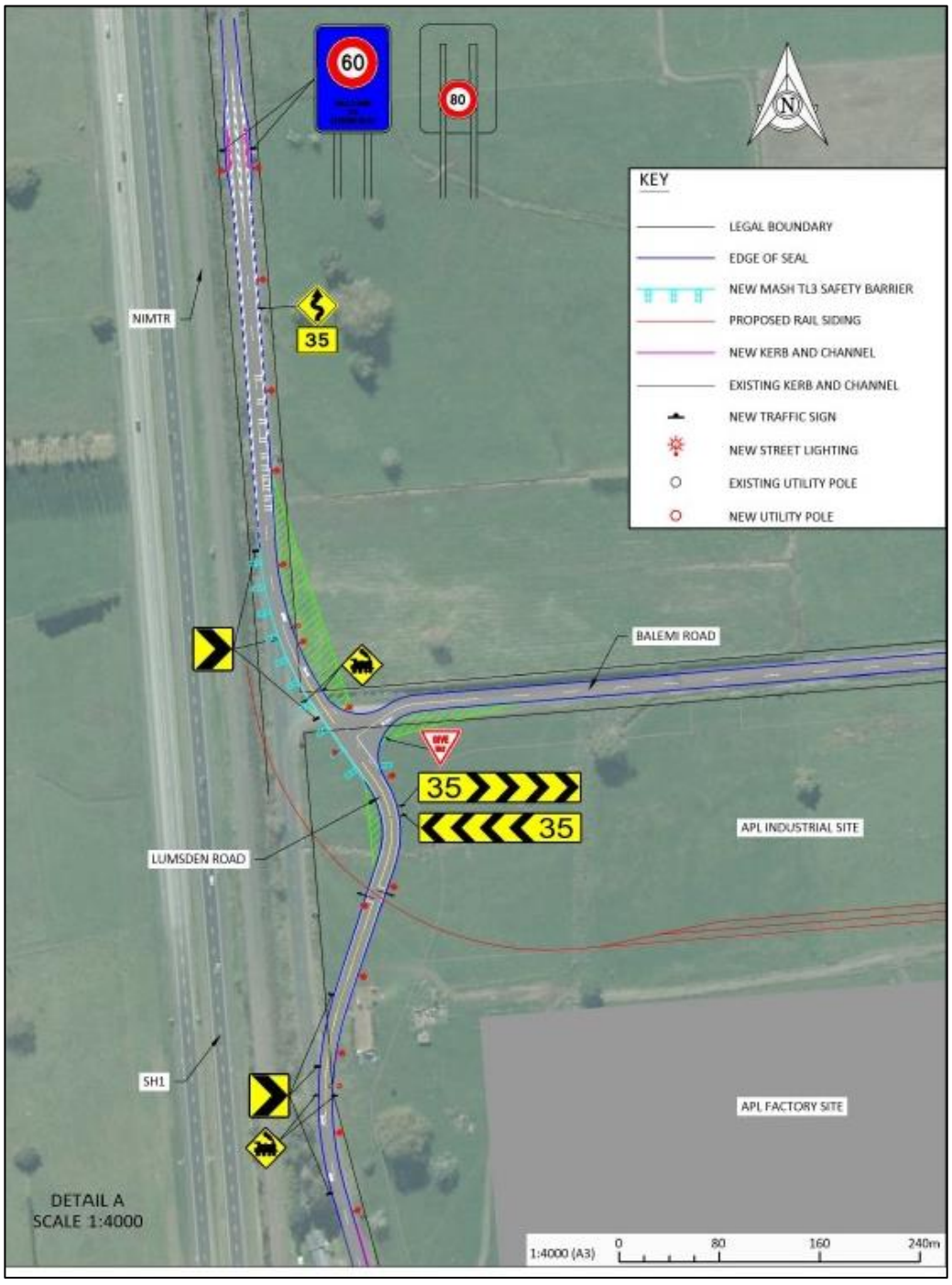
(b) Narrowing of the road carriageway width at the level crossing;

(c) Implementing kerb and channel on Lumsden Road through the urbanised section adjacent to the Site and existing houses on the west side of Lumsden Road;

(d) Installation of roadside barriers, chevron boards and speed advisory signs on the 'S' bend curves; and

(e) Installation of rumble strips perpendicular to traffic flow on the southbound approach prior to the northernmost curve of the 'S' bend.

Figure 10: Concept design - Lumsden Road Re-alignment



5.6 The WDC Transport Peer Review by Ms McMinn suggests that the design should be revised to ensure appropriate and consistent design speeds and speed environment are achieved (potentially without the need for the realignment). The horizontal alignment of the proposed 'S'-bend on Lumsden Road (which needs to be seen in the context of the overall future urbanisation of that section of the road and not on the existing "rural" speed environment) has been designed on the basis of the Safer Speed environment of 80km/h (refer to Paragraphs 7.16 to 7.23). This is

appropriate now and more suitable for future interface with a 60km/h speed limit. I consider is likely to be appropriate on the urbanised section of Lumsden Road.

5.7 The Lumsden Road and Balemi Road intersection will also need to be reconfigured to ensure that the two roads intersect at a safe angle with sufficient sight distance. I have recommended the following intersection upgrades as part of the transportation infrastructure improvement works required to support the rezoning:

(a) That the T-intersection retain the existing give-way control due to the flat topography enabling good sightlines that exist;

(b) The eastern leg of the intersection (i.e. Balemi Road) be upgraded (i.e. widened and sealed) to a minimum 6m trafficable carriageway width; and

(c) The rural intersection be formed in line with the requirements set out in the ODP/ PDP and the RITS.

5.8 The appropriate level crossing solution was assessed based on NZTA's Traffic Control Devices Manual (Part 9 Level Crossings). I have recommended the implementation of an active control level crossing with flashing lights and bells as part of the transportation infrastructure improvement works required to support the rezoning. Barrier arms may not be necessary due to the low traffic volumes using that section of Lumsden Road, but that can be assessed at the time of detailed design in collaboration with KiwiRail and WDC.

5.9 The WDC Transport Peer Review by Ms McMinn recommended that a safety audit of the level crossing and Lumsden Road alignment be completed at this early stage. An independent road safety audit ("RSA") of the concept design of the road realignment and level crossing has subsequently been completed. The RSA identified only two moderate concerns and the rest minor concerns and comments which mostly related to the provision of road signage, marking and safety barrier. All RSA concerns have been addressed in the updated design drawings (illustrated in **Figure 10**). The RSA and designer responses have been provided to WDC for Safety Engineer review and response, which is pending at the time of writing this evidence.

5.10 In addition, the JWS (discussed in detail in Section 9 below) identifies that Ms McMinn would like to see the sight distances protected at the intersection of Balemi Road / Lumsden Road by way of plan provisions, and is concerned about the likelihood / certainty that the level crossing will be acceptable to

KiwiRail at time of implementation given the KiwiRail website states that grade separated crossings are preferred.

5.11 I agree with Ms McMinn that the intersection sight distances should be protected by provisions in the PDP, and I have also requested KiwiRail review the concept design of the level crossing from an operations and safety perspective. A response is pending at the time of writing my evidence.

5.12 On this basis, I consider that the potential road safety effects of the proposed rail siding level crossing and associated 'S'-bend of Lumsden Road can be appropriately mitigated through design.

Site access proposals

5.13 As shown in the plan attached as **Figure 11** and in the OSP illustrated in **Figure 2**, access to the Site is proposed via several new access intersections and private accesses on Tahuna Road, Lumsden Road and Balemi Road as follows:

(a) The primary access for the industrial area will be via Lumsden Road (via Access 3 and Access 4).

(b) The primary access for the residential areas will be Access 2 on Tahuna Road, although some residential traffic related to the northern area of housing might also use Access 3 on Lumsden Road.

(c) The primary access for the business / commercial areas within the development will be entry via Access 1 on Tahuna Road (which is anticipated to accommodate almost all inbound movements to the commercial area), and exit from Access 3 on Lumsden Road (a small component of traffic will exit from Access 1 for eastbound travel on Tahuna Road).

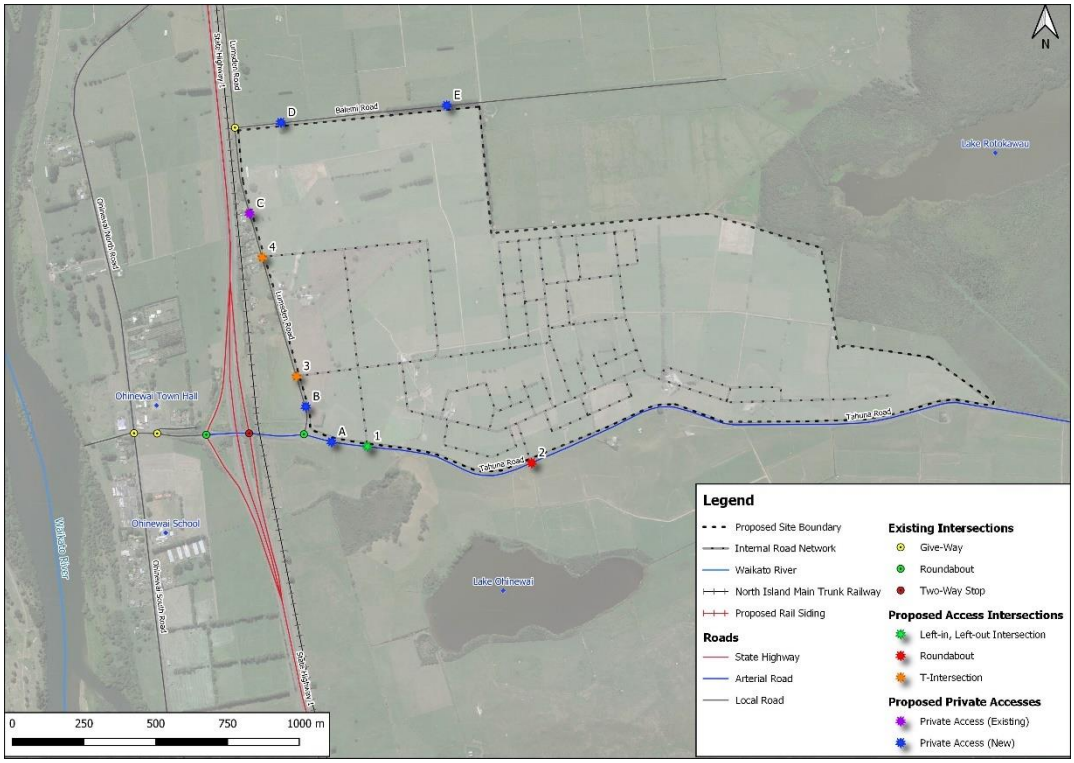
(d) The proposed vehicle crossings on Tahuna Road and Lumsden Road (Private Access A and B) will provide direct access to the service centre. Both crossings will provide for one-way vehicle movements only (left-in on Tahuna Road and left-out on Lumsden Road).

(e) Prior to the construction of Access 4, the existing vehicle crossing on Lumsden Road (Private Access C) will be used as the primary access to the early stages (Stages 1 and 2) of the proposed TCG factory.

(f) The proposed vehicle crossings on Balemi Road (Private Access D and E) will provide direct access to the rail siding for freight related to

other industrial / manufacturing business in the proposed development.

Figure 11: Proposed Site Accesses



5.14 The following preliminary access configurations are proposed for each access:

(a) Access 1 (illustrated in **Figure 12**): Left-in, left out intersection with a raised median to prevent right turn movements in and out of the access.

Figure 12: Proposed Intersection Configuration - Access Intersection 1

(b) Access 2 (illustrated in **Figure 13**) is recommended as a single circulating lane, three-leg roundabout. The roundabout configuration will actively slow traffic on Tahuna Road to create a safer intersection for residents and workers of the APL development. The roundabout also provides the potential for a fourth leg (to the south) to be added in future to provide access to the Ohinewai Lands Limited's "future development area" (refer to Paragraph 10.2).

Figure 13: Proposed Intersection Configuration - Access Intersection 2

(c) Access 3 (illustrated in **Figure 14**): The first access point on Lumsden Road, is recommended as a Give-Way controlled 'T' intersection with a right turn bay treatment on the northbound approach. Construction of Access 3 will involve Lumsden Road being lowered and the Site levels raised to provide compatible levels that can be developed for industrial purposes.

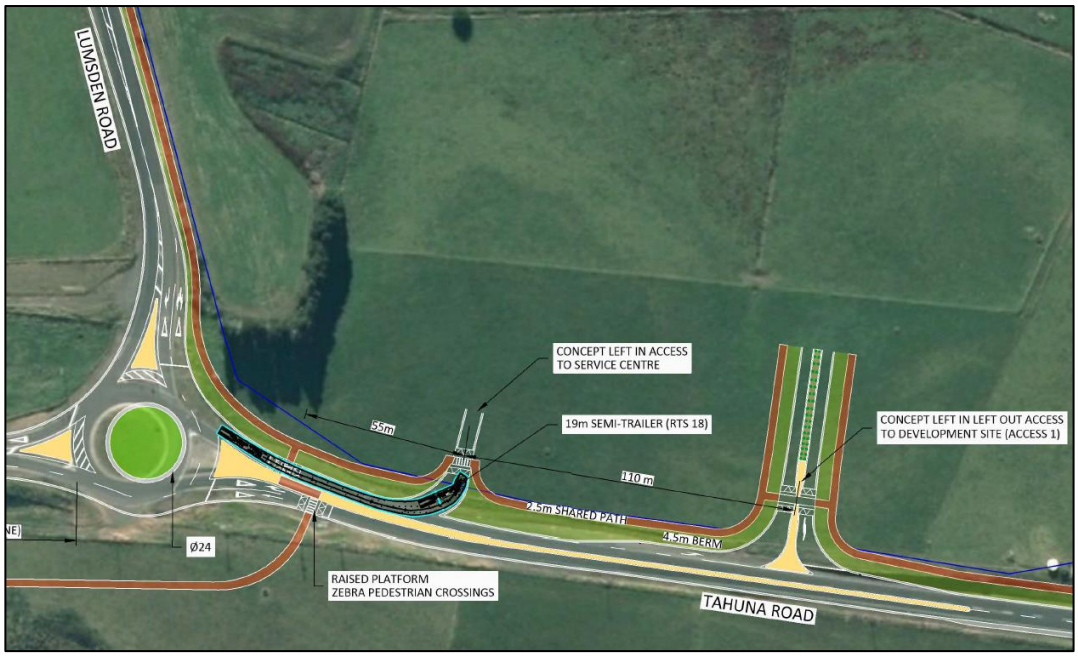
Figure 14: Proposed Intersection Configuration - Access Intersection 3

(d) Access 4 (illustrated in **Figure 15**): Give-Way controlled 'T' intersection with a right turn median treatment on the northbound approach.

Figure 15: Proposed Intersection Configuration - Access Intersection 4

(e) Private Access A (illustrated in **Figure 16**): Private commercial vehicle entranceway (left-in only "slip lane") on Tahuna Road.

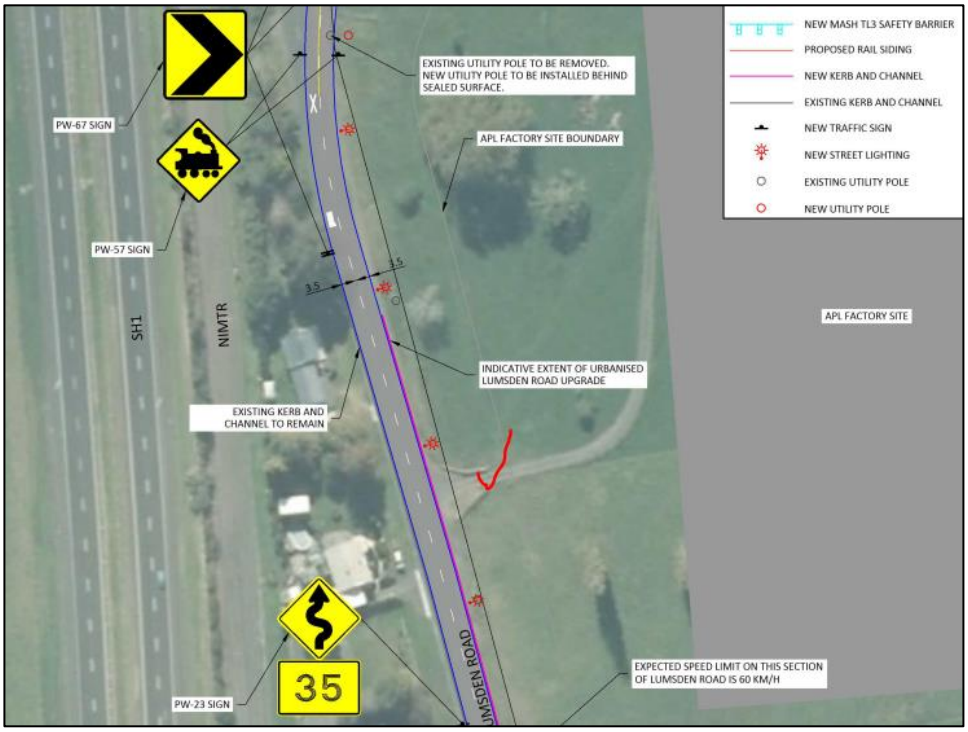
Figure 16: Proposed Access Configuration – Private Access A



(f) Private Access B: Private commercial vehicle entranceway (left out only "slip lane") on Lumsden Road.

(g) TCG Stage 1 & 2 Factory Access on Lumsden Road (Private Access C - illustrated in **Figure 17**): It is recommended that the existing crossing be upgraded to a heavy commercial vehicle access as per the provisions in the District Plan.

