BEFORE THE WAIPĀ DISTRICT COUNCIL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 20 – Airport Northern Precinct Extension to the Operative Waipā District Plan

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STATEMENT OF EVIDENCE OF CAMERON BESWICK INDER

(TRANSPORT)

28 FEBRUARY 2023

INTRODUCTION

Qualifications and experience

1. My name is Cameron Beswick Inder.

2. 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.

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

4. I have 24 years' experience in the field of transportation and traffic engineering gained through 20 years of employment in New Zealand and approximately four years employment in the United Kingdom.

5. 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.

6. I have appeared as expert transportation engineering witness on numerous occasions over the last five years including:

   (a) Ambury Properties Limited for a plan change to the Proposed Waikato District Plan (Ohinewai, 2020);

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

   (c) Waikato Regional Airport Limited for private plan change 10 to the Waipa District Plan (Hamilton Airport, 2018);

   (d) Waikato Kindergarten Association for a resource consent application to operate a childcare facility for 120 children (Hamilton, 2018); and

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

7. I am familiar with the application site and the surrounding locality. I have read the relevant parts of the application, Integrated Transport Assessment ("ITA") review for Waipā District Council ("WDC") by Mr Tim Booth of Aurecon, submissions on the application that raise concern relating to my area of expertise, further submissions, the Section 42A Report and the relevant evidence on behalf of WDC.

Involvement in Proposed Plan Change 20

8. I have been engaged by Titanium Park Limited ("TPL") and Rukuhia Properties Limited ("RPL") to prepare evidence for Proposed Plan Change 20 ("PC20"). I was involved in the development of the rezoning proposal from the development of the first draft of the Structure Plan. Since then, I have managed the preparation of the Integrated Transport Assessment report ("ITA") associated with TPL/RPL's request with the assistance of my colleague Mr Siva Balachandran[1] as we progressed with the transport investigations, data collection and analysis of work. My role also included consultation on transportation matters with representatives of WDC, Waikato Regional Council ("WRC") and Waka Kotahi NZ Transport Agency ("Waka Kotahi").

9. I have visited the locality around the site on multiple occasions over the past two years.

Code of Conduct

10. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2023) and I agree to comply with it. In that regard, I confirm that this evidence is written within my expertise, except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

11. In my evidence, I:

(a) provide an executive summary of my key conclusions;

[1] Siva Balachandran (BEng (Civil Engineering), MEngNZ)) is a qualified Transportation Engineer employed by BBO.

(b) summarise the relevant aspects of PC20 with respect to transportation matters;

(c) set out an assessment of PC20 with respect to anticipated transportation effects;

(d) address relevant submissions;

(e) address any areas of disagreement recorded in the Transport Engineers and Planners Joint Witness Statements, and

(f) Respond to the transportation matters raised in WDC's s42A Report.

12. My evidence should be read in context of the evidence of Mr Grala, who provides an overview of the Northern Precinct masterplan ("Masterplan") and the proposed Airport Business Zone provisions including the Structure Plan, and the design philosophy behind the internal transport connections and layout adopted for the Site.

13. The Masterplan by Harrison Grierson provided the basis for the land use extent and activities used to assess the transportation effects of the rezoning.

EXECUTIVE SUMMARY

14. TPL and RPL seek to change the zoning of approximately 130 hectares of land to Airport Business Zone. This includes updates to the current Airport Business Zone ("ABZ") Structure Plan for 41ha of existing zoned land known as Titanium Park Northern Precinct, together with amendments to the provisions within Section 10 ("Airport Business Zone") of the Operative Waipa District Plan.

15. The Masterplan and Structure Plan envisage approximately 130ha (gross) of Airport Business Zone land use established in accordance with the proposed plan provisions. Within that area almost 5ha is identified as the Bat Habitat Area (BHA) in addition to building setbacks, landscape controls and an area identified as the "Hub" comprising retail and services to support the employees and visitors of the core ABZ businesses. The Permitted Activity Status Table 10.4.1 identifies this includes (but is not limited to) cafes, restaurants, takeaway food outlets, visitor accommodation and service stations.

16. The expected peak period trip generation for the completed Northern Precinct development is approximately 2,500 trips per peak hour, with heavy commercial vehicles likely to be in the range of 12% to 15% of all trips.

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

(a) Two new access intersections are proposed for the Site; one to State Highway 3 and one to Raynes Road.

(b) The internal public road network consists of different road cross-sections. Speed management, safety, mode neutrality and ensuring appropriate use is at the core of the network layout and cross-section designs.

(c) A high level of amenity is provided for walking and cycling with off-road paths internally throughout the site to key connection points to the wider network. Additionally, a strategic walking and cycling path is recommended to connect the future Peacocke residential suburb from Peacocke Road to Northern Precinct and wider Airport Business Zone via Middle Road and the unformed section of Faiping Road.

18. The overall transportation effects of the proposed rezoning on the adjoining road network are likely to be moderate to significant without any transport mitigation measures, due to the existing road network infrastructure. However, with the following recommended infrastructure upgrades relating to safety, capacity, connectivity, and accessibility of 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.

19. The following are the recommended infrastructure upgrades. Developable land area triggers have been assessed and proposed in the provisions under Rule 10.4.2.13A to identify the timing of thee upgrades as staged implementation of development occurs:

(a) Access to the Site:

(i) A new 3 - arm roundabout on State Highway 3 connecting to a new public road through RPL and TPL land holdings, to Raynes Road. The roundabout should be in general accordance with the location and form illustrated in Appendix B of the ITA, and for convenience is included in Attachment 1 of my evidence. Connection of Northern Precinct to SH3 at this new roundabout removes the need for a road connection via Ingram Road to SH3 as shown in the current Structure Plan. Therefore, an upgrade to SH3/Ingram Road intersection is not required in relation to PC20 as the expected significant effects at the intersection are avoided by no longer gaining access to Northern Precinct from Ingram Road.

(ii) Construction of a new Tee intersection access on Raynes Road with banned Left Out and Right In movements in general accordance with the intent illustrated in Appendix B of the ITA and included in Attachment 1 of my evidence. The final intersection form and method of control, that addresses Safe System Design principles will be determined through consultation and agreement with WDC as the road controlling authority and Waka Kotahi as an interested party (due to the potential effects on state highway intersections at either end of Raynes Road).

(iii) A direct road connection from Northern Precinct to the future Southern Links Central interchange is proposed and the internal road network of Northern Precinct is future proofed for it. The connection will provide efficient access to and from Hamilton CBD via the Major Arterial road through the Peacock residential growth area potentially for all traffic modes, or alternatively it could be a dedicated freight, public transport, and walking, and cycling connection to the city. This strategic connection will continue to be investigated and planned in consultation with Waka Kotahi once their current "form and function" review of Southern Links arterial network is completed. The ITA includes concept design plan showing how the proposed road connection could be geometrically accommodated at the future western roundabout of the Southern Links central interchange. The design includes a clover-leaf style westbound off-ramp which enables the roundabout to remain with four arms (not five) and therefore remain consistent with the designation layout.

(iv) No vehicle access is proposed between Northern Precinct and Middle Road or Narrows Road. However, walking and cycling access is provided through the road closure point on Middle Road where it meets the boundary of Northern Precinct, and to Narrows Road from Northern Precinct for connectivity to a proposed walking and cycling path along Middle Road which extends through Faiping Road to Peacockes Road.

(b) Intersection Upgrades:

(i) It is likely the existing State Highway 21 / Raynes Road priority-controlled intersection needs upgrading to at least a single lane roundabout before any land use activity in Northern Precinct generates traffic. The capacity of the roundabout should also be increased to dual circulating lanes and approaches when the proposed Raynes Road access to Northern Precinct

is constructed, or once 80ha gross (70ha net) of developable land has been completed and is generating 1520 trips per peak hour accessing State Highway 3.

(ii) No land use activity in Northern Precinct shall generate operational traffic until the upgrade of State Highway 3 / Raynes Road intersection to a roundabout by Waka Kotahi, is under construction. These transport infrastructure triggers provide certainty that potentially increasing safety and capacity effects at the intersections will be mitigated before Northern Precinct generates the volume of traffic where effects at each location become more than minor.

(c) Walking and Cycling Infrastructure:

(i) Provide, in staged implementation, the internal network of footpaths, bi-directional cycle paths and shared walking and cycling paths in general accordance with the amended Structure Plan and primary and secondary typical road cross-sections.

(ii) Provide a shared walking and cycling path on the west side of Raynes Road connecting from Northern Precinct to the new shared walking and cycling path adjacent to the runway. This then connects Northern Precinct to the eastern and central employment precincts of Titanium Park.

(iii) Provide a walking and cycling path along the east side of State Highway 3 to Ingram Road to connect Northern Precinct with the western employment precinct of Titanium Park.

(iv) Provide a strategic walking and cycling path connection between Peacockes Road and Northern Precinct via Middle Road and the presently unformed section of Faiping Road. This will provide an attractive and convenient walking and cycling connection between the extensive cycling network in the Peacocke residential growth cell to the employment precincts surrounding Hamilton Airport. Delivery of the shared path to Peacocke Road requires a safe and appropriate road crossing facility across Raynes Road for continuity of the proposed path along Middle Road. It is intended that the Faiping Road sections of the path be developed in partnership with WDC, Waka Kotahi (and potentially HCC) as it not only supports the Northern Precinct

development but also provides a wider community benefit by integrating the substantial Peacocke residential growth area with the substantial employment area of the Hamilton Airport Growth Node. A Development Agreement ("DA") between TPL, RPL, Waka Kotahi and Waipa District Council (and potentially HCC) is considered to be an appropriate delivery mechanism for this path.

(d) Public Transport Infrastructure:

(i) The Primary Road connecting between State Highway 3 and Raynes Road (referred to as the "spine road") is designed to accommodate public transport. When complete, this development will enable an efficient public transport service loop around the ABZ precincts and Hamilton Airport. It could potentially be incorporated into the existing Hamilton to Te Awamutu Public Transport ("PT") service or be part of a new PT service in future between Hamilton CBD and the Airport.

(ii) The unformed section of Faiping Road also presents an opportunity for a potential future local public transport link between Hamilton Airport and Hamilton Central Business District ("CBD") via Peacocke residential growth area, particularly in the medium term before Southern Links major arterial is constructed and potentially meets this purpose. The public road reserve is 20 m which is wide enough for buses to operate alongside the proposed walking and cycling path. For clarity, use of this corridor by public transport is not required mitigation for transport effects of the rezoning proposal, as the Spine Road through Northern Precinct provides the opportunity for bus services to loop around the airport precinct.

20. From the transport modelling and assessments outlined in the ITA, my evidence in chief and the matters address in two Transport and Planning Joint Witness Statements, I remain of the opinion that PC20 can be appropriately supported by the existing road network with recommended transportation infrastructure upgrades.

21. The revisions to the PC20 provisions (as outlined in the evidence of Mr Nick Grala) appropriately address and respond to all traffic and transportation matters raised by submitters. The development area triggers in the rule provisions will ensure that all the required infrastructure upgrades are implemented in a timely manner.

22. Therefore, it is my conclusion that there are no outstanding traffic or transport reasons why PC20 should not be approved.

CONTEXT AND BACKGROUND

Site Description and Location

23. Figure 1 shows the locality and extent of the Site. The TPL property is bordered by Hamilton Airport's main runway to the east, the secondary grass runway to the south, Middle Road and Narrows Road to the west and Raynes Road to the north. The RPL property is bordered by Middle Road to the east and State Highway 3 to the west.

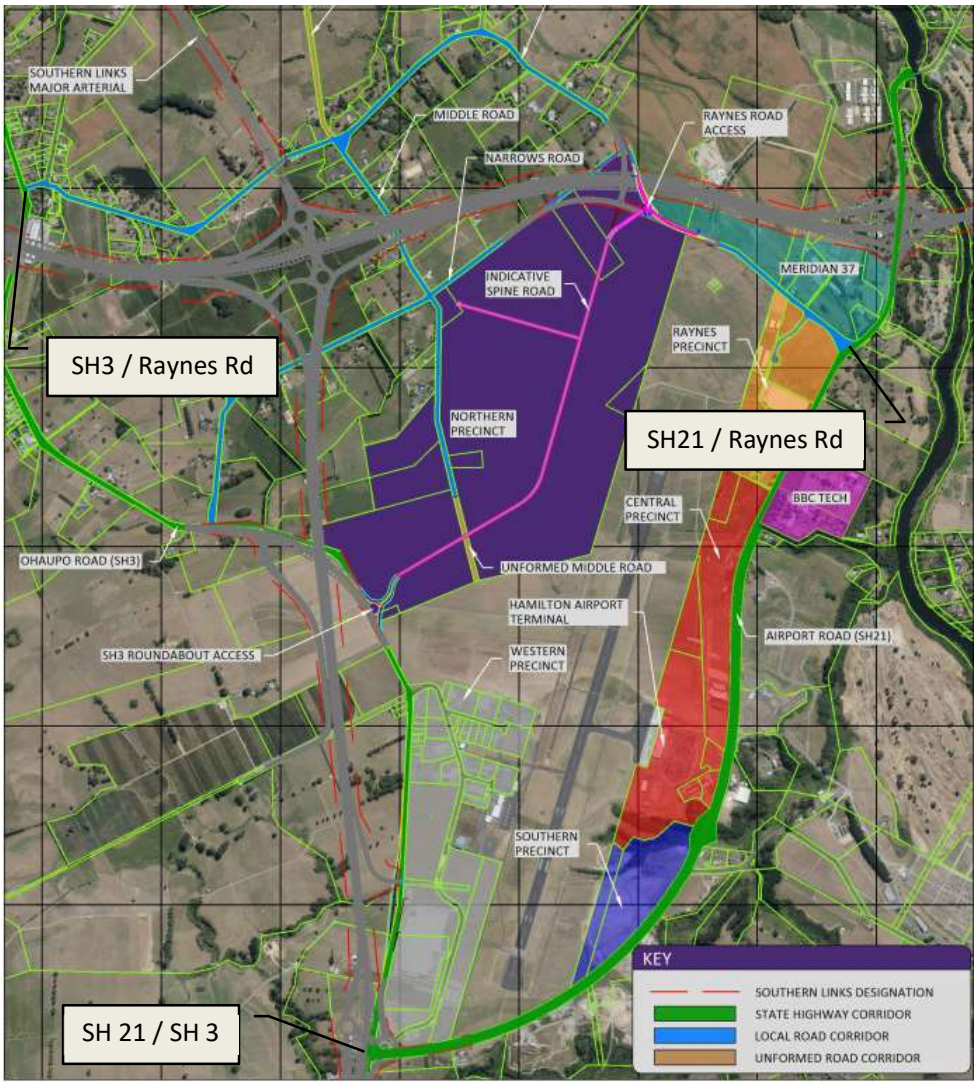


Figure 1: Site Locality

24. The proposed Southern Links Arterial transport corridors will be located to the north of the Site with a new grade separated interchange near the Northern Precinct. The

designations for Southern Links lapse in 2036 unless given effect to before that time or extensions are sought and approved. The build-out of Peacocke Structure Plan area for residential purposes, together with the Southern Links Arterial transport corridors will facilitate strong transport demand between the employment hub of Titanium Park, the transport hub of the Hamilton Airport and employment and shopping in Hamilton CBD.

OVERVIEW OF THE PLAN CHANGE

25. The Northern Precinct comprises approximately 41ha of land already zoned Airport Business on the northern side of Hamilton Airport, and TPL and RPL seek to rezone a further combined approximately 89ha of rural land to the north and west that is presently zoned Rural under the Operative Waipa District Plan (District Plan).

26. An illustrative Masterplan has been produced showing how the combined land holdings can be developed as an integrated precinct in the Airport Business Zone. This provided the basis for the amended Structure Plan (Figure 2). The illustrative master plan is included in Figure 3 for information but is not part of the proposed district plan provisions.

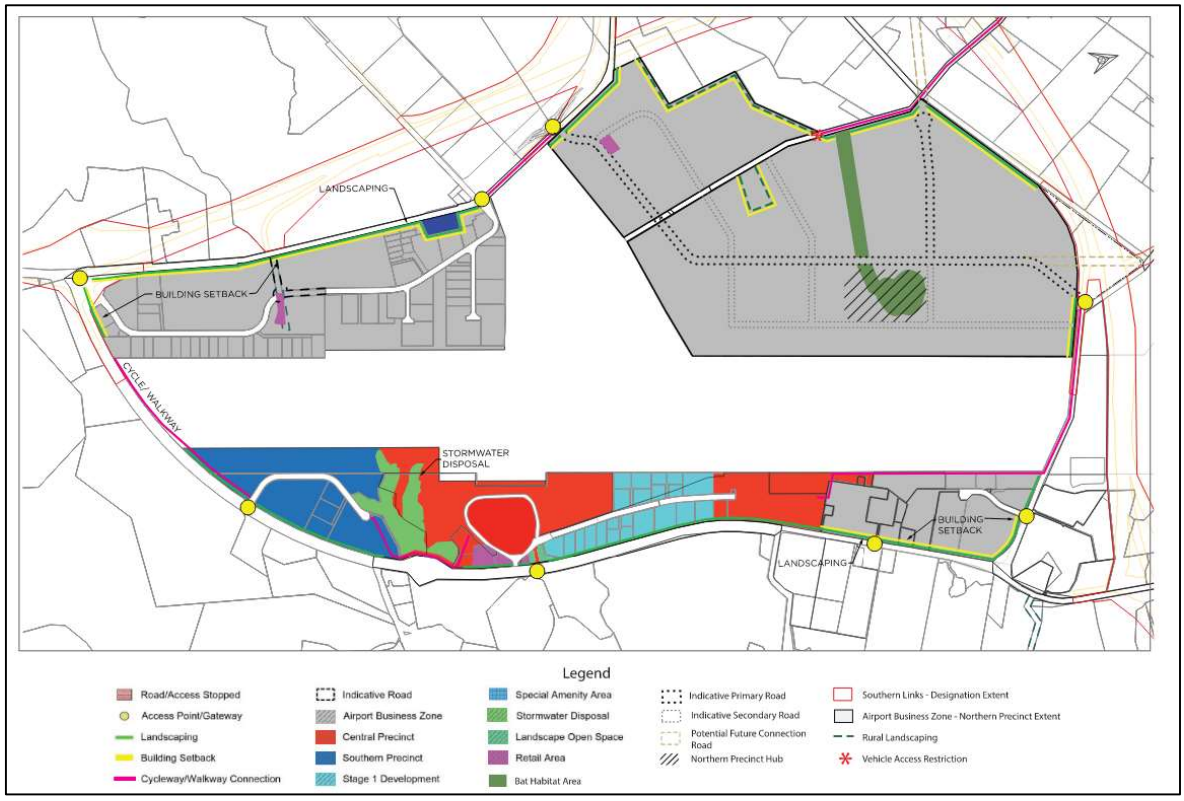


Figure 2: Proposed Airport Business Zone Structure Plan

27. The following provides a summary of the key transportation aspects of the proposed district plan provisions and amended Structure Plan:

(a) The amended Structure Plan shows a revised indicative roading pattern within the Northern Precinct involving two indicative Primary Roads and a series of secondary roads. One of the Primary roads is a 'spine road' extending between new access points at State Highway 3 and Raynes Road. It also introduces a vehicle access restriction preventing vehicles from exiting the site via Middle Road but allowing access to pedestrians and cyclists.

(b) Road cross sections have been developed for the Primary and Secondary roads to cater for all transport modes in a safe manner, as well as contributing to amenity.

(c) The rezoning enables approximately 130ha (gross) of Airport Business Zone land use activity to establish in accordance with the proposed plan provisions. In addition, the Hub overlay is incorporated near the centre of the Northern Precinct to provide a limited extent of retail to support the needs of people visiting and working within the precinct and businesses. The small retail area is within the western part of the Northern Precinct to provide for the convenience needs of workers and visitors in that area for amenity and to reduce the need for short vehicle trips within the site.

(d) Walking and cycling paths and connections are proposed within and from the Northern Precinct to the other precincts of Titanium Park surrounding the airport, as well as to the Peacocke Growth Cell within neighbouring Hamilton City.

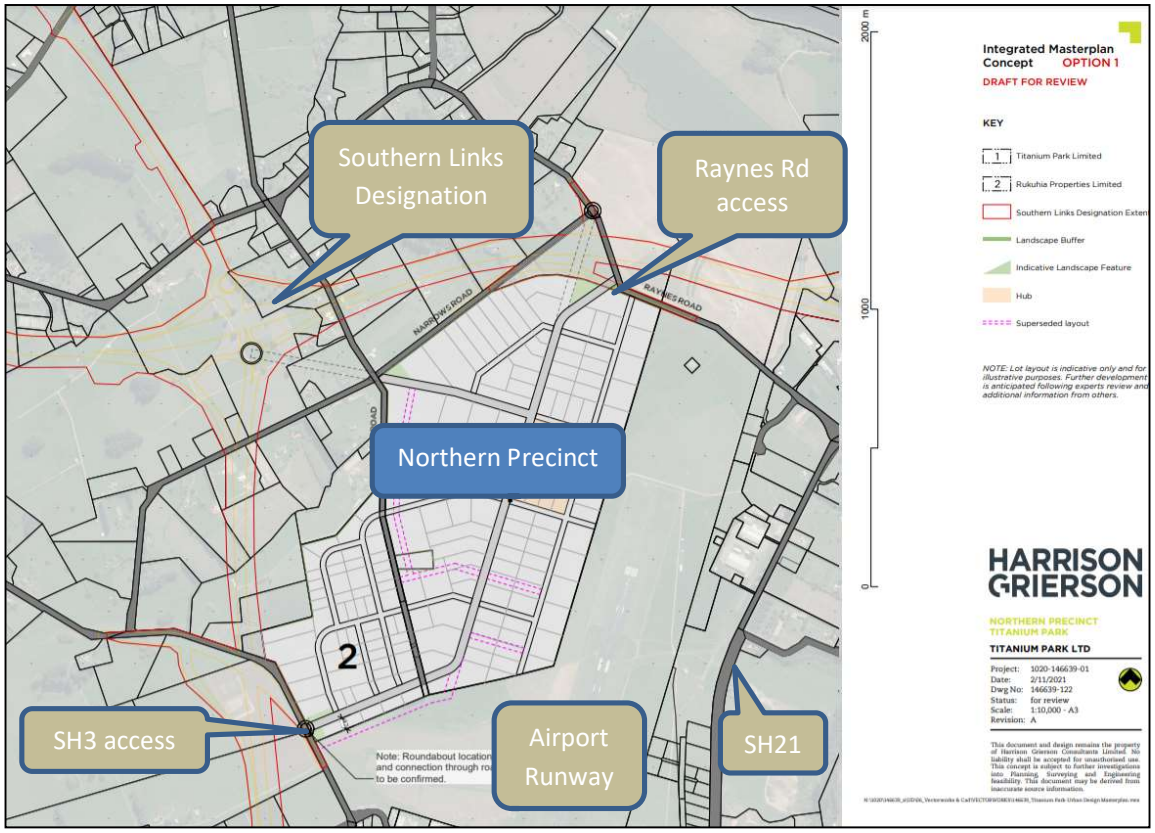


Figure 3: Illustrative Masterplan

EXISTING TRANSPORTATION ENVIRONMENT AND FUTURE PLANNED TRANSPORT INFRASTRUCTURE

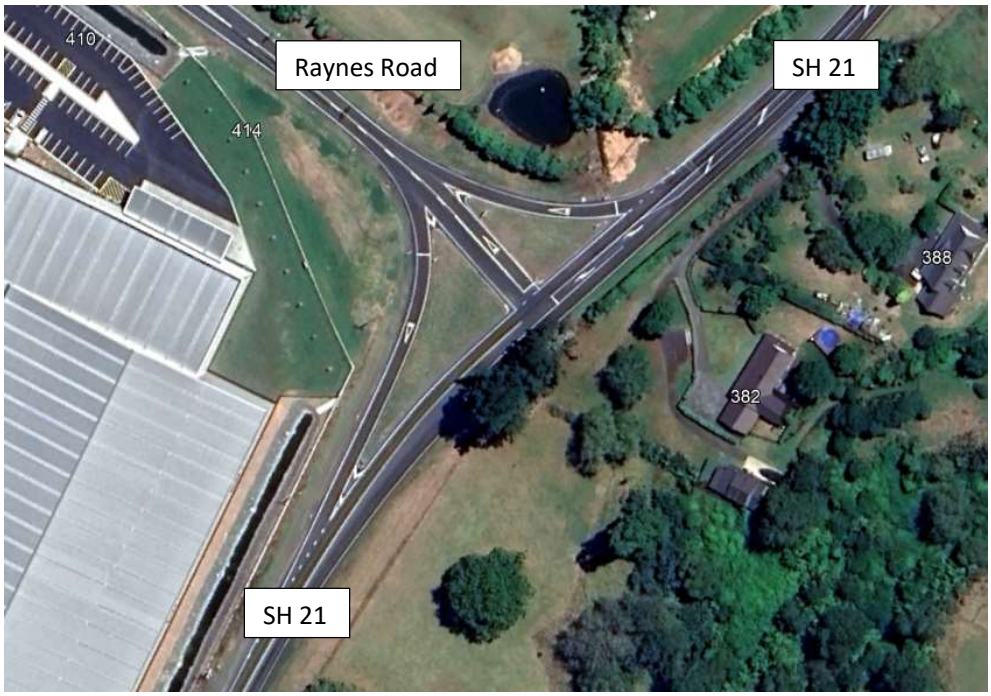
Existing Transportation Environment

28. Vehicle traffic will access the Site from two locations, State Highway 3 and Raynes Road. Current traffic volumes on State Highway 3 are approximately 14,900 vehicles per day ("vpd") with 10% heavy commercial vehicles ("HCV") while Raynes Road has an estimated volume of 3,400 vpd with 10% HCV. State Highway 21 which is located to the south of the Site, in a north-south direction carries approximately 7,150 vpd (10% HCV).

