

**Before Independent Hearing Commissioners  
In Western Bay of Plenty**

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Under the Resource Management (Enabling Housing Supply and  
Other Matters) Amendment Act 2021

In the matter of Proposed Plan Change 92 to Western Bay of Plenty  
Operative District Plan: Ōmokoroa and Te Puke Enabling  
Housing Supply and Other Supporting Matters

and Waka Kotahi  
(Submitter)

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**Statement of Evidence of Duncan Barry Tindall for Waka Kotahi – Traffic**

Dated 25 August 2023

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## STATEMENT OF EVIDENCE OF DUNCAN BARRY TINDALL FOR WAKA KOTAHI

### 1 Summary of Evidence

- 1.1 My full name is Duncan Barry Tindall. I am a Technical Director – Traffic Engineering and Transport Planning at GHD New Zealand, based in Tauranga. My evidence is given on behalf of Waka Kotahi in relation to the Proposed Plan Change 92 (PC92) to the Western Bay of Plenty Operative District Plan, seeking to introduce new Medium Density Residential Standards for all the existing residential areas of Ōmokoroa and Te Puke, in addition to Stage 3 of the Ōmokoroa Structure Plan.
- 1.2 I have reviewed the traffic assessments and reports prepared on behalf of Western Bay of Plenty District Council for the proposed PC92, and my overall consideration of the proposed PC92 is the existing give-way intersection at SH 2 and Ōmokoroa Road should and will be upgraded to a two-lane roundabout, prior to any substantial development arising as a result of the proposed PC92. However, I do not consider the two-lane roundabout to have adequate capacity to mitigate the queues and delays expected to arise from the full demand within the peninsula enabled by PPC92, which in turn negatively impacts the safety and efficiency of SH 2.
- 1.3 Whilst noting the longstanding intent for the TNL Stage 2 grade-separated intersection at SH 2 / Ōmokoroa Road, which I consider to have adequate capacity for the full land use development within Ōmokoroa, there is no committed programme or proposal to deliver that upgrade.
- 1.4 On this basis, the assessments prepared by Beca on behalf of Western Bay of Plenty District Council have shown the current give-way SH 2 / Ōmokoroa Road intersection will be upgraded to a two-lane roundabout with two left turn southbound lanes, which I understand to be completed prior to 30 June 2025.
- 1.5 Whilst I have sufficient confidence in all practical terms that a roundabout will be in place prior to any substantial development arising as a result of the proposed PC92, as I discuss in Section 8, the assessments have shown the two-lane roundabout will not provide adequate capacity for the full demand that would occur as a result of the land use that would be enabled by the proposed PC92 in Ōmokoroa.

- 1.6 Ōmokoroa Road is a critical movement, and so if the double left turns cannot be accommodated within the roundabout footprint, there would be a further increase to delays, thus worsening the efficiency of the network.
- 1.7 The approach I would recommend is to limit the Stage 3 growth, as that is what can be controlled, to prevent the overall quantum of development to exceed the infrastructure capacity of the two-lane roundabout.
- 1.8 I am generally satisfied with Beca's assessment that identified up to 97% of the residential land use of Ōmokoroa peninsula enabled currently and by PPC92 can be accommodated within the capacity of the interim roundabout.
- 1.9 If development were to exceed this level prior to the TNL Stage 2 there would be deterioration to the efficiency of the network, and in my opinion a decline in the safety as a result of driver frustration.

## **2 Qualifications and Experience**

- 2.1 My full name is Duncan Barry Tindall. I am a Technical Director – Traffic Engineering and Transport Planning at GHD New Zealand, based in Tauranga.
- 2.2 I hold a Masters Degree in Civil Engineering from Imperial College, London, and a Masters Degree in Transport from the Centre for Transport Studies, London. I am an affiliate of the Engineering New Zealand Transportation Group and a Member of Engineering New Zealand.
- 2.3 My work experience includes 26 years in transport planning and traffic engineering. I have been based in New Zealand since 2010. Prior to moving to New Zealand, I worked as a traffic engineer in the UK and central Europe for 13 years. I worked on a range of road, planning and development-related schemes for national and local government and for private developers.
- 2.4 My experience in New Zealand includes scheme design, assessment and review roles in the transport planning and traffic engineering field, for both local and national government, and for private developers, predominantly in the upper North Island.
- 2.5 My relevant experience includes:
- a Collaborative peer reviewer for Tauranga System Plan (which included Western Bay to Ōmokoroa);

- b Transport Planner and Traffic Engineer for SH2 BayPark to Bayfair;
- c Traffic Engineer and Transport Planner expert for Tauranga City Plan review;
- d Former Implementation Manager for SmartGrowth;
- e Expert Traffic Engineering Witness Board of Inquiry East West Link and Northern Corridor; and
- f Transport planner and Traffic Engineer for SH2 Riverlink and Expert to Environment Court.

2.6 My evidence is given on behalf of Waka Kotahi in relation to the proposed PC92 to the Western Bay of Plenty Operative District Plan, seeking to introduce new Medium Density Residential Standards for all the existing residential areas of Ōmokoroa and Te Puke.

### **3 Involvement with the Proposal**

3.1 I have reviewed the documents provided by Western Bay of Plenty District Council, including the Section 32 report, and Beca's Ōmokoroa Stage 3 summary Memo (14 April 2023).

