Your Comment on the Sunfield project

Please include all the contact details listed below with your comments and indicate whether you can receive further communications from us by email to substantive@fasttrack.govt.nz.

1. Contact Details			
Please ensure that you have authority to comment on the application on behalf of those named on this form.			
Organisation name (if relevant)	Auckland Transport		
First name	Matthew		
Last name	Richards		
Postal address			
Home phone / Mobile phone	021 196 2810	**Work phone**	
Email *(a valid email address enables us to communicate efficiently with you)*	Matthew.richards@at.govt.nz		

2. We will email you draft conditions of consent for your comment			
☒	I can receive emails and my email address is correct	☐	I cannot receive emails and my postal address is correct

Please provide your comments below, include additional pages as needed.

Author: Neil Stone – Principal Development Planner

Sunfield Substantive Application

Specialist Area: Auckland Transport

Date: 4 August 2025

Introduction

i. My full name is Nicolas Jacobus Stone. I am a Development Planner with 10 years of experience in land use and transport planning. This includes 6 years of working for Auckland Transport (AT) on masterplanning, land use change, and resource consent review-related work. I hold a Bachelor of Town and Regional Planning (University of Pretoria, 2015). I am an associate member of the New Zealand Planning Institute.

- In terms of similar development review experience, I have been extensively involved in the masterplanning and consent review aspects of Kainga Ora Large Scale Projects1 on behalf of AT. These projects are of a similar scale to the Sunfield development proposal.
- I advise that I have read the Code of Conduct for Expert Witnesses (the Code) outlined in the Environment Court's Practice Note (2023) and have complied with the Code in preparing this memorandum. I also agree to follow the Code when participating in any subsequent processes as directed by the Panel. I confirm that the issues addressed in this memorandum are within my area of expertise but are supported by Beca, Progressive Transport Solutions, and a range of internal AT specialists. I also confirm that I have not omitted to consider material facts known to me that might alter or detract from my opinions.
- The assessment set out in this report, though presented on behalf of AT, represents my independent expert analysis.
- I have undertaken an extensive visit to the transport network applicable to the proposal on the 15th of July 2025.

ii. Thank you for referring the Sunfield Masterplanned Community fast-track consent (the **proposal**) to AT for comments. AT is a Council-Controlled Organisation and the Road Controlling Authority for the Auckland region (excluding the State Highway network). AT has the legislated purpose to contribute to an 'effective, efficient and safe Auckland land transport system in the public interest2. In fulfilling this role, AT has an interest in the Project as Road Controlling Authority and as an asset owner.

iii. Auckland Council's annual Letter of Expectation (LOE) sets out the Council's priorities and expectations for AT. The AT Statement of Intent (SOI) responds to the LOE. The SOI 2024 - 2027 outlines how AT intends to understand and carry out the direction set by our shareholder, Auckland Council. The SOI was prepared in alignment with Council's Long-Term Plan 2024 (LTP).

iv. The SOI outlines that Auckland's growth continues to put pressure on our network of infrastructure and services. The Auckland Council Future Development Strategy (FDS), provides Auckland-wide direction and integration of the council group's approach to growth and development, guiding subsequent strategies, operational plans, programmes of work, and investment decisions. We support the actions identified in the

[1] Northcote, Oranga, Roskill South and Tamaki neighbourhoods.

[2] Section 39 of the Local Government (Auckland Council) Act 2009

FDS, including improving alignment between land use planning and transport investment. Out-of-sequence or unanticipated development that puts pressure on AT, Council, and other asset owners to reallocate or reprioritise funding away from projects that support more development ready land, and growth, which is sequenced in accordance with the FDS is not supported.

v. AT's capital programme has been determined by the LTP and the Regional Land Transport Plan (**RLTP**). New capital projects and any growth-related investments should be fully aligned with guiding strategies, including the FDS.[3]

vi. This response should be read in conjunction with the supporting material attached to this memo, which includes:

- **Annexure 1**: Sunfield Fast Track Application Beca Review – Transport, prepared by Craig Richards, Technical Director (Transport) of Beca, dated 30 July 2025. This report focuses on a network-wide assessment and subsequently required infrastructure upgrades;
- **Annexure 2**: Sunfield Fast Track Application Review, prepared by Martin Peake, Director of Progressive Transport Solutions, dated 29 July 2025. This report focuses on the design-related details of the proposal, and;
- **Annexure 3**: Sunfield trip generation technical note prepared by Beca dated 4 July 2025. This technical note focuses on establishing a more realistic trip generation rate.
- **Annexure 4**: Sunfield Stormwater Review Memo, prepared by Griffin Benton-Lynne, Awa Environmental, dated 1 August 2025.