Figure 17: Existing access on Lumsden Road (Private Access C)



(h) Private Access D & E: Private commercial vehicle accesses on Balemi Road.

5.15 The WDC Transport Peer Review by Ms McMinn has raised a concern that the proposed intersection forms (Access 1, 3 and 4) have not adequately considered safety effects and considers that implementing roundabouts over the proposed intersection forms (left-in, left-out and "T" intersection) is more beneficial, particularly in relation to safety. On the basis of the above, an assessment of the efficiency (capacity) and safety of each of the proposed intersection forms and locations for access to the Site was undertaken with reference to the 2041 WRTM traffic model projections (as discussed in Section 6). The findings from the assessment are summarised in the following paragraphs.

5.16 I consider the left-in, left-out configuration appropriate for Access 1 for the following reasons:

(a) Left-in and Left-out only intersections are widely considered to be very safe forms of intersection due to fewer conflicting turning

movements compared with intersections allowing all movements. The remaining conflicting movements occur at low angles, associated with merging or diverging, and therefore much less likely to cause serious injury compared with high or right-angle conflicting movements.

(b) The majority of traffic arriving and exiting the site will be to the west (the Expressway). The OSP layout of the internal road network facilitates the majority of traffic entering and exiting via Access 3 to Lumsden Road or Access 2 (the proposed eastern roundabout on Tahuna Road). Only traffic associated with the DFO, and pedestrians and cyclists using the shared path are likely to use Access 1. The layout provides connectivity options while managing traffic volumes at intersections to appropriate levels.

(c) The exit from the DFO car park to Commercial Road 1 (or "Road Type 1" as per the OSP) can be signed instructing traffic to turn right to exit the site to State Highway 1. This route facilitates safe and efficient turning movements at the existing Lumsden Road / Tahuna Road roundabout.

(d) The design of the Left-in / Left-out arrangement as shown in the concept plan includes a solid central island on Tahuna Road to strongly discourage drivers from turning right out of the Access.

(e) I anticipate that the appropriate speed limit on Tahuna Road at this location will be no greater than 60km/h due to a combination of the presence of the development on the Site, the urbanised upgrade of Tahuna Road through to Access 2, and the proposed raised-platform zebra pedestrian crossing near the Tahuna Road and Lumsden Road roundabout. The latter will actively slow eastbound traffic on Tahuna Road to approximately 30km/h at the crossing. Therefore, the likelihood of vehicle crashes at Access 1 involving eastbound traffic and vehicles entering or exiting Access 1 is very low in my opinion.

(f) The intersection spacing between proposed Access 1 and the existing Tahuna Road / Lumsden Road roundabout is approximately 220m. This is appropriate for a speed environment of up to 70km/h according to Table 5 in Appendix A of the ODP and Table 14.12.5.1 of the PDP.

(g) Given the above points, I expect only eastbound traffic will exit from Access 1 to Tahuna Road and all other traffic can be easily guided to Lumsden Road (Access 3).

(h) Accordingly, I do not consider there to be any sufficient safety or capacity related reasons why Left-in / Left-out connectivity should not be provided at Access 1 on Tahuna Road.

5.17 A roundabout configuration for Access 2 is considered appropriate at this location for the following reasons:

(a) A roundabout provides the safest form (other than grade separation) of intersection allowing all movements in and out of the Site, as it will significantly reduce vehicle operating speeds on the Tahuna Road approaches at the intersection.

(b) In addition to reducing vehicle speeds, the configuration reduces the likelihood and severity of crash injuries by avoiding high angle side impact crashes, and head-on collisions.

(c) The configuration provides a 'gate-way' point to the Site through landscaping, signalling a change to the open road speed environment.

(d) It future proofs the ability for safe and efficient access to the potential development opposite the Site (Ohinewai Lands Limited property) if that occurs.

5.18 A Give-Way "T" intersection configuration is considered appropriate for Accesses 3 and 4 on Lumsden Road for the following reasons:

(a) The WRTM illustrates that the predominant movements at the Access 3 are expected to be the right-turn in (185 vph during AM peak) and left-turn out (approximately 625vph during PM peak) movements. The modelling predicts that approximately 140 vph will approach the intersection on Lumsden Road from the north during the AM Peak and 440 vph during the PM Peak. The turning volumes figures at Access 4 are significantly lower than for Access 3. Performance assessments for the intersections show that both accesses will operate at good levels of service in the peak periods, with little to no queueing expected on the northern and southern approaches of the two intersections.

(b) Safer Speed environment: The safe and appropriate speed of this section based on the NZTA Safe Journeys Risk Assessment Tool is 80km/h (and potentially is appropriate for the existing rural environment). The proposed rezoning includes an urbanised upgrade of this section of road and reducing the speed limit to 60km/h.

(c) Good visibility: both intersections has relatively good sight lines in both directions (in excess of 200m in both directions); drivers approaching the accesses from Lumsden Road will have sufficient stopping sight distance to safely stop before the intersection should there be a vehicle turning in/out of the access. A right turn auxiliary lane is recommended to maximise the safety of both intersections.

(d) Based on the relatively low through traffic volumes on Lumsden Road, the likelihood of a crash at the T-intersections is expected to be low. Additionally, given the low volumes on Lumsden Road, sufficient gaps are likely to be available for vehicles departing the Site.

5.19 Notwithstanding the above, the access configurations are concept designs to demonstrate what I consider to be appropriate and fit for purpose, to acceptably manage the effects of the development based on the illustrative Masterplan layout for the Site. Details around final access configuration and exact positions will be confirmed as part of future planning and subdivision consents, along with engineering approvals from WDC. I expect the new accesses and intersections will be located and formed in general accordance with the OSP provisions, but the details will be subject to further Austroads design guidance, the NZTA Manual of Traffic Signs and Markings, and WDC standards as provided in Chapter 14.12 of the PDP and the RITS.

5.20 An assessment of the sight distance against the minimum safe intersection sight distance ("SISD") requirements provided in *Austroads' Guide to Road Design document*[1] on the basis of the existing speed environment and proposed speed environment framework (discussed in paragraphs 7.16 to 7.23) shows that Access 1, 3 and 4 will all comply with the minimum SISD in all directions. SISD does not apply to the proposed Access 2 intersection as a roundabout. Rather, the approaches to the roundabout are required to meet the requirements for the operating speed in relation to Criterion 1 and 2 of the *Austroads' Guide to Road Design document Part 4B – Roundabouts.* An assessment of the sight distance requirements showed that the proposed

1 Table 3.2 in Part 4A: Unsignalised and Signalised Intersections).

roundabout is able to be designed to comply with the Criteria 1 and 2 requirements on the basis of the existing and safer speed environment.

5.21 Notwithstanding that the sight distances are expected to comply for all four access intersections on the basis of the existing and proposed speed environment, I recommend that the posted speed limit on Tahuna Road and Lumsden Road adjacent to the Site be still reduced in line with the safer speed environment framework discussed in paragraphs 7.16 to 7.23. Additionally, the sight distances at each proposed access should be reassessed based on surveyed levels as an integral input into the detailed design of the intersections.

5.22 An assessment of the access separation against WDC's access spacing requirements (as per Table 14.12.5.1 of the PDP) showed that of the proposed intersections and accesses, only one access is expected to not fully meet the minimum access spacing requirements on the basis of the existing speed environment.

(a) Access 4 is separated by approximately 70m to the nearest access on the same side of the road, and by approximately 35m to the nearest accesses on the opposite side of the road (there is also an existing access located directly across from the proposed access).

(b) The 35m access spacing does not comply with WDC's separation requirement provided in Table 14.12.5.1 of the PDP, of at least 80 m for the existing speed environment (i.e. 80 km/h).

(c) However, on the basis of the speed limit on this section of Lumsden Road reducing to 60km/h as recommended to align with the Safer Speed Environment Framework, the spacing at Access 4 will comply with the minimum separation since 30m as specified in the PDP for a 70km/h speed environment.

(d) Furthermore, the residential access will likely generate approximately one vehicle movement per peak hour each based on typical household trip generation rates. This small amount of traffic is unlikely to cause any material or significant risk of safety issues with traffic using the site access.

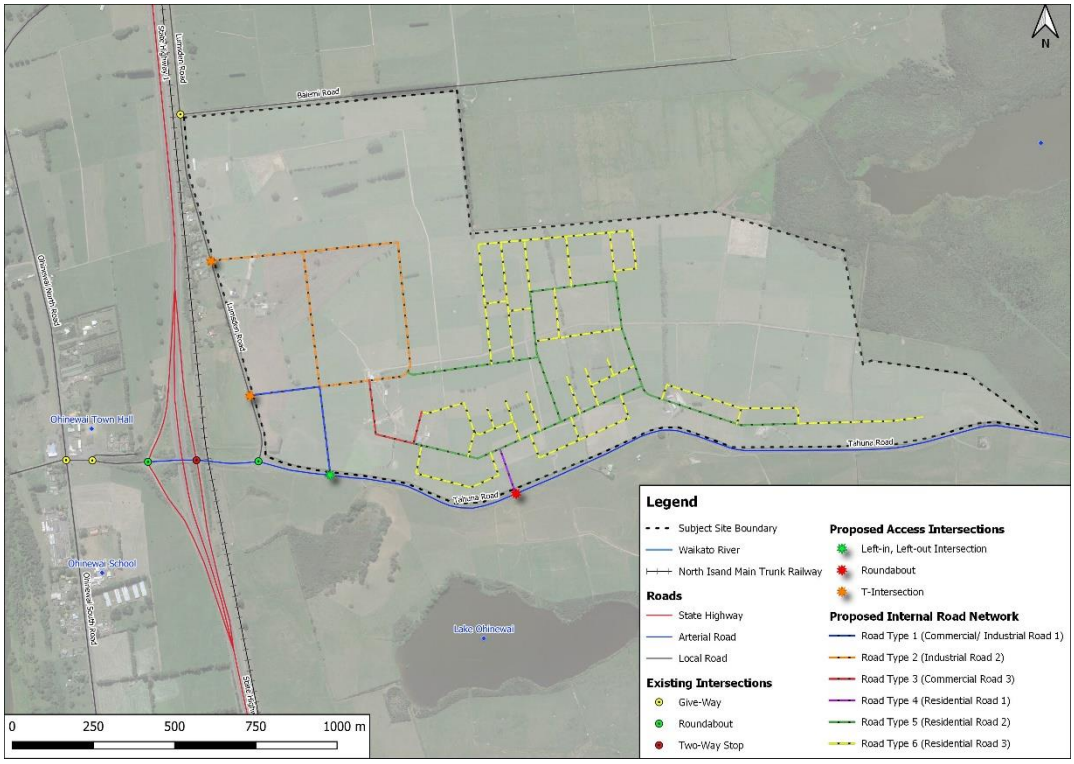
Internal transport network and hierarchy

5.23 An indicative network of internal roads to service the development has been developed in conjunction with the OSP (refer to the **Figure 18** below). The

internal roads are configured in a grid-network formation that take account of the constraints of the Site, connectivity between the different land use areas, and connection to the existing external road network (Tahuna Road and Lumsden Road).

5.24 The street hierarchy (illustrated in **Figure 18**) has been designed to be logical, intuitive and legible. The configuration avoids the need for heavy traffic to use the residential streets while at the same time providing a high degree of connectivity between the land uses, including for active transport such as walking, cycling, scooters, etc. While the OSP reflects the network configuration, the finer details of the road network will be refined at future subdivision stages.

Figure 18: OSP Proposed Street Hierarchy Plan



5.25 The internal road network of the proposed development will consist of the three commercial / industrial road typologies (to be classified as Local Roads as per the PDP) as well as three residential road typologies (to be classified as Local Roads as per the PDP) which have been guided by the provisions in the PDP (Table 14.12.5.14 of the PDP) as well as the New Zealand Standard ("NZS") for Land Development and Subdivision Infrastructure (Table 3.2 of the NZS 4404:2010).

5.26 The overall internal road cross-section arrangement has been planned based on the managed speed environment approach. The road cross-section

dimensions have been developed to match the desired speed and amenity outcomes of the road, delivering a safe speed zone environment and clear road hierarchy across the proposed development area.

5.27 The proposed cross-sections for each of the road typologies were assessed against the standards provided in Table 14.12.5.14 of the PDP. While the residential typologies do not fully comply with the standards set out in the PDP in terms of providing a narrower road reserve width (a 16m wide road reserve width is proposed for "Road Type 6 / Residential Road 3"), the narrower width was considered appropriate for the reasons described below:

(a) There is limited developable land due to significant geotechnical constraints and storm water management and treatment requirements associated with the Site being near a significant wetland. The costs associated with stabilising the marginal areas of land is high, so the 'good ground' areas of land need to be used as efficiently as possible for the purpose intended. In this regard, the narrower road reserve width of 16m for access streets is proposed to support the development of medium density housing. The operational purpose and function of the residential road classes (primarily being for property access) is not expected to be unduly impacted by the reduced road reserve width. Such widths for residential access streets have been successfully implemented in recent developments in Hamilton City.

(b) The proposed cross-section elements align well with the road design standards set out in NZS 4404:2010 for a local road providing primary access to housing. In addition, all services, pedestrian facilities, and road furniture can be adequately accommodated within the road reserve.

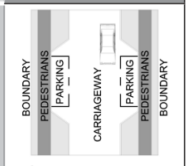
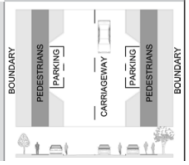
(c) As described in the Urban Design Assessment report for the Ohinewai rezoning, the reduced width will promote safer vehicle speeds and thus a safer and more user-friendly environment to support the viability of active mode travel for internal short trips.

(d) The proposed 16m road reserve is a minimum, not a 'must achieve' width. Therefore, some sections may need to be wider to accommodate specific infrastructure including intersections, sight distance splays, street lights, power transformers, etc. This detail governing the road reserve widths at key locations in the network would be confirmed at subdivision design and engineering approval.

5.28 I note Ms McMinn raised concern with the proposed 16m reserve width for Residential Road 3/ Road Type 6 in her ITA review and the JWS (Issue 19, Para. 20.3). Ms McMinn is concerned the cross section could be applied to serve more than 20 lots. Ms McMinn considers 16m is appropriate for low volume roads serving less than 20 lots but for 20 to 100 lots, a minimum 17m road reserve width and 8m seal width is needed (not including on-street car parking).

5.29 I disagree with this on the basis that a fundamental objective of Road Type 6 / Residential Road 3 is for property access, and to create a slow speed (30km/h) environment for living and playing. This is consistent with NZS 4404:2010 Table 3.2 as reproduced below for clarity.

Table 1: Road Design Standards (Source: Table 3.2 of the NSZ 4404:2010)

PLACE CONTEXT			DESIGN ENVIRONMENT				LINK CONTEXT					TYPICAL PLAN AND CROSS SECTION
Area	Land use	Local attributes	Locality served	Target operating speed (km/h)	Min. road width (m)	Max. grade	Pedestrians	Passing, parking, loading and shoulder	Cyclists	Movement lane (excluding shoulder)	Classification	
Notes	See 3.2.4, table 3.1 & 3.3.1.6	See table 3.1	See table 3.1	See 3.3.5	See 1.2.2, 3.3.1.9, & 3.4.16		See 3.3.11	See 3.3.6 & 3.3.1.4	See 3.3.1.5, 3.3.7, & 3.3.11.2	See 1.2.2, 3.3.1.1, 3.3.1.2, 3.3.1.3, 3.3.1.10, 3.3.11.3	See 3.2.4.2 & 3.3.16 (Typical max. volumes)	See Appendix E for larger versions of figures
Urban	Live and play	Primary access to housing	1 to 200 du	30	15	12.5%	1.5 m one side or 1.5 m both sides where more than 20 du or more than 100 m in length	Parking may occur in the movement lane or be separate and recessed. See 3.3.6.	Shared (in movement lane)	5.5 - 5.7	Local road (~ 2,000 vpd)	
Urban	Live and play	All other "land use" activity types within this "Area" type not specified elsewhere in this table.	All	50	20	10%	2.0 m each side	Parking separate and recessed. See 3.3.6. Public transport is likely (see 3.3.1.4, 3.3.1.5)	Separate provision where local authority defined cycle toute	2 x 4.2	Connector/ collector (~ 8,000 vpd)	

5.30 I do not consider that a 17m reserve width is necessary because the 16m cross-section fits all the necessary street components, including a 5.5m wide movement lane (no centre line) plus roadside parking. The suggested extra 1m of width over all Road Type 6 / Residential Road 3 roads would use up a reasonable amount of developable land that would not then be available for housing. However, my key disagreement is the 8m carriageway width, in addition to parking, that Ms McMinn recommends because I consider that it would not help to discourage speeds above 30km/h. The wide carriageway makes it easier to increase speed, making the street more "travel-based" than access and people based. NZS 4404:2010 identifies that the movement lane width for a residential street up to 200 dwellings should ideally be between 5.5m and 5.7m wide, with a minimum road reserve width of 15m.

5.31 Ms McMinn also identified some concern with the manoeuvring space for cars parking in the 90-degree spaces on the commercial street cross-section (Road Type 3 / Commercial Road 3) at the Neighbourhood centre. I have considered this and believe that a localised widening of the two-way street

to 2 x 3.5m lanes instead of the proposed 2 x 3.0m lanes will improve the manoeuvring space adjacent to the neighbourhood centre.