3.2 I have read the Council Officer's Section 42A report in the course of preparing my own evidence, including:

- a Section 42A Report - Planning Maps - Ōmokoroa Zoning
- b Section 42A Report - Section 14A - Ōmokoroa and Te Puke Part 1 (Section Labelling, Statement, Objectives, Policies)
- c Section 42A Report - Section 14A - Ōmokoroa and Te Puke Part 2 (Definitions, Activity Lists, and Standards)
- d Section 42A Report - Attachment E - Ōmokoroa Roundabout Performance Metrics and Development Thresholds

3.3 I have also read and referred to a document provided to me subsequent to the publishing of the Section 42A report and appendices via Western Bay of Plenty District Council which is a revised version of the document listed as d) above<sup>1</sup>.

#### **4 Code of Conduct**

4.1 I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with it in the preparation of this evidence, and will follow the Code when presenting this evidence. I also confirm that the matters addressed in this statement of evidence are within my area of expertise, except where I rely on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

#### **5 Scope of Evidence**

5.1 My evidence addresses the following:

- a Effects of the proposed PC92 on the SH2 / Ōmokoroa Road intersection considering the following scenarios:
  - i Current give-way intersection
  - ii Future roundabout
  - iii Takitimu Northern Link (TNL) Stage 2 grade-separated interchange
- b Development and Intersection capacities
- c SH2 / Ōmokoroa Road Capacity.

#### **6 Summary of submissions**

6.1 In the “Summary of Submissions and Further Submissions” provided by Western Bay of Plenty District Council, Waka Kotahi had eight submission points (41.1 to 41.8) and six further submission points (79.1 to 79.6).

6.2 Of these submissions, my evidence generally pertains to submissions 41.1 and 41.3.

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<sup>1</sup> Ōmokoroa Roundabout Performance Metrics and Development Thresholds Memo, Beca, Dated 16 August 2023- Not circulated and included as Attachment A

## **7 Effects of the proposed PC92 on the SH2 / Ōmokoroa Road intersection**

- 7.1 When initially considering the adequacy of the traffic assessment to support the proposed PC92, I referred to the available information on the Western Bay of Plenty District Council PC92 website. However, I was unable to undertake a comprehensive assessment of effects as there were key evidence gaps in relation to the trip generation and distribution, effects on the State Highway, public transport routes, walking and cycling access, and construction traffic routes.
- 7.2 In response to the submission from Waka Kotahi, Mr Alex Jeffcoat of Beca subsequently provided additional technical information through a series of phone calls and video conferences to provide additional detail.
- 7.3 A summary of this additional information is contained in a series of memorandums:
- a “Ōmokoroa Stage 3 summary Memo”, Beca, Dated 14 April 2023
  - b Section 42A Report - Attachment E - Ōmokoroa Structure Plan Traffic Threshold Development, Dated 4 August 2023
  - c “Ōmokoroa Roundabout Performance Metrics and Development Thresholds”, Beca, Dated 16 August 2023 (in Attachment A)

## **8 SH2 / Ōmokoroa Road Intersection form**

- 8.1 I note that there are three forms of the SH2 and Ōmokoroa intersection that provide the context for the access and form the basis of my evidence. These are:
- i Current give-way intersection
  - ii Future roundabout
  - iii Takitimu Northern Link (TNL) Stage 2 grade-separated interchange

### **Current give-way intersection**

- 8.2 The current intersection is a priority intersection, and is widely recognised as being problematic in terms of both capacity and safety. Ōmokoroa Road is the only road link for the peninsula, and so provides a critical access route.

- 8.3 With no passenger rail, a limited ferry service and few destinations within 5km limiting cycle or walking access, Ōmokoroa Road, is the key route for the resident and working population of Ōmokoroa, including those using public transport (buses).
- 8.4 In my experience it would be common for there to be some form of initial trigger associated with plan changes that required an intersection upgrade before development commences. However, I understand that there is very strong confidence that the current intersection will be replaced imminently, and so I consider that in this specific case this would add complexity to the Plan and offer minimal real benefit.

### **Future Roundabout**

- 8.5 I understand that works to introduce a roundabout at SH2 / Ōmokoroa Road are due to commence on site in Summer 2023/2024. I understand that the construction period is likely to be some 18 months and be complete prior to 30 June 2025.<sup>2</sup> I consider that this provides sufficient confidence in all practical terms that a roundabout will be in place prior to any substantial development arising as a result of the proposed PC92.
- 8.6 I am however concerned that the roundabout will not provide adequate capacity for the full demand that would occur as a result of the land use that would be enabled by the proposed PC92 in Ōmokoroa. I discuss this below in Section 9.

### **Grade Separation (Takitimu Northern Link Stage 2)**

- 8.7 The third intersection layout is a grade separation which is expected to be a full diamond, with Ōmokoroa Road on an overbridge over SH2 that would provide the local access. This intersection is proposed as part of TNL Stage 2.
- 8.8 I note that construction of Stage 1 of TNL is underway some 5.5km to the southeast of Ōmokoroa and continuing to the east towards Tauranga. For clarity, I note that the Stage 1 project is independent from Stage 2 in the sense that whilst compatible, Stage 1 is able to open to traffic without Stage 2.
- 8.9 Indeed Stage 2 of TNL has not been consented, and does not appear for delivery within the projects contained in the Draft Government Policy Statement on Land Transport<sup>3</sup>. And so

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<sup>2</sup> Design Report – SH2/Ōmokoroa to Prole Road, Manu Tāiko, p45

<sup>3</sup> [Draft-Government-Policy-Statement-on-land-transport-2024.pdf](#) p29

whilst regionally State Highway 29 Tauranga to Tauriko has been included in the strategic investment programme to be delivered by 2033/2034, there is no commitment to TNL Stage 2.