The assessments and conclusions set out in the reports by Beca, Progressive Transport Solutions and Awa are supported.

vii. The substantive application material has been reviewed as it relates to AT, noting that additional s67[4] information by the applicant has been received through Council on the 21st of July 2025. The documentation and information reviewed include the following:

- Sunfield Planning Report prepared by Tattico, dated 31 March 2025;
  - Draft conditions, dated 31 March 2025;
  - S67 response dated 17 July 2025;
- Transportation Assessment prepared by Commute Transportation Consultants, dated 10 February 2025;
  - S67 response dated 17 July 2025;
- Concept Masterplans for the proposed residential, school, employment, and aged care precinct, as well as an overall masterplan prepared by Studio Pacific Architecture, dated February 2025,
- Scheme Plan prepared by Maven Associates, dated February 2025;
- Draft Construction Management Plan prepared by Maven Associates, dated 18 March 2025;
- Infrastructure Report prepared by Maven Associates, dated February 2025, which includes the following plans:
  - Stormwater Management Plan (parts 1, 2, and 3) prepared by Maven Associates, dated February 2025;
  - Stormwater plans, including catchment, wetland, and post-development flood plain plans prepared by Maven Associates, dated February 2025;

[3] Auckland Transport Statement of Intent: Building public confidence 2024-2027 with November 2024 modifications

[4] s67 of the 2024 Fast Track Act

- Roading plans.
  - S67 response dated 17 June 2025;
  - S67 response to Watercare dated 15 July 2025;
- Private Rubbish Collection advice prepared by Rubbish Direct, dated 17 March 2025.

viii. The applicant noted that the proposed development is considered a non-complying activity under the Auckland Unitary Plan (AUP). Similarly, the review of this proposal is guided in general by the objectives and principles, matters of discretion, and assessment criteria of relevant AUP chapters, as well as AT's asset management and road controlling authority responsibilities.

Summary of the proposal

1. The proposal, as summarised in section one of the application's Planning Report by Tattico, dated 31 March 2025, on behalf of Winton Land Limited, is as follows:
   - 3400 individual homes,
   - 600 independent living retirement units,
   - 460,000m^2 of employment, healthcare, and education land use,
   - 76000 sqm school (included in the 460,000m^2 noted above),
   - 277 000m^2 of open space,
   - Four retail hubs throughout the community,
   - Approximately 25 new roads to be vested to Auckland Council,
   - Seven vehicle access points are proposed onto the adjacent and future road network. This includes:
     - Two give-way T-intersections onto Airfield Road,
     - A fourth leg to, and signalisation of the Walters Road, Mill Road, Cosgrave Road Intersection,
     - A give way T-intersection onto Cosgrave Road south of Parahau Road,
     - A fourth leg to, and signalisation of the Bellbird Road, Cosgrave Road intersection,
     - A fourth leg to, and signalisation of the Old Wairoa Road, Pakaraka Drive intersection,
   - Three intersections, externally to the site are proposed to be upgraded, these include:
     - Mill Road, Airfield Road intersection from a single to a double lane roundabout,
     - Signalisation of the Cosgrave Road, Clevedon Road Intersection,
     - Signalisation of the Okawa Avenue, Clevedon Road Intersection,
   - Provision of privately funded public transport using autonomous shuttles within the development that links to both the Takanini and Papakura Rail stations.