6. PREDICTED TRAFFIC GENERATION

6.1 Discussions with the NZTA were undertaken during the development of the December ITA in relation to the appropriate methodology for assessing the transportation effects of the proposed rezoning. It was agreed with NZTA that the effects assessment for the rezoning would first be undertaken using trip generation and assignment first principles with intersection performance evaluations using Sidra Intersection (as reflected in the December ITA) while the WRTM based assessment for the Ohinewai area was underway.

6.2 The predicted trip generation and transportation effects assessment was subsequently updated in March 2020 (as reflected in the updated May ITA) on the basis of the WRTM based trip generation rates for the industrial, residential and business components of the OSP Site.

Indicative development areas

6.3 The proposed land use areas within the Site are described in paragraph 3.9 of my evidence. To inform trip generation, a summary of the anticipated development yield within the OSP area is provided in **Figure 2**. The net developable areas within the OSP area were on the basis of a conservative figure of 50% for building coverage across the industrial and business zone.

6.4 The anticipated development yield, which was based on the average employment and dwelling densities, was estimated as follows:

(a) The anticipated employment densities for the general Light Industrial area have generally been guided by densities applied in recent plan change projects with Industrial zoning (e.g. the consented Ruakura Plan Change and the consented Drury South Structure Plan), as well as data provided in the *Upper North Island Industrial Land Demand* report ("UNIILID"). In line with the above and given the location of the proposed development (rural environment unlike the significantly urbanised Hamilton and Auckland), an employment density figure of 27 employees per hectare was considered appropriate for the general Light Industrial area.

(b) Similar to the industrial area, the anticipated employment densities for the business / commercial area have generally been guided by densities applied in recent plan change projects with the relevant

zoning (including the Drury South Structure plan, consented Ruakura plan change and proposed Warkworth Structure plan). On the basis that the Business zone is anticipated to be predominantly retail rather than office space, and that the development is located in a predominantly rural environment, an employment density of 58 employees per hectare was considered appropriate for the DFO, neighbourhood centre and corner shop.

(c) The average lot sizes within the residential area have been generally guided by the PDP Residential zone subdivision rules. Rule 16.4.1 of the PDP specifies that proposed lots should have a minimum net site area of 450m^2, and the rules do not distinguish between general and medium density dwellings. However, the rezoning Masterplan targets a large number of medium density dwellings. As a conservative estimation, an average lot size of 380m^2 for general density residential dwellings and 250m^2 for medium density residential dwellings was applied for this assessment. This equates to an average net residential density of 33 dwellings per hectare.

6.5 On the basis of the above, the OSP area is anticipated to employ approximately 2,600 employees once fully developed (2,215 workers within the Industrial zone and 400 workers within the business / commercial zone).

WRTM trip generation

6.6 The WRTM predicts an overall trip generation of 1,775 and 2,740 vehicle trips in the AM and PM peak hours respectively. The WRTM predicts that only about 20 to 25% of these trips will be internal trips, resulting in an external trip generation total of approximately 1,420 and 2,190 vehicle trips during the AM and PM peak hours respectively. In my opinion, this is a conservative estimate of hourly external trips for the following reasons:

(a) The residential and business components (with the exception of the discount factory outlet centres) of the OSP area are intended to:

(i) Serve and support the industrial components of the OSP area and Ohinewai West, and

(ii) Serve the local residential community in Ohinewai for every-day convenience items so short trips to Huntly and back are not needed every day.

(b) I consider that the low internal trips figure from the WRTM (20% to 25%) is mostly due to the model being gravity based; this means that a large employer like the proposed TCG factory attracts trips from all nearby external zones with housing, and because of the much larger size of these external housing zones, more trips are assigned to them than the houses that are adjacent to the employment. This is evident from the origin-destination ("O-D") outputs from the WRTM which indicate a more significant attraction to / from these neighbouring communities (including communities located within a 30km radius from the Site, e.g. Pokeno, Pukekohe, south Hamilton) than to the internal residential zones within the Site.

(c) However, I expect that there will be a stronger trip attraction between the internal Residential zones and the industrial / business components than to the external Residential zones because:

(i) The close proximity and ease of non-vehicular travel between the residential component of the Site and the industrial / business components. It will make it an attractive place to live and work without having to commute.

(ii) All of the housing will be new, and much of it will be targeted at providing quality living and long-term home ownership for workers and their families of the manufacturing and industrial facilities.

(d) Furthermore, the gravity-based model does not consider site-specific factors such as housing affordability, the type of housing or the attractiveness of the community as a place to live.

(e) On that basis, I anticipate that the external proportion of trips will more likely be in the region of 60% to 70%. Nonetheless, the WRTM's internal vs external trip figures were accepted and applied to the assessment of effects.

6.7 Further reasons why I consider that the WRTM provides a conservative prediction of the Site's external trip generation are:

(a) With the exception of the residential component, the WRTM predicts higher trip rate figures for the key land use components (manufacturing, industrial and business) compared to widely adopted trip generation manuals and related reports.

(b) There is no reduction in external road-based trips for rail-based freight trips in the WRTM. All freight trips (which are anticipated to be around 14% of the total peak period industrial trip generation (80 and 125 truck movements for the AM and PM peak hours respectively) based on surveys conducted at the existing APL operations in Auckland. As previously discussed, APL predicts that the TCG factory will generate approximately 10 HCV trips per day,[2] and possibly double that for the industrial activities within the proposed development. On this basis, I consider that the ITA has conservatively assessed the effects of HCV's by using a higher figure of HCVs assumed to occur on the road network.

(c) There is also no reduction in road trips for alternative transport modes such as walking and cycling for the school (considered and external trip from the site) and PT trips.

Predicted traffic distribution

6.8 The WRTM's predicted trip distribution and assignment for the proposed OSP area indicates a higher trip distribution to the south (i.e. towards Huntly / Hamilton) than the north (i.e. towards Auckland). In my opinion, the WRTM's trip distribution is reasonable for the following reasons:

(a) An assessment of the future population and employment growth projections for both major and minor centres located within a 30km radius of the Site showed that future growth within the Waikato Region is projected to be more towards the south, with approximately 80% of the overall growth in the district expected along the southern population centres such as Huntly and Hamilton City.

(b) The location of the Site is such that it will form part of the larger Huntly community. On this basis, a larger proportion of the trip generated by the proposed development will travel south to Huntly.

(c) The trip distribution generally reflects the existing travel patterns observed at the Interchange derived from 2019 traffic survey data collected within the vicinity of the Site.

6.9 For a robust assessment, sensitivity testing was conducted as part of the December ITA effects assessment in order to test the effects of various plausible trip distribution figures. The findings from the sensitivity testing

2 Statement of Evidence of David Gaze, paragraph 7.20.

are detailed in Section 7. Further sensitivity assessments are discussed in Section 9 in relation to the JWS.

7. TRAFFIC EFFECTS ASSESSMENT AND PROPOSED MITIGATION MEASURES

7.1 Following the completion of the WRTM, the local as well as wider transportation effects were re-evaluated (subsequent to the December ITA) based on the calibrated WRTM traffic flow predictions accounting for the Ohinewai rezoning.

7.2 The traffic effects of the proposed development were assessed using Sidra Intersection for the base (2019) and future year (2031 and 2041). The following external intersections were analysed:

(a) State Highway 1 Ohinewai Interchange western ramp intersection (which is currently a single-lane roundabout).

(b) State Highway 1 Ohinewai Interchange eastern ramp intersection (which is currently a stop control on the southbound off-ramp).

(c) Tahuna Road and Lumsden Road intersection (which is currently a single-lane roundabout).

7.3 Sensitivity testing was carried out testing various plausible trip generation and distribution scenarios.

State Highway 1 Ohinewai Interchange

7.4 Despite what I consider to be conservative trip generation predictions in the 2031 and 2041 WRTM, the effects of the proposed APL rezoning traffic on the capacity of the Interchange ramp intersections proves to be minor. The southbound off-ramp intersection at the Interchange is expected to continue operating at acceptable levels of service in the peak periods (the critical movement is expected to operate at Level of Service D ("LOS") during the AM peak and E in the PM peak) with the APL rezoning traffic added to the 2031 and 2041 baseline. While LOS D and E are reasonably low levels of service, the queue lengths remain less than 50m long, which is significantly shorter than the 127m queue that the off-ramp can safely accommodate. LOS D and E are fairly typical levels of operation during peak flow periods for an intersection serving development involving a significant amount of employment and housing such as this. Accordingly, I consider that no capacity related upgrades are justified at the Interchange.

7.5 Sensitivity testing for various realistically possible trip generation and distribution alternatives showed that the existing interchange configuration has sufficient capacity to operate without adverse effects that are anything more than minor.

7.6 Capacity upgrade solutions at the niterchange involve significant infrastructure works that will be both complex and expensive to achieve. The updated ITA demonstrates that the effects of the total development traffic are likely to be minor at the Interchange, and therefore the cost and works involved to upgrade the Interchange including extra lanes on the bridges and ramps are not justified.

7.7 It is important to note that the existing stop-control configuration at the eastern ramp intersection does not provide for walking and cycling facilities at the interchange. A separate pedestrian and cyclist bridge structure would have to be provided elsewhere over the NIMT and the Expressway.

7.8 One this basis, two configurations were considered for the Interchange's eastern ramp intersection:

(a) Layout Option 1: The existing interchange configuration which does not provide safe road crossing facilities for pedestrians and cyclists (i.e. no pedestrian or off-road cycling access through the Interchange). A separate pedestrian/ cyclist bridge structure would need to be provided at another location over the NIMT and Expressway.

(b) Layout Option 2: Involves signalising the southbound off-ramp intersection with Tahuna Road, including pedestrian crossing facilities at-grade over both the southbound off-ramp and the northbound on-ramp of the Interchange. This option also requires the widening or replacement of the NIMT Bridge (to provide four trafficable lanes) and inclusion of a shared path facility on the northern side of this bridge, and the expressway overbridge.

7.9 Based on the findings from performance assessment, Layout Option 1 (involving a separate walking and cycling connection) has sufficient capacity to accommodate the APL rezoning traffic on the local road network with no more than minor performance effects. The Interchange ramp intersections are expected to operate at acceptable levels of service during both the AM and PM peak periods for both layout options (existing stop-control configuration as well as the upgraded traffic signal configuration at the eastern ramp intersection). The 95th percentile queue length on the

southbound off-ramp is not expected to exceed the safe maximum length of 127m for both layout options.

7.10 However, with Layout Option 2, modelling results show the 95th percentile queues of 33 vehicles (250m) and 25 vehicles (190m) can be expected on the Tahuna Road eastern and western approaches to the eastern ramp intersection respectively during the PM peak period; these long queues do not occur with Layout Option 1 because these approaches maintain free-flow priority. For this reason, Layout Option 1 (i.e. the existing southbound off-ramp layout) is preferred over Option 2.

7.11 The sight lines at the western and eastern ramp intersection were assessed against the minimum sight distances recommended in the *Austroads' Guide to Road Design Document* (Table 3.2 in Part 4A: Unsignalised and Signalised Intersections).

7.12 The sight distances at the southbound off-ramp (looking both west and east) are more constrained than the northbound off-ramp. This has been addressed in detail in Section 9 of my evidence, (Issue 9).

Tahuna Road and Lumsden Road intersection

7.13 The effects of traffic from the proposed Sleepyhead Estate development on the capacity of the Tahuna Road and Lumsden Road intersection are considered to be more than minor with the intersection expected to operate at poor levels of service with the Sleepyhead Estate traffic added to the 2031 baseline.

7.14 To mitigate this, an additional right-turn lane is proposed to be provided on the Lumsden Road approach (resulting in two right-turn lanes) as part of the transportation infrastructure improvement works required to support the rezoning. An additional through-lane will be required on the eastern approach of the intersection to balance the intersection movements. This capacity upgrade is illustrated in the concept design shown in **Figure 19** below.

7.15 Timing wise, the need for the upgrade corresponds to around Stage 5 of the development when approximately 1,000 vph are anticipated to be generated northbound on Lumsden Road by the industrial and business areas in the PM peak hour (say 4-5pm). I recommend that an ITA is carried out at that time by a qualified transport engineer to assess and confirm that the capacity upgrade is still appropriate as well as the timing for it. If the ITA determines it remains valid and is required to mitigate congestion and improve safety,

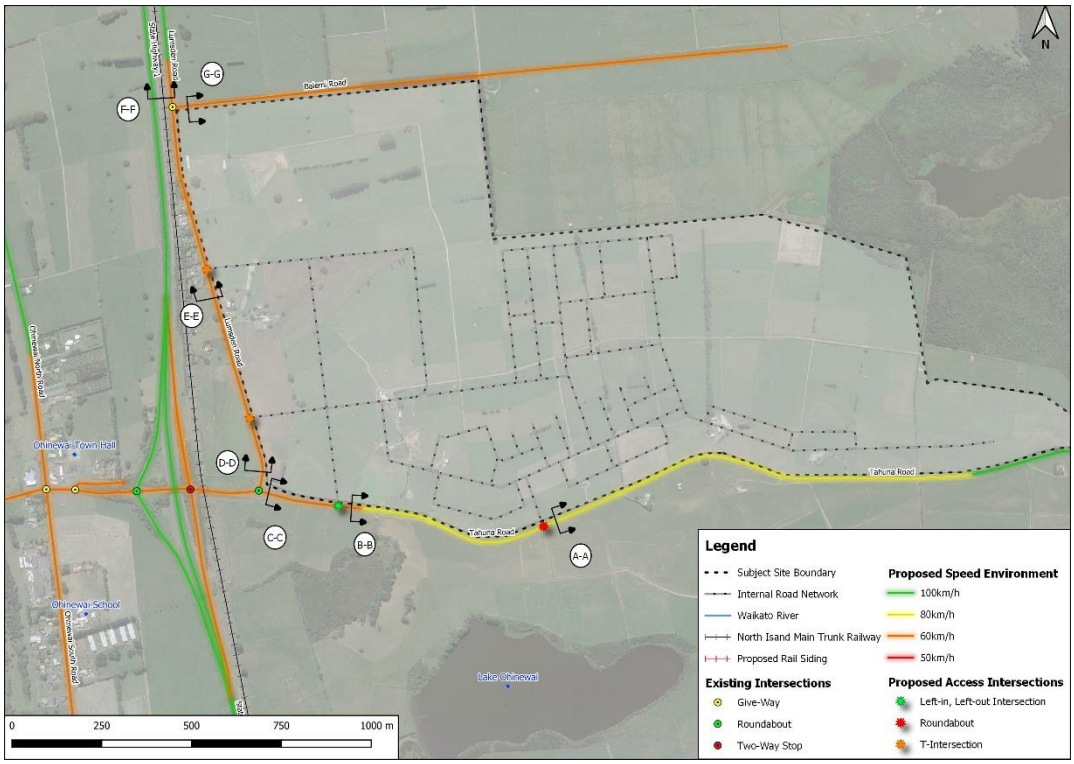
then it should be a condition of a resource consent to deliver the upgrade before any further development stage occurs.

Figure 19: Proposed upgrades at the Tahuna Road and Lumsden Road roundabout

Speed management proposals

7.16 The BBO team and I undertook an assessment of safe and appropriate speed on the external road network as a result of the increased traffic movements (vehicles, pedestrians and cyclists) that are expected to be generated by the development site. Findings from the assessment showed that the current posted speed limits on the adjacent road network would be more suited to the speed framework illustrated in **Figure 20** below (from the ITA).

Figure 20: Proposed Speed Environment



7.17 The road environment along the section of Tahuna Road (which is classified as an Arterial road as per Table 14.12.5.6 of the PDP) bordering the Site is expected to change from a rural to a semi-urban environment adjoining the Site once the Site is fully developed. Given that the road environment on the northern side of the road will effectively become "urbanised", the existing 100km/h posted speed limit along the section of Tahuna Road bordering the Site would not be suited to the new environment. Additionally, the NZTA's Speed Management Guide recommends an 80km/h safe and appropriate speed for Tahuna Road (which falls under the classification of a Class 3 Primary Collector under the NZTA's One Network Road Classification ("ONRC")) based on the existing rural environment.

7.18 The road environment along Tahuna Road, which is a District Arterial, is expected to change from a rural to a semi-urban environment. In line with the NZTA's Speed Management Guide and NZTA's Road and Traffic Standards ("RTS") Series 17 (Setting Speed Limits), the proposal is that the speed limit along the "urbanised" section of Tahuna Road would be changed from the existing 100km/h to:

(a) 60km/h along the section of the road bordering the APL business / commercial area), and

(b) 80km/h along the section of the road bordering the APL residential area where there is no direct property access proposed to Tahuna Road.

7.19 In addition, the following modifications to the road cross-section are proposed which align with the expected speed environment:

(a) Provision of a 0.5m wide sealed shoulder and kerb and shoulder treatment along the eastbound carriageway (i.e. on the side of the road bordering the Site).

(b) Provision of a shared active modes path from the Lumsden Road to approximately 150m east of Access 1 with street lighting along the eastbound carriageway.

7.20 Lumsden Road borders the Site's western boundary and is currently of a semi-rural / urban form with farms and rural-residential lifestyle blocks along the eastern side of the road and several residential dwellings with kerb and channel and road berm along the western side of the road. The rezoning and development of the Site requires the section of Lumsden Road between Tahuna Road to approximately 250m south of Balemi Road to be upgraded to an urban-industrial environment. The existing 100km/h speed limit will not be appropriate for the new land-use environment over this section.