8.10 As such, even if consents are gained for TNL Stage 2 in the near future, I consider that there is currently low confidence in the delivery of TNL Stage 2, and specifically the grade separated intersection at SH2/Ōmokoroa Road within the next decade. Whilst I am aware, and have seen changes to priorities that lead to acceleration, or delays to such programmes, for the purposes of considering the proposed PC92 I consider that the TNL Stage 2 intersection form cannot be assumed to be in place.

8.11 However, once TNL Stage 2, including the SH2 / Ōmokoroa Road grade separation is in place I consider that there will be adequate capacity for the full land use development within Ōmokoroa that would be enabled by the proposed PC92 to occur. I have reached this conclusion based on my past experience of the planning for TNL and confidence in the consenting for TNL Stage 2 being expected to take account of the proposed PC92 land use.

## **9 Development and intersection capacities**

9.1 In my evidence above I have discussed three intersection forms for the SH2 / Ōmokoroa Road intersection. Put simply, the current give way accommodates the lowest capacity, and the current demands are generally viewed to be above that capacity. The roundabout proposed will provide more capacity, and this would therefore allow more traffic from the peninsula to pass through safely and efficiently. And finally, the grade separation is expected to provide yet more capacity.

9.2 Considering the growth of the traffic to and from the peninsula, this is related to an increase in developed land, or increased trips to/from developed land. Some of these land uses exist now, some can occur irrespective of the proposed PC92 and then some are enabled by the proposed PC92.

9.3 This understanding of the 'layering' of development is important to understand in the context of any infrastructure upgrade triggers related to the proposed PC92. Whilst the additional trips generated by the proposed PC92 may be able to be accommodated by the roundabout if added today, over time additional currently enabled infill and development would then lead to further demand that cannot be accommodated.



- 9.4 This has been demonstrated in Beca’s “Ōmokoroa Stage 3 summary Memo” which showed the two-lane roundabout does not have adequate capacity to accommodate the full demand of Ōmokoroa, and drivers will experience unacceptable delays above 70 seconds (relates to Level of Service F)<sup>4</sup>.
- 9.5 And so, whilst in reality it is likely that the Stage 3 development will occur in parallel with the infill and other commercial developments in Ōmokoroa, the approach I would recommend is to limit the Stage 3 growth, as that is what can be controlled, so as to prevent the overall quantum of development from exceeding the roundabout infrastructure capacity.

## **10 SH2 / Ōmokoroa Road Capacity**

- 10.1 Before I discuss the capacity of the roundabout in detail, I will state my reasons for having concerns about the proposed roundabout infrastructure. State Highway 2 provides a key strategic route for the movement of people and freight through the region, and I consider the efficiency and safety of that movement is key for the region to be economically productive and for the safety of the population carrying some 25,000 vehicles per day<sup>5</sup>.
- 10.2 Traffic leaving Ōmokoroa must use Ōmokoroa Road and SH 2 as there is no alternate route. This traffic needs to enter SH2 by way of a gap between southbound SH 2 traffic and will queue until an appropriate gap is found. Equally traffic to Ōmokoroa from the south, i.e. Te Puna and Tauranga, needs to turn right into Ōmokoroa Road and with a roundabout present, this traffic will have priority over the southbound SH 2 traffic.
- 10.3 The delay in being able to make the movements is generally classified using a scale ranging from minimal delay of Level of Service (LOS) A through to LOS F which represents a delay in excess of 70 seconds. In the past it was common to use LOS C as a target design criterion for State Highways, relating to delays up to 35 seconds.
- 10.4 However, in my opinion, with increased urbanisation, and reflecting the future urbanised environment of Ōmokoroa, driver expectations will be aligned with delays up to 70 seconds. And so, I consider LOS E, would be appropriate.

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<sup>4</sup> Ōmokoroa Stage 3 Modelling Update – Summary Memo, Beca, Dated 14 April 2023.

<sup>5</sup> SH2 Waihi to Tauranga Corridor Business Case

- 10.5 At this point there will be delays at peak times, but it is my opinion that the delays are such that there is not a significant increase in frustration which leads to driver choosing to accept smaller gaps in traffic that can then lead to increased safety risks.
- 10.6 My overall concern with the proposed PC92 is if further land use and development occur in Ōmokoroa this will lead to additional trips outside of the peninsula, which in turn lead to queues and delays on SH 2 and Ōmokoroa Road that then negatively impact safety and efficiency of SH 2.
- 10.7 The capacity of a roundabout is governed by several factors including the geometry of the approach arms, the size of the circulating lanes of the roundabout, gradient and the number of lanes approaching and around the roundabout.
- 10.8 In the case of the proposed SH 2 / Ōmokoroa Road roundabout there is a proposal to allow left turning traffic from Ōmokoroa Road to use both approach lanes to turn left at the roundabout towards Tauranga. I note that this is not unique, but it is less common than the left lane being marked to turn left and the right lane to make a right turn movement. I do of course note in this case as a 3-arm roundabout there is no 'ahead' movement where it is normal to have dual lanes.
- 10.9 I would also note that the plan provided on 16 August 2023 does not show this second left turn, but the modelling provided is explicit in requiring this double turn. However, I do consider this to be a minor drafting issue on the plan, but confirmation of the intent and commitment of what is being provided would aid clarity in understanding the effects of the proposed PC92 in the context of the infrastructure that will be in place.
- 10.10 This 'double left' arrangement does require specific consideration in the geometry to ensure that vehicles turning side by side are able to navigate the roundabout without tracking through the adjacent lane which leads to a potential collision. In many cases this leads to the need for wider than normal lanes, and this in turn can increase the footprint of the roundabout when compared to a single left turning movement.
- 10.11 In the case of SH2 / Ōmokoroa Road I am aware that there are land issues with the site that means that the space is constrained, and I have not seen any confirmation that the double turn roundabout is viable from vehicle tracking. Therefore, it is my opinion that there is a risk that the analysis on capacity, and therefore forecast delays overestimates the demands

and development that can occur before the intersection reaches LOS F (delays above 70 seconds).