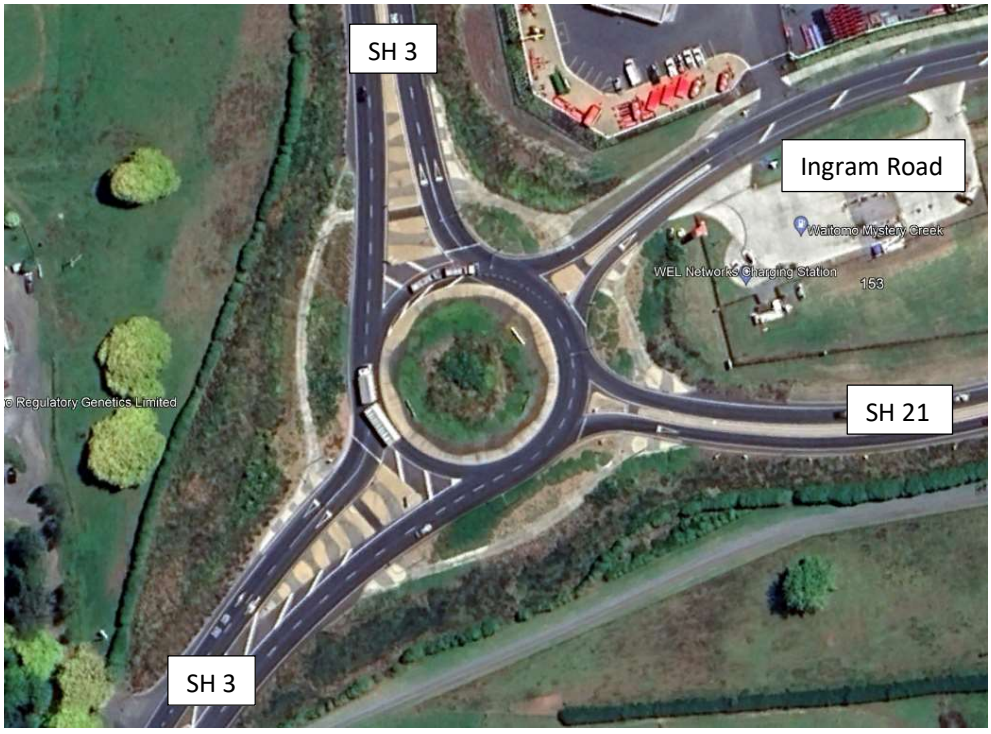
29. Raynes Road intersects with State Highway 21 approximately 780 m south-east of the Site, and to State Highway 3 approximately 2,900 m north-west of the site. The intersection of State Highway 21 / Raynes Road is a priority-controlled T-intersection with a right turn lane on the state highway. The intersection of State Highway 3 / Raynes Road is also a priority T-intersection with a right turn lane on State Highway 3.

30. Raynes Road intersects with State Highway 21 in the form of a priority-controlled T-intersection with a right turn lane on State Highway 21, while a roundabout exists at the intersection of State Highway 3 and State Highway 21. These are illustrated below.

SH 21 / Raynes Road Intersection



SH 3 / SH 21 Intersection



Future Planned Transport Infrastructure

31. The Southern Links Arterial roading project involves the realignment of State Highway 3 and construction of a grade separated interchange at the State Highway 3 / State Highway 21 intersection (refer Figure 1 above). It will provide greater capacity, more efficiency and safer connections from State Highway 3 near State Highway 21 and Hamilton Airport to central and east Hamilton (including Waikato University and the Ruakura industrial growth cell) via the Major Arterial Road through the Peacocke growth cell. A western and southern corridor is also planned, linking from existing State Highway 1 around to the western industrial and residential areas of Hamilton.

32. While the future Southern Links corridors and interchanges are designated, no detailed design has been completed, or construction timeframe or funding confirmed.

33. Waka Kotahi has identified that the State Highway 3 / Raynes Road intersection is soon to be upgraded to a roundabout as part of a safety improvement under the Speed and Infrastructure Programme (previously Safer Network Programme). Funding for the pre-implementation phase is now confirmed in the National Land Transport Programme and design is expected to be completed soon. Funding for construction and land purchases is also available for this upgrade. At present Waka Kotahi expects the roundabout will be a single circulating lane with single lane approaches and exits, although that may change as design and investigations proceed. The existing SH3 / Raynes Road intersection is illustrated below.

SH 3 / Raynes Road Intersection

34. The existing State Highway 21 / Raynes Road Tee intersection is likely to require capacity improvements by 2031 to accommodate the anticipated future traffic demands from the development of the Hamilton Airport Growth Node (HAGN), as referred to in the Waipa District Plan. This “node” includes the consented Meridian 37 industrial area that accesses Raynes Road in addition to the Airport Terminal, Mystery Creek Events Centre, BBC Technologies, and Sharpe Road, central, southern and western precincts of Titanium Park. The right turn out from Raynes Road fails first from a capacity and safety perspective. An upgrade to a single lane roundabout with a dual lane approach from Raynes Road providing a left turn slip lane and right turn lane is required as a minimum to accommodate the HAGN traffic and predicted State Highway 21 traffic growth.

EXISTING TRANSPORT MODES

35. There are no scheduled public bus services operating between Hamilton or other Waikato centres and the Airport/Titanium Park. However, an “on-demand” PT service trial called “Flex” commenced operation in February 2022 between Hamilton City Transport Centre and the Hamilton Airport. The service is operated by WRC as a 12-month trial and operates weekdays from 9.15am to 4pm. WRC may be able to provide an update on the success of this trial at this hearing.

36. There are no existing pedestrian paths or road crossing facilities on State Highway 3, State Highway 21 or Raynes Road given the current rural zoning surrounding the Hamilton Airport Growth Node. Accordingly, the existing volume of pedestrians is observed to be zero in the vicinity of the Northern Precinct site.

37. Cyclists are also uncommon in the area at present. There are no formal safe cycling facilities on or across the identified roads.

38. However, the current Airport Business Zone Structure Plan shows walking and cycling connectivity between Titanium Park Southern Precinct, to Western Precinct and Central Precinct and on to the Raynes Precinct. The connection between Southern and Central Precincts has just been completed and a walking and cycling path will soon be constructed from Ozzie James Drive (Central Precinct) to Raynes Road adjacent to the runway reserve and Raynes Precinct as part of the Stage 5 development of Titanium Park Central Precinct.

39. In my opinion, this presents one of the key transportation challenges (and opportunities) for rezoning the Site, given the proposed level of employment. Northern Precinct will add

to the need started by Peacocke Structure Plan and the Hamilton Airport Growth Node developments, for high quality and safe connections along the predominant walking and cycling desire lines to and around the ABZ, so that active mode travel is an attractive and viable option for future workers as well as for recreational use.

ROAD SAFETY ENVIRONMENT

40. The ITA provides a detailed analysis of crash data for the previous ten-year period (2011 – 2020) that was sourced from the Waka Kotahi Crash Analysis System ("CAS"). Table No: 1 provides a summary of the number and severity of crashes recorded on the network of roads within the vicinity of the Site.

Table No: 1

Crash History 2011 - 2021						
Location	Total Crashes	Crash Severity				Comments
		Death	Serious Injury	Minor Injury	Non-injury	
SH 3 near proposed Northern Precinct Access	3	1	0	1	1	The fatal incident involved a vehicle crossing the centre line to overtake and collided with the on-coming vehicle. Two vehicles were racing.
Raynes Road near proposed Access Intersection	1	0	0	0	1	-
SH3 / Normandy Ave intersection	51	0	1	8	42	Trends noted were failing to give way when entering the roundabout and rear-end collisions.
SH3 / Collins Rd intersection	23	0	1	4	18	Rear-end collisions were the most common crash type, which is common at signalised intersections. Right turn against crashes were also found to be a pattern, which is more likely when filter turns are allowed.
SH3 / Raynes Rd intersection	30	1	5	6	18	Trend of drivers turning right from Raynes Road failing to give way to southbound SH3 traffic. The fatal incident involved a head-on collision between two vehicles on SH3.

SH3 / SH21 intersection	29	0	3	7	19	This intersection was upgraded to a roundabout in 2016. Only 12 crashes have been recorded since. The 3 serious crashes occurred prior to the upgrade.
SH21 / Raynes Rd intersection	14	0	1	6	7	Crash factors included failure to give way, and failure to observe another vehicle slowing ahead. The crash record suggests that the form of intersection may be contributing such that some drivers are not understanding or obeying priorities.
Tamahere Interchange	13	0	1	3	9	Trend of rear-end collisions due to driver inattention on various approaches, which is common at major intersections.

41. The crash data indicates that the current right turn bay intersection forms of the State Highway 3 / Raynes Road intersection and State Highway 21 / Raynes Road intersection are likely to be contributing to the crash types observed at these intersections. Both intersections are likely to be reconfigured to roundabouts within the next five years. The State Highway 3 / Raynes roundabout is currently being designed by Waka Kotahi with construction completion expected in 2024. Roundabouts will bring both intersections into alignment with Safe System principles, significantly reducing the risk of death or serious injury crashes.

PROPOSED TRANSPORTATION INFRASTRUCTURE

42. The following transport infrastructure is proposed to support and provide mitigation of effects of the Northern Precinct development:

(a) Two new access intersections, one to State Highway 3 and one to Raynes Road.

(b) Provide safe, convenient and attractive walking and cycling connectivity to Peacocke Structure Plan area, others precincts with the Airport Business Zone and internally throughout the Site.

Site Access Proposals

43. As shown in Figure 1 and in the Structure Plan illustrated in Figure 2, access to the Site is proposed via two new intersections; one to State Highway 3 and one to Raynes Road. The following preliminary access configurations are proposed for each access (full size plans are included in Attachment 1 to my evidence):

(a) SH3/Northern Precinct Access 1 (illustrated in Figure 4) is recommended as a dual circulating lane, three-arm roundabout with double right turn lanes from the Site.

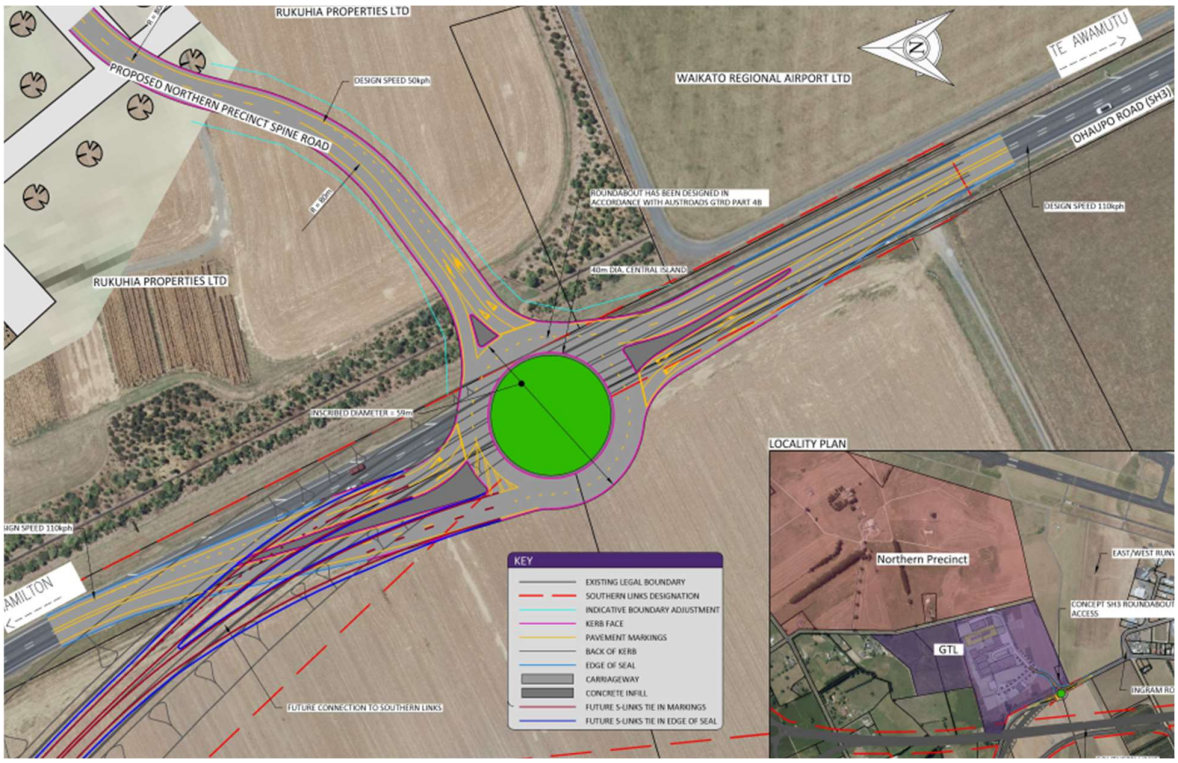


Figure 4: Concept Design Configuration – SH3 / Access Intersection

(b) Access 2 (illustrated in Figure 5) is recommended as a priority-controlled (or potentially signal controlled) T-intersection, with banned left turn out and right turn in movements from / to the Site.

44. I consider the roundabout configuration is appropriate for the SH3 / Access intersection for the following reasons:

(a) Roundabouts are a primary safe system intervention. The elimination of high angles of conflicts thereby ensuring low relative speeds between conflicting vehicles makes roundabouts a very safe form of intersection.

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

(c) There is sufficient suitable land for the roundabout while avoiding any clash with the Southern Links alignment and designation.

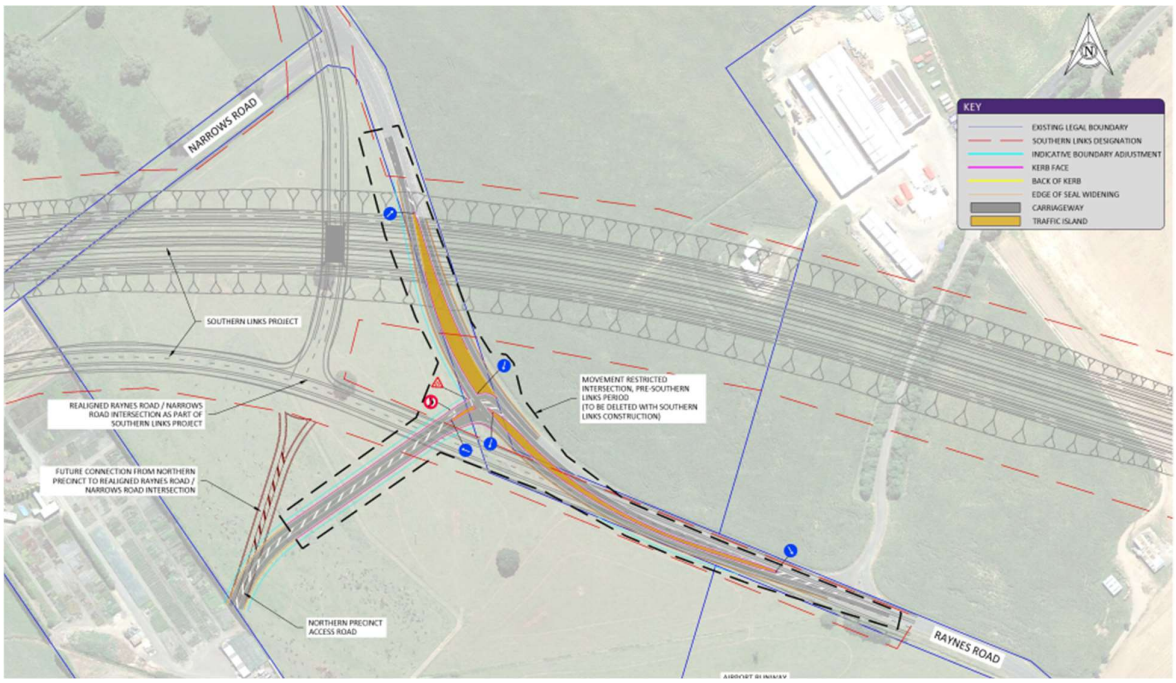


Figure 5: Concept Design Configuration – Raynes Road / Access Intersection

45. I consider the movement restricted configuration appropriate for the Raynes Road / Access 2 intersection for the following reasons:

(a) The future Northern Precinct commercial / industrial activities have the potential to significantly increase heavy vehicle volumes on Raynes Road north of Narrows Road if unrestricted access is enabled to Raynes Road from the Site prior to the Southern Links transport corridor being operational. This potentially would create adverse amenity and safety effects for residents of the numerous rural residential properties along Raynes Road (north of Narrows Road) and Lowe Road, and the need to mitigate this with significant road upgrade requiring more land are likely to be needed on Raynes Road. Therefore, a partial seagull treatment (channelised T-intersection) would provide improved safety for right turning traffic exiting the site and less delay than at a conventional T-intersection as the right turn out movement gives way to one opposing traffic movement only (northbound on Raynes Road).

(b) Left turn movements out of the site and right turn movements into the site would be legally banned and made physically impractical through kerb and infrastructure design. The removal of the right turn in movement reduces high angle conflict points and reduces conflicting traffic volumes. It therefore aligns more closely with Safe System principles than a conventional priority-controlled T-intersection.

(c) The location of the intersection is a balance of achieving separation from the access to the Meridian 37 (M37) industrial development on the opposite side of Raynes Road while ensuring a practical lot depth from the Airport runway boundary. If the intersection is located closer to M37 access, the right-turn out merge lane will overlap with that access, which is undesirable for safety.

(d) This intersection is suitable until the Southern Links Transport Project is under construction. It would be a 'sacrificial' investment for TPL and RPL, but the lack of any certainty around the timing of Southern Links means it could be good for at least 10 years and possibly 15 years or more.

(e) Shifting the location of the intersection to Narrows Road adjacent to the existing Nursery would not prevent vehicles at the Raynes Road / Narrows Road intersection turning left onto Raynes Road or right in from Raynes Road, via State Highway 3 / Raynes Road intersection which is what the proposal is trying to avoid.

46. Alternative options for Access 2 that could achieve the same outcome of physically inhibiting vehicle access to and from Raynes Road (north of Narrows Road) could be considered at detailed design. These could include:

(a) Connecting the internal Spine Road to Raynes Road (south) in a continuous curve; or

(b) Severing Raynes Road to general traffic north of the Spine Road connection; or

(c) Provision of a signalised T-intersection with Raised Safety Platforms ("RSP") and strategic kerb and island design that ensures banned left out and right in movements.

47. Notwithstanding the above, the access configurations are concept designs to demonstrate what I consider to be appropriate and fit for purpose intersection forms to acceptably manage the effects of the development based on the proposed Structure Plan. Details around final access configuration and exact positions will be confirmed as

part of future subdivision consents, along with the standard engineering approval process with WDC and Waka Kotahi. I expect the new accesses and intersections will be located and formed in general accordance with the Structure Plan, but the details will be subject to further Austroads design guidance, road safety audits, the Waikato Regional Infrastructure Technical Specifications ("RITS"), the Waka Kotahi NZ Transport Agency Planning Policy Manual and the Waka Kotahi Manual of Traffic Signs and Markings. In my experience, these matters of detail are best dealt with at the detailed design stage for subdivision consent.

Internal Transport Network

48. An indicative network of internal roads to service the development has been developed in conjunction with the Structure Plan (refer to the indicative layout in Figure 6). The internal public road network will be designed in accordance with the Structure Plan network layout and road hierarchy (Primary and Secondary roads) and will adhere to relevant design provisions in the District Plan. This includes, but not limited to the proposed road cross-sections for Primary and Secondary roads, new vehicle crossing spacings, sight distance and parking requirements, and a well-connected network of paths for walking and cycling within Northern Precinct and connecting to the wider Titanium Park walking and cycling paths linking the precincts around the Airport.

Figure 6: Northern Precinct Indicative Internal Transport Network

Walking and Cycling

49. The two primary roads within Northern Precinct will include footpaths on both roadside berms and a separated bi-directional cycling path on one roadside berm. Secondary roads will include a footpath on one side and a shared walking and cycling path on the opposite berm. The spine road paths will connect at the northern end to a new shared walking and cycling path on the berm of Raynes Road between Northern Precinct and the Raynes Precinct (Sharpe Road precinct), and at the southern end a new shared walking and cycling path will be constructed on the berm of SH3 connecting Northern Precinct paths to the Western Precinct (Ingram Road).

50. For connectivity to the wider network, a strategically important walking and cycling path is identified connecting between Peacockes Road and Northern Precinct via Middle Road and the unformed section of Faiping Road. The path length for the route between Northern Precinct and Peacockes Road via Middle Road and Faiping Road is approximately 1.9 km, while the distance to central Peacocke growth cell and the Cobham Drive / Wairere Drive interchange via the new Waikato River bridge (presently under construction) would be a cycling distance of approximately 4 km and 6 km respectively.

51. The walking and cycling path from Northern Precinct to Peacocke Road, including a crossing facility on Raynes Road aligns with the government's transport objectives and the emission reduction plan by providing greater travel choice which reduces car dependency and transport emissions.

52. Southern Links construction will severe the proposed walking and cycling corridor route to Peacockes Road, at Middle Road. At that time, an opportunity exists to reconnect the path by extending it along the northern side of Southern Links arterial, then over Southern Links arterial via the designated Raynes Road overbridge. This future route adds approximately 1 km to the cycling journey from Peacocke. Alternatively, an underpass could be provided beneath the Southern Links Arterial to continue the path at Middle Road. This would be approximately 80 m long. Alternatively, an underpass could be provided beneath the Southern Links arterial road to continue the active modes path along the existing Middle Road alignment.

TRIP GENERATION

53. Trip generation for the proposed development was calculated in the ITA using two methodologies:

    (a) Based on the indicative land use activities shown on the Master Plan, the total Northern Precinct area when developed was calculated to generate around 2,560 trips per peak hour. This included allowance for visitor accommodation, airside logistics activities, a childcare facility and non-ancillary retail of up to 5000m^2 GFA. All but the retail trips were treated as new trips generated externally to/from the site. That is a conservative assumption since a reasonable proportion of the total trips in a development of this size will be internal between the core businesses and to/from the convenience services in the Hub. I discuss the elements of conservatism in the trip generation assessment further from paragraph 54.