7.21 The road environment on the eastern side of Lumsden Road and the Site's western boundary is proposed to change from a rural character to an urban industrial environment, while the western side of the road would remain as existing with numerous residential dwellings fronting the road. The NZTA's Speed Management Guide recommends a safe and appropriate speed of 80km/h for Lumsden Road (which currently falls under the classification of a Class 3 Secondary Collector under the ONRC) based on the existing rural environment. On this basis the appropriate speed limit for the proposed "urbanised" section of Lumsden Road is 60km/h, and the remaining rural section north of Balemi Road is 80km/h, down from 100km/h. Given that the character would effectively be "urbanised", I proposed that the speed limit along the road frontage of the Site reduce from the existing 100km/h to 60km/h.

7.22 In addition, the following modifications to the cross-section are proposed as part of the transportation infrastructure improvement works required to support the rezoning which are line with the proposed speed environment:

(a) Provision of a 0.5m wide sealed shoulder and kerb & channel treatment along the southbound carriageway (i.e. on the side of the road bordering the proposed development site).

(b) Provision of a shared active modes path from Tahuna Road to Access 4 with street lighting along the southbound carriageway.

7.23 The road environment along the southern boundary of Balemi Road is proposed to change from a rural to industrial environment. Given this change, and that the road currently falls under the classification of a Class 4 Low Volume Access Road (with an ADT of 34 vpd and 6% HCV) under the ONRC, I proposed that the speed limit along the road be change from the existing 100km/h to 60km/h in line with the Figure 1.4 of the NZTA's Speed Management Guide. Provision of a 0.5m wide sealed shoulder and kerb and channel treatment along the westbound carriageway (i.e. on the side of the road bordering the Site) is proposed as part of the transportation infrastructure improvement works required to support the rezoning.

Public transport

7.24 As shown in the Business Area Structure Plan (illustrated in **Figure 5**), PT is promoted within the Site through the provision of both an interim bus stop facility located on Tahuna Road just west of the Tahuna Road / Lumsden Road Roundabout, and the ultimate facility within the proposed business precinct. The identified long-term PT location was selected due to the convenience and accessibility it offers for all users; residents, visitors to the DFO and employment areas in the Site. Critically, it also enables efficient access via a short anti-clockwise circulatory route in and out of the Site to minimise delays to the service. It is designed so buses enter from Tahuna Road at Access 1 and exiting to Lumsden Road at Access 3 then back to the Interchange via the Lumsden Road / Tahuna Road Roundabout.

7.25 WRC has been consulted about the rezoning and the desire for PT to service the Site in future. While WRC acknowledges that there is potential to extend existing Huntly and Te Kauwhata services into Ohinewai, it has concerns about the efficiency of such servicing, the uptake of such if the service frequency is very limited like the Te Kauwhata service, and the lack of any funding now and with no plan for funding the service in future. Section 9 of my evidence deals with these issues in more detail and identifies the progress and agreement made to date between APL and WRC to find lasting solutions.

Walking and cycling

7.26 An extensive walking and cycling network has been provided within the proposed development which consists of shared paths within the public open spaces as well as pedestrian and cyclists paths on both sides of the proposed collector road network and on one or both sides of the proposed local road network within the Site.

7.27 Additional walking and cycle paths are proposed as part of the transportation infrastructure improvement works required to support the rezoning on Lumsden Road and Tahuna Road as follows:

(a) A shared path on the northern side of the Tahuna Road (the side bordering the Site) from the Tahuna Road roundabout to 150m east of Access 1.

(b) A shared path on the eastern side of Lumsden Road (the side bordering the Site) from the Tahuna Road roundabout to Access 4.

7.28 Three options were considered for provision of a dedicated walking and cycling connection over the Expressway. The predominant desire line for future users is expected to be to / from the southwest, where the Ohinewai primary school is located, and connectivity to Huntly is proposed by either a shared path facility on the Waikato River Stop Bank or a separate new path alongside the existing Great South Road (old State Highway 1). The following paragraphs briefly describe the options and reasons for the preferred option:

7.29 Option 1 includes providing a walking and cycling path at the Interchange. This option requires:

(a) Providing two shared path structures, one over the NIMT and another over the Expressway.

(b) Upgrading the eastern ramp intersection to traffic signal control, with pedestrian and cyclist phases to cross the eastern ramp intersection. This option involves widening the southbound off-ramp to accommodate two traffic lanes for queue storage due to the delays introduced by signals and requires replacement of the NIMT overbridge to provide four lanes to accommodate queue storage.

(c) Significant ground improvements around the abutments of the existing Expressway overbridge to mitigate liquefaction risks. The original construction works improved only the area needed to support the current structure.

(d) Providing a signalised pedestrian crossing on the Interchange northbound on-ramp, approximately 20m north of the western ramp intersection. At this location, vehicle operating speeds will still be less than 50km/h due to having just exited the roundabout. This is proven by the 85th percentile speed of 74.5km/h recorded approximately 85m north of the roundabout intersection.

(e) Overall, this option presents a significant engineering and cost challenge due to the major infrastructure amendments required to accommodate the shared paths and crossings. It also exposes pedestrians and cyclists to some safety risk with crossing the off and on ramps of the Interchange. Lastly, the installation of signals on the eastern intersection of the Interchange results in worse queuing and delays on the southbound off ramp and both approaches on Tahuna road than without the signal control.

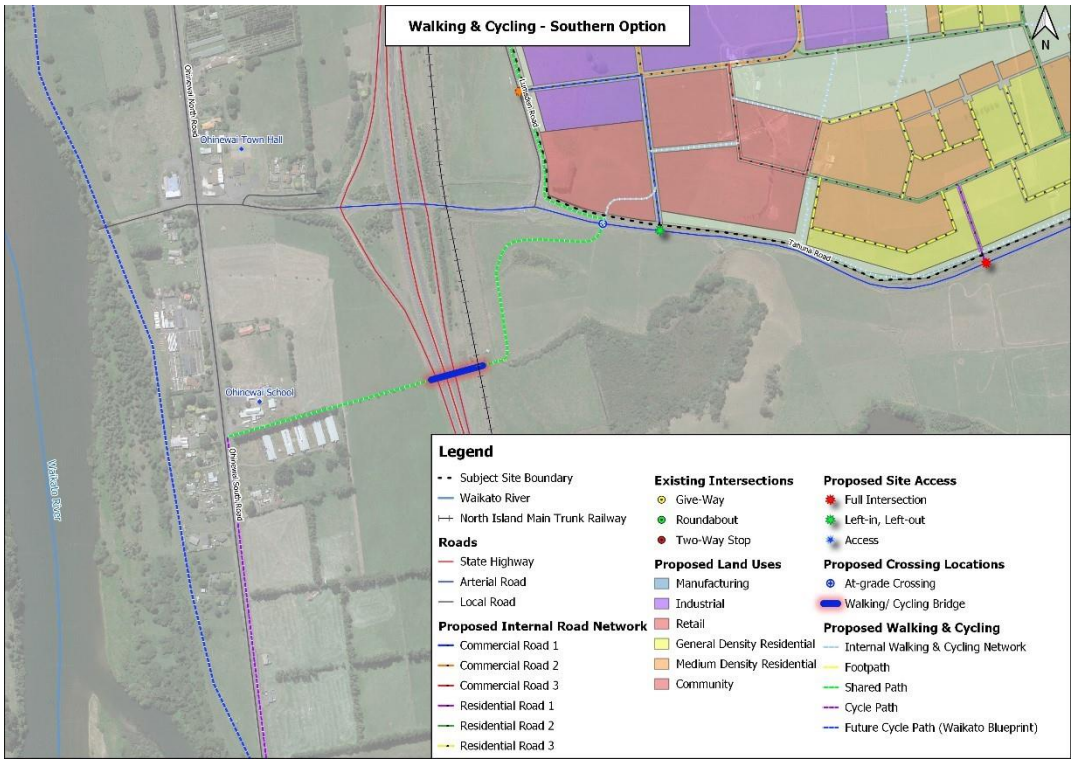
7.30 Options 2 and 3 both involve a new purpose-built walking and cycling-path bridge over the Expressway and NIMT, connecting to Ohinewai west. The key difference between the two options is the location of the structure and approach paths, and the length of the structure.

(a) Option 2: The new structure would span the NIMT and Expressway, located approximately 215m north of the Interchange. The bridge would connect to a new shared path on the eastern side of State Highway 1 through KiwiRail land which would extend from the local industrial road within the APL development at the proposed T-intersection on Lumsden Road (Access 3). The bridge would connect to a new shared path on the western side of State Highway 1 provided within the interchange road reserve and then on to Ohinewai South Road via Lilley Lane.

(b) Option 3: The new structure would be located approximately 315m south of the Interchange. The bridge connects to a new shared path on the eastern side of State Highway 1 through Department of Conservation reserve land and some privately-owned land to the south of Tahuna Road. The path then connects to the proposed shared path on the northern side of Tahuna Road via the raised-platform zebra crossing on the western leg of the Lumsden Road/ Tahuna Road roundabout. On the western side of the Expressway, the bridge path connects to a new shared path through privately-owned land to Ohinewai South Road along the southern boundary of Ohinewai Primary School. Private land-owners affected by the path

have been consulted about the proposal and are supportive of the future connection, subject to details around acquiring the land. This option is illustrated in **Figure 21** below.

Figure 21: Walking and Cycling Connection to Ohinewai West and School



7.31 A detailed comparison of the options is provided in the ITA.

7.32 As a summary, Option 1 has significant engineering challenges for providing a shared path through the Interchange, and more complexity and risk relating to the safety of pedestrians and cyclists crossing the on and off ramps. For these reasons it was not considered to be a viable option worth any further consideration.

7.33 Option 3 (the southern stand-alone option) is preferred over Option 2 for the following reasons:

(a) The route aligns with the expected, predominant desired lines for walking and cycling between the Site and Ohinewai west. It offers a safer and more direct connection than the other options to Ohinewai Primary School and Huntly.

(b) It involves just one road crossing on the external network: that being the proposed raised pedestrian platform zebra crossing on Tahuna Road. Option 2 involves two road crossings and shared use of an

access lane. Less exposure to road traffic for users means less safety risk, which is important for use of the path by school children.

(c) The route provides a shorter bridge span over the Expressway compared to the northern option (Option 2), and therefore lower construction and maintenance costs. Pedestrians / cyclists only cross the external road network at one location, which is Tahuna Road at the proposed zebra pedestrian crossing where vehicle speeds have slowed due to the exiting roundabout.

(d) Shorter travel times between the Site and Ohinewai Primary School and Huntly compared to the northern option.

(e) In November 2019, John Olliver consulted with the two affected private landowners on either side of the bridge position (at 15 Ohinewai South Road) on the potential walking and cycling path connections to the bridge. Both parties expressed positive feedback and were not opposed to the concept. Land for the paths would need to be purchased or made legally accessible to the public in some way, and the alignment on the west side would need to work in with the rural-residential development plans that the zone allows for.

7.34 In summary, the southern standalone walking and cycling bridge is the preferred solution for crossing the NIMT and Expressway because it provides the safest solution for active mode users (including school children) while also aligning best with the expected, predominant walking and cycling desire lines between the east and west sides of Ohinewai.

7.35 All traffic experts agreed in the JWS para. 13.6, with the following statement:

> *"All agree that the most appropriate location for an active modes connection should be to the south of the Interchange".*

7.36 However. I also note that Mr Swears and Ms McMinn are of the view that the average distance for walking to the Ohinewai Primary School and other trips via the new bridge is too long, so its use may not be high. But they agree that if only one overbridge is provided then the position to the south is the better location of the options considered.

7.37 NZTA has confirmed in writing that a new pedestrian and cycling bridge can be constructed over the Expressway to the south of the Interchange. This agreement is subject to usual design conditions and approvals, including that the bridge is removable on a temporary basis by mobile crane if significant over-dimension loads need to pass through on State Highway 1, and also for

future off-site maintenance work. This condition can be accommodated in the design.

7.38 My recommendation for the purposes of rezoning is that the southern bridge option be identified as the preferred walking and cycling connection route over the NIMT and Expressway. However, district plan provisions should not preclude the northern structure option (Option 2) in the event that further information make it apparent during the design of the southern bridge option that the northern option is more feasible. This provides greater certainty that a safe and efficient pedestrian and cycling connection between the eastern and western side of Ohinewai will be provided.

7.39 In terms of walking and cycling linkages from Ohinewai to Huntly, **Attachment A** shows an indicative walking and cycling linkage between Ohinewai and Huntly using the Ohinewai South Road (old State Highway 1) and current State Highway 1 that will be revoked to a WDC road following the opening of the Huntly Section of Expressway in early 2020. There is significant amount of space in the road reserve that could be transformed to accommodate segregated paths for cycling and walking. However, a fully segregated path would only be possible once State Highway 1 is revoked and the carriageway space reallocated by WDC to accommodate safe facilities for walking and cycling.

7.40 An alternative and attractive option is for a shared walking and cycling path on the Waikato River Stop Bank between Ohinewai to Huntly. This is currently shown in the Waikato Blueprint as a future ambition for the district, although Ms McMinn noted in the JWS that "the stop-bank path is not funded in the current WDC LTP".

7.41 I consider that a river bank path would benefit not only workers and residents of the APL development, but the wider community including Huntly and residents in Ohinewai West. The path could quite possibly become a popular recreational asset for community enjoyment. So, in my opinion, the proposed plan provisions in relation to the APL rezoning should allow for multiple funding partners to enable formation of the path, ideally on the Waikato River Stop Bank between Ohinewai and Huntly.

Staging of transportation infrastructure improvements

7.42 The staging triggers associated with each proposed transportation improvement are described in Table 31 of the ITA. The triggers were devised according to one or both of the following:

(a) Transport safety improvements associated with the subdivision and/or development of specific land use areas.

(b) Capacity and safety improvements associated with the advancement of the proposed development stages of the Project. Although the change in effects that trigger mitigation is never 'black and white', I have endeavoured to practically relate the staging of improvements as the associated number of trips expected to be generated and distributed on the local road network increases as the Site successively develops.

7.43 For example, the new shared path bridge connection over the NIMT and Expressway and its associated approach paths is a very significant and expensive piece of infrastructure. The effects of not providing it at the very start of development of the Site are negligible in my opinion as there will still be very low demand for walking and cycling between the eastern and western sides of Ohinewai even with Stage 1 of the TCG factory operating.

7.44 Therefore, to match an increase in demand, I have recommended that the shared path bridge be constructed upon the first 100 houses being completed on-site. Completion of 100 houses will create a level of demand for walking and cycling that is not negligible, but also not very high. Based on typical trends in the Waikato where approximately 4% to 5% of travel is by walking and cycling trips, and assuming an average household occupancy of 3.0 people, the first 100 houses could potentially generate walking and cycling demand of approximately 15 trips in the peak hours. Not all of these would be external from the Site, but some will be school and work-related trips that could use the path and bridge.

Construction traffic management

7.45 Construction of Sleepyhead Estate and the internal road network is expected to occur in stages starting with ground improvements in 2020 through to completion approximately by 2028 (subject to market conditions).

7.46 As set out in Mr Pain's evidence, it is expected that significant volumes of clean fill material will be imported during this 8-year period from off-site to lift the ground levels above the existing site levels as there will not be enough fill available from the designated "cut" area.

7.47 It is anticipated that the clean fill material will be sourced from several quarries within the Waikato Region and transported to site using 50MAX truck-and-trailer units. Given the proximity of the nearest quarries to the

site are also near Expressway, it is expected that most, if not all, of the truck-and-trailer units hauling fill material will access the Site via the Ohinewai Interchange and Tahuna Road.

7.48 The ground improvement earthworks, subdivision and building construction activities will all temporarily increase traffic volumes at various stages throughout development, on the expressway, Tahuna Road and Lumsden Road. Separate resource consent applications and Construction Traffic Management Plans ("CTMP") for each phase of works will be required to determine, quantify and mitigate any transportation related effects of construction traffic.

7.49 However, an overarching principle for the bulk import fill phase of earthworks in particular, is to minimise adverse amenity effects on residents on Lumsden Road opposite the Site. This is anticipated to be achieved by requiring access to the site from purpose-built accesses (either temporary or at future permanent intersection locations) on Tahuna Road, connecting to internal haul roads. The importation of fill material will be restricted to the temporary access(es) on Tahuna Road and the proposed haul road. The proposed temporary access(es) should be constructed as per the RITS standards for heavy commercial rural entranceways. The location and access design will be subject to planning and engineering approvals from WDC.

8. CONSULTATION

8.1 Consultation on transportation matters related to the rezoning proposal has been undertaken with the NZTA, WRC and WDC staff.

8.2 I met with NZTA staff on-site on Thursday, 30th January 2020 to walk-over and discuss the extent of the mitigation measures to be implemented as a result of the draft ITA conclusions and recommendations.

8.3 Essentially the meeting was to enable NZTA staff to familiarise themselves with the site in the context of the surrounding road network.

8.4 Since then my colleague, Msi Baloyi, and I have corresponded with Mr Swears in relation to running the APL development in the WRTM model to assess the trip generation and distribution effects, as per his initial feedback recommendation. Ms Baloyi confirmed the inputs and calibration of the model and provided the results update to Mr Swears and Ms McMinn (being, as already noted, the traffic peer reviewing consultant for WDC) for review.

8.5 On 19 February 2020, Ms Baloyi and I met with Ms McMinn to discuss the transportation matters of the rezoning and further information requests from her initial review of the ITA. The requested information was subsequently provided to Ms McMinn.

9. TRANSPORTATION ENGINEERING JOINT WITNESS STATEMENT

9.1 Expert Witness Conferencing between the transportation experts for WDC, WRC, NZTA and APL occurred over two days on 22 and 23 June 2020. A JWS was written and signed on 24 June 2020 by the four experts after the conferencing meeting. This documented the key issues and whether there was agreement or disagreement in relation to the assessment of the effects in the ITA.