- 10.12 To demonstrate the risk I described in Para 10.10, I have modelled a single left turn lane on Ōmokoroa Road, using the same traffic volumes adopted by Beca in their latest assessment (at Attachment A). Whilst Beca identified all movements maintain LOS E or better under this scenario, by reducing the left turn capacity to a single lane leaving the peninsula, the critical left turn movement experiences an increased AM peak delay from 55 seconds (Beca's assessment) up to 251 seconds (at Attachment B), which I consider to be unacceptable delays.
- 10.13 I consider that this shows the critical nature of the double turn being enabled from Ōmokoroa Road towards Tauranga on SH2.
- 10.14 This risk could be allayed by the provision of a drawing showing the roundabout with tracking on the plan, and the overall design fitting within the land available. Alternatively, there is the potential to add an additional rule in a similar form to that currently proposed that places a trigger on a (lower) development level prior to either TNL stage 2 or a two lane turn roundabout.
- 10.15 Having noted this risk, I now proceed to consider the situation with a double turn roundabout provided.
- 10.16 My initial review of "Ōmokoroa Roundabout Performance Metrics and Development Thresholds" that was Attachment E of the Section 42A report led to my concerns in relation to the LOS for the roundabout overall being presented as opposed to the delay on any approach. And so, whilst that analysis showed that up to 4,850 Household Equivalent Units (HEU<sup>6</sup>) could be provided with LOS E, this did not reflect that there was a delay for traffic of well over 2 minutes on Ōmokoroa Road in the morning.
- 10.17 I raised this with the report author, Mr Jeffcoat who has undertaken the additional analysis as Attachment A which provides an updated assessment of the development that can be accommodated by the two-lane roundabout, prior to any movement experiencing a delay of more than LOS E.

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<sup>6</sup> HEU is a term that combines traditional residential and retirement living units reflecting the lower trip rates of the latter.

- 10.18 In doing this analysis he noted an error in the earlier work appended to the Section 42A report which incorrectly translated the traffic flows into HEU, leading to a significant underestimation. I have discussed this with Mr Jeffcoat, and we have agreed on the data used in Attachment A being correct.
- 10.19 I understand from Mr Rodney Albertyn of Waka Kotahi that the scope of PPC92 is such that the most appropriate way to ensure that an excess of development does not occur prior to the grade separation of the SH2/Ōmokoroa Road intersection is by way of a development threshold.
- 10.20 I am therefore satisfied that up to 4,904 HEU can be accommodated at a two-lane roundabout<sup>1</sup>. This demand represents 97% of the total 5,077 HEU residential land use on the Ōmokoroa peninsula. If development were to exceed this level prior to the grade separation of the intersection (i.e. TNL Stage 2) I consider there would be unacceptable deterioration to the efficiency of the network, and in my opinion a decline in the safety as a result of driver frustration.
- 10.21 I understand from the Ōmokoroa Stage 3 summary Memo (14 April 2023)<sup>7</sup> appended to the Section 32 that without the additional development enabled by PPC92, that there would be a maximum of 3,344 HEU within Ōmokoroa. Therefore, an additional increment of 1,560 HEU can be accommodated by the two-lane roundabout on top of the trips I understand as a baseline that can be developed under current plan provisions.
- 10.22 As such, having accounted for 100% infill and development outside of Stage 3, this would provide a nett Stage 3 residential development threshold of 1,361 HEU. This represents 89% of the 1,534 HEU total within Stage 3<sup>1</sup>. Contributions to trips by other land uses i.e. industrial and commercial land use are allowed for in the overall capacity assessment as per the Ōmokoroa Structure Plan.
- 10.23 I note that this is 20 HEU less than Mr Jeffcoat proposed in Attachment A, as I consider that the full infill of 199 infill I understand to be enabled should be allowed for and not the 179 he uses. Using Mr Jeffcoat's approach there is the potential for another 20 HEU to be developed beyond that which the intersection has the capacity to safely and efficiently cater for.

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<sup>7</sup> This report is referenced within the Attachment E to the Section 42A report).

## 11 Conclusion

- 11.1 The SH 2 / Ōmokoroa Road intersection will be upgraded to a two-lane roundabout, prior to 30 June 2025<sup>2</sup>, which is consistent with the modelled arrangement in Beca's assessment as Attachment A.
- 11.2 The two-lane roundabout does not have adequate capacity for the full demand that would occur as a result of the land use that would be enabled by the proposed PC92 in Ōmokoroa. Specifically, the additional traffic results in an increase in delays on Ōmokoroa Road and SH 2 southbound through movements, which deteriorates the LOS to a point below what I consider to be acceptable for this intersection (i.e. Level Service E).
- 11.3 Ōmokoroa Road is a critical movement, and so if the double left turns cannot be accommodated, there would be a further increase to delays, thus worsening the efficiency of the network.
- 11.4 It has been shown that this could be mitigated by developing up to 4,904 HEU which represents 97% of the total residential land use enabled by PPC 92 on the Ōmokoroa peninsula.
- 11.5 Assuming the base 2028 development of 3,344 HEU within Ōmokoroa, an additional increment of 1,560 HEU can be accommodated by the two-lane roundabout, which would provide a nett Stage 3 residential development threshold of 1,361 HEU.
- 11.6 If development were to exceed this level prior to the TNL Stage 2 there would be deterioration to the efficiency of the network, and in my opinion a decline in the safety as a result of driver frustration. As such I consider it appropriate and necessary to include a rule that prevents such a threshold being exceeded prior to the appropriate infrastructure being provided.
- 11.7 I am concerned that I have not seen any confirmation that the roundabout double left turn is viable from vehicle tracking. Therefore, the effects of the proposed PC92 as it stands has been shown to be mitigated by ensuring an excess of development does not occur prior to the grade separation of the SH2/Ōmokoroa Road intersection. However, this development may be overestimated, if the geographical constraints dictate only a single left turn lane can be accommodated on Ōmokoroa Road, as I demonstrated in Para 10.12.