(b) A “reasonableness” check was achieved by applying a typical area-wide industrial estate trip generation rate of 20.9 trips/ha (net) to the combined area of the Northern Precinct yields approximately 2,490 trips per peak hour for the Site. This is approximately 3% less than the total trips derived in method (a), giving me considerable confidence that the quantum of trips calculated for the effects assessment is robust.

54. As mentioned, I consider that the trip generation assessment used in the ITA and on which the various infrastructure upgrades for effects mitigation are based, has numerous elements of conservatism built into it already. The following explains further.

55. The activity-based trip generation included a childcare centre for 100 children. Although childcares are a high trip generating activity in peak hours, I consider for this Site that most trips are likely to be “by-pass” trips internal to the Site as employees of Northern precinct businesses drop off and collect children as part of their journey to and from work. So, treating all these trips as new trips on the external network (in addition to the employment relates trips) adds conservatism in the assessment of network effects.

56. With Northern Precinct developed and the recommended walking and cycling infrastructure upgrades (paragraph 19(c)) completed, the active mode home to work / work to home trips are expected to significantly increase compared with existing active mode-share, but is still likely to be a low overall percentage (less than 5%) relative to the potential for trips by private vehicles as the viability for cycling is likely to reach only the catchment areas of Peacocke and possibly southern parts of Melville.

57. For comparison, a suburb like Pukete in Hamilton which is approximately 2.5 km southeast of Te Rapa North industrial zone has an active-mode uptake of between 2% and 3% according to Census 2018 data. Walking and cycling connectivity is plentiful between these two areas, in the form of on-road cycle lanes as well as off-road shared paths. Road crossing opportunities and facilities are generally lacking for cycling convenience, and there are no dedicated off-road cycle paths for high-speed cycling with little interruption. Therefore, it is considered a baseline proxy for the active-mode share that is likely to be achieved by Northern Precinct. An active mode share of 2% to 3% (i.e. 50 – 75 trips per peak hour) is considered negligible overall. Hence, for the purposes of this evidence I have not assessed any reduction of estimated trips by private vehicle due to active mode share at this stage. This is applicable to public transport as well.

58. Furthermore, the recent addition of the BHA reduces the developable site area from approximately 130ha to 125 ha. That means the overall quantum of trips used in the assessment of the road infrastructure and access requirements in the ITA is approximately 6%[2] greater than can be reasonably expected to generate with the BHA. That also excludes accounting for the 5m building setback from the BHA, which effectively reduces the developable Site area further.

59. I consider that these various elements all clearly illustrate the ITA for PC20 is founded on a sufficiently conservative assessment of trip generation and network infrastructure effects, and these conservative calculations are the basis of the modelling methodology and assessment of the developable area "triggers" for infrastructure upgrades proposed in rule 10.4.2.13A (discussed further in paragraphs 90, 90(a) and 90(b). There is some disagreement identified in the 15 February Joint Witness Statement of Transport and Planning experts[3], that these developed area "triggers" should adopt an even more conservative position by reducing the identified land area values by some percentage or amount as a form of safety factor. I disagree with the notion of an arbitrary safety factor as the trip generation and assessment that relates to the identified triggers is clearly already conservative for the reasons discusses above.

TRANSPORT MODELLING

60. BBO had undertaken a transport modelling assessment for PC20. This modelling included undertaking trip generation calculations associated with PC20 and transport modelling of those future trips on the network using the Waikato Regional Transportation Model (WRTM) to assess the trip distribution and any resulting capacity or safety effects on affected intersections and the proposed accesses to the site.

61. The resulting distribution of trips from the WRTM with full development of Northern Precinct is approximately 50% of the daily trip generation to each access point (State Highway 3 and Raynes Road). This adjusts slightly in the peak periods with 55% via Raynes Road and 45% via SH3 accesses in the AM Peak, and 40% to Raynes Road and 60% to SH3 in the PM peak.

62. The WRTM modelling indicates that approximately 129ha (98%) of the total Site area could be serviced by the new access intersections on State Highway 3 and Raynes Road in the pre-Southern Links period while also causing negligible traffic impacts on Raynes

[2] Calculation is 125ha x 0.9 x 20.9=2350 trips per hour. 2500 (trips/hr previously) – 2350 = 150. 150/2500 = 0.06.
[3] Refer to paragraphs 1.72 and 1.74(a) for discussion about the Expert witness conferencing and resulting Joint Witness Statements (JWSs).

Road residents and at the SH3 / Raynes Road intersection. However, considering the inclusion of the BHA reduces the total 130ha Site area by 5ha (gross), I am confident that 100% of the balance (125 ha) Site can be developed and serviced by the road infrastructure as proposed before Southern Links arterials are constructed.

63. Modelling also indicates that approximately 80ha Gross area (71ha Net) of the Site can be serviced by the proposed State Highway 3 roundabout alone before delays on the highway approaches deteriorate to level of service ("LOS") D. This equates to approximately 1,520 trips (two-way) per pm peak hour.

64. A future third transport access is proposed to Northern Precinct when Southern Links arterials are constructed. The proposed access is via a direct connection to the Southern Links central interchange. TPL and RPL propose that this link connects to the future roundabout on the western side of the interchange to provide a highly efficient public transport connection between Hamilton CBD, the Airport and Titanium Park employment hub and a strong freight connection to the wider strategic transport corridors through and around Hamilton.

65. Transport modelling was also undertaken early in the master planning process to determine the effects of the proposed direct connection to the Southern Links central interchange roundabout. The assessment considered this direct connection to Southern Links in tandem with a secondary access at Raynes Road for the Year 2041. The resulting trip distribution from the WRTM involves 60% of the trips accessing via the Southern Links direct link while the remaining 40% of trips distributes between State Highway 3 (16%) and State Highway 21 (24%).

66. The reduction in the number of trips distributed to the State Highway 21 / Raynes Road intersection due to the direct connection to Southern Links central interchange allows the State Highway 21 / Raynes Road roundabout to perform better at LOS A and LOS B during the AM and PM peak periods respectively. With Southern Links constructed, traffic volumes on State Highway 3 are expected to reduce by approximately 25% from current day flows, and therefore 100% of the Northern Precinct development trips can be accommodated with efficient performance through the proposed State Highway 3 and Raynes Road accesses.

TRANSPORTATION EFFECTS ASSESSMENT AND PROPOSED MITIGATION MEASURES

Emissions Reduction

67. The Emissions Reduction Plan ("ERP") supports low-emission transport infrastructure and urban form. PC20 is aligned with the ERP by providing the following opportunities to reduce the reliance on cars and support people to walk, cycle and use public transport:

(a) For connectivity to the wider network, the ITA[4] recommends an active modes path be provided from Northern Precinct to Peacocke Road, via Middle Road and Faiping Road, and in partnership with Waipa District Council and Hamilton City Council to ensure it meets the needs of the wider community by integrating well with the planned walking and cycling networks in Peacocke. (This is captured in proposed Rule 10.4.2.13A of the PC20 provisions).

(b) Walking and cycling path connections are also identified and recommended which will complete a continuous path around the airport precinct, linking Northern Precinct to Raynes Precinct, Central and Southern Precincts and Western Precinct. This will enable people working or visiting the entire Airport precinct to be able to do so by bike, e-scooter or walking. The loop path effectively reduces dependency on private vehicles for short trips around the airport business zone precinct.

(c) For PT, the proposed spine road between State Highway 3, and Raynes Road through the development will be suitable to accommodate public bus services. Bus stop locations will be identified and incorporated in the preliminary and detailed design phases through consultation with Waikato Regional Council in relation to route planning and WDC concerning infrastructure. Once connected between SH3 and Raynes Road, the spine road will enable a public transport service to loop around the Airport Business Zone precincts and the Airport Terminal. This could be incorporated into the Hamilton to Te Awamutu services and / or a new dedicated bus service to and from Hamilton Transport Centre.

(d) The unformed section of Faiping Road also presents an opportunity for a potential future local PT link between the Northern Precinct, the Airport Terminal and Hamilton CBD via Peacocke growth cell. This option could be a suitable alternative

[4] Section 5.6 in PC 20 Integrated Transport Assessment report.

route to the existing bus route through Ohaupo in the period before Southern Links major arterial is constructed.

Intersection Effects Assessment

68. Following the completion of the WRTM, the local as well as wider transportation effects were re-evaluated based on the calibrated WRTM traffic flow predictions accounting for the Northern Precinct rezoning. Capacity assessment undertaken via SIDRA (modelling software) indicates that all intersections identified in Appendix O12 of the District Plan, except for Tamahere Interchange, perform satisfactorily for the year 2031 with the addition of the trips generated by the Plan Change proposal.

69. I provide further explanation in regards to the performance of the Tamahere Interchange (specifically, the eastern roundabout intersection with Tauwhare Road) in paragraphs 86 - 87, and 141 - 146 of my evidence.

Public Transport Network

70. Over time the demand and feasibility for PT services operating between Hamilton and the Airport is likely to increase as employment within the Northern Precinct increases together with completion of existing Titanium Park and M37 employment precincts, plus passenger growth at the Airport. PT route options that were identified during the meeting with WRC as having merit for future network planning and design consideration were:

(a) Pre-Southern Links, Northern Precinct Spine Road not connected to Raynes Road (Short Term)

(i) New bus stops provided on both sides of State Highway 3 in the vicinity of the access roundabout

(ii) Extending a future bus route serving the Peacocke Structure Plan Area into Northern Precinct and the Airport via Middle Road and the presently unformed Faiping Road. Faiping Road offers the potential for an efficient public transport connection alongside the proposed walking and cycling shared path.

(b) Pre-Southern Links, Northern Precinct Spine Road connected to Raynes Road (Medium Term)

(i) A bus service connecting from Hamilton via State Highway 3 and Ohaupo Road to the Airport and the surrounding Airport Business Zone land. The service travels through Northern Precinct down the spine road then via Raynes Road and State Highway 21 to loop around to the Airport terminal and other Titanium Park precincts, returning to Hamilton via State Highway 3.

(ii) Extending a future bus route serving the Peacocke Structure Plan Area via the unformed section of Faiping Road. As mentioned, there is an opportunity to develop this road not only as a dedicated walking and cycling corridor but also for public transport. For clarity, use of the Faiping Road / Middle Road corridor by PT is not required for mitigation of transport effects of the rezoning proposal. The existing highway road network can and does accommodate public transport services. It is also recognised that PT route planning and provision of services is the responsibility of Waikato Regional Council and is not something the District Plan rules can require of them. However, PC20 can facilitate this through transport infrastructure design, and offers scale in terms of employment opportunities.

(c) Post-Southern Links

(i) A direct PT (potentially a Rapid Transit line) connection Hamilton CBD to the Airport via a new road corridor from Northern Precinct to the Southern Links central interchange.

Staging of Transportation Infrastructure Improvements

71. Table No. 2 below, is copied from the ITA (Table 9). It summarises the recommended transportation infrastructure upgrades, timing, and responsibilities for delivery. The infrastructure upgrades and timing (developed area triggers) are reflected in the proposed plan provisions, rule 10.4.2.13A. Minor amendments have been made to those provisions as a result of Expert Witness conferencing on 10 and 15 February 2023 and to correct errors, which is discussed further below in paragraphs 66-75 of my evidence.

Table No: 2

Staging of Transportation Infrastructure Improvements			
No.	**Infrastructure Upgrade**	**When?**	**Delivered By**
1	Upgrading of SH21 / Raynes Road intersection to a 3-arm roundabout (Refer Figure 20 of ITA)	Before any commercial / industrial activity in Northern Precinct generates traffic	*Waka Kotahi, the Applicants and Meridian 37
2	Capacity Increase at SH21 / Raynes Road roundabout to double circulating lanes and dual approach lanes (Refer to Figure 19: of ITA)	Before any commercial/industrial activity in Northern Precinct generates traffic accessing Raynes Road OR When the cumulative total consented land area in Northern Precinct with sole access to SH3 roundabout, exceeds 70ha (gross)	The Applicants
3	3-arm roundabout at SH3 / Raynes Road intersection	Before any commercial/industrial activity in Northern Precinct generates traffic	**Waka Kotahi
4	3-arm roundabout on SH3 for access to Northern Precinct	Before any commercial/industrial activity in Northern Precinct generates traffic accessing SH3 OR When the cumulative total consented land area in Northern Precinct with sole access to Raynes Road, exceeds 40ha (gross)	The Applicants
5	Restricted movement intersection access from Northern Precinct to Raynes Road	Before any commercial/industrial activity in Northern Precinct generates traffic and requires access to Raynes Road OR When the cumulative total consented land area in Northern Precinct with sole access through SH3 roundabout, exceeds 70ha (gross)	The Applicants
6	Construction of new walking and cycling shared path connecting Peacocke Road to the Northern Precinct via Middle Road and Faiping Road	Before any commercial/industrial activity in Northern Precinct generates traffic	Waipa District Council, Hamilton City Council, the Applicants

* Upgrade is necessary as a safety improvement project. Cost share between Waka Kotahi, the Applicants (TPL/RPL) and Meridian 37 has been agreed in principle between these parties.

** Upgrade is programmed for construction as a Speed and Infrastructure Program project by Waka Kotahi to address existing safety deficiencies.

JOINT WITNESS STATEMENTS

72. Expert Witness conferencing was held for Transportation and Planning aspects of PC20 over two days, on 10 and 15 February 2023. I attended and participated in both conferencing sessions and confirmed my agreement with the facts outlined in the two Joint Witness Statements.

73. As outlined in Mr Grala's evidence, agreement was reached by all Transport & Planning experts on the following matters at the conferencing sessions:

(a) The use of the WRTM is an appropriate modelling methodology tool for PC20[5].

(b) The PC20 transport upgrade provisions[6] should include a degree of flexibility to account for changes that are likely to occur in the future, including network and operator requirements.

(c) The amended structure of the planning provisions to enable the flexibility set out above.[7]

(d) There should be a walking and cycling connection between the Northern Precinct and the Peacocke Residential Growth Cell.

(e) There should be some flexibility afforded on the route identified between the Northern Precinct and the Peacocke Residential Growth Cell and provided a proposed amendment to Rule 10.4.2.13A to achieve this.[8]

(f) It is appropriate for the Proposed Structure Plan to include walking and cycling connections between the precincts.

(g) The District Plan already provides some provision for public transport within the ABZ.

74. Therefore, I now focus on the areas of disagreement by the transportation experts at the conferencing together with further information from me to address some outstanding transportation matters queried/raised by the other experts. The areas of disagreement include:

[5] This was agreed only by the transport experts as it was outside the expertise of the planners.
[6] Under Rule 10.4.2.13A
[7] This was agreed at the 15 February session and these have been adopted in the current PC20 provisions.
[8] This has been adopted in the current PC20 planning provisions

(a) The stage of development where the upgrades specified in Rule 10.4.2.13A are required.

(b) The effectiveness of the concept design for the Raynes Road access proposal

(c) The route for the walking and cycling connection between the Northern Precinct and the Peacocke Residential Growth Cell, including termination point.

(d) How PC20 enables / requires the provision of end of journey facilities and electric vehicle charging facilities.

75. Item 74(a) relates to the further information I provided in my memorandum (Attachment 2 of my evidence) to the Transport and Planning Experts on 22 February 2023, which I address further in 84(d) and 90(a) and (b).

76. In relation to 74(b), the Transport and Planning JWS of 15 February 2023 records in 3.1.3 that Mr Tindall as Transport Expert for Waka Kotahi supports the inclusion of the concept design for the Raynes Road access intersection in the district plan provisions. I agree with Mr Grala's suggestion that this is better dealt with through expanding the wording in Rule 10.4.2.13A to specify the outcome desired, which is to inhibit all Northern Precinct traffic physically and legally from turning left into Raynes Road and right into Northern Precinct from Raynes Road. This is now reflected in the draft wording of the rule as copied below.

77. *"Restricted movement intersection access from Northern Precinct to Raynes Road. The intersection should be designed to physically and legally prevent all vehicles leaving the Northern Precinct from turning left onto Raynes Road, and right turn into Northern Precinct from Raynes Road".*

78. Further to this topic, Mr Prakash as Transport Expert for HCC has reservations that the concept intersection design would physically prevent light vehicle traffic from turning left out of the site.

79. My response to that is the wording in Rule 10.4.2.13A specifying the outcome desired satisfactorily ensures that the detailed design phase will address the way to inhibit vehicles from turning left into Raynes Road. The concept design shows the intent, but it is just one option that with further refinement, would achieve that objective. The final intersection form and method to prevent the banned movements is a matter to be

decided at subdivision consent stage in consultation with WDC and Waka Kotahi. I also agree with Mr Grala's opinion in the JWS that one must assume people follow the law concerning where you can and cannot drive. While I accept not all drivers respect driving laws at of the time, overall, I consider this to be a small percentage of the daily volume and this small volume is unlikely to have a material adverse effect on the safety of Raynes Road residents or the SH3 / Raynes Road intersection, which are the two sensitive environments behind the reasoning for the banned movements.

80. In relation to 74(c), I echo Mr Grala's evidence, paragraph 81 – 86. The key transportation engineering reasons why I continue to support the Faiping Road path are:

(a) Faiping Road is a legal unformed road. Waipa District Council could choose to form it for its intended purpose tomorrow without requiring consents or formal public consultation (although I am sure they would speak with the neighbours). Faiping Road provides the most direct and cyclable route available at the present time between Middle Road and the Peacocke residential growth cell. I do not agree with Mr Prakash that the gradient of Faiping Road may be unsuitable for cycling. I have observed the steepest part (near Peacockes Road) and it is entirely adequate for cycling on traditional bikes let alone an e-bike.

(b) I have considered and addressed the two alternative routes identified in HCC's submission (refer to my paragraphs 101 and 102), and concluded these to be far inferior to the existing public road option in terms of topography, distance and certainty. For the walking and cycling connection to Peacocke to be attractive and therefore be effective in reducing car dependency for short trips, the route needs to be as direct, safe and short as possible for commuter cycling.

(c) No information or plans have been provided by HCC to demonstrate why a walking and cycling path cannot co-exist with their planned development for the land either side. There is limited information provided by HCC surrounding their intentions, but the parcels on either side of Faiping Road are large enough to accommodate a wide range of potential uses. In the absence of information, I cannot see why or how their intended use cannot be designed to work with the shared pathway, or alternatively how the pathway would frustrate or prevent their planned (but not consented or designated) activities from being developed.

81. In relation to 74(d), the JWS for Transport and Planning records that Waikato Regional Council will provide relief on how in its view PC20 should require end of trip facilities and

electric vehicle charging facilities to be provided within the Northern Precinct by way of planning provisions.

82. However, it is my opinion that the provision of end of journey facilities (EoJ) and electric vehicle (EV) charging facilities are too very different matters in relation to appropriateness in district plan provisions specifically for PC20. I support EoJ facilities (ie showers and changing rooms, secure bike parking etc) being a requirement for new developments in PC20 as part of the land use consent and/or building consent process. EoJ facilities is part of enabling greater travel mode choice so that future employees in Northern Precinct view walking and cycling as viable for internal and short commuter trips, thus maximising the benefits of the significant investment in walking and cycling infrastructure that will be provided.

83. EV charging is a matter that I consider is something that should be enabled by RPL and TPL in the subdivision design of public car parking areas but is not the prerogative of the developer or even future business owners in Northern Precinct to provide it. The provision of public charging units and power supply is something electricity retailers install and operate if/when they see a market for it.

84. Items requiring further information at the conferencing from me were subsequently addressed in my memorandum (Attachment 2 of my evidence) to the Transport and Planning Experts on 22 February 2023. This memorandum provided:

(a) A comparison of 2031 Baseline and 2031 Northern Precinct intersection performance results from SIDRA modelling. (SIDRA is industry standard intersection performance modelling software).

(b) SIDRA modelling results for Ohaupo Road (SH3) / Saxbys Road roundabout, which was not addressed in the PPC20 ITA.

(c) Reason for the 315m queue and LOS A results presented for SH3 / Raynes Rd roundabout.

(d) Transport modelling results supporting the development area ‘triggers’ in the infrastructure upgrades table in rule 10.4.2.13A. This relates to the area of disagreement noted in paragraph 74(a) above.

85. The following summarises the content in response to those four items.

86. In response to 84(a), the WRTM model was rerun with a 2031 Baseline scenario (involving 41ha of Northern Precinct ABZ and completion of all other ABZ precincts and M37 development). The comparison of intersection performance results for Baseline v PC20 shows either negligible or minor change in performance at all of the intersections of interest on the wider network (ie those beyond the State Highway 3 and 21 intersections with Raynes Road). The only exception is the Tamahere Interchange east roundabout approach from Tauwhare Road. This approach performs poorly in the AM Peak with full development of Northern Precinct, due to the approach being one lane and immediately adjacent to a deep gully which makes widening the approach and enlarging the roundabout very difficult. This is gully area is illustrated below in the red outline.

87. While poor AM Peak performance on this approach is not ideal, our consultation with Waka Kotahi to date has not highlighted that they have critical concerns with it. However, Waka Kotahi did request in their submission that the models be rerun with the recently completed safety upgrades focused primarily on the southwest roundabout of Tamahere Interchange (design shown in above illustration). I confirm the results discussed here account for those safety upgrades. I understand Waka Kotahi may be accepting of this level of congestion on Tauwhare Road approach as the modelling shows it occurs only in the AM Peak (the PM peak operates well) and the deep gully system adjacent to the roundabout provides a significant topographical constraint for widening the approach and roundabout. Also, much of the traffic using this approach in the AM peak to access

Hamilton has an alternative route via Matangi Road and SH26, and if from Cambridge they can (and should) use the SH 1 expressway rather than local country roads.

88. Concerning 84(b), the SIDRA modelling for SH3 / Saxbys / Tomin Road roundabout shows the intersection is likely to continue performing well in future with the modelled PPC20 traffic added.

89. Concerning 84(c), the modelled results predicting the long queue (315 m) while producing low delay values per vehicle is explained by the fact the arrival volume is high (approximately 1400vph) but the queue is not stationary. It is predominantly moving all the time. The opposing right turn volume is low (1 per minute) so few cars at the front of the moving queue are required to stop.

90. Concerning 84(d), I have provided SIDRA modelling results in my memorandum to the Transport and Planning experts in support of the proposed development area 'triggers as requested during conferencing. I stand by these as they are based on the trip generation methodology described in the ITA and my evidence (which I have explained is conservative), and the WRTM modelling that I note the JWS recorded all experts agree with. In addition, I recommended some minor wording amendments to the infrastructure development area triggers under proposed rule 10.4.2.13A. These are:

(a) A consistent change from Gross area to Net area for all land area triggers. For consistency with the ITA assessment, Net area is 90% of Gross area. Net area is exclusive of roads and non-developable area and is easier to measure at subdivision consent stage, so I consider it to be more appropriate for implementation purposes. The trip rates and assessment of effects in the ITA report are also based on Net area, so the proposed tracked changes in rule 10.4.2.13A relating to land area provide consistency with the assessment basis.

(b) In relation to when the SH3 / Access roundabout is required if initial subdivision access is from Raynes Road, the rule incorrectly had been tracked changed from 70ha (gross) to 65ha (net). As per my ITA section 7.5.1, the correct area value is 70ha (net). These changes are included in the provisions appended to Mr Grala's evidence.

91. As discussed earlier in paragraph 59, I consider that there is no need for arbitrarily added conservatism to the development area triggers. I note Mr Grala in his paragraph 75 - 77 agrees for the same reasons in the context of applying arbitrary factors of conservatism.