9.2 The JWS identifies 27 key issues of agreement and disagreement for transportation effects. For brevity, I will respond to each of the issues only where there was no agreement and only those, in my opinion, where the issue and disagreement is fundamental to whether the Site is appropriate for the proposed rezoning or not. In some cases, I refer to back to my evidence where I consider I have already addressed the particular issue of disagreement. In other cases, the disagreements are somewhat academic in my opinion as further assessments of effects to confirm the details of mitigation and timing will be required as part of future resource consent applications for developing the various stages of the Site.

Issue #2: *Appropriateness of the trip generation rates adopted in the updated ITA from the WRTM for the industrial, residential and commercial components of the Ohinewai Structure Plan (OSP)*

9.3 Mr Swears and Ms McMinn noted in paragraph 3.5 of the JWS that the robustness of the trip generation rates affects certainty over mitigation measures (looking at whether the scale and timing of mitigation is identified correctly – not the detailed design of mitigation).

9.4 However, despite general disagreements about whether the trip generation rates applied in the WRTM and the ITA are conservative or representative of expected trip generation in future, the experts ultimately agreed in paragraph 3.6 of the JWS that:

> *With the exception of the Interchange ramps (see later), the type of transport upgrades already identified in the ITA are likely to be the ones required (with details to be confirmed at resource consent stage). However, if certain transport upgrades not currently identified as necessary are later shown to be necessary, these can be required at resource*

consent stage as long as plan provisions are drafted specifically to allow that.

9.5 Then in paragraph 3.7:

> *Future resource consents will be required, and Cameron considers that to be the appropriate way of fine tuning mitigation measures. Robert and Naomi consider that the uncertainty could be adequately reduced by undertaking sensitivity testing on the updated WRTM and sensitivity scenario. Cameron; original sensitivity testing used higher rates for industrial and residential [than the WRTM has] – and showed the proposed network upgrades are robust (Section 8.18 of the ITA, Issue 2) – he considers this was robust and conservative at the time. The experts agreed to document and share with each other before the hearing their opinions with regard to sensitivity testing.*

9.6 At the time of writing this evidence the discussion about sensitivity testing is yet to occur as Mr Swears was on annual leave soon after the JWS was signed. However, further sensitivity tests have been carried out and updated in the final ITA, as follows (the results from the sensitivity testing are summarised in **Table 2** below):

(a) Test A1: Trip rates for industrial & commercial all +10%

(b) Test A2: Trip rates for residential +10%

(c) Test A3: Trip rates for industrial, commercial & residential all +10%

(d) Test A4: Trip rates for industrial & commercial all +20%

(e) Test A5: Trip rates for residential +20%

(f) Test A6: Trip rates for industrial, commercial & residential all +15%

Table 2: Findings from the Trip Rate Sensitivity Assessment (SIDRA outputs for critical movements)

Critical Movement				AM Peak						
Intersection	**Approach**	**Movement**	**Sidra Outputs**	**Test A0**	**Test A1**	**Test A2**	**Test A3**	**Test A4**	**Test A5**	**Test A6**
Tahuna Rd/ Lumsden Rd Roundabout	Northern approach (Lumsden Road)	Right-turn	Volume (vph)	248	256	248	261	273	248	266
			LOS	A	A	A	A	A	A	A
			95th percentile queue (m)	7.1	7.4	7.1	7.8	8.4	7.2	8.1
			Ave Delay (sec)	9.0	9.0	9.1	9.2	9.2	9.1	9.3
Eastern Ramp Intersection	Northern approach (SB off-ramp)	Right-turn	Volume (vph)	15	15	15	15	15	15	15
			LOS	D	D	D	D	D	D	D
			95th percentile queue (m)	29.1	31.3	30.3	34.8	39.4	31.2	28.6
			Ave Delay (sec)	27	28.3	28.1	30.9	33.0	29.1	33.2
	Western approach (Tahuna Road)	Right-turn	Volume (vph)	7	7	7	7	7	7	7
			LOS	A	A	A	A	A	A	A
			95th percentile queue (m)	0	0.2	0.2	0.3	0.2	0.3	0.3
			Ave Delay (sec)	8.6	8.7	8.9	9.1	8.8	9.3	9.3

Critical Movement				PM Peak						
Intersection	**Approach**	**Movement**	**Sidra Outputs**	**Test A0**	**Test A1**	**Test A2**	**Test A3**	**Test A4**	**Test A5**	**Test A6**
Tahuna Rd/ Lumsden Rd Roundabout	Northern approach (Lumsden Road)	Right-turn	Volume (vph)	1,098	1,128	1,098	1,169	1,242	1,098	1,205
			LOS	D	C	C	D	E	D	E
			95th percentile queue (m)	121.5	125	127.2	192.1	263.1	148.5	286.7
			Ave Delay (sec)	21.3	20.7	21.7	28.9	36.4	24.9	41.8
Eastern Ramp Intersection	Northern approach (SB off-ramp)	Right-turn	Volume (vph)	6	6	6	6	6	6	6
			LOS	E	F	F	F	F	F	F
			95th percentile queue (m)	44	46.6	52.6	61.1	59.1	63.6	76.6
			Ave Delay (sec)	47.8	50.1	52	59.5	60.5	58.9	68.2
	Western approach (Tahuna Road)	Right-turn	Volume (vph)	15	15	15	15	15	15	15
			LOS	D	D	D	E	F	D	F
			95th percentile queue (m)	2.1	2.4	2.2	3.1	4.3	2.3	3.9
			Ave Delay (sec)	30.6	34.2	31.9	43.4	63.2	33.4	55.6

9.7 As shown in **Table 2**, the worst performing sensitivity test is Test A6, causing a 95th percentile queue of 76.6m (equivalent to 13 cars) on the southbound off-ramp during the PM peak. The ramp length is 312m from the stop line to the nose of the gore area of the ramp. The required deceleration distance (comfortable deceleration) from 110km/h to a stop is 185m[3]. On this basis, the 95th percentile queue length on the southbound off-ramp should not exceed 127m. There is clearly ample reserve storage (50m) to the back of the worst-case sensitivity test queue length. This is discussed further in Issue 25 below.

9.8 The same Test A6 produces a 287m 95th percentile queue southbound on Lumsden Road at the Tahuna / Lumsden Roundabout, due to over 1,200 vph giving way to approximately 650 vph eastbound flow.

9.9 These sensitivity test volumes are significant, and the resulting queue length on Lumsden Road is very large. I consider that this volume of traffic is highly unlikely given it would require all of the trips rates to be significantly higher than published survey results indicate, and effectively no reduction in peak hour freight trips due to the rail siding. However, at the same time it demonstrates that the assessment of the mitigation and approximate timing of transport upgrades is robust and appropriate.

3 Table 5.2 in Austroads Road Design Guide Part 4A

Issue #6: Are the impacts of the Ohinewai Structure Plan development on the operation of the surrounding road network, including the Waikato Expressway, acceptable?

9.10 There are two areas of disagreement on this issue. The first is defined in para paragraph 7.3 as follows:

> *"Mr. Swears considers that a fundamental issue is that the Ohinewai Interchange was not designed with the Ambury proposal foreseen. Also, as a fundamental principle, the Expressway should not be used for the local trips as a fundamental principle. More of a strategic issue but also has some level of service concerns as the Ohinewai Interchange and the Huntly Northern Interchange are close together (5-8 km is minimum desirable spacing – para 6.32)."*

9.11 In response, I agree that the Interchange was not designed with the APL proposal foreseen. It was designed in 2001 / 2002 as a Design and Construct contract 17 year before APL took interest in the area. However, that does not mean the Interchange is unsuitable or inappropriate for accessing APL's proposed development on the Site. Neither is it an uncommon situation. It is the reason for the transportation effects assessments, to identify what effects may be generated by the development and what solutions are available and feasible on the network to mitigate effects to an acceptable level.

9.12 The ITA for rezoning the Site identified a number of network improvements that are now proposed as part of the plan provisions, some of which address significant shortfalls in modern infrastructure that are critical for safety, such as safe walking and cycling connections across the Expressway. I consider that it should be remembered that we engineer and plan in largely challenging environments in New Zealand, both the natural ground condition, topography and built environment provides significant constraints that limit options and requires the need to work with and make the best of the realistic options we have. I consider through our extensive ITA assessments and modelling work that we have demonstrated that suitable and appropriate network improvements exist to acceptably mitigate the likely transport movement effects of the APL development at Ohinewai Interchange and the adjacent local roads. The upgrades will deliver high levels of safety and improved efficiency for future users and the community, and the development enables a broad multi-modal choice for trips by rail, heavy vehicles, walking and cycling and private cars. So given the assessment of transport effects identifies and mitigates the critical safety and mode choice issues, it is my opinion that the less than desirable spacing of the Ohinewai and Huntly North Interchanges is non-complying with a

strategic ideal that is rare to achieve on much of the network while ticking all of the other boxes that make the Site ideal. I consider the separation distance in this case to be largely of inconsequential effect given the scale of the volumes on the ramps and the Expressway in 20 years-time.

9.13 The second area relates to left turning HCV semi-trailer truck turning paths at the Interchange.

9.14 Mr Swears tabled a model showing the 19.4m HMPV semi-trailer significantly encroaching into the oncoming traffic lane when turning left from the southbound off ramp to Tahuna Road. I demonstrated through a tracking path model of the NZS RTS 18 2007 semi-trailer that the vehicle can turn left without encroaching onto the opposite lane although there is no safe space for cyclists in the eastbound shoulder when trucks turn. I disagreed with Mr Swears that the HPMV semi-trailer is the required design vehicle when the NZS (albeit over 10 years old) specifies the 17.9m semi-trailer. In my opinion the HPMV semi-trailer is an over-dimension truck that has recently been approved to travel on many parts of the New Zealand road network, other than where bridge cannot withstand the 50-tonne weight. Every HPMV truck requires a permit to operate, so it is not a standard length of vehicle in that sense. In approving their use, there was no campaign of intersection and road upgrades around the country so NZTA must have accepted that there will be many locations where an HPMV cannot turn and remain wholly within the lane markings. In my opinion the expectation is that HPMV drivers turn into space on the road when it is safe to do so in order to complete the manoeuvre.

9.15 Notwithstanding this, I agreed to undertake some further turning path assessments provided we could obtain an HPMV semi-trailer tracking curve model (they are not standard, so not commonly available) and Mr Swears would try to obtain information from NZTA about the proportion of HPMV semi-trailer trucks in the heavy vehicle fleet on State Highway 1 near Ohinewai.

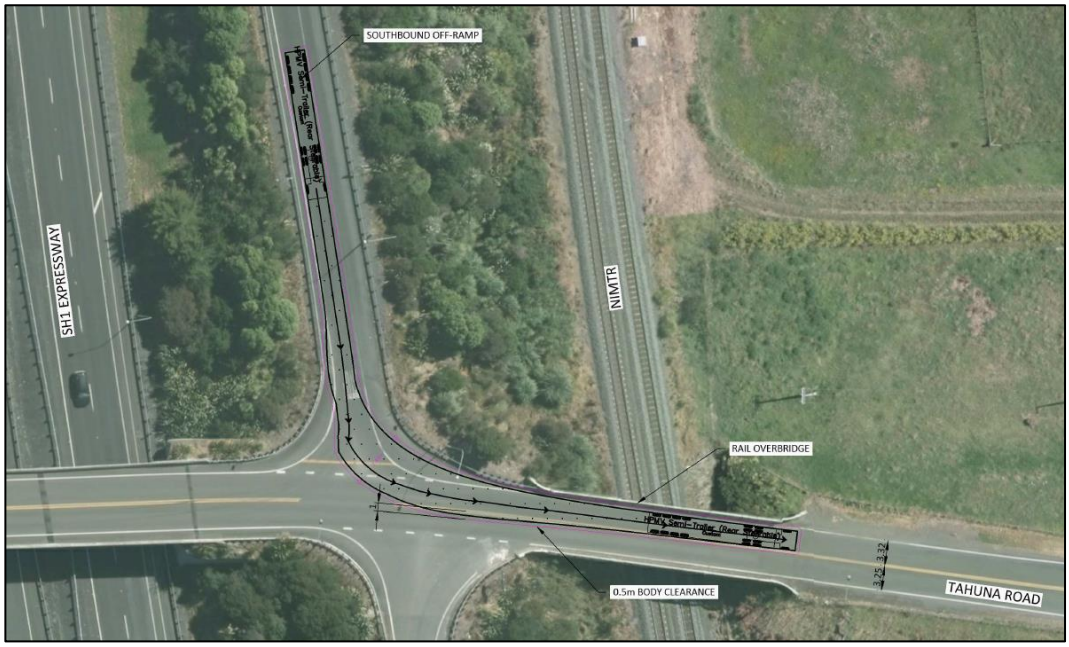
9.16 Mr Swears has since confirmed that data on the proportion of HPMV semi-trailers on State Highway 1 is not available from the information NZTA currently collects at the weigh-in-motion or telemetry traffic count sites.

9.17 However, it occurred to me that we have classified count information from the tube counts on the southbound off-ramp recorded in August 2019. By adjustments in the software the count data can be broken down to vehicle class and size. On this basis, the 5-day average daily count of semi-trailer HCV greater than 19m long is five trucks out of a 5-day average daily total

of 96 trucks (5.2%). The peak hours contained an average of just 1 HPMV semi-trailer truck. The single highest volume of HPMV trucks on the off-ramp is the Truck and Trailer unit at 67% of all HPMV.

9.18 **Figure 22** below illustrates the tracking path assessment that was undertaken using a 19.4m HPMV semi-trailer tracking curve model which was provided to me by Mr Swears' design colleague, Mr Johan Becker. As the figure illustrates, the tracking curve of a 19.4m HPMV (which includes 0.5m body clearance on each side) is anticipated to only encroach a maximum of a metre into the opposing traffic lane (this includes the 0.5m body clearance; effectively, the body of the truck encroaches only 0.5 m into the opposing lane). As shown in **Figure 22**, while the 19.45m HPMV tracking curve does encroach onto the opposing lane, it does so at a significantly lesser extent than indicated by Mr Swears in his Summary Position Statement.

Figure 22: 19.4 m HPMV Tracking Curve Diagram



9.19 A video recording on-site reveals the tracking of actual HPMV trucks turning left on to Tahuna Road. The screen shot of the video below (**Figure 23**) illustrates that the front of the Truck and Trailer HPMV just crosses the centreline of Tahuna Road, but to a significantly less extent than indicated by Mr Swears in his Summary Position Statement.

9.20 As stated above, I expect that some minor encroachment by HPMV trucks into other traffic lanes as shown below is generally accepted on existing infrastructure, provided the manoeuvre is carried out safely as was

demonstrated by this driver. If this acceptance is not the case, such roads would be excluded for use by HPMVs.

Figure 23: Observed HPMV truck manoeuvre at the southbound off-ramp (June 2020)

9.21 In paragraph 7.6 of the JWS, Mr Swears questioned the effect on the SIDRA modelling if turning HPMV's need to wait for both lanes to clear. I responded that delay in turning has already been accommodated within the SIDRA modelling. Having said that, I carried out further sensitivity tests subsequent to expert conferencing to test the impact of higher gap acceptance and opposing vehicle factors (i.e. higher delay in turning factors for large trucks) for left turning heavy vehicles at the southbound off-ramp, as follows (the results from the sensitivity tests are summarised in **Table 3** below):

(a) Test B1: Gap acceptance and opposing vehicle factor of 2.5 (SIDRA default value for large vehicles) and a design vehicle length of 19.5m.

(b) Test B2: Gap acceptance and opposing vehicle factor of 3.0 (Highway Capacity Manual (HCM) default value for large vehicles) and a design vehicle length of 19.5m.

(c) Test B3: Gap acceptance and opposing vehicle factor of 4.0 and a design vehicle length of 19.5m.

Table 3: Findings from the Gap Acceptance Sensitivity Assessment (SIDRA outputs for critical movements)

Critical Movement				AM Peak			
Intersection	**Approach**	**Movement**	**Sidra Outputs**	**Test B0**	**Test B1**	**Test B2**	**Test B3**
Eastern Ramp Intersection	Northern approach (SB off-ramp)	Left-turn	Volume (vph)	309	309	309	309
			LOS	B	C	C	C
			95th percentile queue (m)	21.9	27.9	31.5	41.2
			Ave Delay (sec)	14.4	16.7	18.2	22.2
	Northern approach (SB off-ramp)	Right-turn	Volume (vph)	15	15	15	15
			LOS	C	C	C	C
			95th percentile queue (m)	21.9	27.9	31.5	41.2
			Ave Delay (sec)	19.7	21	21.9	24.5
	Western approach (Tahuna Road)	Right-turn	Volume (vph)	7	7	7	7
			LOS	B	B	B	B
			95th percentile queue (m)	1.1	1.1	1.1	1.1
			Ave Delay (sec)	10.4	10.4	10.4	10.4

Critical Movement				PM Peak			
Intersection	**Approach**	**Movement**	**Sidra Outputs**	**Test B0**	**Test B1**	**Test B2**	**Test B3**
Eastern Ramp Intersection	Northern approach (SB off-ramp)	Left-turn	Volume (vph)	397	397	397	397
			LOS	C	C	C	D
			95th percentile queue (m)	31.6	42.3	49.7	74
			Ave Delay (sec)	15.3	18.5	20.7	28.5
	Northern approach (SB off-ramp)	Right-turn	Volume (vph)	6	6	6	6
			LOS	D	D	E	E
			95th percentile queue (m)	31.6	42.3	49.7	74
			Ave Delay (sec)	31.8	34.4	36.4	43.3
	Western approach (Tahuna Road)	Right-turn	Volume (vph)	15	15	15	15
			LOS	E	E	E	E
			95th percentile queue (m)	25.1	25.1	25.1	25.1
			Ave Delay (sec)	44.5	44.5	44.5	44.5

9.22 The worst performing sensitivity test is Test B3 (longest turning delay), causing a 95th percentile queue of 74m (equivalent to ten cars) on the southbound off-ramp. The ramp length is 312m from the stop line to the nose of the gore area of the ramp. The required deceleration distance (comfortable deceleration) from 110km/h to a stop is 185m[4]. On this basis, the 95th percentile queue length on the southbound off-ramp should not exceed 127m. There is clearly ample reserve storage (55 m) to the back of the worst-case sensitivity test queue length.