**Attachment A – Ōmokoroa Roundabout Performance Metrics**  
- Issue Version, Beca, Dated 16 August 2023

Western Bay of Plenty District Council  
1484 Cameron Rd  
Greerton  
Tauranga 3112

16 August 2023

**Attention: Raj Sumeran**

Dear Raj,

### **Omokoroa Roundabout Performance Metrics and Development Thresholds**

This memo has been prepared to define a threshold for development of Household Equivalent Units (HEUs) within Stage 3 of the Omokoroa Peninsula Structure Plan relative to the performance of the SH2 / Omokoroa Roundabout. The memo builds upon the findings of the *Omokoroa Stage 3 Modelling Update – Summary Memo*, prepared by Beca and provided to WBOPDC and Waka Kotahi in April 2023.

## Previous Summary Memo Findings

The previous memo assessed the Omokoroa Stage 3 Structure Plan (dated July 2022), which included the following:

- 5,415 dwellings/HEUs, separated as follows:
  - 1,294 Within Stage 3 in 2028
  - An additional 1,897 within Stage 3 by 2048
  - 2,025 within Omokoroa (but outside of Stage 3) in 2028
  - An additional 199 within Omokoroa (excluding Stage 3) by 2048.
- 25.80 ha of Industrial Development
- 5.87 ha of Commercial development, and
- 8.3 ha School.

This stage was expected to result in a population of approximately 12,348 in Omokoroa by 2048, over a 20-year period from 2028 onwards. This land use was incorporated into the regional strategic transport model (TTSM) and the traffic volumes forecast by the model were applied to the SH2 / Omokoroa Interim Roundabout (Concept provided in Attachment A) to determine indicative performance for the 2031, 2038 & 2048 design years. In summary the performance was as follows:

- 2031, Both AM and PM peak performance is expected to result in an Intersection Level of Service of A, with individual movements ranging from LOS A-C, with minimal delays and queuing of less than 40m (approximately 7 vehicles).

- 2038, Both AM and PM peak performance is expected to result in an intersection Level of Service of B, with individual movements also ranging from LOS A-C, however delays increase by approximately 50% to ~12s per vehicle, and queues doubling to Approximately 80m (or 14 vehicles).
- By 2048, AM and PM peak performance is expected to result in an intersection Level of Service of E-F. This indicates there is insufficient capacity at the SH2 / Omokoroa Road Roundabout to accommodate the full development scenario listed above, with queues of up to 1.3km, delays of almost 3 minutes. The key movements affected (with an LOS F) include:
  - Omokoroa Road (eastern) Approach (both left & right) AM Peak
  - SH2 (Northern) Approach (through) both peaks & left in the PM Peak
  - SH2 (Southern) Approach (right) PM Peak.

The summary memo then evaluated an alternative option that considered a revised scenario where a large parcel within the structure plan area is now proposed to be developed as a retirement village. The benefits of this are twofold:

- Reduced overall density of development (375 dwellings in Stage 3 reduced to 160); and
- Fewer vehicle trips generated from the remaining dwellings, retirement units generate fewer peak hour vehicle trips than a standard residential dwelling.
- For the purposes of this assessment, a retirement village/country club dwelling is expected to be the equivalent of 0.23 HEU, or a reduction from 375 to 37 HEU for this land use. This reduces the total 2048 HEU from 5,415 to 5,077.

The revised trip generation was then reapplied to the 2048 intersection model which indicates the following:

- AM Peak:
  - Intersection LOS E, average delays of 55 seconds with the worst approach being Omokoroa Road with some movements having a LOS F with the max delay 116s and max Queue Length of 145m (approximately 20 vehicles).
- PM Peak
  - Intersection LOS B, average delays of 15 seconds with the worst approach being SH2 south with LOS B/C, max delay 20s and max Queue Length of 106m (approximately 17 vehicles).

This performance indicates that under the revised scenario that the intersection is anticipated to effectively be operating close to capacity in the 2048 year. Effectively indicating that there is sufficient capacity within the revised scenario to accommodate the current development plan.

## Future Network Operation

To provide wider context surrounding the indicative network in 2048, network performance was also extracted from the TTSM for the scenario where TNL Stage 2 has not been constructed. In this scenario, the link volumes to the south of the intersection are modelled to be at LOS F. LOS along the corridor will also impact general travel times and the performance of the network, outside of the operation of the roundabout. This is shown in the below figures 1 and 2.