RESPONSE TO SUBMISSIONS RAISED

92. I have read the submissions and further submissions lodged for PC20 in relation to traffic / transportation matters. I address these submissions by topic in my evidence to follow.

Walking and Cycling

93. HCC (submission #23) opposes the proposed walking and cycling facility on Faiping Road for reasons that are not entirely clear, nor what the adverse transport effects are that HCC is concern with except to say it does not align with HCC's future plan for the area. HCC also submit:

- That it is unclear how this path would be funded and delivered
- That the gradient of Faiping Road may mean that cycling is not attractive for commuter cyclists
- That the shared path should be 3 m wide for the full length of the path to cater for e-bike speeds, but this is not included in the provision table
- There is limited evidence to suggest the level of demand / patronage would support the investment required for this type of solution, in the short-term, prior to the construction of Southern Links
- Data showing where the future labour force might reside would help inform where and what type of PT and walking / cycling solution is required – determining the origin of trip destination of employees to the Northern Precinct is critical
- An on-demand PT service is likely to be more practical short-term solution.

94. I strongly disagree with most elements of this submission point and my reasons are elaborated in the following paragraphs. Firstly, Faiping Road is a public road in Waipa District. It should not be confused as a paper road. As a public road its purpose is for access and conveying people and utility services. To prevent its use for this purpose will require a formal road-stopping process by Waipa District Council. That is a process under the Local Government Act which requires public consultation and consideration of affected parties. The process to formally stop the road is by no means a foregone conclusion in the way that HCC appear to be assuming in respect of their plans.

95. Secondly, it seems that HCC's future plans in the area postdate PC20 and the walking and cycling path. I am unable to address transportation effects when opposition to a strategic walking and cycling connection between the Peacocke residential development and a significant employment node nearby is based on not disrupting HCC's very high-level plans for the area.

96. I note HCC have also offered no clear evidence or plan that illustrates why a walking and cycling path using Faiping Road could not co-exist with its future plan for the land.

97. I also note that this submission point is opposed by Bike Waikato in its further submission, as they strongly support the Faiping Road cycleway proposal.

98. Further to this, I, along with other members of the Project Team, have walked and inspected the Faiping Road route, and the grades are perfectly adequate for cycling, even more-so for cyclists on e-bikes. This is supported by Bike Waikato's further submission in which it is stated that "*We do not agree that the grade of Faiping Road will deter cyclists (whether commuter or recreational). When given the choice of an unprotected on-road option with that of an off-road option, the vast majority of cyclists will choose the safer off-road dedicated facility, unless it is a considerably longer trip. In the case of the proposed Faiping Road, it is a shorter, more direct option. Furthermore, with the further uptake of E-bikes, grades are less of an issue as they might be for some cyclists.".*

99. In my opinion HCC opposition to the clear and obvious benefit of a walking and cycling linkage with the Peacocke growth cell that the Faiping Road proposal offers is unusual. To further back its position HCC suggest there is a lack of data showing where the future labour force might reside. I disagree with the need for and utility of such a study and it is a confusing request when, from a transport sense HCC also highlight its support for PC20 due to the imminent population growth in Peacocke and the "2 km" distance between Peacocke and the Airport "employment" node.

100. Walking and cycling provision on Peacocke Road is something HCC plans to develop as part of the Peacocke Structure Plan (Plan Change 5). Connecting walking and cycling via Faiping Road to the Airport employment node is a significant opportunity that is being offered where there are no other viable or practical solutions - while the future Southern Links form and timing remains uncertain. The proposed walking / cycling path is shown on the opposite side of Peacockes Road in the Peacocke Structure Plan. A safe crossing facility will be needed for cyclists and pedestrians to cross Peacockes Road, however,

the location and design of this crossing facility can be confirmed in consultation with HCC during the detailed design stage of the Faiping Road path.

101. The alternative walking and cycling route proposed by HCC as Option 1, along the edge of vegetation and watercourse / stream, is approximately 600 m longer than the Faiping Road route proposed in the ITA. This is shown in the image below from HCC's submission. In my opinion this route is inferior as it is not along the most efficient line of travel (the "desire line" for walking and cycling) and it will require land acquisition which appears unnecessary when there currently is an unformed public road corridor available.

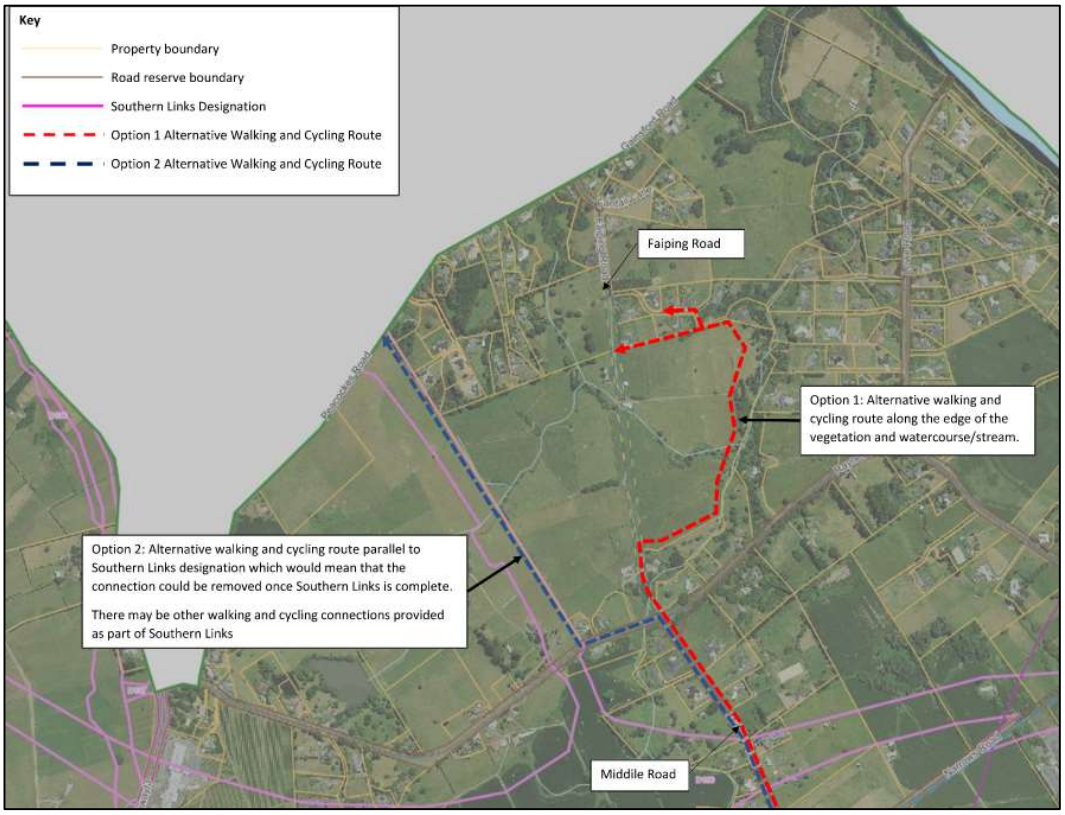


Image 10: The alternative walking and cycling shared path from the HCC submission.

102. As for the alternative walking and cycling route, Option 2, the blue dashed line in the image above is parallel to Southern Links designation. I have investigated this in greater detail and the preliminary assessment has been presented to WDC during the consultation phase of PC20 along with an interested party adjacent to Faiping Road. The assessment concludes that:

(a) While most of Option 2 route appears to cover comparable flat topography as the proposed Faiping Road route, the northern end of the alternative route presents a significant challenge for an accessible path due to a steep embankment up to

Peacockes Road. The intent for the Southern Links arterial is to pass under Peacockes Road, through the embankment.

(b) The level difference between the toe of the embankment and Peacockes Road is approximately 18 m based on LiDAR survey information. The straight-line length from bank toe to top is approximately 75 m, making the slope gradient 24% (1 in 4.2). However, the maximum desirable design grade for new 'accessible' paths is 8% (1 in 12) with minimum 1.2 m long landings spaced every 9 m. Therefore, the path length up the embankment would be at least 252 m long involving 4 or more zig-zags up the slope as shown in Figure 7. Each of the four path sections are likely to require retaining walls for structural support. Accounting for the zig zag ramp length, the overall length of the suggested alternative route between the same starting and end point as the proposed route (Northern Precinct to Faiping Road / Peacockes Road intersection) is approximately 2.9 km.

(c) A scenic and quite route initially but in the long term with Southern Links arterial road next to the Option 2 path it will become noisy, and with the extra travel distance it risks being less attractive for users weighing up travel by car or bike.

(d) Land is required from the Healy's and other private landowners which would make Option 2 a more expensive option and a longer and uncertain timeframe to achieve. The path could not be established without Waka Kotahi's written consent under s176 RMA as the Requiring Authority for the north-south road corridor of Southern Links. In future the path would also need to be closed and the northern end within the designation destroyed to enable construction of the Southern Links project.

(e) The Faiping Road route has less impact on the Southern Links designation, minimising future design and constructability issues for that project while preserving the use of the path throughout much of the Southern Links construction period. During this time, the Faiping Road path will provide commuters and recreational users an uninterrupted travel option that does not require the use of cars or driving a convoluted and congested route between Peacocke and the Airport Business Zone.

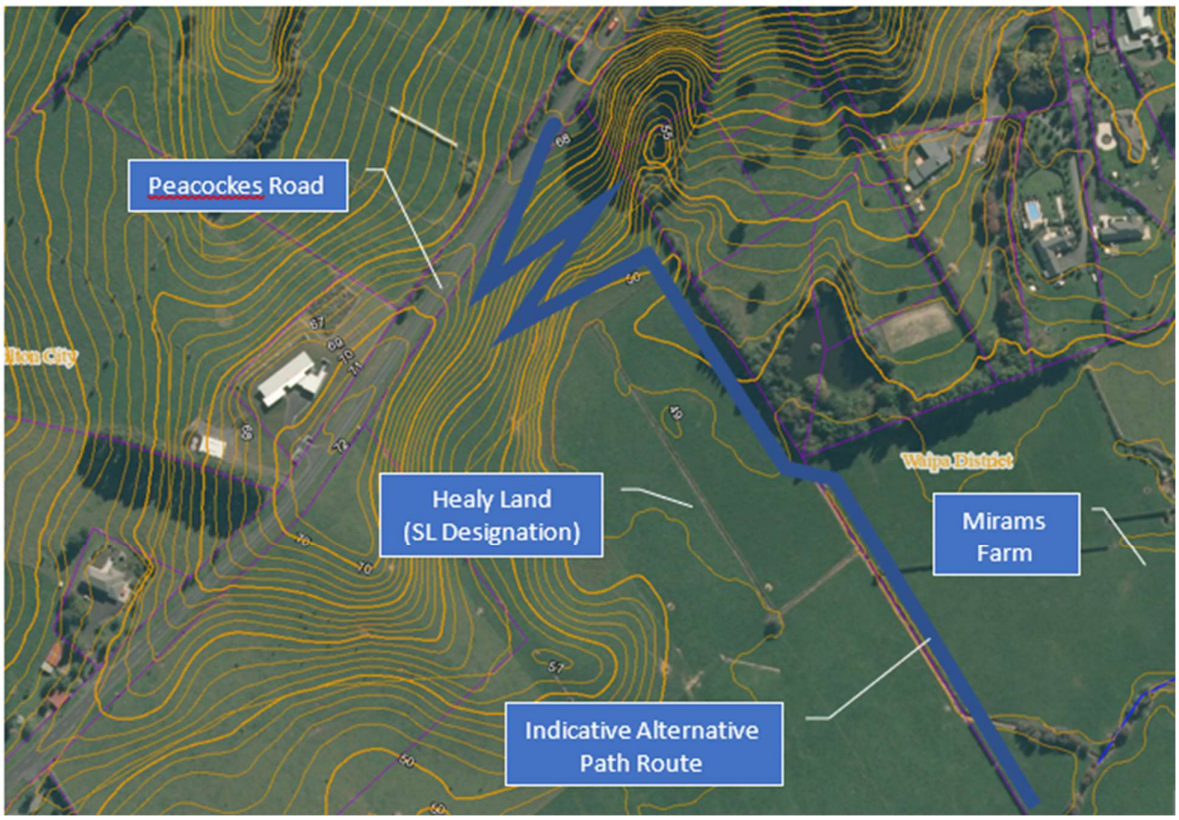


Figure 7: LiDAR Contours of the Embankment along Option 2

103. Tainui Group Holdings (09) has sought change to the proposed walking and cycling link along the east side of State Highway 3 such that it should be established to provide safe connectivity over the full length between the Northern and Western Precincts including either along the full length of Ingram Rd or an alternative route. This submission point is supported by two further submissions (Bike Waikato and NZ National Fieldays Society ("NZNFS")).

104. A walking and cycling path is proposed as part of PC20 along the east side of State Highway 3 to Ingram Road, to connect Northern Precinct with the western employment precinct of Titanium Park. It is WDC responsibility to provide any walking and cycling facility along Ingram Road to service the existing zoned development, therefore I do not agree with the submission point. This was confirmed during discussions with Mr Bryan Hudson of WDC[9] that WDC will seek to programme the upgrade of the historic section of Ingram Road in the next LTP cycle to include kerb and channel drainage, lighting and provision of a walking and cycling facility since these are all either non-existent or sub-standard due to the age of the road.

[9] Phone conversation between Cameron Inder and Bryan Hudson on 16 November 2022.

105. Mr Hickey (22) raises concern that there are no walking paths or safe provision for cycle use along Raynes Road and argues that the suitability for recreational use will be greatly reduced with traffic density increases associated with PC20. This submission point is supported by two further submissions (Bike Waikato and NZNFS).

106. The PC20 area is anticipated not to add any traffic to the north of the Raynes Road access, hence no upgrades have been proposed. However, off-road walking and cycling shared paths proposed along the internal roads will provide a safe connection to Faiping Road. Although, a path along Raynes Road will be approximately 200 m shorter than the path through the Site, the current speed limit of 80 km/h on Raynes Road increases the risk of serious and fatal accidents for pedestrians and cyclists. Also, significant road upgrade is required to address the open drains and relocation of power poles.

107. Bike Waikato has proposed that Rule 10.4.2.13A be amended to include the following additional requirement for the provision of the walking and shared path between the Northern Precinct, the Western Precinct and Southern Precinct:

(a) Transport Upgrade

(i) Construction of new walking and cycling shared path connecting the Northern Precinct to Ingram Road and beyond to the Southern Precinct.

(b) Implementation Requirement

To be completed prior to:

(i) Any section 224c certificate for subdivision under the RMA being issued for the completion of any subdivision within Northern Precinct; or

(ii) Any industrial / commercial activity being able to generate traffic.

Bike Waikato has also proposed that Principle S10.3.7 is updated to account as follows:

(a) Direct convenient access for public transport at State Highway 3, State Highway 21 and Raynes Road. A continuous cycle / walkway connection from all **seven** access points in accordance with the structure plan.

108. The walking and cycling paths requested by Bike Waikato are already shown on the amended Structure Plan. However, to capture the shared paths that are directly relevant for connecting Northern Precinct to the Western and Central Precincts the following two

amendments (in purple) to the transport infrastructure Rule 10.4.2.13A are recommended:

Upgrading of SH21 / Raynes Road intersection to a 3-arm roundabout. The construction of the section of the shared walking and cycling path between the Northern Precinct and Ingram Road as shown on the Airport Business Zone Structure Plan.	To be completed prior to: • Any section 224c certificate for subdivision under the RMA being issued for the completion of any subdivision within Northern Precinct; or • Any industrial / commercial activity being able to generate traffic.
Restricted movement intersection access from Northern Precinct to Raynes Road The intersection should be designed to physically and legally prevent all vehicles leaving the Northern Precinct from turning left onto Raynes Road, and right turn into Northern Precinct from Raynes Road. The construction of the section of the shared walking and cycling path between the Northern Precinct and Sharp Road as shown on the Airport Business Zone Structure Plan.	To be completed prior to • Any industrial / commercial activity being able to generate traffic that gains access off Raynes Road; or • When the cumulative total consented land area in Northern Precinct with sole access to SH3 exceeds 70 ~~65ha~~ (net) ~~70 ha (gross)~~

109. In terms of Bike Waikato's request for wording "all seven access points" in Principle S10.3.7, I note these access points are not all related to Northern Precinct and are therefore not required under PC20.

110. I would reiterate though, that the provision of walking and cycling connection along the original section of Ingram Road is not the PC20 Applicants' responsibility but rather WDC's (as it is an existing historical road that requires bringing up to standard). Mr Hudson of WDC confirmed this (discussed in Paragraph 104).

Transport Modelling

111. HCC (23) requests re-modelling to be undertaken to update the baseline based on current demand and various scenarios are run based on different land-use activities within the Northern Precinct.

112. I do not also agree with the need to run further land-use scenario testing beyond what has been done. The request does not appear to be targeted toward solving a particular identified issue. As also highlighted in Waka Kotahi's submission, "*the trip rates used are some 30% higher than would be typical for the proposed land use" and "in terms of transport if the triggers for the infrastructure required to provide a safe and efficient use of the State Highway network are robust, this does not impact the current proposal*.". This means the trip rates used are conservative.

113. I also refer again to additional conservatism within the assessment now that the BHA is effectively removed from the developable area. Furthermore, the Transport experts confirmed in JWS 10 February 2023 that they are all in agreement that the WRTM modelling undertaken is appropriate.

114. However, as identified in relation to the Expert Witness conferencing, I have carried out further WRTM modelling post-lodgement to provide the requested baseline 2031 scenario for comparison with the 2031 PC20 model results. The 2031 Baseline model includes:

(a) Full build out of Meridian 37, Raynes Precinct, Central Precinct, Southern Precinct and Western Precinct (north and south)

(b) 41ha of Northern Precinct with access to Ingram Road as per current Structure Plan

(c) Build out of Peacocke for the year 2031

(d) No Southern Links.

115. Comparison of the 2031 baseline and 2031 PC20 intersection performance results is discussed in paragraphs 85 and 86 and included in Attachment 2.

116. HCC (23) requests confirmation if modelling takes account of the build-out of Peacocke (Plan Change 5).

117. I can confirm that the modelling undertaken <u>does</u> take account of the build out of Peacocke for the year 2031. The number of households modelled within the Peacocke Structure Plan area was agreed and signed off by the stakeholders (of the WRTM) including Mr Tony Denton from Hamilton City Council.

State Highway 3 Access Roundabout

118. Waka Kotahi (18) seeks confirmation that the delivery of the State Highway 3 access roundabout is achievable within the land under the control of the applicant or Waka Kotahi. This submission point is supported by HCC and NZNFS in their further submission.

119. I can confirm that the access roundabout can be accommodated within the existing road reserve and TPL / RPL land as shown in Figure 8 (Drawing 0021 – Rev B). The concept design attached as Appendix B (Drawing 0021 – Rev D) to the ITA varies from Figure 8 below as its purpose is to illustrate that the access roundabout could integrate with the future Southern Links Arterial corridor without adversely impacting on the Southern Links design or construction. Design plans show there is sufficient suitable land for the roundabout while avoiding any clash with the Southern Links alignment and designation. It is to be noted that during previous consultation with Waka Kotahi, it was identified that the roundabout position could potentially be further west into the land opposite RPL, which is Crown owned. It was acknowledged that this may assist with better integration with the Southern Links transport corridor but can be addressed during the detailed design phase of the roundabout.

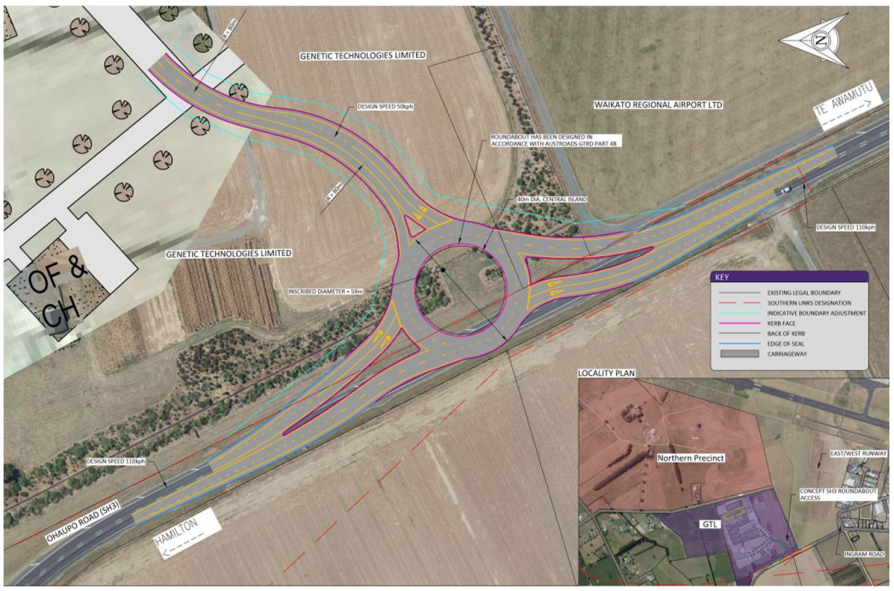


Figure 8: State Highway 3 Access Roundabout Concept Design Revision B

Raynes Road Access Intersection

120. Waka Kotahi (18) seeks clarity about the mechanism for Waka Kotahi to retain oversight and approval of Raynes Road restricted movement access, and the retention of this as a restricted intersection into the future.

121. As stated in paragraph 41(b), the access intersection will have to be designed in such a way that legally banned movements are made physically impractical. Details around final intersection design will be provided to Waka Kotahi for comments prior to engineering approval stage, which I anticipate would be required as part of a relevant subdivision consent.

122. HCC (23) raises concern that vehicles may try and turn left out onto Raynes Road instead of using State Highway 3 roundabout intersection as the layout does not prevent left turn by cars resulting in additional left-turning and unanticipated effects at the Raynes Road / State Highway 3 intersection and on Peacockes Road. HCC also consider there is potential for U-turns on Raynes Road at the end of the proposed islands. Similar issue is also raised by Joan and Robin Cuff (12) submission in which they question the measures to limit traffic to Raynes Road.

123. I do not agree with this concern and have provided reasons in paragraphs 77-79.

State Highway 21 / Raynes Road Intersection

124. Waka Kotahi (18) seeks clarity about the mechanism for funding, designing and implementing the single and dual lane roundabout at State Highway 21 / Raynes Road and confirmation that there is sufficient land under the control of the applicant of Waka Kotahi to accommodate the roundabouts.

125. The State Highway 21 / Raynes Road intersection will require a private development / funding agreement to be entered into with Waka Kotahi. I understand that discussion in that regard have been undertaken but at the time of preparing this evidence an agreement has not been finalised. However, it is important to note that PC20 provides a significant degree of certainty to Waka Kotahi and other interested parties by clearly setting out the required transport upgrades, the timing those upgrades are necessary, and any restrictions placed upon TPL / RPL from proceeding with aspects of Northern Precinct until the upgrades have been undertaken.

126. Drawing 0052 attached as Appendix B in the ITA does illustrate a concept design of a dual lane roundabout at State Highway 21 / Raynes Road intersection. The design shows that a dual lane roundabout could be accommodated within the existing road reserve. Stormwater treatment is likely to involve swale drains and soakage to ground, which can be accommodated in the berm areas around the roundabout.

127. Ms McDowall (01) and Mr McDowall (03) raise concern that PC20 has made no attempt to mitigate the risk of additional fatal accidents (due to increase in traffic) at either end of Raynes Road. While Mr Hickey (22) raises concern that peak time traffic density will also challenge the current roading infrastructure for access to local highways and that intersections and road widening will need to be improved.

128. In response to the above-mentioned submissions, I refer the submitters to Sections 8.2.1 and 8.2.2 of the ITA. The PC20 recommends that the existing State Highway 21 / Raynes Road intersection is upgraded to a three-arm single lane roundabout before any commercial / industrial activity in Northern Precinct generates traffic. Similarly, Waka Kotahi has indicated that design is advanced for upgrading the State Highway 3 / Raynes Road intersection to a roundabout as a Safer Network Programme improvement. Both intersection upgrades are considered primary safe system treatments to mitigate the potential for serious and fatal injuries if crashes occur.