9.23 A further area of disagreement related to truck tracking curves is recorded in paragraph 7.7 of the JWS as:

> *Significant safety risk including to cyclists because there is no extra space or shoulder on the [rail] overbridge. Naomi is concerned that the tracking curves have no clearances (0.5 m each side). Cameron – HPMV occasional, risks to the likely low number of cyclists can be mitigated through signage. Robert and Naomi disagree.*

9.24 I agree there is significant safety risk to eastbound cyclists on Tahuna Road at present when large trucks turn left on to Tahuna Road from the

4 Table 5.2 in Austroads Road Design Guide Part 4A.

southbound off-ramp. There is no safe shoulder space for a cyclist to co-exist with a truck at that position.

9.25 However, Mr Swears and Ms McMinn disagree with me that the risk can be sufficiently mitigated through signs and other measures that exclude widening or replacing the rail overbridge.

9.26 In my opinion, widening (which is unlikely to be possible) or replacing the bridge with a new wider version to address this apparent safety issue is disproportionate to the likelihood of such a crash occurring in the first place. My suggestion of signs was alluding to the fact there are very few cyclists in this location now, and the preferred walking and cycling path over the Expressway and NIMT south of the Interchange will see very few people walking and cycling over the existing bridges in future. Instead, for the occasional cyclists on Tahuna Road, I consider there to be cost efficient and innovative ways to achieve the same outcome, which is avoiding the serious injury or death of a cyclist. Electronic Messaging Signs can now be activated through loop, radar or video detection of a cyclist. The sign board lights up (from an otherwise black facia) alerting drivers to the presence of cyclists. It lights up only when there is a cyclist, so avoids becoming part of the road furniture and losing their effectiveness over time as static signs do.

9.27 Once such system exists on Boundary Road in Hamilton on the westbound approach to Whitiora Bridge. I enquired of John Kinghorn at Hamilton City Council about how that sign works. He responded that cyclists are detected by loops cut into the sealed shoulder, which makes the sign light up and flash.

9.28 Another system was recently installed by Mr Kinghorn and Hamilton City Council on Claudelands Bridge where cyclists merge from a segregated cycle lane to share the road with vehicles. In this case they use radar and video detection. Radar was used to identify the cyclists speed and then calculate how long to flash the warning sign up for (travel time). The Google Street View image below shows this system soon after it was installed. It is worth noting this is used as a safety solution for space constraints on an existing bridge structure, much like what I am suggesting is appropriate for Tahuna Road.

Figure 24: Electronic Messaging Signs at the Claudelands Bridge, Hamilton (Source: Google Street View)

9.29 To prove these solutions are not only found in Hamilton, a cycle safety system is installed on the Petone northbound off-ramp in Wellington, which carries over 15,000 vpd. The system is shown below and has been operative for more than eight years now. Illuminated warning signs are activated by approaching cyclists by clicking the button on the post. These warns motorists of the cyclist's presence on the constrained road section ahead. This system is not as sophisticated as the newer systems in Hamilton, but it achieves the same purpose.

Figure 25: Cycle safety system on the Petone northbound off-ramp, Wellington (Source: Google Street View)

9.30 These are examples of appropriate mitigation measures that I consider are appropriate for implementation on the Tahuna Road rail overbridge and southbound off-ramp of the Interchange as an effective means of alerting drivers to the presence of cyclists. With the signs activated, it would be unlikely that a driver of a large truck or HPMV would not look for the cyclist and wait until the cyclist has moved out of harm's way before proceeding to turn the truck on to the rail overbridge.

9.31 Static signs like those on the Petone Off-ramp (**Figure 26** below) could also be effective on the Interchange southbound off-ramp, in advance of the electronic signs.

Figure 26: Static warning signs on the Petone northbound off-ramp, Wellington (Source: Google Street View)

Issue #8: *Is the conclusion for no capacity-related upgrades being needed to the Ohinewai interchange, based on the updated ITA modelling and effects assessments, agreed?*

9.32 Ms McMinn agreed with me (paragraph 9.3 of the JWS) that capacity related upgrades to the Interchange are unlikely to be required, based on the updated ITA assessment. However, paragraph 9.2 states that Mr Swears does not have sufficient information to draw any conclusion.

9.33 I strongly disagree with Mr Swears that he does not have sufficient information to draw any conclusion. There is a significant amount of detailed assessment of the Interchange capacity (which is essentially the capacity of the two off-ramp intersections with Tahuna Road) in both the December 2019 draft ITA and the May 2020 updated ITA. Each ITA report assessed the performance and capacity of the Interchange using industry standard SIDRA software but the input flows representing full Site development were derived using different methods of calculating trip generation and proportion of trips that would be to and from the Site and internally within the Site. The first method, in the December 2019 ITA was from first principles for trip generation from land use activities, applying industry standard trip rates for manufacturing, light industrial, commercial, retail (neighbourhood centre) and residential.

9.34 Following an initial review of the December 2019 draft ITA on behalf of NZTA, Mr Swears recommended that the APL proposal should be modelled using the WRTM to determine the Site's trip generation and distribution on the road network. BBO proceeded to do this, involving Stantec (the operators of the WRTM) to calibrate the WRTM to 2019 conditions and then model the APL development effects relative to a 20-year baseline timeframe. BBO then updated the Interchange capacity assessment models to reflect the WRTM volumes at the intersections, and revised the capacity assessment in Section 8 of the May 2020 ITA. This includes five scenario tests of the Interchange capacity including 2031 and 2041 performance assessments with and without the APL development traffic included.

9.35 Overall, the capacity assessments for the Interchange, using the WRTM traffic volumes as requested by Mr Swears, revealed that the Interchange will continue to operate at good LOS in 2041 with APL development. That is, no worse than LOS B in the PM Peak for the western roundabout, and LOS C during both peaks for the eastern intersection). The 95th percentile queue length predicted on the northbound off-ramp (western intersection) is just 39m, and 36m is predicted for the southbound off-ramp with full APL

development traffic. This modelling work clearly demonstrates that the Interchange has more than enough capacity to accommodate the APL development traffic as predicted by the WRTM, without any need for capacity upgrades.

Issue 9: Sight Distances at the Ohinewai Interchange

9.36 I demonstrated to Mr Swears and Ms McMinn during the expert witness conference meetings that more work had been done since the May 2020 ITA, to assess the sight distance looking west from the southbound off ramp of the Interchange. My initial assessment identified that it fell short of the minimum SISD of 95m[5], for an 85th percentile speed of 49km/h (assuming the minimum desirable reaction time of two seconds applies). There is real difficulty in measuring the sight distance on site due to vegetation (which should be removed) on the west side of the southbound off ramp, and the lack of any safe shoulder zone on the westbound lane of the overbridge to physically measure to.

9.37 However, I explained that I managed to find the original as-built long-section and plan view drawings of the Interchange bridge from 2003, and from that, was able to accurately measure the sight distance from the southbound off-ramp in accordance with accepted Austroads practices (driver eye height 1.1m at a minimum of 3m back from the through lane edge line). I found that for the measured operating speed of 49km/hr (measured with radar speed gun) the achievable clear sight distance is 95m. I also noted that the as-built plan of the bridge shows the eastern deck width has asymmetric widening of 0.5m which enables this sight distance to be achieved. This appears to confirm the sight distance design basis at the time.

9.38 For the benefit of this hearing, **Figure 27** below illustrates the 95m sight distance on the as-built plan drawing looking west from the driver position on the ramp (3m from edge line), and **Figure 28** shows the actual drivers view to a vehicle at the 95m distance.

5 Table 3.2 of Austroads Guide to Road Design Part 4A, Reaction Time = 2 seconds

Figure 27: Achievable sight distance on the as-built drawing looking west at the Ohinewai Interchange southbound off-ramp (3 m from edge line)

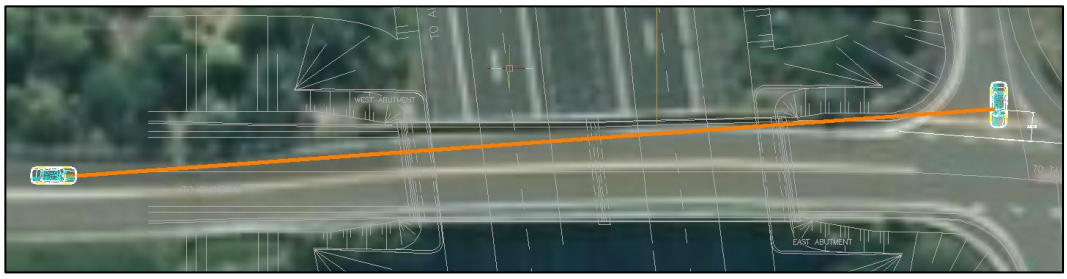
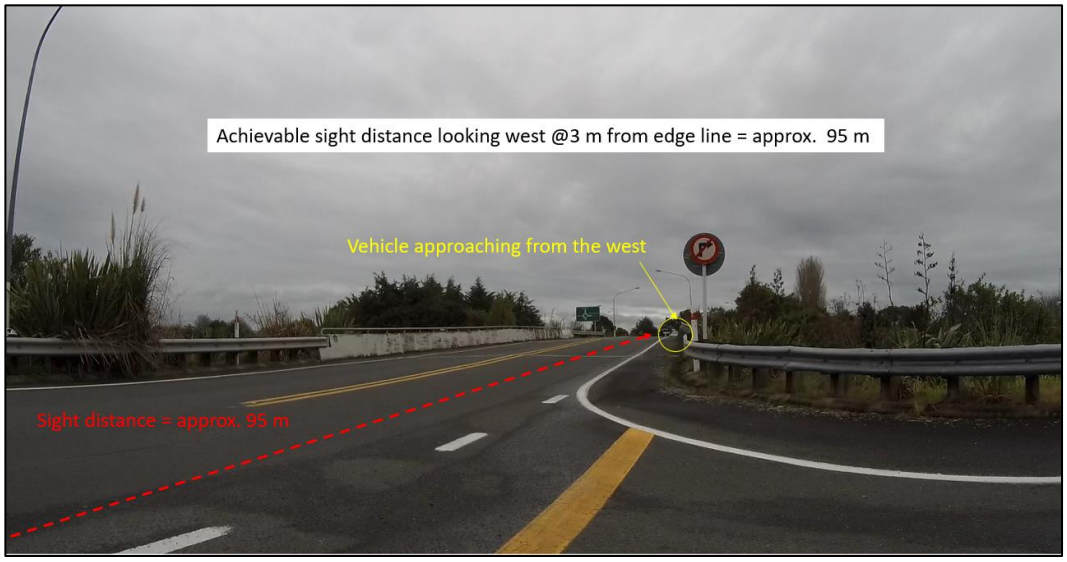


Figure 28: Actual drivers view looking west at the Ohinewai Interchange southbound off-ramp (3 m from edge line)



9.39 In my opinion this information is sufficient to verify that the sight distance looking to the west achieves 95m which is compliant for the operating speed of eastbound traffic on Tahuna Road.

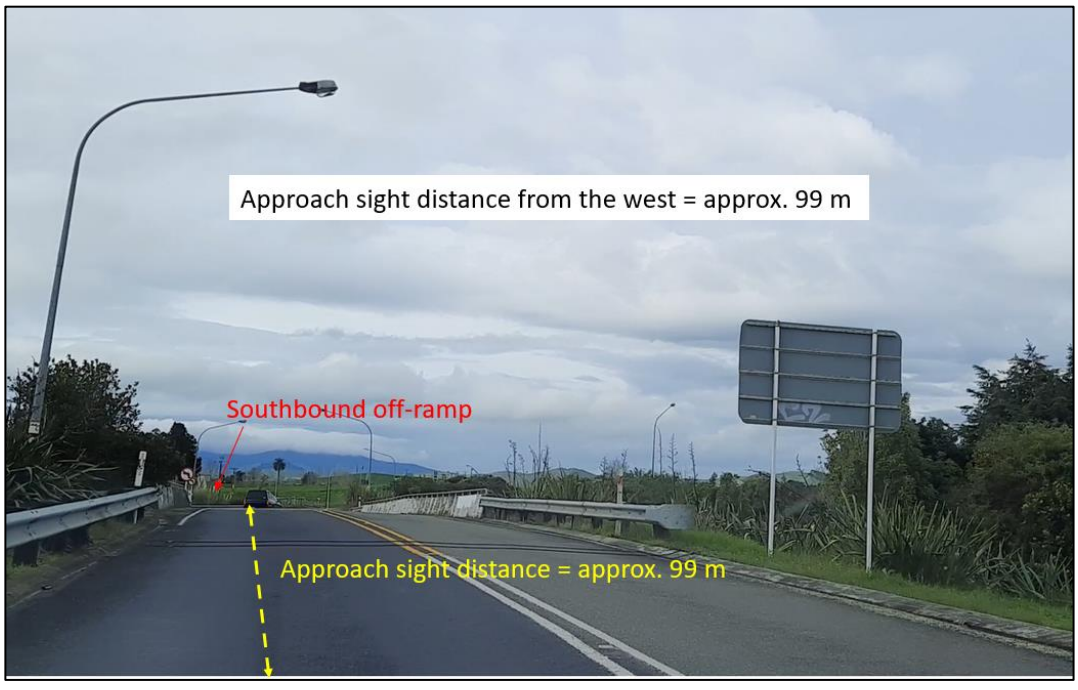
9.40 Mr Swears highlighted his concern that the operating speed was based on a small sample size of vehicles. (20 vehicles, over one hour). I therefore agreed to have a tube counter placed on Tahuna Road just west of the overbridge (approximately 65m from the centre of the southbound off ramp), for one week to gather more speed data. The counter was placed on 26 June 2020 and uplifted on 4 July 2020. The counter recorded the 85th percentile speed (operating speed) over this period during daylight hours (7:30 to 5pm) as 52.6km/h.

9.41 For an 85th percentile speed of 52.6km/h, a minimum SISD of 104m is required (assuming the minimum desirable two second reaction time) while an absolute minimum SISD of 96m is accepted on the basis of a reaction

time of 1.5 seconds. It is important to note that Table 5.2 in Part 3 of the Austroads Guide to Road Design clarifies that the absolute minimum reaction time of 1.5 second can be only be used in constrained situations where drivers will be alert; one such situation it lists is at interchange ramps when sighting over or around barriers and where the maximum operating speed is less than 90km/h (both true in this case).

9.42 Furthermore, an assessment of the stopping sight distance ("SSD") indicates that a minimum SSD of 60m is required for traffic traveling east on Tahuna Road, on the basis of the 2 second reaction time. SSD is defined as the distance to enable a normally alert driver travelling at the design speed on wet pavement to perceive, react and brake to a stop before reaching a hazard on the road ahead. SSD is the minimum sight distance that must be achieved on the major road approaches. As shown in **Figure 29** below, the 6 m SSD requirement is easily achieved for eastbound traffic. This means sufficient sight distance is available for eastbound vehicles on Tahuna Road to react to a vehicle turning onto Tahuna Road from the southbound off-ramp, and stop short of a collision.

Figure 29: Approach sight distance from the west of the Ohinewai Interchange southbound off-ramp



9.43 In my opinion, while the sight distance is constrained, the available 95m looking west is not entirely unsafe or critical by being 11m short of the 104m SISD. The works required to achieve 104m has significant structural ramifications to the existing overbridge, and advice from BBO structural engineering manager is that it would be practically impossible to retro fit the

improvement. The fact that the 95m sight distance is 30m further west than the tube counter location (meaning speeds will likely be less than 50km/h at the 95m mark due to being closer to the roundabout exit), and because the sight distance complies with the absolute minimum, and easily provides the SSD requirement, I consider that the safety effects will be less than minor.

9.44 For the sight line looking east from the southbound off-ramp (towards Lumsden Road), Mr Swears highlighted his concern that an observed dip in the road east of the rail over bridge might cause the actual sight distance to be non-compliant. I agreed the sight line east from the off-ramp would be investigated further. This has since been carried out using a 1.2m tall orange bollard and the sight distance is found to be 108 to 110m, depending on the position of the car turning right on the off-ramp. **Figure 30** below illustrates this from the Site.