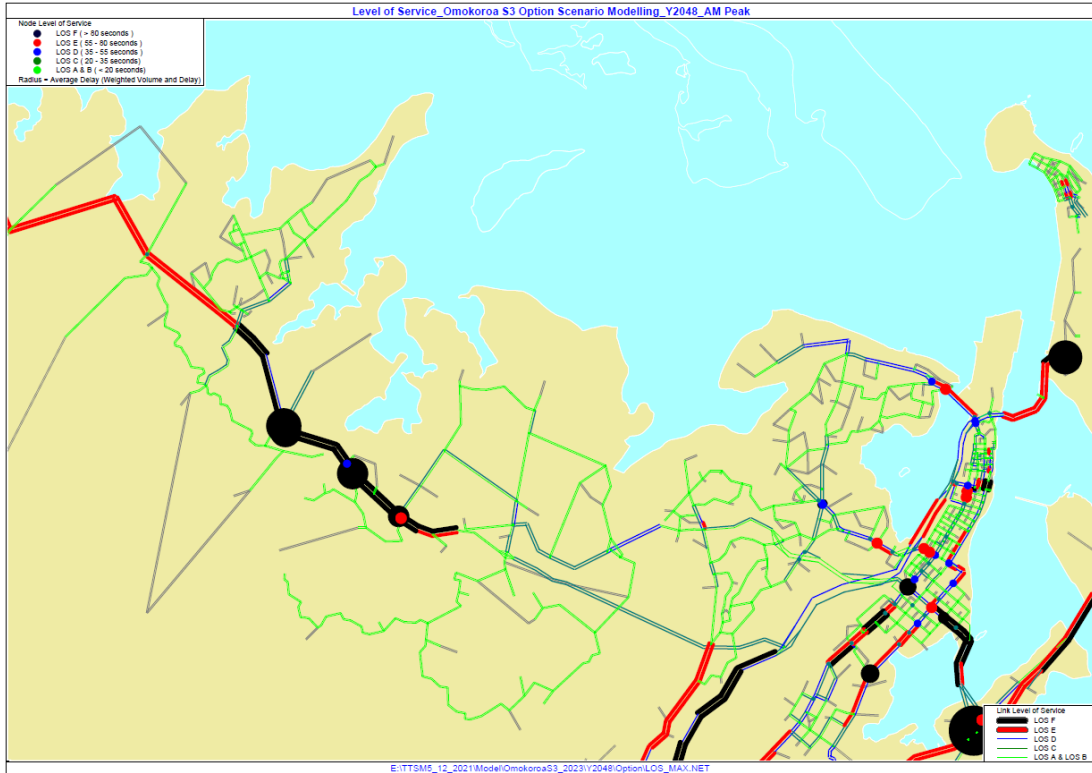


Figure 1. Level of service network for Omokoroa without TNL stage 2 (Model year 2048 – AM Peak)

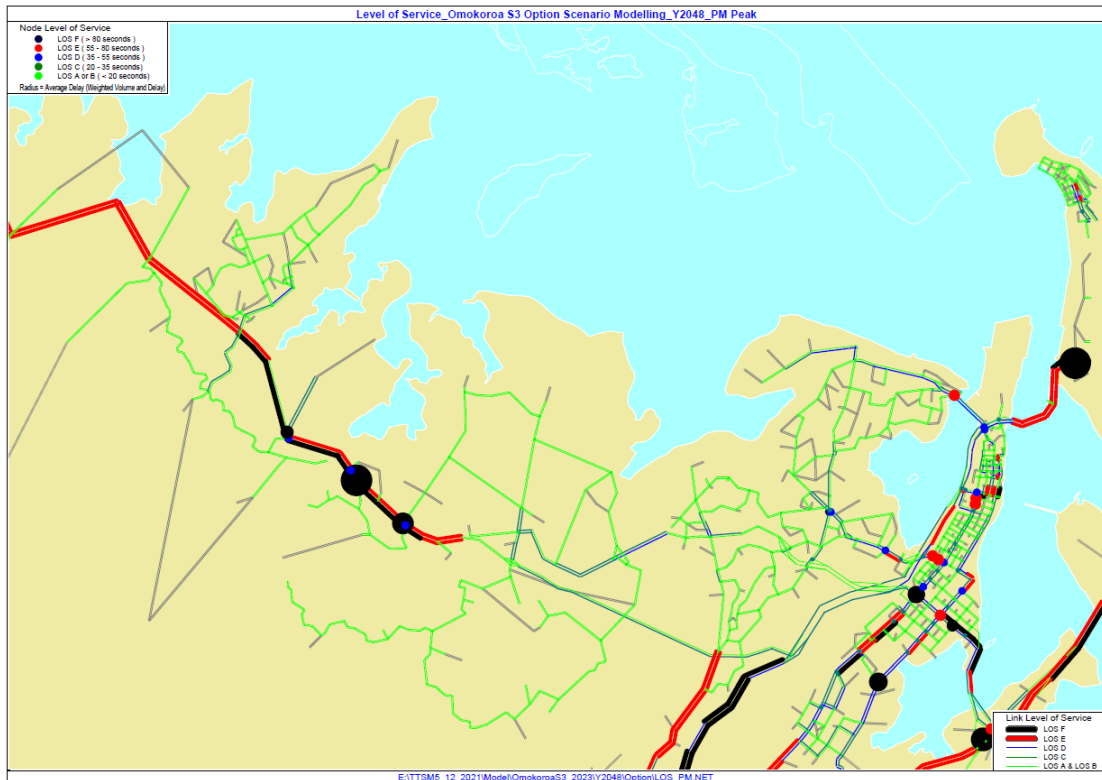


Figure 2. Level of service network for Omokoroa without TNL Stage 2 (model year 2048 – PM Peak)

## Estimating the Development Threshold

Derived from the previous memo, the SH2/Omokoroa Road intersection capacity threshold is expected to occur somewhere between 2038 and 2048 or 4,211 and 5,077 dwellings within Omokoroa respectively.