State Highway 3 / Raynes Road Intersection

129. Waka Kotahi (18) seeks clarity about the mechanism for funding and implementing a multi-lane roundabout at State Highway 3 / Raynes Road intersection. HCC (23) also requests clarity around what intersection form is required to accommodate the development, and that the need for the additional lane is not clearly stated in the provisions.

130. In communications earlier in the year with Sarah Loynes of Waka Kotahi concerning the roundabout design that was well advanced, Ms Loynes confirmed that no additional lane was being included on the northbound approach to the roundabout, and neither was any additional land being purchased to accommodate an additional lane later. The project was being delivered and funded by the Speed and Infrastructure programme as part of the Road to Zero strategy, and this funding stream can only be used to fund safety projects. There was no ability to offer any top up funding or support for capacity related changes. It was also a top priority for Waka Kotahi to get the roundabout delivered quickly.

131. I confirmed to Waka Kotahi that the capacity increase was unlikely to be required for many years unless the Peacocke development increased the turn right into Raynes Road to access Peacocke Road. We agreed then that Waka Kotahi could look at advancing an alteration to the designation at some point in the future if required once Northern Precinct is developed and generating traffic such that it is driving the need for an additional northbound lane at the roundabout.

132. This issue was raised at the Transport and Planning Experts conferencing. I agreed with the other transport experts that a provision for this upgrade is best included in Rule 10.4.2.13A. The following was drafted and agreed by all experts for the proposed rule:

SH3 / Raynes Road - additional northbound approach and circulating lane on the roundabout.	To be completed prior to: • Any 224c being issued for any subdivision in Northern Precinct that takes the cumulative developed area with sole access to SH3 roundabout over 65 ha (net); or • When the cumulative total consented land area in Northern Precinct with sole access to SH3 roundabout exceeds 65 ha (net)

State Highway 3 / Ingram Road Intersection

133. Tainui Group Holdings (09) (TGH) submission seeks clarification on the design form concept for the staged transport infrastructure works at the State Highway 3 / Ingram Road intersection. This submission point is supported by Waka Kotahi in its further submission. HCC (23) also raises the concern that it is unclear what the implications are at State Highway 3 / Ingram Road intersection but relates to existing zoned development and related to State Highway 3.

134. TGH do not explain how they are directly affected by this (and other) transport effects of PC20. TGH's land is a 6.5ha block zoned Airport Business Zone that, when developed, will gain access from Ingram Road. However, the land is currently farm paddocks with no dwelling or activity other than crops and/or livestock. So, it is difficult to see a direct transport related effect of PC 20 on TGH 's land.

135. Notwithstanding this, the ITA (Section 5.2.1) states when the internal road connection between old and new sections of Ingram Road is completed, the State Highway 3 / Ingram Road intersection could be modified to left in / left out ("LILO") only movements

to improve safety at the intersection if Waka Kotahi and Waipa District Council felt there is need for it.

136. For clarity, there is no proposal to upgrade this intersection in relation to PC20. Effects on the intersection were discussed at the Transport and Planning Experts conferencing where I explained that PC20 deletes the current Northern Precinct access proposal (in the current Structure Plan) from connecting to Ingram Road. PC20 now proposes the access direct to SH3 via the roundabout as assessed in the ITA and proposed in the infrastructure provision for the district plan. If anything, the effects of this new access proposal at that intersection will be a significant improvement over the baseline where 41ha of development from Northern Precinct is shown accessing the SH3 / Ingram Road intersection in the current Structure Plan. The 15 February JWS records that Mr Tindall as Transport Expert for Waka Kotahi agreed that nothing further is required to be considered at SH3/Ingram Road intersection in respect of PC20.

137. Tainui Group Holdings (09) also seeks clarification on the timing and funding of the proposed State Highway 3 / Ingram Road intersection upgrade to address effects.

138. My paragraph 136 addresses this issue in respect of PC20. Any upgrade to the intersection is the responsibility of Waka Kotahi, or potentially other developers such as TGH with developable land that accesses Ingram Road.

139. Tainui Group Holdings (09) seeks clarification on what, if any, restriction to access is implied in the event development is progressed on Ingram Road as a result of the Staged Transport Infrastructure indicated for the State Highway 3 / Ingram Rd intersection.

140. I confirm that no changes have been proposed to existing provisions in relation to the Western Precinct.

Tamahere Interchange

141. Ms McDowall (01) and Waka Kotahi (18) requests further detail on Tamahere Intersection operation and possible mitigations to address level of service decline. This submission point is supported by HCC and NZNFS in their further submissions.

142. Works are currently being undertaken to improve access and safety under the Tamahere Interchange for pedestrians, cyclists, and people on mobility scooters as illustrated in Figure 9. Safety improvements include the introduction of raised pedestrian crossings, widening of shared paths and widening of existing carriageway to incorporate an

exclusive left turn lane on State Highway 21 approach and a right turn lane on Tauwhare Road approach at the south-western roundabout. My colleague Mr Balachandran has updated the SIDRA model for this interchange and the capacity analysis results are summarised below and included in the memorandum in Attachment 2 to the Transport and Planning experts:

(a) The Tamahere Interchange was analysed as a network consisting of the north-eastern and south-western roundabouts, and not individually to account for the potential impact that an intersection would have on the adjacent intersection.

(b) With the safety upgrades, only the Tauwhare Road approach at the north-eastern roundabout is expected to operate with congestion and delays during the AM peak period. The rest of the traffic movements at the interchange are predicted to operate at acceptable levels of service during both peak periods.

(c) The Tauwhare Road approach at the north-eastern roundabout is projected to perform at LOS F with an average delay of just above three minutes and a 95th percentile back of queue of 206 m (an improvement from the previous layout which was assessed to perform with an average delay of more than four minutes and a 95th percentile back of queue of 276 m).

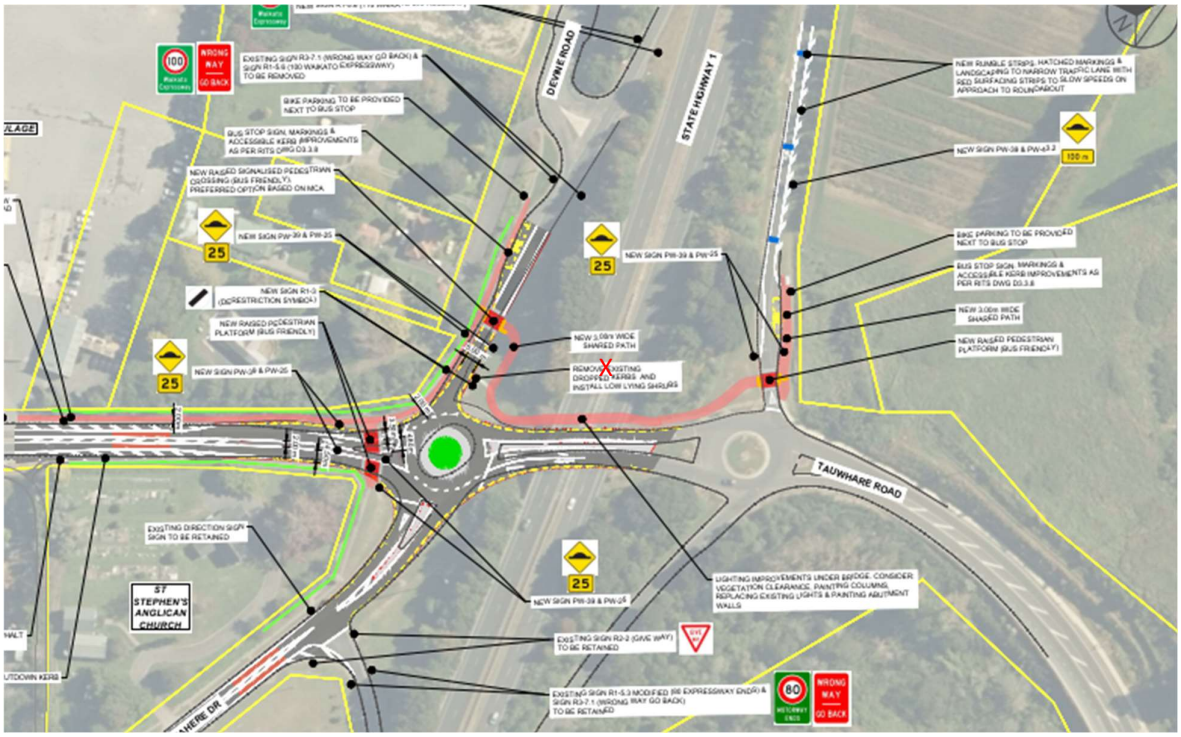


Figure 9: Tamahere Interchange Safety Improvements (Source: Waka Kotahi)

143. I have provided some commentary on this topic and the issues with addressing the poor performance in paragraphs 86 and 87. However, further traffic engineering assessment specific to this submission point is provided below.

144. PC20 contributes approximately 560 vph to the Tamahere Interchange during the AM peak hour and 290 vph during the PM peak hour. Approximately 30% (210 vph) of the traffic turning right from the State Highway 1 off-ramp to Tauwhare Road is attributed to Northern Precinct. The additional right turning volume causes the southbound through movement traffic from Tauwhare Road to give way to more vehicles and hence increasing the average delay and queue distance on that approach.

145. However, it is to be noted that the southbound Tauwhare Road approach at the north-eastern roundabout is projected to carry about 423 vph during the AM peak period (year 2031) without Northern Precinct development. This through movement volume is expected to increase by 100 vph (20%) when Northern Precinct is developed. Therefore, majority of the through moving traffic is attributed to wider network traffic from as far away as Cambridge, accessing Hamilton.

146. I noted in paragraph 87 that alternative routes exist for users of this approach in the AM Peak, if desired. Alternative routes include taking Tauwhare Road northeast to Matangi, then left turn on to Matangi Road before joining State Highway 26 to Cambridge Road or taking Silverdale Road to Ruakura Road. Taking the SH26 route to the Morrinsville Road / Cambridge Road roundabout is approximately 5.9 km longer than via Tamahere Interchange. This equates to approximately 4 minutes of additional travel time (at an average speed of 80 km/h), which is 1 minute more than waiting in the Tauwhare Road queue. My assessment is that no mitigating measures are necessary to address the AM Peak congestion effect on Tauwhare Road approach for the following reasons:

(a) The modelling shows the congestion is an issue in the AM Peak only. The PM peak period is likely to function well.

(b) Widening to add an auxiliary lane on Tauwhare Road approach and enlarge the roundabout is a very significant undertaking and cost due to a deep gully system adjacent.

(c) The current roundabout intersection aligns with Safe System principles and does its part to keep the DSI risk as low as one in the past ten years (at the whole Interchange).

(d) I have explained how the trip generation inputs to the modelling assessment are conservative, and this is also accepted by Mr Tindall (Waka Kotahi's transport expert) and Mr Tinnion-Morgan (WDC's transport expert).

State Highway 3 / Saxbys Road / Tomin Road Roundabout

147. HCC (23) raises concern that the no assessment of the State Highway 3 / Saxbys Road / Tomin Road intersection is provided in the ITA. The effects of PC20 at this intersection are uncertain as there are a lot of competing priorities on these networks, giving rise to conflicts between freight movement, pedestrians, cyclists etc. These are critical parts of the network which are already under significant pressure. Increasing the vehicle movements / thoroughfare in these urban environments and intersections is likely to detract the urban amenity and the safety for cyclists and pedestrians.

148. My colleague, Mr Balachandran has since modelled the roundabout using SIDRA Intersection 9 software for both the baseline and PC20 development scenarios. The results are presented in Attachment 2.

149. As discussed in paragraph 88, the model results for the roundabout show that the intersection will continue performing well in future with the modelled PC20 traffic added. I consider that no further assessment or improvements to this intersection are necessary in relation to PC20.

Wider Road Network

150. HCC (23) raises a range of concerns and assertions in relation to wider network effects of PC20:

(a) increased freight vehicle movements and heavy vehicle freight movements will be pushed onto local and urban road networks – these will negatively affect the urban amenity of areas such as Glenview (Ohaupo Road)

(b) the increase in traffic on State Highway 21 may make alternative routes more attractive.

(c) the predicted increase in traffic on Raynes Road and raises the concerns that the proposal may result in additional traffic on surrounding HCC roads prior to urbanisation of the Peacockes Road network.

(d) there is risk of additional traffic on Peacockes Road if intersections such as the Raynes Road intersection are not well designed to restrict movements to and from the north.

(e) there is a risk that the ITA may underestimate queues and delays at the State Highway 3 / Normandy Avenue intersection.

(f) that the potential for additional traffic may have adverse impacts on active modes in particular active mode commuters at Narrows Bridge.

151. Although the list of concerns seems extensive, it appears evident that little attention has been given by HCC to the assessment of wider network effects in the ITA or the WRTM modelling work that supports that assessment of wider network effects. That aside, most importantly I note that the Transport and Planning experts JWS of 10 February 2023 records all experts agree that the transport modelling work undertaken for PC20 is appropriate. Other than requesting the Saxbys Road / Tomlin Road / Ohaupo Road roundabout performance be assessed (as that was not in the ITA) HCC's transport experts Mr Prakash and Mr Black did not identify any further issues with the assessment of wider network effects in either of the JWSs.

152. On that basis, I believe HCC's submission points have been satisfactorily addressed through the JWSs, my evidence in paragraphs 77 - 79 in relation to the Raynes Road access intersection design, and the ITA provided for PC20.

153. Ms Cals (02) submission raises concerns with the impact of heavy vehicles on Mystery Creek Road and that this will only increase with PC20.

154. I agree with Mr Williams, author of the s42A report for Council on this topic, that the road condition is a maintenance issue and the responsibility of WDC. I add that WDC has limited funds to spread around a large network, so maintenance is programmed and prioritised where it is needed most. While trucks do use Mystery Creek Road, they are entitled to as there is no by-law banning its use. While trucks movements associated with PC20 are likely to occur on Mystery Creek Road, I consider it unlikely that the daily volume would be high due to the more accessible and high standard State Highway Network available from Northern Precinct to travel south toward Te Awamutu or to Cambridge.

155. Middle / Narrows Focus Group (05) suggests that the Northern Precinct development does not need access / egress to Middle Road to operate successfully and that the

residential neighbours wish to maintain their present lifestyle without extra traffic on a rural road.

156. In response to the submission by Middle / Narrows Focus Group, I refer the submitter to Section 5.2 of the ITA. This recommends that no access be provided from the Northern Precinct to Middle Road (north of Northern Precinct) or Narrows Road for general traffic. This recommendation has been adopted on the amended Structure Plan.

157. However, access for walking and cycling is recommended (and adopted on the amended Structure Plan) through the closure point of Middle Road and also to Narrows Road from Northern Precinct to enhance active mode connectivity to the proposed shared walking and cycling path on Middle Road. The proposed walking and cycling path on Middle Road provides an opportunity to connect the Hamilton Airport Growth Node to the Peacocke growth cell via Faiping Road, which is the most direct route available.

158. Ms McDowall (01) raises a specific concern that visibility is poor turning into and out of Lowe Road onto Raynes Road and accidents at this intersection are likely to increase.

159. My response is that the design of the road infrastructure for Northern Precinct purposely does not increase the traffic volume on Raynes Road north of the proposed PC20 access due to the turning restrictions required to and from Raynes Road at the access. It is possible however that the traffic volume on Raynes Road will increase significantly in future as a result of the residential growth in the Peacocke area, as there are no restrictions on traffic movements to my knowledge, associated with that development.

160. NZNFS (21) recommends the inclusion of the following policies to ensure that future developments need to take to account and avoid / mitigate any potential adverse effects of the functionality of NZNFS:

(a) "*Future industrial development shall take into account the existing operation and functionality of the Mystery Creek Events Centre. Any potential adverse effects on the existing and future operation of the Mystery Creek Events Centre shall be avoided*"

(b) "*Future development of the Northern Precent cannot adversely impact on the safety and functionality of the existing roading infrastructure*".

161. The ITA and modelling work carried out for PC20 has addressed the potential adverse effects on the surrounding road network where they were identified as requiring

mitigation. It is unclear to me what Mystery Creek Events Centre is specifically referring to regarding "the existing and future operation of the centre" and adverse effects being "avoided". Events to my knowledge are temporary and each is often different to the last in terms of traffic generation and arrival and departure patterns. So, it is not possible to confirm that adverse effects will always be avoided on all Mystery Creek Events Centre operations. On the flipside, and as NZNFS will be aware it is apparent that traffic effects of large events at Mystery Creek Events Centre can and do adversely impact on the access to the Airport and surrounding businesses. Again, that cannot always be avoided but instead it is usually mitigated to acceptable levels.

162. In the same way, from the assessment work BBO has undertaken I consider that there is unlikely to be adverse transport effects attributable to Northern Precinct development that are more than minor on the Mystery Creek Events Centre accesses. I also support Mr Grala's response on this matter in Annexure 5 of his evidence, as follows:

(i) PC20 is required to manage the transport effects of developing the Northern Precinct and is not required to deliver transport upgrades for the operations at Mystery Creek Events Centre.

(ii) PC20 proposes a policy and rule framework that requires several transport upgrades to be undertaken at varying stages of development. The upgrades have been based on a region wide modelling exercise that assessed the traffic that will be generated by the Northern Precinct and how the surrounding road network would function.

Southern Links

163. HCC (23) submits that:

(a) full or staged delivery of the Southern Links is a key enabler for future expansion of the Airport Precinct. Without Southern Links being fully constructed, the local road networks performance may be compromised through additional demand created by the Northern Precinct build-out. This submission is supported by three other further submissions (Mr Kessels, WRC and Royal Forest and Bird Protection Society of New Zealand)

(b) that the future intersection form of realigned Raynes Road / Narrows Road intersection once Southern Links is completed is uncertain. This may potentially result in additional traffic on Raynes Road heading north. Additional traffic on

Raynes Road heading north may put additional pressure on the HCC local road network within the Structure Plan area.

164. I disagree with the concern in 163(a) as it is not supported by the WRTM modelling undertaken for this project, as detailed in the ITA. As explained in paragraph 58, I consider that 100% build out of the 130ha Northern Precinct land area can be accommodated by the pre-Southern Links road network with the infrastructure upgrades identified in rule 10.4.2.13A. Therefore, Southern Links is not an enabler of the of the ABZ expansion.

165. Issue 163(b) is effectively another wider network effect issue raised by HCC which I have addressed sufficiently in my evidence and that the JWS also addressed by confirming that the modelling and assessment work was consider by all Transport experts in attendance, to be appropriate and no further issues or concerns about wider network effects were identified. This included HCC's transport experts.

166. With regards to the future connection to Southern Links, HCC (23) states that five leg roundabouts are considered undesirable. The effect is related to Waka Kotahi and the Southern Links Designation.

167. The ITA presents two options for the future connection to Southern Links, one of which is clearly a four-leg roundabout.

Public Transport

168. Waka Kotahi (18) and HCC (23) requests the provision of PT infrastructure within the Site, between the Airport Precincts, on the adjoining road network be included in the staging table (Table 9 of the ITA) and subsequently in the proposed Rule 10.4.2.13A following agreement between TPL, RPL, WRC, WDC and HCC around the funding mechanisms and timing and route details. This submission point is supported by the further submission from NZNFS.

169. I refer to the JWSs of 10 and 15 February 2023 where in relation to PT infrastructure, the Transport experts for Waka Kotahi and HCC agreed that the District Plan already ensures provision for PT within the ABZ, and that the amended wording concerning the design of the SH3/Access roundabout in rule 10.4.2.13A to include "<u>including provision for bus stops near the roundabout</u>" is sufficient to ensure PT will be "enabled" to support Northern Precinct. I agreed with this, as neither TPL and RPL are operators of PT, and

neither can require Waikato Regional Council who are the operators of PT to operate services to or through the Northern Precinct.

170. Instead, I consider that the developers of Northern Precinct are responsible for ensuring the road infrastructure is connected and constructed in accordance with the Structure Plan and typical road cross-sections, so it is suitable for accommodating public transport including bus stops and shelters if/when PT services are provided. I consider that the Structure Plan provides a well-connected road network, and the Primary and Secondary road cross sections are suitable for bus services to operate in future.

171. HCC (23) raises the concern that the use of Faiping Road as a PT route (medium term) does not align with HCC's future intentions.

172. Issues identified with regards to a bus route via Faiping Road have been addressed in Paragraphs 94 and 98. For clarity, use of the Faiping Road / Middle Road corridor by PT is not required for mitigation of transport effects of the rezoning proposal. The existing highway road network can and does accommodate public transport services. I reemphasise that there is also no clarity or certainty about HCC's future intentions for the land either side of Faiping Road.

173. HCC (23) further seeks clarity on how the proposed strategic connection to Southern Links Central Interchange will be limited to use by PT. They also suggest no assessment has been provided to assess the effects of this connection to the interchange.

174. The future connection to Southern Links central interchange is proposed as an efficient transport connection to Hamilton CBD given it directly connects to the planned Major Arterial corridor through Peacocke Structure Plan area. Whether it would be beneficial for access by all traffic or alternatively only PT, freight and/or active modes is a detail to be determined at a much later date. The location most certainly provides a strong PT and freight connection to the wider strategic transport corridors. But I have not recommended that the connection be provided only for these transport modes. In fact, the modelling undertaken and reported in the ITA is based on private vehicles being permitted to utilise this connection as well. But if private vehicles were banned from using it there would be no worsening of effects on the network from that which has been assessed for the pre-Southern Links period. In short, transport for PC20 does not require Southern Links for mitigation.

175. WRC (11) raises concern that the nature and location of urban development can have a strong influence on WRC's ability to provide effective and efficient PT services and that

careful consideration should be given to the internal road network and connectivity between the western and eastern [Northern and Southern] sides of the airport.

176. I understand the concern raised here by WRC, but I am confident this is appropriately considered with the road network proposed in the amended Structure Plan. It is also addressed by the medium-term option for potential PT routes presented in the ITA (Section 5.7.2) showing a bus route that connects Northern Precinct to the Airport terminal and other Titanium Park precincts as direct and efficiently as possible given the location of the Airport runway and surrounding road network.

177. I also note that the JWS dated 10 February 2023 confirms that all experts agreed the District Plan already provides some provision for PT within the ABZ, and that the addition of the words "including provision for bus stops near the roundabout" be included in Rule 10.4.2.13A in relation to the design of the SH3/Access intersection for Northern Precinct. After some discussion, the experts at the conferencing did not consider there to be any further plan provisions required to enable PT. I consider that these aspects together with the Structure Plan and Primary and Secondary Road cross-sections will ensure that PT is appropriately 'enabled' in the Northern Precinct ABZ, as required.

Retail Activity

178. HCC (23) raises concern that there is potential for increased traffic on surrounding roads if retail activities generate more than what the ITA anticipates. This submission point is supported by Waka Kotahi in their further submission. HCC considers that a retail shop could generate 42.5 trips/100m² GFA or a medium sized shopping centre could generate 17.2 trips/100m² GFA, whereas a trip rate of 4.0 trips//100m² GFA was used in the ITA for retail.

179. My response is the rule provisions for Northern Precinct restricts the types of retail, the total non-ancillary retail GFA to 5,000m^2, and individual retail floor areas to be less than 450m^2 (except one, which can be up to 1000m^2). I refer to the evidence of Mr Grala, paragraph 63 (a) – (i) that outlines the areas of agreement of the Economics and Retail experts conferencing including that some retail is appropriate in Northern Precinct for amenity, and that the level of retail within Northern precinct should not undermine the "*vitality and viability of existing commercial centres"*.