Figure 30: Achievable sightlines looking east at the Ohinewai Interchange southbound off-ramp (3 m from edge line)

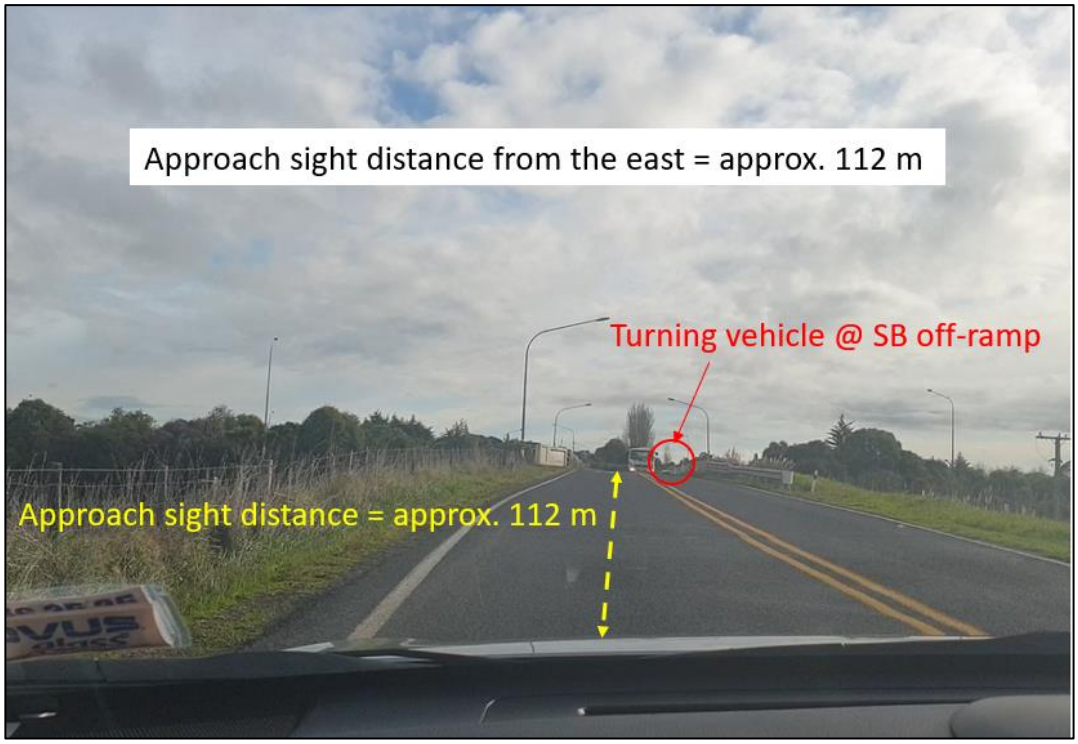
9.45 A sight distance of 110m aligns with an operating speed of 55km/h[6], for a minimum desirable reaction time of two seconds (noting that the absolute minimum required SISD is 102m for a 1.5 second reaction time). I had confirmed at the expert witness conferencing that the westbound operating speed had been measured as 54km/h at a position 50m from the roundabout exit, and 60km/h from a tube counter positioned 90m from the roundabout exit. Furthermore, as shown in **Figure 31** below, the minimum required SSD of 64m (on the basis of a two second reaction time) is easily achievable;

6 Table 3.2 of Austroads Guide to Road Design Part 4A, Reaction Time = 2 seconds

almost double the SSD is available for westbound vehicles on Tahuna Road to perceive and react to a vehicle turning onto Tahuna Road from the southbound off-ramp

9.46 In my opinion this information confirms that the existing sight distance in both directions from the southbound off-ramp, although constrained, is safe and acceptable for the current operating speed on Tahuna Road. I note too, that operating speeds on Tahuna Road are likely to reduce as traffic volumes increase. At present the low volumes mean there is very little resistance to people driving at their desired free speed.

Figure 31: Approach sight distance from the east of the Ohinewai Interchange southbound off-ramp



9.47 In addition, my observations of driver behaviour on the southbound off-ramp is that they position themselves closer than 3m from the lane edge line (continuity line) to maximise the view before proceeding to turn left or right. This small movement ensures the bridge parapets on either side do not obstruct the view. The slightly more advantageous viewing position is approximately 0.5m closer to the dashed lane edge line, and from my observations there does not appear to be a significant increase in safety risk by doing this since the vehicle is not protruding into the live lane. The only risk could be to an eastbound cyclist on the shoulder but as discussed, the cyclist numbers are negligible.

9.48 Although shifting the Stop Line 0.5m closer to the lane edge line (currently 1.6m from the edge line) is not strictly compliant with traffic engineering design guidelines, I consider it appropriate to apply engineering judgement and weigh the benefits and risks, as one size does not fit all when there are significant physical constraints involved. In my opinion, formalising this better viewing position improves safety by ensuring all drivers are positioned to maximise the available sight distance.

9.49 Ms McMinn identifies in the JWS (paragraph 10.6) her concern with the existing safety issues and crash history associated with vehicles on the off-ramp approaching the stop limit line and not stopping, and felt that shifting the stop limit line as proposed may reduce the approach visibility to the stop limit line.

9.50 My response is, although the 10 year crash history shows 13 drivers have failed to stop at the intersection and have hit other vehicles or roadside barriers on the opposite side, this issue appears to be more about not recognising there is an intersection rather than not seeing the stop line. I consider that shifting the limit line 0.5m would make very little difference to this issue as drivers rely on sufficient signs and visual clues such as back drops, kerbs, guardrail and lighting, well before the stop line to 'see' and comprehend there is an intersection ahead. The southbound off-ramp has these visual cues now, including addition of high reflectivity gated Stop signs. I consider these are the likely reason there has been a 55% reduction in 'failing to stop crashes' over the last five years compare to the previous 5-year period.

Issue 11: Public Transport (PT) Provision

9.51 The JWS identifies that Mr Kuo (WRC PT Policy Advisor) agrees in principle that a PT connection to the Site can be provided by the proposed public transport infrastructure, but is concerned that there is no certainty around whether a service will be provided (funding), in what form, and the long walking distances between the residential area and the proposed bus stops.

9.52 The JWS identifies that further conversations around provision of PT was to be had between Mr Kuo and me. This has occurred. I met with Mr Kuo and his WRC colleagues, Andrew Wilson (PT Manager) and Andy Carnell on 30 June 2020. At that meeting, it was clear that while WRC agrees that existing PT services to Huntly and Te Kauwhata could potentially service the Site, there is no funding mechanism that would enable this at present. The existing services are also very limited in frequency, so would have marginal effect in promoting uptake of PT use. A funding mechanism/s would need to

be identified and agreed with WRC and WDC in order to firstly address costs of extending existing services in the Interim development period, and then a sustainable method of funding for the ultimate long term servicing of PT to the site.

In light of these discussions, I understand that APL has agreed to work with WRC to enable and confirm funding mechanisms, as set out in the evidence of Mr Gaze.

9.53 Accordingly, the parties are continuing to work together to identify suitable funding mechanisms, the form of PT and the frequency needed during the staged and completed development, and timing of service implementation. Funding mechanisms being explored include initial developer lead subsidy during early stages of development, and a potential targeted rates system on the new properties developed in the Site to provide long term PT funding.

Issue 12: Walking and Cycling Infrastructure

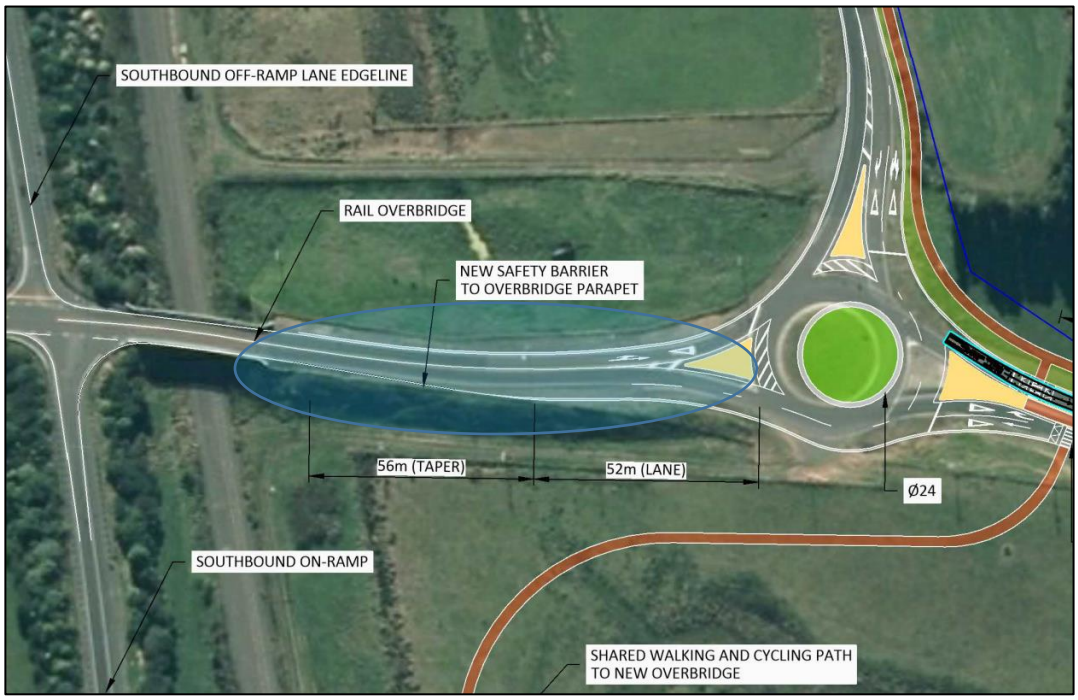
9.54 I refer to my comments in Section 7, paragraphs 7.20 to 7.39

Issue 15: Speed Limit Proposals

9.55 The JWS records that all experts agree the proposed speed limits relate to what the area is to become and therefore the design parameters used for the future road geometry and intersection locations. We agreed that speed limits and a reduction to the operating speeds would be required to permit safe use of any mitigation that is based on a design speed lower than the existing speed limit and / or operating speed.

9.56 However, in relation to design speeds, Mr Swears identified his significant concerns with the proposed Tahuna Road / Lumsden Road roundabout upgrade; specifically the design speed of the westbound exit and available length to accommodate the proposed two to one lane merge taper without conflicting with the rail overbridge. Mr Swears noted this as a significant safety issue with the potential for merge crashes and people driving into and / or off the bridge abutment / parapet / wingwall. **Figure 32** illustrates the area of the design in question.

Figure 32: Concept design - Tahuna Road/ Lumsden Road roundabout lane merge



9.57 Ms McMinn agreed the length to the bridge abutment is constrained and recommended an independent concept design safety audit be carried out. I did not agree that this was necessary as speeds will be 30 to 40km/h at the merge when two lanes are operating at capacity, resulting in a low risk of serious injury crashes occurring. However, I agreed to obtain an independent safety audit as Mr Swears had identified that this was a significant safety issue for him, and one of the fundamental issues of the proposal.

9.58 Independent safety auditors Mr Duncan Campbell and Mr Ian Constable have carried out a concept stage RSA as they had done for the other safety audits involving the rail siding 'S'-bend and the left turn slip lane to Ohinewai South Road. Mr Campbell and Mr Constable are both very experienced safety auditors and are familiar with the Site and the infrastructure upgrade mitigations as proposed.

9.59 The RSA for the Tahuna Road/ Lumsden Road roundabout upgrade was delivered on 4 July 2020. Our designer's responses have been added and the RSA forwarded on to Mr Swears and Ms McMinn for review.

9.60 The Safety Audit Team identified two 'Moderate Concern' items, one 'Minor Concern' and three 'Comments' in relation to the design.

9.61 The first Moderate concern relates to the steep bank adjacent to the westbound exit lanes and merge taper. the Safety Audit Team recommended that a safety barrier be installed from the roundabout exit up to and

connecting to the bridge abutment to ensure vehicles could not leave the road and roll down the bank, as one car has already done after losing control. I agree with this recommendation and consider that adding a safety barrier is a practical and achievable solution to mitigate the run off road risk.

9.62 The other Moderate Concern identified by the Safety Audit Team is the potential speed of left turning vehicles from Tahuna Road into Lumsden Road due to the existing lane geometry. The Safety Audit Team felt that a realignment to increase deflection is necessary to slow vehicles.

9.63 The Safety Audit Team did not identify the rail overbridge abutment in relation to the westbound merge as a safety concern. However, they did provide a comment on this aspect because I had briefed them before the audit that it was an area of disagreement, and of concern to NZTA's traffic engineer.

9.64 The Safety Audit Team's statement about the merge taper and bridge abutment is attached in full to this evidence as **Attachment B**. However, I note the following key finding copied below:

> *"However, the SAT considers the proposed merge length between the roundabout and the rail bridge to be satisfactory as discussed below.*
>
> *Vehicles right turning from Lumsden Road into Tahuna Road will be travelling at an estimated speed no greater than 30 – 40 km/hr as vehicles depart the circulating lanes of the roundabout. In this situation the 120m merge distance is considered to be adequate to enable these vehicle streams to merge safely. Lane markings are shown for some 30m west of the roundabout which leaves over 70m of unmarked roadway to merge, and is considered acceptable for this situation.*
>
> *For the above reasons the SAT does not believe the westbound merge layout will present any safety issues of significance. This situation is quite different from a typical acceleration lane or downstream merge from a signalised intersection, where at least one continual stream of traffic could be travelling at design speed (in this case 60 km/hr) with a second stream attempting to merge in available gaps"*

9.65 On the basis of the RSA's findings, I consider that the roundabout upgrade concept design as proposed has no fatal safety flaws. The safety concerns identified can be addressed through practical design amendments without involving relocation of the roundabout or replacing the rail overbridge.

Issue 17: Lumsden Road Realignment

9.66 All experts agreed that the rail siding is a good idea if there are no unacceptable safety and / or efficiency effects, but no specific agreement

was reached. It was agreed that KiwiRail safety and operational review comments be obtained in relation to the concept design.

9.67 This issue is addressed in paragraphs 5.10 and 5.11 of my evidence.

Issue 18: Triggers for Transportation Infrastructure Upgrades

9.68 Ms McMinn highlighted some inconsistencies in the staging plan in terms of Access 1 being the first to be constructed along with Access 3, then Stage 2 involves the first stage of housing but the access to this housing (Access 2) is not constructed until Stage 4. The staging plan for Stage 2 should show the internal road connection to Stage 2 residential development from the industrial area (past the future neighbourhood centre). I agree with this and the staging plan has been updated accordingly.

9.69 Ms McMinn also identified that the 1,000 vph trigger for upgrading the Tahuna Road/ Lumsden Road roundabout had not been included in the planning provisions. I agreed that it should be and has been included now. However, I consider that the 1,000 vph should trigger an ITA to determine if the upgrade is warranted at that time or later, subject to known parameters at the time.

9.70 Mr Kuo identified that he supports the interim PT stop provision in the staging table of the ITA (Table 31 in the ITA) but that the proposed long-term bus stop facility within the Site is not included in the table with a staging time frame. This will be updated in the final staging plan following agreement between APL, WRC and WDC around the funding mechanisms and timing and route details for the long-term PT service.

Issue 19: Internal Road Cross Sections

9.71 This issue has been addressed in paragraphs 5.23 to 5.31.

Issue 20: Proposed Intersections / Accesses

9.72 Although there was some disagreement and detailed discussions on this topic, I refer to the JWS para. 21.10 which states:

> *"The experts agree, if plan provisions require the road intersections to be provided in general accordance with the Structure plan, with flexibility to move locations from what is shown, the detail can be determined at later resource consent stage (given there is nothing fundamental identified that intersections absolutely have to be in a certain location). All agreed that vehicle crossings for direct vehicle movements between properties and Lumsden Road should be assessed on their merits at resource consent stage. There is a need to ensure a resource consent is triggered so these*

are assessed. All agree that 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 (provision to this effect is currently in Residential provisions, not in Business provisions). No agreement was reached about the existing vehicle crossing on Tahuna Road that provides access to the beehives and whether this should be allowed to remain. Cameron considers it should remain as it is existing and serves a rural activity. Robert and Naomi consider access should be provided through the site."

9.73 I do not consider the last issue about the access to the beehives to be of any material consequence to the proposed rezoning, so have nothing further to add to my comments in the JWS.

Issue 21: Proposed Mitigation for Tahuna Road / Lumsden Road Roundabout

9.74 This is addressed earlier under Issue 15.

Issue 25: Adequacy of the On and Off ramp Lane Lengths at the Interchange

9.75 It was agreed that this issue would be discussed further between Ms McMinn, Mr Swears and I before the hearing.

9.76 At the time of writing this evidence there has been no further discussion as Mr Swears was on annual leave the week after our JWS was finalised and my evidence was due soon after that.

9.77 However, I reiterate my position stated at the conferencing, and above in relation to Issue 3 that the southbound off-ramp length is more than sufficient to accommodate the predicted 95th percentile queue under full APL development, while providing the required deceleration distance to the back of the queue for a car decelerating from 110km/h. The updated sensitivity tests discussed earlier under Issue 3 demonstrates that the maximum queue under Scenario Test A6 (+15% trip generation for all activities) is expected to be 76.6m, leaving approximately 50m of reserve storage length without affecting the deceleration length requirement.

9.78 HCV require significantly more distance than cars to decelerate to a stop. However, as Austroads design guidance identifies, it is rarely practical or economic to provide the full length for deceleration of trucks in a separate lane. Instead, it is generally accepted that HCV's decelerate in the main line of the Expressway on approach to the ramp. Therefore, provided HCV drivers have sufficient forward sight distance to see the back of queue on the ramp then the ramp is appropriate for HCVs. In this case the required Stopping Sight Distance for HCV;s is 248m (travelling at 100km/h). This is easily

achieved from the southbound expressway to the back of the maximum allowable queue on the off-ramp.

9.79 Mr Swears agreed in paragraph 26.3 of the JWS that if the length of the southbound off-ramp is adequate then the northbound off-ramp will also be adequate by default. I concur with Mr Swears on the statement, because the northbound off-ramp is not only longer than the southbound ramp, it is controlled at the top of the ramp by a roundabout, so off-ramp traffic need only give way to their right. Traffic on the southbound off-ramp is controlled by stop control, and right turners must give way to both directions of traffic on Tahuna Road.