Conversations with Waka Kotahi have indicated that Level of Service E should be considered the maximum for any movement (delays of <70 seconds). New volumes and HEUs were derived by interpolating from 2031 to 2048. From the calculated volumes, 2046 was determined to be the last year where the Level of Service of any movement was E or better. The left turn out of Omokoroa Road in the AM Peak was determined to be the critical movement with LOS E. In 2046 the total number of HEUs in Omokoroa was determined to be 4,904 HEUs.

Table 1: SH2 / Omokoroa Road Roundabout 2046 Peak Performance

AM 2046						
Approach	Direction	Volume	V/C	Average Delay (sec/veh)	Queue Length	LOS
SH2 South	Through	501	0.453	6.9	25.4	A
	Right	330	0.453	10.4	25.4	B
Omokoroa Road	Left	829	0.902	55.1	102	E
	Right	276	0.902	25.9	102	C
SH2 North	Left	259	0.55	7	31.9	A
	Through	872	0.605	28.7	41	C
Overall Intersection		<b>3068</b>	<b>0.902</b>	<b>28.2</b>	<b>102</b>	<b>C</b>
PM 2046						
Approach	Direction	Volume	V/C	Average Delay (sec/veh)	Queue Length	LOS
SH2 South	Through	723	0.87	15.4	123.9	B
	Right	729	0.87	19.5	123.9	B
Omokoroa Road	Left	412	0.548	8.9	32.2	A
	Right	407	0.548	12.2	32.2	B
SH2 North	Left	376	0.718	16.8	57.3	B
	Through	480	0.79	19.6	80.9	B
Overall Intersection		<b>3127</b>	<b>0.87</b>	<b>15.9</b>	<b>123.9</b>	<b>B</b>

Therefore, in order to achieve what is considered a safe and efficient intersection operation, the following statements summarise the approximate dwellings that can be developed within Omokoroa and the structure plan area separately whilst maintaining LOS E or better traffic performance at the roundabout:

- 4,904 HEUs (expected to be reached in 2046) of the maximum 5,077 expected in 2048 within Omokoroa.
- Using a base 2028 dwellings of 3,344, this indicates an additional increment of 1,560 HEU
- Of this 1,560 HEU:

- 179 are identified by WBOPDC as infill (not associated with Stage 3). This represents 90% of the 199 total infill.
- This results in an estimated Stage 3 HEU threshold of 1,381 in 2046 to achieve an LOS E or better for individual movements approaching the Omokoroa Road / SH2 roundabout. This represents 88% of the 1,534 HEU total within Stage 3.

This is directly transferrable into the statement below as requested by Waka Kotahi:

- Subdivision and four or more units on a site within the Ōmokoroa Stage 3 Structure Plan area:
  - Following the establishment of a roundabout at the intersection of Ōmokoroa Road and Stage Highway 2 if:
    - More than **1,381** HEU have been approved within the Ōmokoroa Stage 3 Structure Plan (with approved meaning a granted building consent that was lodged on or after the date of 2028); and
    - A grade-separated interchange or equivalent has not been established at the intersection of Ōmokoroa Road and State Highway 2.

Note the above HEU value relates specifically to Dwellings and excludes contributions by other land uses i.e. it assumes industrial and commercial land use is developed as per the structure plan.

We believe this is an appropriate measure to ensure the safe and efficient operation of the roundabout. Please contact us if you have any queries or require any further clarification on this information requested.

Yours sincerely,



Yours faithfully  
**Alex Jeffcoat**

Associate - Transportation

on behalf of  
Beca Limited

CC: Craig Richards, Beca

# Attachment A – Omokoroa Roundabout Concept



**LEGEND**

**EXISTING**

- POLE
- FLAG LIGHT
- SW
- W
- P
- OH
- T
- //
- <
- >
- 

**DESIGN**

- LAND REQUIRED
- SW — STORMWATER PIPE
- 3 x 7 ROAD MARKING
- EDGE LINE
- EDGE OF SEAL
- KERB
- SHOULDER APRON
- DRAIN
- VERGE
- BACK OF FOOTPATH
- GROUND INTERFACE (FILL)
- WR4 — WIRE ROPE BARRIER
- WS-4 — GUARD RAIL
- LEADING END TERMINAL
- WIRE ROPE TERMINAL

○ TRANSFORMER POLE  
 □ CATCH PIT  
 — STORMWATER  
 — WATER MAIN  
 — POWER  
 — OVER HEAD  
 — TELECOM  
 — FENCE  
 — DRAIN  
 — BARRIER RETAINED

DATA OBTAINED FROM OTHERS AND INCLUDED IN THESE DRAWINGS ARE AS FOLLOWS:

- LINZ PROPERTY BOUNDARIES
- WESTERN BOP DISTRICT COUNCIL, POWERCO CHORUS SERVICE PLANS
- LEVEL DATUM NZVD
- COORDINATE SYSTEM NZTM

No.	Revision	By	Chk	Appd	Date
A	FOR INFORMATION - 50% DESIGN	GRH	AH	AH	12.07.23

Original Scale (A1)	Design	RB	06.23	Approved By	Waka Kotahi
1:1500	Drawn	GRH	06.23	Date	
Reduced Scale (A3)	Dwg Check				
1:3000	Dwg Review				
	Approved				