180. I also refer to the evidence of Mr Colgrave on the appropriateness of the 5,000m^2 cap, including modelling how this amount of retail within the Northern Precinct would affect 'the vitality and visibility of existing commercial centres' as directed by the WRPS.[10]

181. I therefore understand the intent of the retail component within the ABZ is to provide convenience shopping, services and amenity for the employees and visitors of the employment zone. While I accept some retail offerings can generate high numbers of peak hour trips, that rate is the total trips which is the sum of internal and external trips (internal being to/from activities within the Site and external being to/from outside of the Site). Since the intersection assessments in the ITA are primarily concerned with the performance of the main access intersections and intersections on the wider network, these are affected only by the external trip component for retail activities.

182. Given the intent of the retail floor area caps in the plan provisions, I am confident that external trips to the retail activities within the Site will be low and therefore 4 trips/100m^2 GFA (representative of the external (new) trip component within large shopping centres) is a reasonable proxy.

Issues for Resolving at Detailed Design Stage

183. The following detailed design related issues were raised by HCC (23) and supported by NZNFS in their further submission:

(a) Details of crossing facilities and walking and cycling paths connecting the site to the bus stops is unclear.

(b) Internal road layout results in multiple cross-roads intersections. Cross road intersections are typically undesirable unless roundabouts are used.

(c) Primary Road cross section includes 3 m shared paths however, there may be a greater mix of active modes users in the future i.e. electronic scooters, e-bikes along with pedestrians.

(d) Secondary Road cross section does not include cycling facilities which means that cyclists would have to cycle in the lane. This is undesirable given the likely presence of heavy vehicles. The proposed footpaths are 1.5m wide which are too

[10] Refer Section 3.1 of the JWS for Economics and Retailing where the planners agreed this was the relevant directive by the WRPS when considering the appropriate quantum of retail GFA.

narrow. Potential for vehicles to park within the traffic lane resulting in potential safety risks for on-road cyclists.

(e) Internal walking and cycling provisions lack a framework in the District Plan provisions that outline the proposed walking and cycling hierarchy and location of connections i.e. primary and secondary cycling routes and how these routes connect to the network.

(f) Staging lakes clarity on the anticipated effects of access during the initial stage of the development. If the Raynes Road access is constructed first, then there is a risk of increased traffic within the HCC local road network.

184. My response to the above matters is that, with exception to the road cross-section most of these issues are typically addressed during detailed design in consultation with the road controlling authority as part of a subdivision consent, not a Plan Change. The location and detail of bus stops, safe crossing facilities and paths connecting to the bus stops can be planned and confirmed at detailed design provided a preferred bus route has been identified by WRC. All other aspects of PT enabling are addressed in my paragraph 169 and 170.

185. In terms of development staging effects, the trips generated by the Plan Change area are distributed to the state highway network whether the Raynes Road access or the SH3 access is constructed first. It is difficult to understand how HCC sees risk of increased traffic on their network due to PC20 and the associated access points, and they do not state which part of their network they specifically concerned with.

186. Regarding the proposed Primary and Secondary Road cross-sections, these have been updated with improved walking and cycling infrastructure on both road types, and a 3m wide flush central median is included between the 3.5m wide traffic lanes for safer heavy vehicle manoeuvring on the Secondary Road type where previously only two 3.5m wide lanes were proposed.

Emissions

187. WRC (11) suggests that:

(a) There are further opportunities to effect real change in relation to integrated land use and transport planning, and the required reduction of transport emissions which are a major contributor to climate change.

(b) Objective UFD-01 and Policy UFD-P1 of the WRPS need to be considered in PC20. Every opportunity to avoid short car trips and encourage walking or cycling to activities and services within a local area, should be prioritised.

(c) References to CPTED principles be added to PC20.

(d) Provisions be added requiring provision of end of journey facilities and EV charging facilities. This submission point is supported by Bike Waikato, HCC, NZNFS and Waka Kotahi

188. Concerning 187(a), the opportunities for PC20 to align with the Emissions Reduction Plan have been sufficiently addressed in Paragraph 67.

189. The JWS for Transport and Planning records that Waikato Regional Council will provide relief on how PC20 should require end of trip facilities and electric vehicle charging facilities to be provided within the Northern Precinct.

RESPONSE TO THE SECTION 42A REPORT

190. I have reviewed the Section 42A report on PC20 that has been prepared by Mr Williamson. Mr Williamson relies on the evidence of Mr James Tinnion-Morgan, who provides a transportation review on behalf of WDC.

191. In summary, I agree with all matters addressed by Mr Williamson in relation to Transport and Traffic issues and submissions points, and I have no further comments to add in respect of Mr Williamson's assessment.

192. Turning to the WDC transport review evidence of Mr Tinnion-Morgan (Appendix 2 of the s42A report) there are four items that Mr Tinnion-Morgan considers further information/assessment is required for. I note Mr Williamson's assessment had not previously identified these as outstanding transportation matters in need of further information. However, I address them after addressing some statements in Mr Tinnion-Morgan's evidence that I consider require my response for clarification and/or rebuttal.

Matters for Clarification/Rebuttal

193. In 4.15, Mr Tinnion-Morgan states "given the lack of confirmed designation status, Southern Links is a consideration for this plan change… but it cannot be assumed or relied upon for assessment of effects or mitigation of the local road network".

194. I partially agree with this, but I disagree with there being a "lack of confirmed designation status". Southern Links is a confirmed designation, and it has been for close to 10 years. While there is presently no funding or timeframe certainty for design and construction, and while its current form may not align well with the current government's GPS for Transport, it is still a live designation that has an element of expectancy and impact on landowners and businesses affected by the designation and by the stakeholder Councils (HCC and WDC). We know governments and their priorities also change, potentially every three years, and future governments may see Southern Links as a priority. The current designation remains live until an alteration to designation process for a preferred alternative is publicly notified, formally heard and changes granted. So, it must still be assumed to be a component of the long-term future transport environment.

195. But I agree that limited weight for effects mitigation should be placed on it due to timing uncertainty. Indeed, the ITA and my evidence confirms PC20 does not require Southern Links for effects mitigation.

196. I raise this because the ITA identifies a proposed long-term future connection between Northern Precinct and the Southern Links Central Interchange that would facilitate a highly efficient transport route between the Airport and Hamilton CBD via the strategically important Peacocke Major Arterial. The road network in the amended ABZ Structure Plan is also purposely future-proofed within Northern Precinct to enable this connection, with a Primary Road orientated east-west connecting to the north-south spine road. Refer below to the image from the amended Structure Plan. "FC" = Future Connection.

197. Mr Tinnion-Morgan states in his paragraphs 6.8 – 6.13 that a future Rapid Transit line between Hamilton and the Airport is a highlighted aspiration in the Metro Spatial Plan Transport PBC and that "PPC20 presents an opportunity to safeguard an alignment for this rapid transit line between Hamilton and the Airport".

198. In my opinion, the future-proofed Northern Precinct network assessed in the ITA and shown on the amended Structure Plan safeguards this very opportunity. The two Primary Roads in the Structure Plan highlighted above will have a 26m wide road reserve. I consider that this provides space to retro-fit infrastructure for bus rapid transit if/when that occurs in the long-term future. No doubt it requires rebuilding and reallocation of carriageway space along the corridors when the time comes, but that is appropriate given the timing and route for a Rapid Transit system is highly uncertain.

199. In paragraph 3.2, Mr Tinnion-Morgan states in relation to retail floor area "this area would include non-ancillary retail not exceeding 5,000m^2 and 5,300m^2 of retail within the Northern Precinct (a total of 10,300m^2).

200. This is incorrect. The total amount of non-ancillary retail is capped in Northern Precinct at 5000m^2.

201. Mr Tinnion-Morgan confirms his opinion five times that the trip generation assessment in the ITA is conservative (see paragraph 5.8, 5.9, 5.17, 5.56 and 7.16). I agree, and this is consistent with what I have explained in my evidence also.

202. In 5.14(b) Mr Tinnion-Morgan describes a feature of the Structure Plan road network as "A major connector road running east-west between the spine road and the Narrows Road / Middle Road intersection".

203. I must clarify (as Mr Tinnion-Morgan may not be clear) that the east/west Primary Road does not connect to either Narrows Road or Middle Road for vehicles. The Structure Plan shows a connection to these roads only for walking and cycling. In the long-term it is proposed to connect this road to the future corridor linking to Southern Links Central Interchange, but it remains a cul-de-sac for vehicle traffic until then. When that connection is made to Southern Links it is envisaged that Narrows Road and Middle Road, together with the properties around them will be transitioning to a very different environment from the rural-residential lifestyle environment that exists now and it is possible they would become cu-de-sacs or completely reconfigured for land development around them.

204. In 5.15(a) Mr Tinnion-Morgan states “A northern access point onto Raynes Road (which may become a restricted movements access at 70ha)”.

205. This is incorrect. The ITA and proposed rule 10.4.2.13A are clear that the restricted movements at the Raynes Road access point are constructed when the intersection is constructed.

206. In 5.20, Mr Tinnion-Morgan states “there is no strategic model scenario presented which demonstrates the impacts of any quantum of development serviced either solely from Raynes Road with no access onto SH3. Nor is there any testing of the development presented in the ITA which assumes a level of development solely accessed from SH3”.

207. I refer to my paragraphs 84(d) and 90(a) and (b). Intersection modelling results supporting the development area triggers for each access intersection is supplied in my memo to the Transport and Planning experts which is included in Attachment 2.

208. The memorandum in Attachment 2 also addresses Mr Tinnion-Morgan’s statement in 5.32 concerning the JWS recording that I would provide further information supporting the proposed development area thresholds (triggers).

209. In paragraph 5.35, Mr Tinnion-Morgan states that the methodology used to determine the developed land area trigger for the SH3 / Access roundabout is unclear.

210. The methodology used was to start with the 2031 full development trip generation in the AM and PM peak hour together with the 2031 state highway volume predictions from the WRTM and prorate the turning movements in and out of Northern Precinct down until an acceptable level of queue and delay on the most sensitive SH3 approach was achieved (LOS C to ensure reasonable efficiency remains). From there a back-calculation was done on based on 20.9 trips generated per developed hectare, to identify the land area trigger. This method was favoured over running numerous sensitivity tests in the WRTM which cost $2000-3000 per run and would unlikely result in a materially different trigger value. The same methodology sits behind the modelled results for the ‘access from Raynes Road only’ scenario, except this time the performance threshold is governed by the side road (Northern Precinct approach) at the intersection, where I considered LOS D to be the accepted worst level of service, as this is generally accepted as representing early congestion levels.

211. In 5.39 Mr Tinnion-Morgan states in relation to public transport, “however there are no commitments by way of triggers for public transport infrastructure delivery mechanisms for the state highway intersection upgrades”.

212. This is no longer correct. I covered how this was addressed in the JWS earlier in paragraph 177.

213. In paragraphs 5.42 – 5.44 Mr Tinnion-Morgan comments concerning the infrastructure staging provisions that the SH3 / Access intersection may be the sole point of access for the development for considerable time and that this has not been reflected in either the strategic or detailed intersection modelling.

214. It would have been beneficial if Mr Tinnion-Morgan had raised this matter in the expert witness conferencing so they could be discussed and included in the JWSs. I agree the SH3 / Access roundabout may be the sole point of access for some time. However, I do not understand what difference that makes to the performance of intersections on the wider network or how that might have affected the land area trigger calculation for the SH3 / Access intersection. The methodology for that trigger, as explained, assumes 2031 state highway flows forecast by the WRTM. For clarity, the 2031 WRTM includes expected build out of Peacocke development in 2031, and full build out of all other precincts at Titanium Park along with M37. Traffic from these developments contribute to traffic on SH3, SH21 and local roads in the wider network. Given the rate of development uptake across Titanium Park to date averages less than 5ha per year I consider it highly unlikely the developed area in Northern Precinct will achieve 70ha net in 8 years (8.75ha net per year). Conservatively, my assessment of the land area trigger assumes it will, but I consider it more likely that 45-50ha (net) is the maximum achievable over 8 years (subdivided and built on). In that case the volumes generated from Northern Precinct will be less than assessed in the ITA for 2031 and the performance of the SH3 / Access intersection will be better than assessed. Similarly, the performance of intersections elsewhere on the network is likely to be better than assessed by the ITA as this assumed full build out of Northern Precinct by 2031.

215. Mr Tinnion-Morgan states in his paragraph 5.48 that “It may be appropriate to consider upgrades for walking and cycling on Raynes Road in the future in view of the likely increased accessibility via public transport and active modes on the corridor resulting from the proposed MSP transport changes.”

216. My response is that a shared walking and cycling path is proposed on Raynes Road between the Northern Precinct access and the shared path constructed as part of Titanium Park Stage 5, adjacent to the runway. This path is shown on the Structure Plan.

217. Regarding 5.57 where Mr Tinnion-Morgan supports Waka Kotahi on the submission point that it is “unclear if the concept design (for the SH3/Access roundabout) can be provided within the road reserve or requires land outside of the control of the applicant or Waka Kotahi”.

218. My response is that the roundabout design shown in Appendix B of the ITA for this intersection was redesigned and shifted from being wholly within road reserve and RPLs land, to the centralised location on SH3 following consultation and feedback from Waka Kotahi that they prefer the roundabout centralised on SH3. Waka Kotahi requested the change on the basis they have the land on the southern side of SH3 (or right to it) due to the Southern Links designation that requires it. With that land being made available by Waka Kotahi, the concept roundabout design requires land only from RPL and the existing SH3 road reserve.

219. In response to 5.61 concerning SH3/Raynes Road roundabout capacity upgrade, this is captured in proposed rule 10.4.2.13A.

220. In response to 5.62 – 5.65 concerning SH3 / Ingram Road intersection, I refer to the JWS of 15 February 2023 where Mr Tindall confirms that nothing further is required at this intersection in relation to PC20.

221. Mr Tinnion-Morgan states in 5.67, “In my view the impacts on Narrows Road and in particular its intersection with SH3 have not been adequately assessed by the applicant”.

222. I respond that the effects on Narrows Road itself have not been assessed because PC20 is not proposing vehicle access to Narrows Road at any location. It is unlikely anything more than negligible traffic volume from PC20 will exit the Site to SH3 then turn right into Narrows Road. Further, there is also no reason why the right turn out volume from Narrows Road would increase as a result of Northern Precinct access to Raynes Road given the restricted movements proposed at that access. Overall, I expect that the effects of Northern Precinct traffic on Narrows Road and at the Narrows Road / SH3 intersection will be minor or less.

223. Regarding Mr Tinnion-Morgan 5.72, the proposed typical cross-sections for the Primary and Secondary roads in the amended Structure Plan have been revised following the expert conferencing sessions as I noted they would be. They now provide a greater degree of separation for cyclists and pedestrians.

224. I consider that all other material matters raised by Mr Tinnion-Morgan have been addressed throughout my evidence, or the JWSs or through the further information supplied in my memo in response to the requests made at the conferencing.

225. I now respond to the four items Mr Tinnion-Morgan identifies that he considers further information/assessment is still required for. These are:

> (a) Evidence including modelling results and rationale for proposed trigger points for access points and intersection mitigation.
>
> (b) An assessment of the effects of the development on Narrows Road (assuming no Southern Links) and proposed mitigation if required.
>
> (c) Proposed mitigation of or clarification of the traffic effects of the development on the Tauwhare Road and Tamahere Drive at the SH1 on slip / off slip roundabouts.
>
> (d) Details of how the development will provide future proofing for the proposed rapid transit corridor(s) to the Airport as set out in the Hamilton Waikato Metro Spatial Plan Transport Programme Business Case (2022).

226. In response to 222(a), I have addressed this in the memo in Appendix 2.

227. In response to 222(b), I have addressed this in paragraph 222.

228. In response to 222(c), I have addressed this matter in my evidence paragraphs 87 and also 144 - 146.

229. In response to 222(d), I have addressed this above in paragraphs 193 to 198.

CONCLUSION

230. Based on the modelling and assessments outlined in the ITA, my evidence in chief and the matters address in the two JWSs, I remain of the opinion that PC20 can be appropriately supported by the existing road network with recommended transportation

infrastructure upgrades (as I have detailed), to maintain appropriate levels of safety and efficiency on the adjoining network.

231. In my opinion, the revisions to the PC20 provisions (as outlined in the evidence of Mr Nick Grala) appropriately address and respond to all traffic and transportation matters raised by submitters. Appropriate triggers to ensure that all the required upgrades are implemented in a timely manner have been included in the revised PC20 provisions, as I have also outlined above.

232. Therefore, it remains my conclusion, as I concluded in the Integrated Transportation Assessment, that there are no outstanding traffic or transport reasons why PC20 should not be approved.

Cameron Beswick Inder
Bloxam Burnett & Olliver

28 February 2023

Attachment 1

RUKUHIA PROPERTIES LTD

R = 80m

PROPOSED NORTHERN PRECINCT SPINE ROAD

DESIGN SPEED 50kph

R = 80m

WAIKATO REGIONAL AIRPORT LTD

TE AWAMUTU

OHAUPO ROAD (SH3)

ROUNDABOUT HAS BEEN DESIGNED IN ACCORDANCE WITH AUSTROADS GTRD PART 4B

DESIGN SPEED 110kph

40m DIA. CENTRAL ISLAND

RUKUHIA PROPERTIES LTD

INSCRIBED DIAMETER = 59m

DESIGN SPEED 110kph

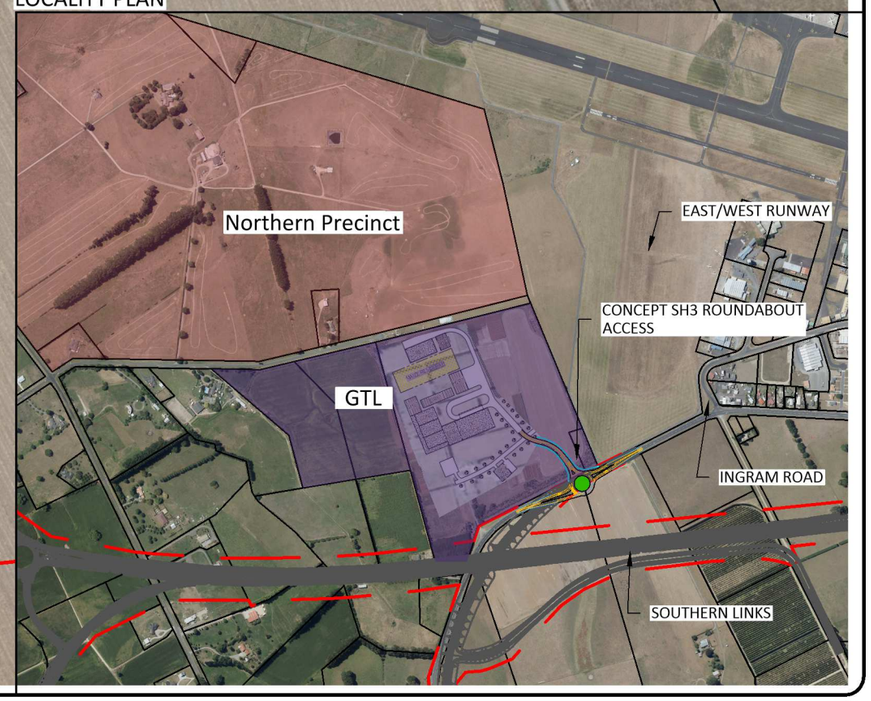
HAMILTON

FUTURE CONNECTION TO SOUTHERN LINKS

KEY

- EXISTING LEGAL BOUNDARY
- SOUTHERN LINKS DESIGNATION
- INDICATIVE BOUNDARY ADJUSTMENT
- KERB FACE
- PAVEMENT MARKINGS
- BACK OF KERB
- EDGE OF SEAL
- CARRIAGEWAY
- CONCRETE INFILL
- FUTURE S-LINKS TIE IN MARKINGS
- FUTURE S-LINKS TIE IN EDGE OF SEAL

LOCALITY PLAN



100mm

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SCALE FOR VALIDATING SIZE OF A3 PLOT ONLY

K:\144380 Titanium Park Ltd (WRA)\06 Northern Precinct Development\DRAWINGS\144380_06_0021.dwg 19/4/2022 10:06 am cinder Plotted: 19 Apr 2022 - 10:06 am

D	23.02.2022	CORRECTION TO RPL APPROACH LANE MARKINGS (2 X RT)	CI	CI	CI	
C	09.11.2021	ROUNDABOUT REPOSITIONED	GT	CI	-	
B	08.07.2021	ADDITIONAL LANE ON ACCESS LEG - FOR RESOURCE CONSENT	SB	CI	-	
A	05.05.2021	ISSUED FOR INFORMATION	GT	CI	-	
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR	

DESIGNED: GT | CHECKED: CI
DRAWN: GT | APPROVED: CI
mx model version:

Version 4.0 - March 2020

BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

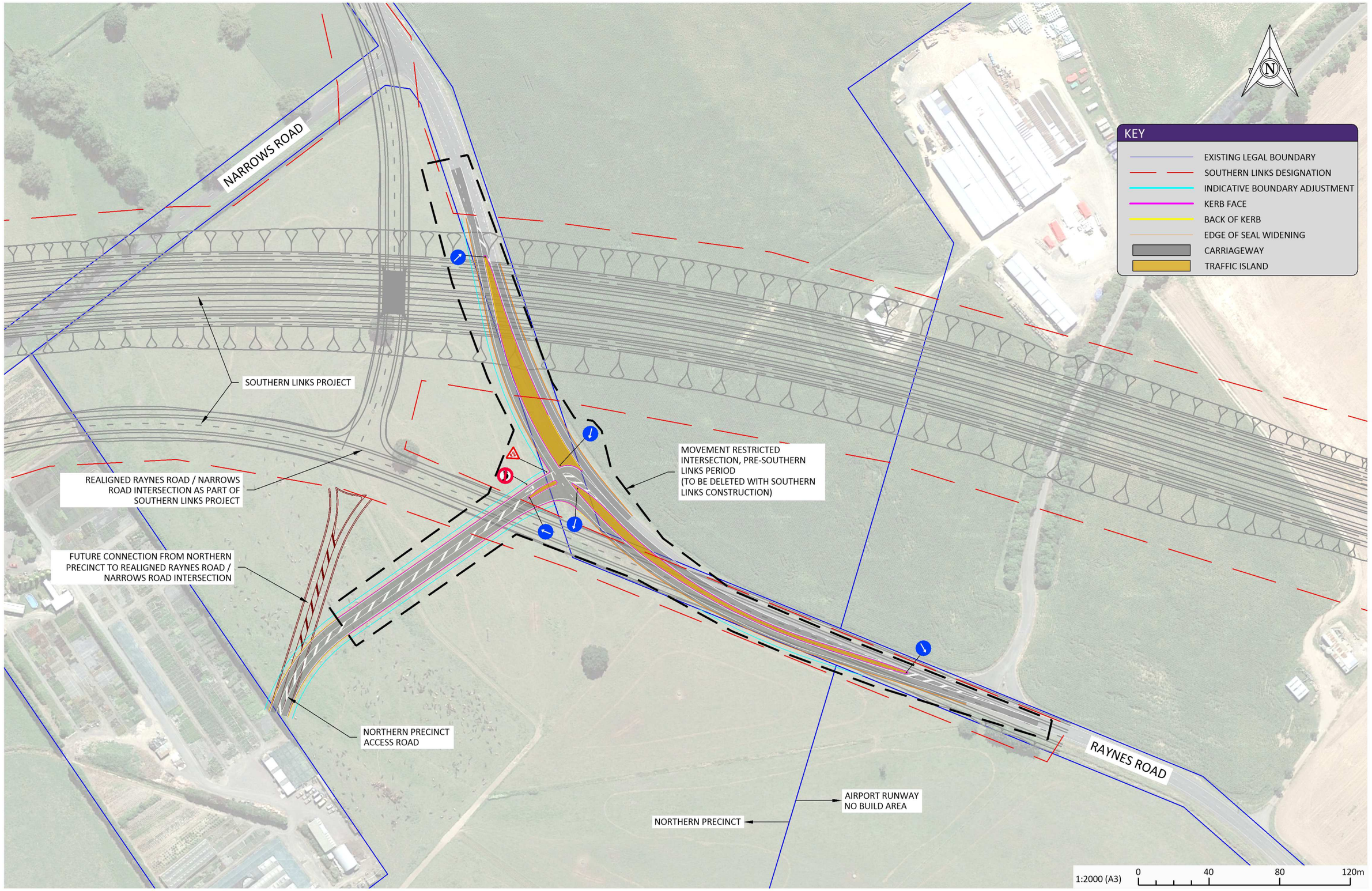
PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: SH3 ROUNDABOUT ACCESS GENERAL ARRANGEMENT SHEET 1