9.80 Mr Swears identifies in the JWS (paragraph 26.3) that he considers the lengths of the on-ramps are unlikely to be sufficient to allow heavy vehicles to accelerate to 90km/h before needing to merge with through traffic on the Expressway. I agreed to provide more information in advance of the hearing in relation to whether there would be an issue with the on-ramp lengths.

9.81 The length of the of the north- and southbound ramps are 325m and 415m respectively (from the ramp intersection to the start of the merge taper). Table 5.7 in Part 4A of the Austroads Guide to Road Design, which provides a guide to the acceleration lane lengths that are required for semi-trailers to accelerate from rest to a specified decrement below the through lane speed, specifies an acceleration lane length of 400m for semi-trailers to accelerate from rest to 80km/h (20km/h below the posted speed limit of 100km/h on the Expressway) on a 3% downgrade. However, given the intersection forms at the two ramp intersections (i.e. roundabout at the western ramp intersection and free-flow at the eastern ramp intersection for traffic on Tahuna Road, truck exit speeds are likely to be in the range of 30 – 40km/h), trucks will likely not be accelerating from rest (0 km/h).

9.82 As described in section 4.6 of my evidence, the 85th percentile speeds of Classes 11 to 13 HCV (B-Trains, A-Trains and Semi-Trailer trucks) vehicles on the Interchange on-ramps were 51.8km/h on the northbound on-ramp (measured 85 m north of the exit lane of the western ramp intersection) and 43.2 km/h on the southbound on-ramp (measured 75m south of the exit lane of the eastern ramp intersection). On the basis of these operating speeds, it is my opinion that there is sufficient length available at both on-ramps for a large vehicle to accelerate to 80km/h prior to merging onto the Expressway as follows:

(a) A large vehicle on the northbound on-ramp would require a distance of approximately 240m to accelerate from 51.8km/h to 80km/h

(based on the same accelerate rate required to accelerate from 0 to 80km/h over the specified 400m distance). On this basis, there would be sufficient acceleration distance on the northbound on-ramp (8m plus 240m = 325m of acceleration distance).

(b) A large vehicle on the southbound on-ramp would require a distance of approximately 280m to accelerate from 43.2km/h to 80km/h (based on the same accelerate rate required accelerate from 0 to 80km/h over the 400m distance). On this basis, there would be sufficient acceleration distance on the southbound on-ramp (75m plus 280m = 355m of acceleration distance) for semi-trailer to accelerate to 80km/h prior to the merge.

Issue 26: Interchange Spacing

9.83 I consider this issue has been addressed in Issue 3 above.

10. OTHER RELEVANT REZONING SUBMISSIONS

10.1 The potential development of additional land in the Ohinewai area was included in the traffic effects assessment given the existence of other submissions seeking rezoning and their proximity to the Site as well as the Ohinewai Interchange. The following submissions were considered:

(a) The Ohinewai Lands Limited submission which relates to land located south of the proposed Sleepyhead Estate development on Tahuna Road.

(b) The Shand Properties Limited ("SPL") rezoning submission which relates to land located to the west of the Expressway on Ohinewai North Road.

10.2 Ohinewai Lands Limited proposes a 'future development area' on a landholding to the south of the site that would require a private Plan Change at some time in the future. Ohinewai Lands Limited is not seeking a 'live-zone' and the development timeframes are unknown at this stage.

10.3 I anticipate that Ohinewai Lands Limited would provide for its own transportation assessments at the relevant time of their proposed Plan Change, and if necessary, infrastructure upgrades are provided for at that time. I also anticipate that the capacity of the Tahuna Road / Lumsden Road roundabout could be potentially adversely affected by the Ohinewai Lands Limited proposal, and similarly, so too could the Interchange intersections. Contributions to safety and capacity upgrades may be required from

Ohinewai Lands Limited depending on the level of effects anticipated at the time of assessment.

10.4 SPL is requesting to change the zoning of its landholding from Rural Zone to Country Living Zone to allow for the development of approximately 100 residential lots. The draft ITA details the predicted trip generation and resulting traffic effects assessment associated with the addition of the SPL rezoning traffic to the APL rezoning traffic. The effects assessment concludes that the addition of the proposed SPL rezoning traffic is unlikely to trigger any additional road network upgrades. However, in my opinion, the SPL proposal is likely to result in localised transport effects with the OSP area, in the following way:

(a) Safe and efficient walking and cycling connectivity will be required between the SPL site and proposed OSP walking and cycling path over the expressway and railway, and the proposed shared path on Ohinewai South Road.

(b) The safety of active and vulnerable transport modes crossing Tahuna Road near its intersection with Ohinewai South Road requires appropriate consideration and assessment that takes account of the increased traffic volumes associated with OSP and pedestrian / cycling demands from SPL. Safety effects will need to be acceptably avoided or mitigated.

11. COMMENTS ON MATTERS RAISED IN FURTHER SUBMISSIONS

11.1 The further submitters who have raised issues relevant to traffic and my comment of their concerns are as follows:

Daniel and Rebekah Holmes

11.2 Mr and Mrs Holmes' further submission requested more information relating to traffic as the proposed rezoning affects them directly. The updated ITA, my Summary Position Statement and this Statement of Evidence all provide greater detail related to the predicted traffic volumes and associated effects, more certainty about the proposed walking and cycling infrastructure and safety improvement on Tahuna Road, the proposed interim and long-term PT provision, and the recommended infrastructure upgrades and staging.

11.3 The Holmes's property is located on Lumsden Road, near where Access 4 to the Site will be. Overall, if their property is not purchased by APL, Mr and Mrs Holmes can expect that traffic volumes on Lumsden Road will increase

at this location, including a noticeable increase in truck movements over the present volumes. However, with the proposed urbanisation upgrade on Lumsden Road between Tahuna Road and Access 4, including a 60km/h speed environment, kerb and channel drainage on the eastern side (already exists on the west side), a shared walking and cycling path on the east side and street lighting along the length to Tahuna Road, I consider that the potential adverse effects of the additional traffic volumes will be appropriately mitigated to no more than minor. The urbanisation upgrade of Lumsden Road is required with Stage 2B, the first stage of development of the Industrial zone.

David Whyte

11.4 Mr Whyte:

(a) Is concerned about the potential impact of the increased HCV associated with the rezoning proposal on the existing NIMT and Tahuna Road overbridges.

(b) Requests that consideration is given to having the bridges rebuilt / modified at the start of the project (if approved) so that it is completed in a timely manner.

11.5 As discussed in paragraphs 0 to 7.11, the assessment shows that no capacity related upgrades are necessary at the Interchange or the NIMT overbridge. Therefore, there is no justification to replace the bridges. However, I recommend that sight line improvements are carried out at the southbound off-ramp for drivers of cars, but this will not affect HCV drivers given they already have a height advantage and greater sight distance as a result.

11.6 Furthermore, I recommended that the safety related improvements at the Interchange and rail overbridge in relation to cyclist safety through the use of electronic warning signs and cycle detectors. I recommend these to be designed, safety audited and implemented prior to operation of the TCG factory and / or industrial area.

Richard and Shanette Marsh, Suzanne Stow and the Ohinewai Area Committee

11.7 These submitters are concerned about the traffic generation and related effects associated with the rezoning proposal.

11.8 As I have outlined in section 7 of my evidence, the effects assessment concludes that the effects of the OSP development traffic on the surrounding

road network will be more than minor if no mitigation is planned for in terms of intersection capacity and improved safety, and convenient connectivity for walking and cycling trips to Ohinewai West and Huntly. With the implementation of the recommended mitigation measures as outlined in this statement of evidence, the effects of the APL development traffic on the network will be appropriately mitigated as staged development occurs. Specific resource consents will be required for each stage of development, and at that time, more details about effects and the appropriate mitigation and timing will be determined. Ultimately the completed transport network will ensure the effects are mitigated to an acceptable level; no more than minor for road users of the Ohinewai network. However, there will be a significant improvement in terms of safety and attractiveness for walking and cycling than exists at present, due to the segregated pathways on Lumsden Road and Tahuna Road, the internal paths and connections through the Site, and the new shared path bridge over the Expressway and railway to the Primary School.

12. COMMENT ON COUNCIL'S s42A REPORT

12.1 I have reviewed the s42A Report by WDC's reporting officer, Chloe Trenouth, in relation to transportation matters. The transportation matters raised in the transport peer review by Ms McMinn of Gray Matter Ltd were discussed during expert conferencing. While a number of matters were agreed upon as a result of expert conferencing, agreement could not be reach on several matters as outlined in Section 9 of my evidence.

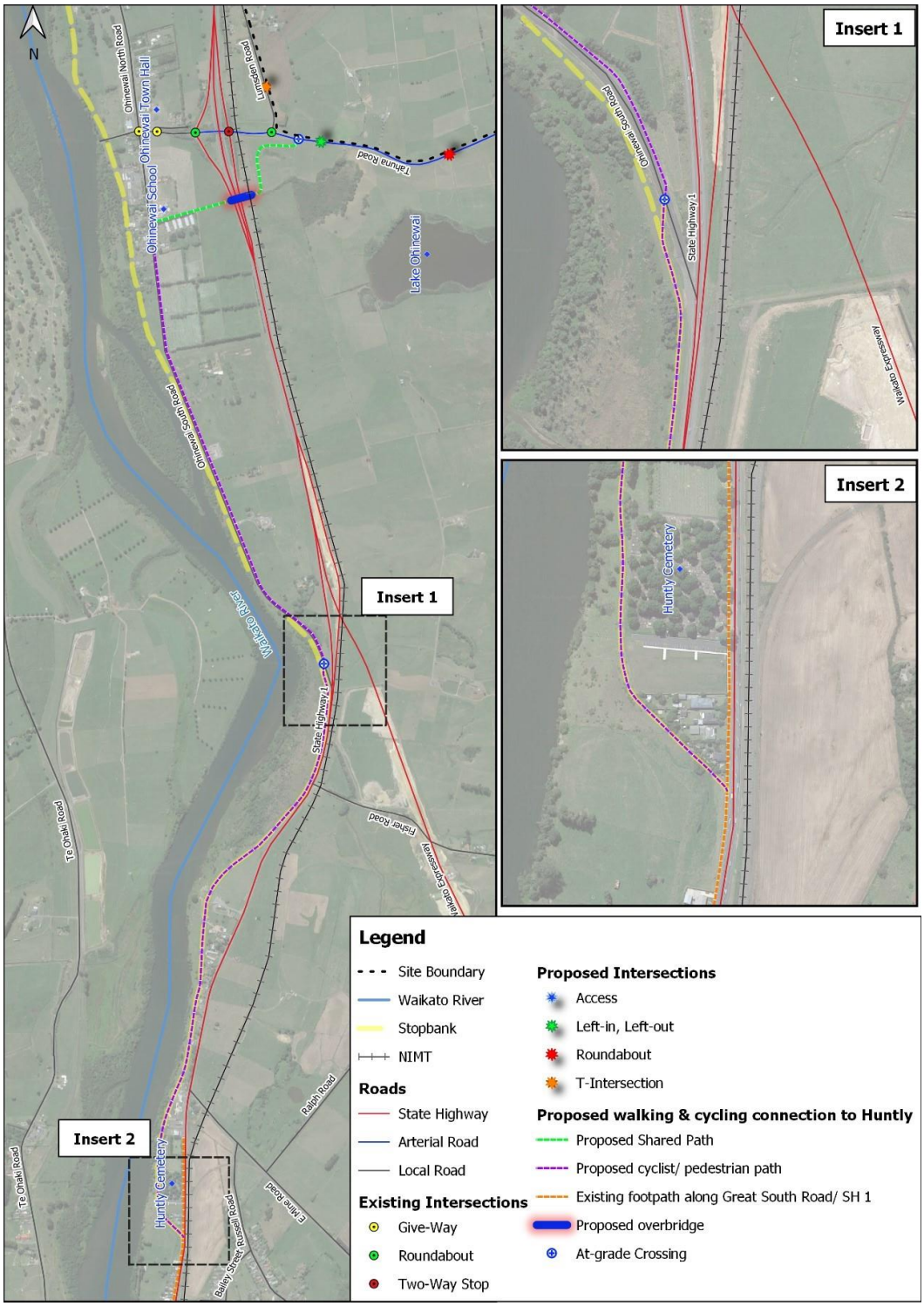
13. CONCLUSIONS

13.1 On the basis of the assessments carried out, I consider that the conclusions and recommendations of the Revision 1 ITA report (May 2020) for the proposed APL rezoning at Ohinewai, remain valid. That is, the overall transportation effects of the APL rezoning on the adjoining road network are likely to be moderate to significant without any transport mitigation measures, due to the limited infrastructure that exists. However, with the infrastructure upgrades recommended in this statement of evidence (summarised in paragraph 2.9 above) relating to capacity, safety, connectivity and accessibility for all anticipated vehicle and active travel modes, I consider that the transportation effects of the development will be sufficiently mitigated to an acceptable level, which is generally no more than minor.

Cameron Inder
9 July 2020

ATTACHMENT A

PROPOSED WALKING AND CYCLING NETWORKS TOWARDS HUNTLY



ATTACHMENT A

SAT COMMENT – WESTBOUND MERGE ON TAHUNA ROAD

2.4. Westbound merge on Tahuna Road – COMMENT

The rail bridge abutments are located some 120m to the west of the roundabout. Between the roundabout and the bridge, Tahuna Road has a slight uphill gradient towards the west. The Austroads[2] 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% (gradient was not measured on site but is estimated to be of this magnitude). However, the SAT considers the proposed merge length between the roundabout and the rail bridge to be satisfactory as discussed below.

Vehicles right turning from Lumsden Road into Tahuna Road will be travelling at an estimated speed no greater than 30 – 40 km/hr as they depart the circulating lanes of the roundabout. In this situation the 120m merge distance is considered to be adequate to enable these vehicle streams to merge safely. Lane markings are shown for some 30m west of the roundabout which leaves over 70m of unmarked roadway to merge, and is considered acceptable for this situation.

The eastern approach to the roundabout on Tahuna Road will comprise one through traffic lane, which will be kerbside. Westbound through traffic on Tahuna Road could potentially enter the roundabout alongside traffic right-turning from Lumsden Road in the inner circulating lane. Through traffic approach speeds will be limited by the upstream raised platform east of the roundabout (assuming a satisfactory profile to reduce driver speed to around 30-40 km/hr or less), so although still a possibility there is unlikely to be frequent and significant speed differential between the two exit lanes. In addition, drivers often hesitate to enter a roundabout in the presence of circulating traffic even when the closest circulating lane is clear.

For the above reasons the SAT does not believe the westbound merge layout will present any safety issues of significance. This situation is quite different from a typical acceleration lane or downstream merge from a signalised intersection, where at least one continual stream of traffic could be travelling at design speed (in this case 60 km/hr) with a second stream attempting to merge in available gaps. However, if for some reason problems are experienced in practice, the lane marking on Lumsden Road could potentially be altered as shown in Figure 4. This could guide some of the right-turning vehicles from Lumsden Road into the kerbside lane, in order to dissuade westbound Tahuna Road drivers from entering at the same time.

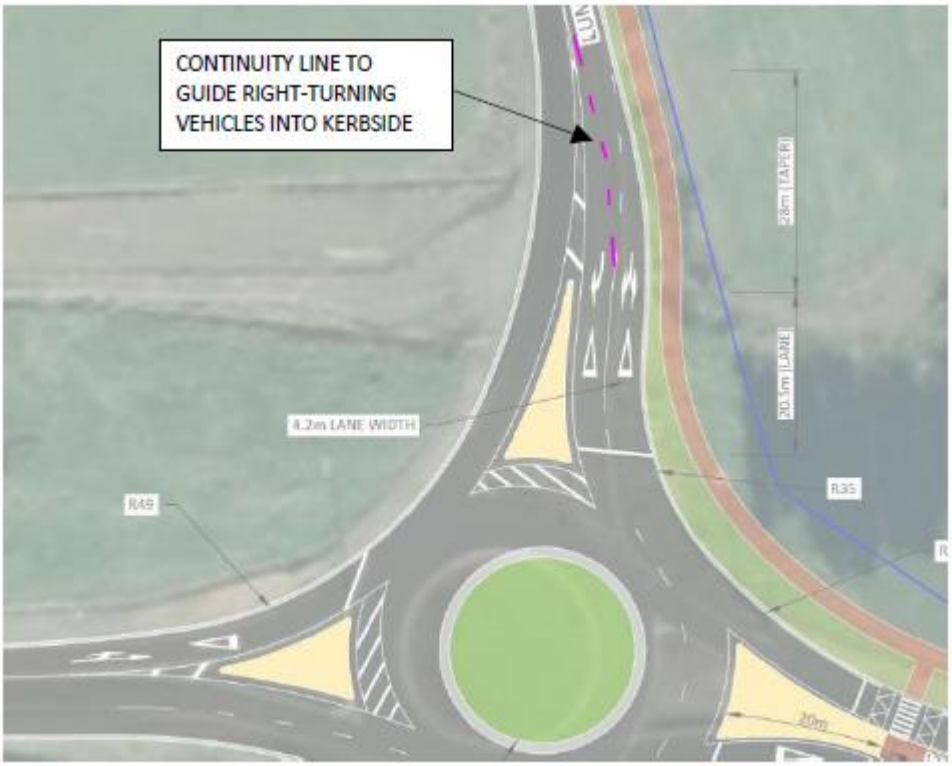


Figure 4: Suggested lane marking change if problems arise