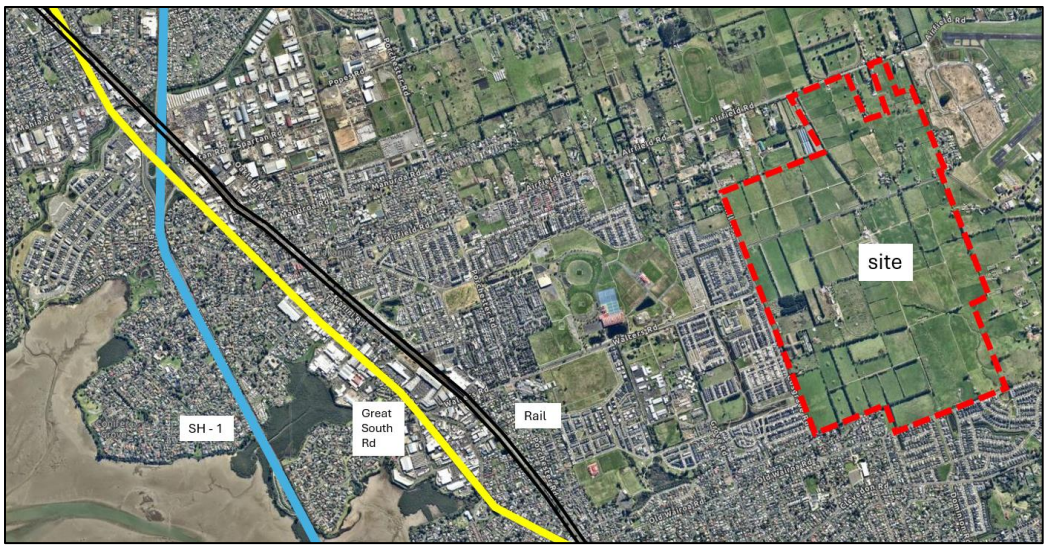


Figure 1: development site in relation to State Highway 1, Great South Road, and the Kiwirail Rail line.

2. The site comprises 22 properties as detailed in section 2.2 of the applicant's Planning Report, of which 13 are owned by the applicant. Tattico's s67 response section 2.6.1 indicated that there is some land that has been excluded from the application since lodgement as a substantive application. The full extent of this is unknown, but it appears to be within the central/western portion of the site. The applicant has acknowledged that this removes the ability to provide a circular loop road within the site.

3. The proposal is located within the Future Urban Zone (FUZ) and the Rural - Mixed Rural Zone in the Auckland Unitary Plan (**AUP**).

4. The rural land that this proposal covers represents approximately three quarters of the proposal site and is not anticipated as a growth area as it does not sit within the Future Development Strategy for Auckland[5] (**FDS**).

5. The section (southwestern corner) of the site that is zoned Future Urban is earmarked for development after 2050 as per Auckland Council's FDS. The FDS (Appendix 6) identifies that the Mill Road (NZTA upgrade) as well as a Takanini Frequent Transit Network upgrade must be in place before this FUZ zone land is developable.

Auckland's Future Development Strategy

6. Council's FDS, excludes the majority if this land from the strategy, with the exception of the southwestern corner. As such the majority of this land is not considered developable, at least for the duration of the strategy, which is up to 2050+. The FDS notes that both New Zealand Transport Agency Waka Kotahi's (**NZTA**) Mill Road and a Frequent Transit Network (**FTN**) are required before the development can proceed on this land. Similarly, it is also considered that the site should not be developed without the required transport upgrades in place. At a high level, these include:

    a) The NZTA Mill Road Project, adjacent to the site (as per Figure 2 below), and its previous stages to the north towards Redoubt Road.
    b) Active modes related infrastructure that connects the site to Clevedon Road, Walters Road, and both the Takanini and Papakura rail stations.
    c) A Frequent Transit Network operating in close proximity to the site.

[5] The Future Development Strategy (FDS) is Auckland's long-term approach to growth and development. It sets out how Auckland will grow and change over the next 30 years.

d) Capacity upgrades at key intersections throughout the wider area, including those along Great South Road. Refer to Figure 2 below for the locations of these intersections.

e) Significant stormwater works to ensure no adverse flooding effects on the site and on adjacent neighbourhoods.