STATUS: PRELIMINARY

DATE: 05.05.2021 | SCALE (ORIGINAL SIZE A3): 1:1000

DRAWING NUMBER: 144380_06_0021 | REVISION: D



B	21.05.2021	SOUTHERN LINKS INDICATIVE ALIGNMENT INCLUDED	SB	CI	CI	
A	27.04.2021	ISSUED FOR INFORMATION	SB	CI	CI	
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR	

DESIGNED: SB | CHECKED: CI
DRAWN: SB | APPROVED: -
mx model version:

BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: RAYNES ROAD ACCESS GENERAL ARRANGEMENT OVERALL PLAN

STATUS: PRELIMINARY

DATE: 21.05.2021 | SCALE (ORIGINAL SIZE A3): 1:2000

DRAWING NUMBER: 144380_06_0031 | REVISION: B

NARROWS ROAD

RAYNES ROAD

EXISTING CENTRELINE RADIUS = 300m

TIE-IN POINT TO EXISTING

RADIUS = 300m

RADIUS MATCHES EXISTING CENTRE LINE RADIUS

57m TRANSITION

LOCALISED WIDENING OF EDGE OF SEAL

INDICATIVE NEW ROAD BOUNDARY

9.7
3.5
1.5
3.5
1.5

CENTRELINE RADIUS = 225m
DESIGN SPEED = 72 KM/H
IN ACCORDANCE WITH AUSTROADS GTRD PART 3

RADIUS MATCHES EXISTING INNER RADIUS OF SOUTHBOUND LANE

JOINS SHEET 0033

GIVE WAY

KEY

- EXISTING LEGAL BOUNDARY
- SOUTHERN LINKS DESIGNATION
- INDICATIVE BOUNDARY ADJUSTMENT
- KERB FACE
- BACK OF KERB
- EDGE OF SEAL WIDENING
- CARRIAGEWAY
- TRAFFIC ISLAND

N

1:1000 (A3) 0 20 40 60m

	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR
A	27.04.2021	ISSUED FOR INFORMATION	SB	CI	-

DESIGNED: SB | CHECKED: CI
DRAWN: SB | APPROVED: -
mx model version:

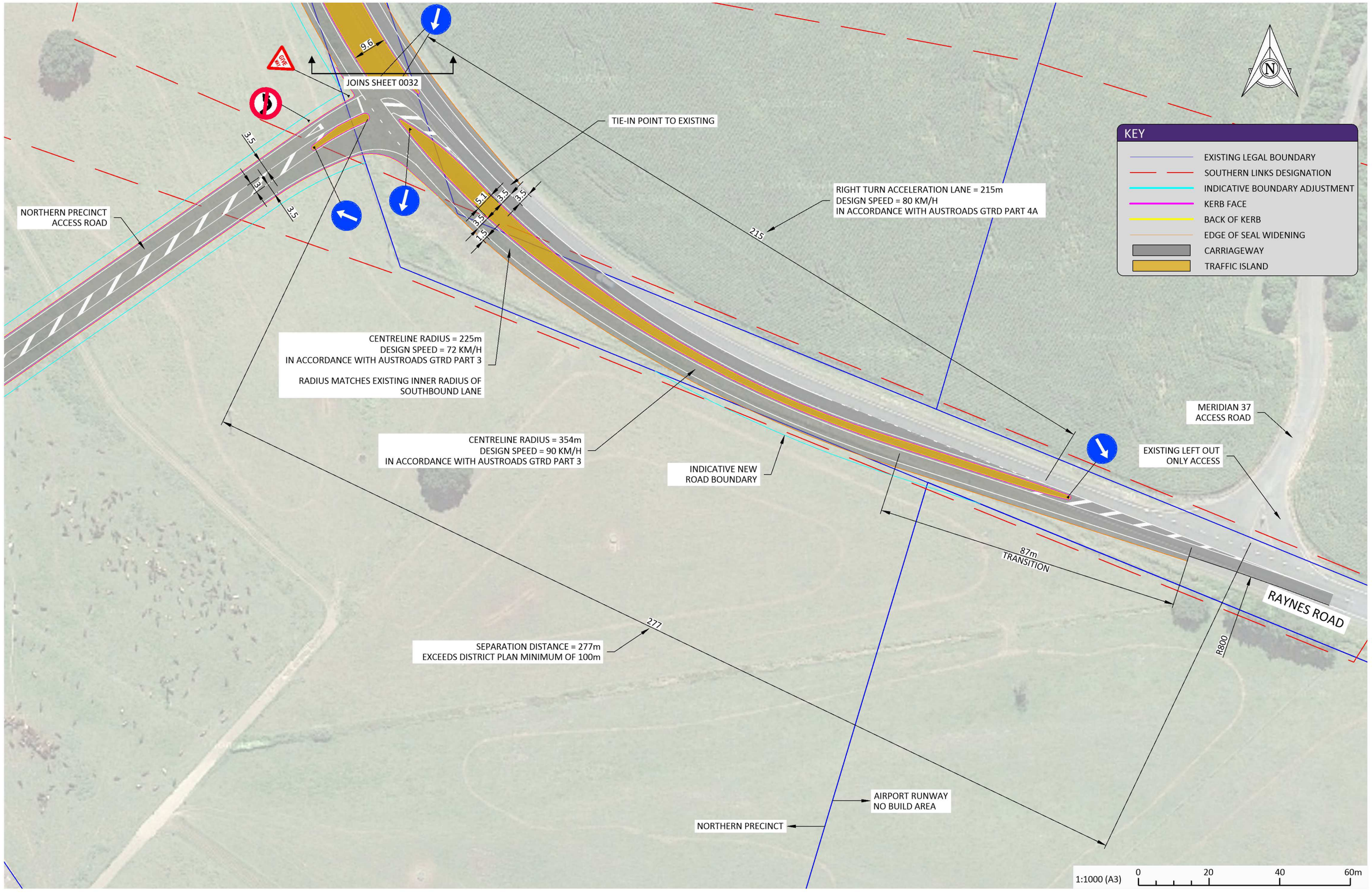
BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: RAYNES ROAD ACCESS
GENERAL ARRANGEMENT
SHEET 1

STATUS: PRELIMINARY
DATE: 15.04.2021
SCALE (ORIGINAL SIZE A3): 1:1000
DRAWING NUMBER: 144380_06_0032
REVISION: A



100mm

SCALE FOR VALIDATING SIZE OF A3 PLOT ONLY

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K:\144380 Titanium Park Ltd (WRAL)\06 Northern Precinct Development\DRAWINGS\144380_06_0033.dwg 27/4/2021 3:33 PM sva Plotted: 27 Apr 2021 3:33 PM

						DESIGNED: SB	CHECKED: CI	
						DRAWN: SB	APPROVED: -	
A	27.04.2021	ISSUED FOR INFORMATION	SB	CI	-	mx model version:		
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR			

BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: RAYNES ROAD ACCESS GENERAL ARRANGEMENT SHEET 2

STATUS: PRELIMINARY

DATE: 15.04.2021

SCALE (ORIGINAL SIZE A3): 1:1000

DRAWING NUMBER: 144380_06_0033

REVISION: A

Version 4.0 - March 2020

100mm

SCALE FOR VALIDATING SIZE OF A3 PLOT ONLY

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A SEMI-TRAILER WILL NOT BE ABLE TO TURN LEFT FROM THE NEW ACCESS ROAD

1.5
3.5
0.6
9.6
0.6
3.5
1.5
0.6
0.5
0.6
3.5
3
3.5
0.6

RAYNES ROAD

N

KEY

- EXISTING LEGAL BOUNDARY
- SOUTHERN LINKS DESIGNATION
- INDICATIVE BOUNDARY ADJUSTMENT
- KERB FACE
- BACK OF KERB
- EDGE OF SEAL WIDENING
- CARRIAGEWAY
- TRAFFIC ISLAND
- 19.4m HPMV SEMI-TRAILER TRACKING CURVE WITH 0.5m VEHICLE BODY CLEARANCE

1:250 (A3)

0 5 10 15m

K:\144380 Titanium Park Ltd (WPAL)\06 Northern Precinct Development\DRAWINGS\144380_06_0034.dwg 27/4/2021 3:32 PM sva Plotted: 27 Apr 2021 3:32 PM

	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR
A	27.04.2021	ISSUED FOR INFORMATION	SB	CI	-

Version 4.0 - March 2020

DESIGNED	CHECKED
SB	CI
DRAWN	APPROVED
SB	-

mx model version: -

BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: RAYNES ROAD ACCESS INTERSECTION 19.4m HPMV SEMI-TRAILER TRACKING CURVES

STATUS: PRELIMINARY

DATE	SCALE (ORIGINAL SIZE A3)
15.04.2021	1:250

DRAWING NUMBER	REVISION
144380_06_0034	A

						DESIGNED: GT	CHECKED: CI	
						DRAWN: GT	APPROVED: -	
A	08.11.2021	ISSUED FOR INFORMATION	GT	CI	-	mx model version:		
	DATE	ISSUE/REVISION DETAIL	BY	CHK	APPR			

BLOXAM BURNETT & OLLIVER

CLIENT: TITANIUM PARK LIMITED

PROJECT: NORTHERN PRECINCT DEVELOPMENT

DRAWING: SH21/RAYNES ROAD ROUNDABOUT CONCEPT 2 GENERAL ARRANGEMENT

STATUS: DRAFT COPY NOT APPROVED PRELIMINARY

DATE: 08.11.2021

SCALE (ORIGINAL SIZE A3): 1:1000

DRAWING NUMBER: 144380_06_0052

REVISION: -

Attachment 2

BLOXAM BURNETT & OLLIVER

Level 4, 18 London Street
PO Box 9041, Hamilton 3240
New Zealand

+64 7 838 0144
consultants@bbo.co.nz
www.bbo.co.nz

Memo

To	All Transportation and Planning Experts that attended PPC20 conferencing on 15/2/23
CC	Marlene Oliver
From	Cameron Inder
Date	22 February 2023
Job name	PPC20
Subject	**PPC20 Caucus – Transportation Assessment Information**

This memo provides response to the actions on BBO (as Transportation Engineers for the Applicant) from the PPC20 transportation and planning experts conference meetings on Friday 10th February and Wednesday 15th February 2023. The actions included:

- Provide a comparison of 2031 Baseline and 2031 Northern Precinct intersection performance results (from SIDRA modelling)
- Provide SIDRA modelling results for Ohaupo Road (SH3) / Saxbys Road roundabout, which was not addressed in the PPC20 ITA.
- Explain the reason for the 315m queue and LOS A results presented for SH3/Raynes Rd roundabout
- Provide transport model results supporting the development area 'triggers' in the infrastructure upgrades table in rule 10.4.2.13A.

1. Intersection Performance Comparison: 2031 Baseline vs 2031 with Northern Precinct

Tables 1 and 2 provide the Baseline v Northern Precinct intersection performance comparison for the 2031 AM Peak and 2031 PM Peak hours, respectively. The Ohaupo Road (SH3) / Saxbys Road / Tomlin Road roundabout performance results are included.

Table No: 1

Intersection Performance Results: 2031 AM Peak							
Intersection	Approach	AM Baseline			AM Baseline + NP		
		Av. Delay (sec)	95th %ile Queue (m)	LOS	Av. Delay (sec)	95th %ile Queue (m)	LOS
Intersection 3: SH3 / Normandy Avenue	SE: SH3	7.0	120.6	A	7.0	88.5	A
	NE: Normandy	9.4	11.3	A	10.4	14.8	B
	NW: SH3	6.9	19.4	A	7.3	23.5	A
	Intersection	7.3	120.6	A	7.7	88.5	A
Intersection 4: SH3 / Collins Road	South: SH3	35.6	207.7	D	32.7	181.2	C
	North: SH3	11.2	64.5	B	11.9	64.5	B
	West: Collins Rd	26.3	59.0	C	28.0	55.3	C
	Intersection	24.6	207.7	C	23.1	181.2	C

Intersection 5: SH3 / Raynes Road rdabt*	South: SH3	4.5	32.7	A	4.5	27.7	A
	East: Raynes Rd	20.4	27.9	C	19.5	25.0	B
	North: SH3	4.6	118.6	A	6.9	314.9	A
	Intersection	6.0	118.6	A	7.0	314.9	A
SH3 / Raynes Road rdabt**	South: SH3	n/a	n/a	n/a	4.4	20.5	A
	East: Raynes Rd	n/a	n/a	n/a	19.5	25.0	B
	North: SH3	n/a	n/a	n/a	6.8	307.1	A
	Intersection	-	-	-	6.9	307.1	A
Intersection 7: SH21 / Raynes Road	NE: SH21	5.3	21.5	A	8.0	63.8	A
	NW: Raynes Rd	5.3	5.7	A	5.0	16.2	A
	SW: SH21	5.7	11.1	A	16.0	24.6	B
	Intersection	5.4	21.5	A	8.0	63.4	A
Intersection 8: Tamahere Interchange (NE Roundabout)	NE: Tauwhare Rd	15.8	20.9	B	195.7	205.8#	F
	NW: SB offramp	13.6	11.4	B	19.8	35.8	B
	SW: Tauwhare Rd	5.6	0	A	5.9	0	A
	Intersection	12.9	20.9	B	73.4	205.8	E
Intersection 8: Tamahere Interchange (SW Roundabout)	SE: Tamahere Dr	13.2	7.2	B	27.6	22.1	C
	NE: Tauwhare Rd	4.9	13.6	A	4.7	24.9	A
	SW: SH21	9.6	4.5	A	9.3	6.1	A
	Intersection	7.4	13.6	A	9.8	24.9	A
Intersection 9: SH3 / Saxbys Rd / Tomin Rd	South: Saxbys Rd	7.8	13	A	7.3	11.3	A
	SE: SH3	5.6	25.6	A	5.5	23.0	A
	NE: Tomin Rd	10.9	13.1	B	12.9	16.5	B
	NW: SH3	4.1	39.1	A	4.2	54.3	A
	Intersection	5.8	39.1	A	5.8	54.3	A

Notes:
* SH3 / Raynes Road intersection modelled as per Waka Kotahi design (single lane approaches and circulating)
** SH3 / Raynes Road roundabout modelled with additional northbound entry lane (on south approach)
LOS F performance due to single lane entry from Tauwhare Road and increased flows on SB off-ramp as well as right turn to SB on-ramp. Results differ from ITA as remodelled with recently completed Tamahere Interchange improvements.

Table No: 2

Intersection Performance Results: 2031 PM Peak							
Intersection	Approach	PM Baseline			PM Baseline + NP		
		Av. Delay (sec)	95th %ile Queue (m)	LOS	Av. Delay (sec)	95th %ile Queue (m)	LOS
Intersection 3:SH3 / Normandy Avenue	SE: SH3	8.4	95.3	A	9.1	114.4	A
	NE: Normandy	15.7	35.4	B	15.3	34.0	B
	NW: SH3	7.1	31.9	A	7.1	31.7	A
	Intersection	9.7	95.3	A	9.9	114.4	B
Intersection 4: SH3 / Collins Road	South: SH3	32.8	164.7	C	34.6	184.3	C
	North: SH3	10.0	128.1	B	9.9	125.4	A
	West: Collins Rd	25.1	50.2	C	25.6	49.5	C
	Intersection	19.5	164.7	B	20.5	184.3	C
Intersection 5: SH3 / Raynes Road rdabt^	South: SH3	11.1	212.6	B	269.3	1861.5	F
	East: Raynes Rd	11.8	18.3	B	13.6	25.7	B
	North: SH3	10.0	103.0	A	16.9	149.8	B
	Intersection	10.7	212.6	B	157.9	1861.5	F

SH3 / Raynes Road rdabt^^	South: SH3	-	-	-	6.5	77.7	A
	East: Raynes Rd	-	-	-	13.7	25.8	B
	North: SH3	-	-	-	19.1	153.8	B
	Intersection	-	-	-	11.4	153.8	B
Intersection 7: SH21 / Raynes Road	NE: SH21	5.3	12.1	A	6.1	13.5	A
	NW: Raynes Rd	9.4	17.2	A	23.8	173.2	C
	SW: SH21	4.9	35.6	A	5.9	27.5	A
	Intersection	5.9	35.6	A	13.1	173.2	B
Intersection 8: Tamahere Interchange (NE Roundabout)	NE: Tauwhare Rd	9.7	5.7	A	11.0	7.1	B
	NW: SB offramp	14.5	12.1	B	19.0	21.7	B
	SW: Tauwhare Rd	5.5	0	A	5.7	0	A
	Intersection	10.3	12.1	B	12.4	21.7	B
Intersection 8: Tamahere Interchange (SW Roundabout)	SE: Tamahere Dr	9.3	2.8	A	9.9	3.7	A
	NE: Tauwhare Rd	4.8	6.7	A	4.6	8.3	A
	SW: SH21	8.9	9.8	A	8.8	10.0	A
	Intersection	7.6	9.8	A	7.5	10.0	A
Intersection 9: SH3 / Saxbys Rd / Tomin Rd	South: Saxbys Rd	6.5	5.0	A	6.9	5.5	A
	SE: SH3	6.1	32.3	A	6.5	38.2	A
	NE: Tomin Rd	16.5	12.2	B	16.4	12.3	B
	NW: SH3	5.2	164.1	A	5.2	160.4	A
	Intersection	6.0	164.1	A	6.1	160.4	A

Notes:
^ SH3 / Raynes Road intersection modelled as per Waka Kotahi design (single lane approaches and circulating)
^^ SH3 / Raynes Road roundabout modelled with additional northbound entry lane (on south approach)

Tables 1 and 2 show that the SH3 / Saxbys / Tomin Road roundabout continues to perform well in future with the modelled PPC20 traffic added. The following are the related SIDRA results for Baseline + Northern Precinct scenario. Some turning movements to/from SH3 with Tomlin Road and Saxbys Road show zero flow in the WRTM for both the Baseline and Baseline + Northern Precinct scenarios. As this appears to be an issue with WRTM calibration we have added 50 vph in the SIDRA models to each zero-movement outbound from the side roads and 25 vph inbound to side roads in the AM Peak and vice versa for the PM peak.

MOVEMENT SUMMARY

Site: 101 [SH3 / Saxbys Rd / Tomin Rd Roundabout - AM Peak (Site Folder: WRTM Volumes - 104ha NP + 28ha GTL - Access to SH3 and Raynes Rd - No SL (Option 4))]

SH3 / Saxbys Rd / Tomin Rd Roundabout
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Saxbys Rd														
1a	L1	193	1.0	193	1.0	0.369	6.1	LOS A	1.6	11.3	0.65	0.82	0.71	46.2
3a	R1	3	1.0	3	1.0	0.369	9.8	LOS A	1.6	11.3	0.65	0.82	0.71	46.2
3b	R3	50	2.0	50	2.0	0.369	11.7	LOS B	1.6	11.3	0.65	0.82	0.71	47.1
Approach		246	1.2	246	1.2	0.369	7.3	LOS A	1.6	11.3	0.65	0.82	0.71	46.4
SouthEast: SH3														
21b	L3	25	1.0	25	1.0	0.451	5.6	LOS A	3.0	23.0	0.61	0.60	0.61	45.5
22	T1	785	10.7	785	10.7	0.451	5.4	LOS A	3.0	23.0	0.61	0.60	0.61	46.8
23	R2	25	1.0	25	1.0	0.451	9.4	LOS A	3.0	23.0	0.61	0.61	0.61	46.9
Approach		835	10.1	835	10.1	0.451	5.5	LOS A	3.0	23.0	0.61	0.60	0.61	46.8
NorthEast: Tomin Rd														
24	L2	50	2.0	50	2.0	0.431	10.2	LOS B	2.3	16.5	0.75	0.95	0.89	42.7
24a	L1	4	1.0	4	1.0	0.431	9.1	LOS A	2.3	16.5	0.75	0.95	0.89	43.3
26	R2	195	1.0	195	1.0	0.431	13.7	LOS B	2.3	16.5	0.75	0.95	0.89	43.6
Approach		249	1.2	249	1.2	0.431	12.9	LOS B	2.3	16.5	0.75	0.95	0.89	43.4
NorthWest: SH3														
27	L2	89	1.0	89	1.0	0.266	4.1	LOS A	1.5	11.1	0.32	0.43	0.32	46.9
28	T1	932	9.0	932	9.0	0.668	3.9	LOS A	7.3	54.3	0.44	0.43	0.44	47.4
29a	R1	96	1.0	96	1.0	0.668	7.1	LOS A	7.3	54.3	0.45	0.43	0.45	47.0
Approach		1117	7.7	1117	7.7	0.668	4.2	LOS A	7.3	54.3	0.43	0.43	0.43	47.3
All Vehicles		2447	7.2	2447	7.2	0.668	5.8	LOS A	7.3	54.3	0.55	0.58	0.57	46.6

MOVEMENT SUMMARY

Site: 101 [SH3 / Saxbys Rd / Tomin Rd Roundabout - PM Peak (Site Folder: WRTM Volumes - 104ha NP + 28ha GTL - Access to SH3 and Raynes Rd - No SL (Option 4))]

SH3 / Saxbys Rd / Tomin Rd Roundabout
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Saxbys Rd														
1a	L1	91	1.0	91	1.0	0.199	5.6	LOS A	0.8	5.5	0.64	0.75	0.64	46.3
3a	R1	3	1.0	3	1.0	0.199	9.3	LOS A	0.8	5.5	0.64	0.75	0.64	46.3
3b	R3	25	1.0	25	1.0	0.199	11.2	LOS B	0.8	5.5	0.64	0.75	0.64	47.1
Approach		119	1.0	119	1.0	0.199	6.9	LOS A	0.8	5.5	0.64	0.75	0.64	46.4
SouthEast: SH3														
21b	L3	50	1.0	50	1.0	0.583	6.5	LOS A	5.0	38.2	0.72	0.71	0.77	45.2
22	T1	978	10.7	978	10.7	0.583	6.3	LOS A	5.0	38.2	0.72	0.71	0.77	46.4
23	R2	50	1.0	50	1.0	0.583	10.3	LOS B	5.0	38.2	0.72	0.72	0.77	46.5
Approach		1078	9.8	1078	9.8	0.583	6.5	LOS A	5.0	38.2	0.72	0.71	0.77	46.4
NorthEast: Tomin Rd														
24	L2	25	1.0	25	1.0	0.310	14.1	LOS B	1.7	12.3	0.89	0.96	0.91	41.1
24a	L1	2	1.0	2	1.0	0.310	12.7	LOS B	1.7	12.3	0.89	0.96	0.91	41.6
26	R2	72	1.0	72	1.0	0.310	17.3	LOS B	1.7	12.3	0.89	0.96	0.91	42.0
Approach		99	1.0	99	1.0	0.310	16.4	LOS B	1.7	12.3	0.89	0.96	0.91	41.8
NorthWest: SH3														
27	L2	212	1.0	212	1.0	0.360	4.2	LOS A	2.3	16.4	0.35	0.46	0.35	46.9
28	T1	1108	9.0	1108	9.0	0.903	4.8	LOS D	21.5	160.4	0.87	0.49	0.87	45.9
29a	R1	227	1.0	227	1.0	0.903	8.0	LOS D	21.5	160.4	0.91	0.50	0.91	45.5
Approach		1547	6.7	1547	6.7	0.903	5.2	LOS A	21.5	160.4	0.80	0.49	0.80	46.0
All Vehicles		2843	7.5	2843	7.5	0.903	6.1	LOS A	21.5	160.4	0.77	0.60	0.79	46.0

2. Explanation for SH3 / Raynes Road Roundabout 315m Queue and LOS A in AM Peak

The 2031 WRTM predicts approximately 1,400 vph approaching the roundabout from the north (traveling southbound) in the AM peak hour with the development. The roundabout will have a single lane northern approach. All southbound traffic on SH3 therefore gives way to vehicles from the south turning right into Raynes Road. Approximately 60 vph is predicted by the WRTM for this. This explains the northern approach queue of 315 m. However, the average delay remains minimal at 6.9 seconds per vehicle, which is LOS A when average delay is the chosen parameter to describe Level of Service (as is typical practice). In SIDRA, average delay is the sum of stop-line delay and geometric delay. The low average delay value essentially demonstrates a moving queue on the north approach rather than a stopped queue. This is confirmed by the zero “di” value in the SIDRA output table below. “di” denotes Stopped Delay (ie stopping (idling) time at near-zero speed).