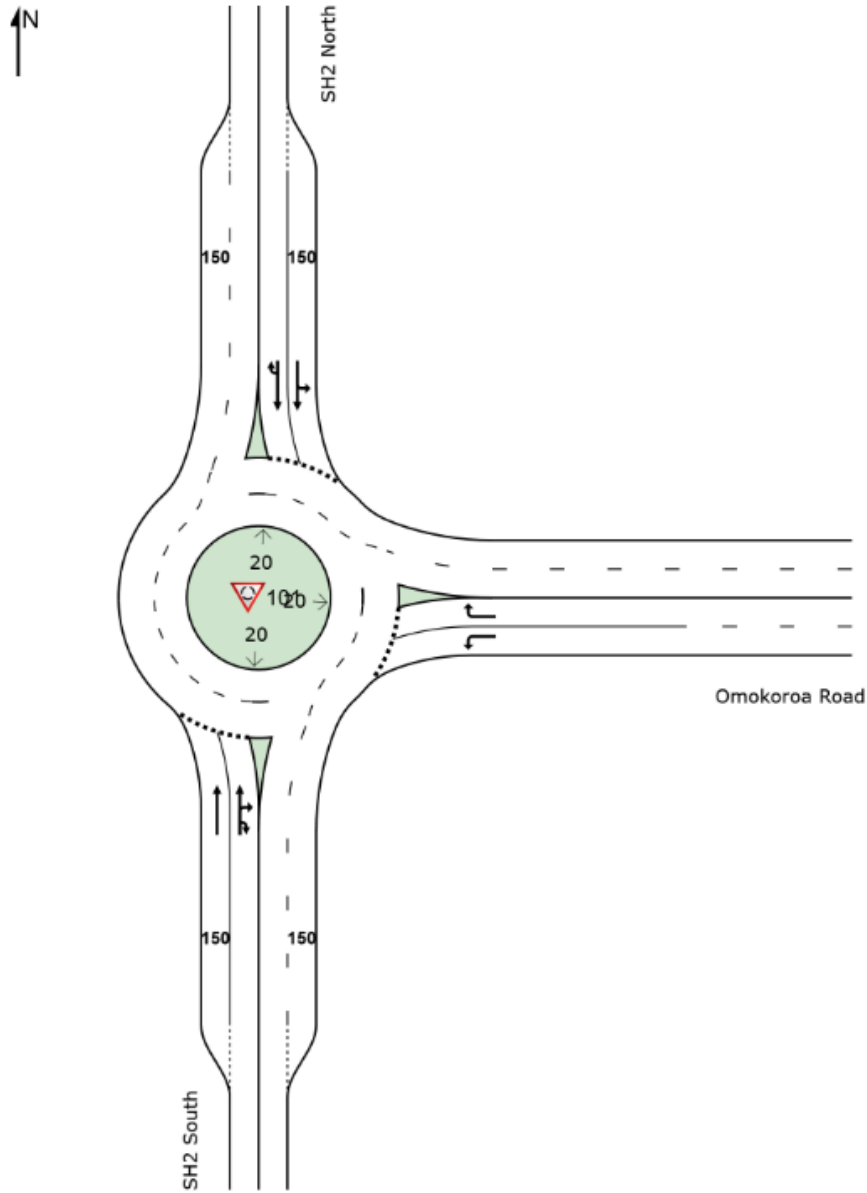
Project: **SPEED & INFRASTRUCTURE PROGRAMME**  
 SH2 WAIHI TO OMOKOROA  
 OMOKOROA ROUNDABOUT

Title: **GENERAL ARRANGEMENT**  
 SHEET 1

Status:	<b>FOR INFORMATION</b>	
	<b>NOT FOR CONSTRUCTION</b>	
Drawing No.	SNP-B-8000-1-1201	Rev.
		A

# Attachment B – SIDRA Summary Results – SH2 / Ōmokoroa Road roundabout

Modelled SIDRA layout – single left turn lane on Ōmokoroa Road



**2046 AM peak hour (critical peak)**

<b>Vehicle Movement Performance</b>														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %	v/c	sec		[ Veh. veh	Dist ] m				km/h
<b>South: SH2 South</b>														
2	T1	501	24.2	501	24.2	0.447	6.9	LOS A	3.0	24.0	0.57	0.62	0.57	53.1
3	R2	330	12.3	330	12.3	0.447	10.4	LOS B	3.0	24.0	0.58	0.68	0.58	51.8
3u	U	1	0.0	1	0.0	0.447	12.2	LOS B	3.0	24.0	0.58	0.68	0.58	53.2
Approach		832	19.5	832	19.5	0.447	8.3	LOS A	3.0	24.0	0.57	0.64	0.57	52.6
<b>East: Omokoroa Road</b>														
4	L2	829	9.0	829	9.0	1.123	251.4	LOS F	129.9	979.7	1.00	6.59	16.13	11.9
6	R2	276	4.7	276	4.7	0.553	16.7	LOS B	3.3	24.4	0.81	1.01	1.03	47.8
Approach		1105	7.9	1105	7.9	1.123	192.8	LOS F	129.9	979.7	0.95	5.20	12.36	14.8
<b>North: SH2 North</b>														
7	L2	259	7.3	259	7.3	0.549	7.0	LOS A	4.1	31.7	0.67	0.73	0.71	52.4
8	T1	872	15.0	872	15.0	0.604	9.7	LOS A	5.2	40.7	0.69	0.73	0.75	53.3
9u	U	1	0.0	1	0.0	0.604	13.6	LOS B	5.2	40.7	0.70	0.74	0.77	54.4
Approach		1132	13.2	1132	13.2	0.604	9.1	LOS A	5.2	40.7	0.69	0.73	0.74	53.1
All Vehicles		3069	13.0	3069	13.0	1.123	75.0	LOS F	129.9	979.7	0.75	2.32	4.88	27.5