Lane Delays
Site: 2031 SH3 / Raynes Road RAB - AM Peak - NZTA Layout

Site ID: 4
Roundabout

LANE DELAYS

Lane No.	Deg. Satn x	Prog. Factor	Min Del dm	Stop-line Delay 1st d1	2nd d2	Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	Zebra Xing dp	Dstrm Merge dEM	Control dic
				Delay (seconds/veh)										
South: SH3														
1	0.417	NA	0.2	0.3	0.0	0.3	1.7	0.0	0.0	0.0	4.2	0.0	0.0	4.5
East: Raynes Road														
1	0.429	NA	8.6	12.4	2.7	15.1	4.0	11.1	0.7	10.4	4.4	0.0	0.0	19.5
North: SH3														
1	0.965	NA	0.2	2.6	0.8	3.4	5.6	0.0	0.0	0.0	3.5	0.0	0.0	6.9

SIDRA Standard Delay Model is used. Control Delay is the sum of Stop-line Delay and Geometric Delay.

```
   dm: Minimum delay for gap acceptance cases
   dSL: Stop-line delay (=d1+d2)
   dn: Average stop-start delay for all vehicles queued and unqueued
   dq: Queuing delay (the part of the stop-line delay that includes
       stopped delay and queue move-up delay)
   dqm: Queue move-up delay
   di: Stopped delay (stopped (idling) time at near-zero speed)
   dig: Geometric delay
   dEM: Exit Merge delay
   dp: Zebra Crossing delay
   dic: Control delay
```

BACK OF QUEUE (DISTANCE)

Lane No.	Deg. Satn x	Platoon Ratio	Prog. Factor	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio Av.	95%	Prob. Block %	Prob. SL Ov. %
South: SH3												
1	0.417	0.000	NA	0.0	11.1	0.0	11.1	27.7	0.02	0.06	0.0	NA
East: Raynes Road												
1	0.429	0.000	NA	0.7	9.6	0.5	10.1	25.0	0.02	0.05	0.0	NA
North: SH3												
1	0.965	0.000	NA	1.8	120.8	5.9	126.7	314.9	0.25	0.63	0.0	NA

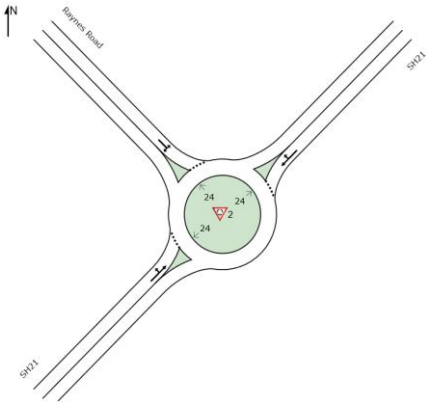
3. Supporting Information for Development Area Triggers in Rule 10.4.2.13A

Four development area triggers are included in the infrastructure upgrades rule 10.4.2.13A. The following supporting information is provided in the order that the triggers appear in the table.

SH21 / Raynes Road roundabout capacity upgrade

2.	Capacity Increase at SH21 / Raynes Road roundabout to double circulating lanes and dual approach lanes.	To be completed prior to • Any industrial / commercial activity being able to generate traffic that gains access off Raynes Road; or • When the cumulative total consented land area in Northern Precinct with sole access to SH3 roundabout exceeds 70 ha (net ~~gross~~)

The development area trigger of 70 ha (net) is identified in section 7.5.1 of the ITA. The modelled performance of the single lane roundabout for this trigger point is as follows:



MOVEMENT SUMMARY

Site: 2 [2031 SH21 / Raynes Road RAB - AM Peak - Single Lane RAB - 70Ha NP (Site Folder: Manual Dist - 51ha NP + 28ha Genetic - Access to SH3 Only - No SL)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: SH21														
2	T1	731	6.0	731	6.0	0.855	7.2	LOS A	15.7	116.6	0.93	0.65	0.98	51.1
3	R2	337	10.0	337	10.0	0.855	10.9	LOS B	15.7	116.6	0.93	0.65	0.98	48.1
Approach		1068	7.3	1068	7.3	0.855	8.4	LOS A	15.7	116.6	0.93	0.65	0.98	50.1
NorthWest: Raynes Road														
4	L2	164	20.0	164	20.0	0.321	4.7	LOS A	2.1	17.1	0.57	0.64	0.57	45.7
6	R2	132	20.0	132	20.0	0.321	9.5	LOS A	2.1	17.1	0.57	0.64	0.57	47.0
Approach		296	20.0	296	20.0	0.321	6.9	LOS A	2.1	17.1	0.57	0.64	0.57	46.3
SouthWest: SH21														
7	L2	64	10.0	64	10.0	0.363	5.2	LOS A	2.5	19.6	0.67	0.65	0.67	48.6
8	T1	253	12.0	253	12.0	0.363	6.4	LOS A	2.5	19.6	0.67	0.65	0.67	53.2
Approach		317	11.6	317	11.6	0.363	6.2	LOS A	2.5	19.6	0.67	0.65	0.67	52.2
All Vehicles		1681	10.3	1681	10.3	0.855	7.7	LOS A	15.7	116.6	0.82	0.65	0.85	49.8

MOVEMENT SUMMARY

Site: 2 [2031 SH21 / Raynes Road RAB - PM Peak - Single Lane RAB - 70Ha NP (Site Folder: Manual Dist - 51ha NP + 28ha Genetic - Access to SH3 Only - No SL)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: SH21														
2	T1	349	10.0	349	10.0	0.391	4.3	LOS A	3.3	25.8	0.35	0.47	0.35	53.5
3	R2	155	20.0	155	20.0	0.391	8.0	LOS A	3.3	25.8	0.35	0.47	0.35	50.2
Approach		504	13.1	504	13.1	0.391	5.5	LOS A	3.3	25.8	0.35	0.47	0.35	52.4
NorthWest: Raynes Road														
4	L2	367	10.0	367	10.0	0.789	23.0	LOS C	10.8	81.9	1.00	1.34	1.75	37.8
6	R2	68	10.0	68	10.0	0.789	27.8	LOS C	10.8	81.9	1.00	1.34	1.75	38.8
Approach		435	10.0	435	10.0	0.789	23.8	LOS C	10.8	81.9	1.00	1.34	1.75	38.0
SouthWest: SH21														
7	L2	146	20.0	146	20.0	0.760	5.6	LOS A	9.7	73.7	0.76	0.62	0.79	48.3
8	T1	758	8.0	758	8.0	0.760	6.5	LOS A	9.7	73.7	0.76	0.62	0.79	53.1
Approach		904	9.9	904	9.9	0.760	6.3	LOS A	9.7	73.7	0.76	0.62	0.79	52.3
All Vehicles		1843	10.8	1843	10.8	0.789	10.2	LOS B	10.8	81.9	0.70	0.75	0.89	48.1

The above results relate to a single lane roundabout operating with 70ha (net) developed area in Northern Precinct. Technically the capacity of the single lane roundabout could be stretched further except the sight distance to the back of the southbound entry lane queue in the AM Peak becomes compromised if the roundabout is constructed in the location shown in the ITA (within the existing road reserve).

SH3 / Northern Precinct access

4.	3-arm roundabout on SH3 for access to Northern Precinct, including provision for bus stops near the roundabout.	To be completed prior to • Any industrial / commercial activity being able to generate traffic that gains access off SH3; or • When the cumulative total consented land area in Northern Precinct with sole access to Raynes Road exceeds 40 ha (gross)

The development area trigger of 40 ha relates to the maximum development area that can be accommodated through the Raynes Road access on its own. The figure is identified in Table 9, section 8.2.3 in the ITA. The PM Peak performance of the right turn out from Northern Precinct governs the developable

land area trigger point. For this assessment we identified LOS D as a reasonable practical capacity for the right turn out to maintain safety at the Tee intersection.

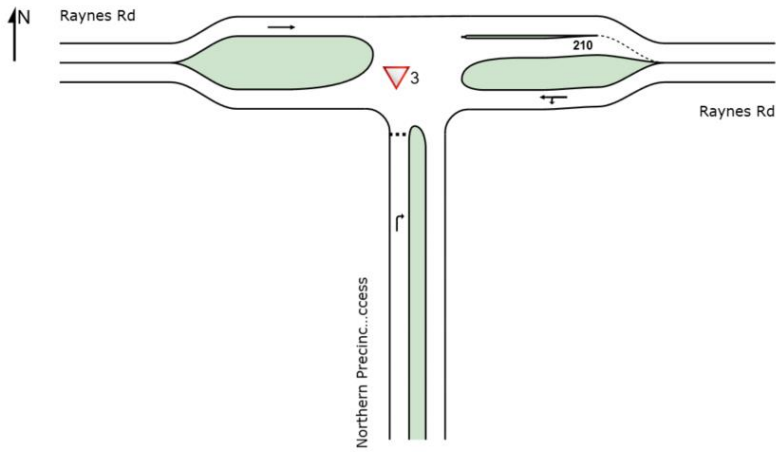
An important point to note is that the 40ha trigger referred to in the proposed provisions should be net developable area, not gross area. Total two-way pm peak trip generation is 910 vph in the model. 910/20.9 = 43.5 ha. We rounded down to 40 ha to build in a level of conservatism. So I intend to recommend "gross" be exchanged for "net" in this provision as for the other provisions.

SITE LAYOUT

▽ Site: 3 [2031 Raynes Road access - PM Peak (Site Folder: Manual Dist - 100ha NP + 28ha Genetic - Access to SH3 and Raynes Rd - No SL)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

▽ Site: 3 [2031 Raynes Road access - PM Peak (Site Folder: Manual Dist - 100ha NP + 28ha Genetic - Access to SH3 and Raynes Rd - No SL)]

New Site
Site Category: (None)
Give-Way (Two-Way)

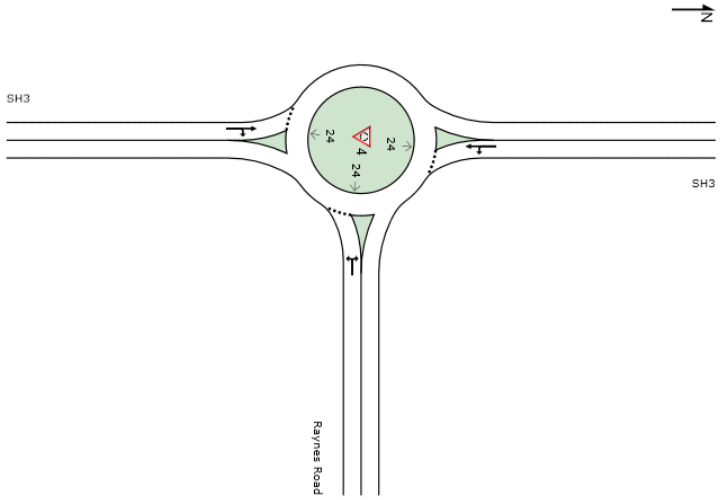
Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Northern Precinct Access														
3	R2	659	10.0	659	10.0	0.953	30.4	LOS D	21.6	164.1	0.95	2.52	4.95	34.8
Approach		659	10.0	659	10.0	0.953	30.4	LOS D	21.6	164.1	0.95	2.52	4.95	34.8
East: Raynes Rd														
4	L2	252	20.0	252	20.0	0.375	6.4	LOS A	0.0	0.0	0.00	0.23	0.00	59.0
5	T1	422	5.0	422	5.0	0.375	0.1	LOS A	0.0	0.0	0.00	0.23	0.00	62.8
Approach		674	10.6	674	10.6	0.375	2.5	NA	0.0	0.0	0.00	0.23	0.00	61.3
West: Raynes Rd														
11	T1	54	5.0	54	5.0	0.028	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		54	5.0	54	5.0	0.028	0.2	NA	0.0	0.0	0.00	0.00	0.00	80.0
All Vehicles		1387	10.1	1387	10.1	0.953	15.6	NA	21.6	164.1	0.45	1.31	2.35	45.3

SH3 / Raynes Road roundabout capacity upgrade

5.	SH3 / Raynes Road - additional northbound approach and circulating lane on the roundabout.	To be completed prior to: • Any 224c being issued for any subdivision in Northern Precinct that takes the cumulative developed area with sole access to SH3 roundabout over 65 ha (net); or • When the cumulative total consented land area in Northern Precinct with sole access to SH3 roundabout exceeds 65 ha (net)

The development area trigger of 65 ha (net), approximately 70 ha (gross) relates to the maximum developable area in Northern Precinct when access is solely via the proposed SH3 roundabout. This trigger point was defined as part of the Expert Witness conferencing.



MOVEMENT SUMMARY

Site: 4 [2031 SH3 / Raynes Road RAB - AM Peak - NZTA Layout - 65Ha (Site Folder: WRTM Vol - 41ha NP + 28ha Genetic - Access to SH3 Only - No SL)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH3														
2	T1	591	5.0	591	5.0	0.447	4.2	LOS A	4.2	30.6	0.32	0.41	0.32	55.3
3	R2	37	8.0	37	8.0	0.447	7.8	LOS A	4.2	30.6	0.32	0.41	0.32	51.9
Approach		628	5.2	628	5.2	0.447	4.4	LOS A	4.2	30.6	0.32	0.41	0.32	55.1
East: Raynes Road														
4	L2	73	1.0	73	1.0	0.332	14.6	LOS B	2.4	17.1	0.98	0.99	0.98	41.0
6	R2	54	3.0	54	3.0	0.332	19.5	LOS B	2.4	17.1	0.98	0.99	0.98	42.1
Approach		127	1.9	127	1.9	0.332	16.7	LOS B	2.4	17.1	0.98	0.99	0.98	41.4
North: SH3														
7	L2	210	4.0	210	4.0	0.865	3.4	LOS A	21.0	156.2	0.58	0.38	0.58	49.1
8	T1	1099	8.0	1099	8.0	0.865	4.7	LOS A	21.0	156.2	0.58	0.38	0.58	53.8
Approach		1309	7.4	1309	7.4	0.865	4.5	LOS A	21.0	156.2	0.58	0.38	0.58	53.0
All Vehicles		2064	6.4	2064	6.4	0.865	5.2	LOS A	21.0	156.2	0.53	0.43	0.53	52.7

The PM Peak performance governs the developable land area trigger value with the highest queue on SH3.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH3														
2	T1	1123	7.0	1123	7.0	0.951	7.2	LOS A	28.5	211.5	1.00	0.59	1.02	51.9
3	R2	132	5.0	132	5.0	0.951	10.7	LOS B	28.5	211.5	1.00	0.59	1.02	48.9
Approach		1255	6.8	1255	6.8	0.951	7.6	LOS A	28.5	211.5	1.00	0.59	1.02	51.5
East: Raynes Road														
4	L2	56	1.0	56	1.0	0.297	8.9	LOS A	2.1	15.0	0.89	0.90	0.89	43.2
6	R2	105	4.0	105	4.0	0.297	13.8	LOS B	2.1	15.0	0.89	0.90	0.89	44.4
Approach		161	3.0	161	3.0	0.297	12.1	LOS B	2.1	15.0	0.89	0.90	0.89	44.0
North: SH3														
7	L2	97	4.0	97	4.0	0.734	4.1	LOS A	9.8	71.2	0.74	0.54	0.74	48.6
8	T1	819	5.0	819	5.0	0.734	5.3	LOS A	9.8	71.2	0.74	0.54	0.74	53.4
Approach		916	4.9	916	4.9	0.734	5.2	LOS A	9.8	71.2	0.74	0.54	0.74	52.8
All Vehicles		2332	5.8	2332	5.8	0.951	7.0	LOS A	28.5	211.5	0.89	0.59	0.90	51.4

The northbound entry 95th percentile queue length = 212 m with an average delay of 7.6 s/veh. The first image below shows approximately where a queue of 265 m extends to (south of the ex-fruit packing factory entrance). This still allows for a stopping sight distance (SSD) of 150 m to the back of the queue (90km/h operating speed and 2.5 second driver reaction time (unalert)) without SD interference by the crest curve near the gated speed limit signs entering Rukuhia. The second figure illustrates the 150m SSD.

It is clear from this information that the trigger of 65Ha (net) leaves approximately 50m of queue space on the SH3 northbound approach before sight distance to the back of the queue reduces below the Austroads recommended SSD for 90 km/h. For clarity, the speed limit on SH3 in this location is 80km/h including through Rukuhia.

Raynes Road / Northern Precinct access

6.	Restricted movement intersection access from Northern Precinct to Raynes Road. The intersection should be designed to physically and legally prevent all vehicles leaving the Northern Precinct from turning left onto Raynes Road, and right turn into Northern Precinct from Raynes Road.	To be completed prior to • Any industrial / commercial activity being able to generate traffic that gains access off Raynes Road; or • When the cumulative total consented land area in Northern Precinct with sole access to SH3 exceeds 65 ha (net) ~~70 ha (gross)~~

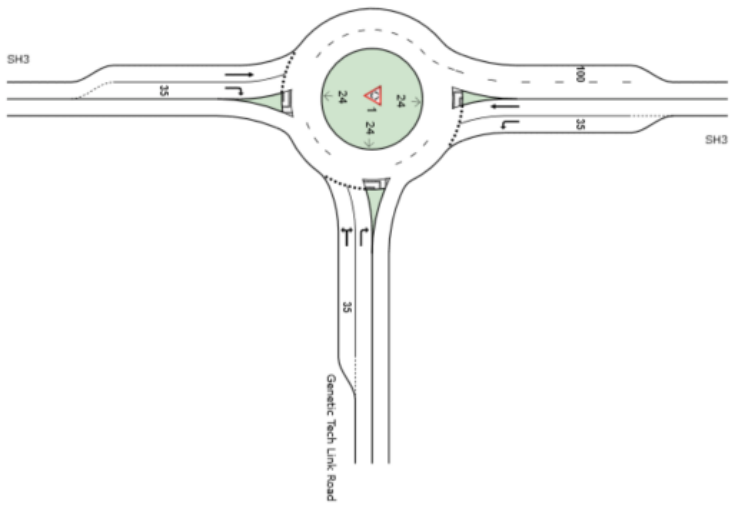
The development area trigger of 70 ha relates to the maximum developable area in Northern Precinct when access is solely via the proposed SH3 roundabout. This is the figure that triggers the need to construct the Raynes Road access. The figure is identified in ITA Section 7.5.1 as 80 Ha gross (71 Ha net).

7.5.1 Access by SH3 Roundabout Only

BBO had also undertaken modelling to understand the land area that could be developed if the site were to be serviced by only the proposed SH3 / RPL roundabout. The modelling and further manual refinement of the traffic flows indicated that approximately **80 ha of the plan change area (gross area)** can be serviced by the single access. This equates to approximately **1,520 trips per peak hour** (i.e. 71 ha developable land x 20.9 trips per hectare per peak hour).

It is clear an error occurred during the amendments to the provisions during expert witness conferencing online, where the word “gross” should have been changed to “net” but instead 70ha (gross) was changed to 65 ha (net). I intend to recommend in my evidence that this be corrected to 70 ha (net) as it should be.

The PM Peak performance of the SH3 access intersection governs the developable land area trigger point. LOS C with an average delay of 30 s/veh was chosen as a practical maximum permissible delay to SH3 traffic. The supporting SIDRA results follow:



MOVEMENT SUMMARY

Site: 1 [2031 SH3 / Genetic Tech RAB - AM Peak (Site Folder: Manual Dist - 51ha NP + 28ha Genetic - Access to SH3 Only - No SL)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH3														
2	T1	396	5.0	396	5.0	0.344	5.0	LOS A	2.4	17.7	0.49	0.50	0.49	54.9
3	R2	490	10.0	490	10.0	0.377	8.5	LOS A	2.8	21.5	0.49	0.62	0.49	45.7
Approach		886	7.8	886	7.8	0.377	6.9	LOS A	2.8	21.5	0.49	0.57	0.49	49.4
East: Genetic Tech Link Road														
4	L2	113	20.0	113	20.0	0.164	6.5	LOS A	1.0	8.2	0.71	0.71	0.71	45.8
6	R2	174	20.0	174	20.0	0.202	10.5	LOS B	1.4	11.2	0.71	0.75	0.71	45.1
Approach		287	20.0	287	20.0	0.202	8.9	LOS A	1.4	11.2	0.71	0.73	0.71	45.4
North: SH3														
7	L2	809	10.0	809	10.0	0.808	13.4	LOS B	13.5	102.5	1.00	1.16	1.50	42.3
8	T1	519	8.0	519	8.0	0.641	11.0	LOS B	6.6	49.3	0.87	0.96	1.10	51.6
Approach		1328	9.2	1328	9.2	0.808	12.5	LOS B	13.5	102.5	0.95	1.08	1.34	45.5
All Vehicles		2501	9.9	2501	9.9	0.808	10.1	LOS B	13.5	102.5	0.76	0.86	0.97	46.8

MOVEMENT SUMMARY

Site: 1 [2031 SH3 / Genetic Tech RAB - PM Peak (Site Folder: Manual Dist - 51ha NP + 28ha Genetic - Access to SH3 Only - No SL)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH3														
2	T1	545	7.0	545	7.0	0.838	32.3	LOS C	15.7	116.7	1.00	1.48	2.17	40.2
3	R2	97	20.0	97	20.0	0.258	17.2	LOS B	1.6	12.9	0.87	0.95	0.87	41.9
Approach		642	9.0	642	9.0	0.838	30.0	LOS C	15.7	116.7	0.98	1.40	1.97	40.4
East: Genetic Tech Link Road														
4	L2	239	10.0	239	10.0	0.546	9.2	LOS A	4.6	35.3	0.82	0.93	0.97	43.5
6	R2	878	10.0	878	10.0	0.710	15.7	LOS B	9.0	68.5	0.90	1.03	1.18	43.2
Approach		1117	10.0	1117	10.0	0.710	14.3	LOS B	9.0	68.5	0.88	1.01	1.14	43.3
North: SH3														
7	L2	301	20.0	301	20.0	0.275	3.8	LOS A	1.9	15.4	0.38	0.45	0.38	47.0
8	T1	545	5.0	545	5.0	0.373	4.3	LOS A	3.0	22.1	0.38	0.43	0.38	55.4
Approach		846	10.3	846	10.3	0.373	4.1	LOS A	3.0	22.1	0.38	0.44	0.38	52.1
All Vehicles		2605	9.9	2605	9.9	0.838	14.9	LOS B	15.7	116.7	0.74	0.92	1.10	45.0

That closes out the actions I had for BBO from the two Expert Witness Conference meetings.

Yours sincerely
Bloxam Burnett & Olliver

Cameron Inder
Transportation Engineering Manager

https://bbonz-my.sharepoint.com/personal/cinder_bbo_co_nz/Documents/Desktop/PPC20 Caucus - Transport Update.docx