7. There is a concern that enabling development in an area earmarked for development more than 25 years in the future could potentially undermine planning and investments already underway for development areas with nearer-term development horizons.

8. The NZTA Mill Road Stage 2 project has been lodged as a Notice of Requirement (**NoR**), which shows the route running through and parallel with the eastern boundary of the site, see Figure 2 below that shows the route with the Sunfield development overlaid. Please refer to paragraphs 14 to 18 below regarding Mill Road's strategic importance.

Figure 2: Mill Road – Notice of Requirement with Sunfield overlay.

Executive Summary

9. It is considered that the proposed development would result in significant adverse impacts that are disproportionate to its benefits (regional or otherwise) and cannot be adequately avoided, remedied, mitigated, offset, or compensated through conditions or modifications. Independent modelling by Beca and modelling collaboration between Beca and the Auckland Forecasting Centre confirms that if more realistic trip generation rates eventuate, significant additional intersection upgrades will be required beyond those proposed by the applicant, with some requiring land acquisition outside current road reserves. Therefore, under section 85(3) of the Fast-track Approvals Act 2024 (**FTAA**), the Panel should consider declining consent. The Applicant has overstated the regional benefits, and development ahead of supporting infrastructure is likely to lead to poor transport outcomes both in this area and in other areas where development is expected but might be delayed if this proposal proceeds. Key adverse impacts include reduced productivity and efficiency of the surrounding road network, especially the Cosgrave Road – Mill Road corridor and associated

intersections, as well as key linkages along Great South Road leading to the Takanini rail station, the Papakura rail station, and the State Highway 1 interchange. This productivity reduction will affect both freight and commercial vehicles as well

10. The main issues and areas of concern identified include:

- The underlying assumptions, specifically the trip generation rate relied on in the Commute transport assessment, are considered aspirational and unlikely to eventuate. The result is the applicant underestimating the infrastructure required to support this proposal, specifically active modes and intersection upgrades. Although the applicant proposes some intersection upgrades, AT expects significant future congestion on existing roads and intersections that do not anticipate future traffic from this development. For more information, please refer to **Annexure 1** – Beca report. As Beca note, there is a risk of significant impacts on the safe and efficient operation of the wider transport network if the assumptions adopted in the ITA do not eventuate, which will not be appropriately mitigated. Beca conclude that:

  > "*... there is high risk that the assumptions applied in the ITA are not achievable and if the development proceeds, then there is likely to be significant adverse effects (and, in terms of section 85 of the FTAA, significant adverse impacts) on transportation safety and efficiency.*"

  Beca's independent analysis using more realistic trip generation rates identifies eight specific intersections that will require upgrades, including two not assessed by the applicant: Mill Road/Popes Road and Mill Road/Alfriston Road. Several proposed upgrades will require additional land acquisition and more extensive works than the applicant has provided for.

- Concerns with the operation of a large, privately funded public transport service that is required to ensure the feasibility of the proposal.
  i. Concerns with the ability of the existing public transport service to cater to the demand of the proposal before a frequent service is in place.
- Major gaps in the stormwater and flooding assessment provided by the applicant. AT's concern is road safety and asset damage, flooding effects both within the site and on adjacent neighbourhoods.
- Detailed engineering design issues that must be addressed as part of the Fast Track application in order to avoid significant future delays and potential required amendments to the application. More details on these are provided in the Progressive Transport Solutions report included as **Annexure 2**.
- The transport assessment has not been updated since the applicant acknowledged the proposed alignment of NZTA's Mill Road Stage 2.

11. In the absence of a proper plan change process to address zoning, land use, and infrastructure services, it is expected that the development should address larger cumulative issues and effects resulting from the development. In this case, however, the proposal has not addressed major concerns in relation to the provision of appropriate infrastructure. Recommendations are made in the main body of this report for further assessment and modelling by the Applicant. The applicant's s67 response dated 17 July 2025, provides brief responses to AT's queries but does not provide additional assessment, including with regard to the matters noted in point 10 above. This response does not address the majority of AT's concerns, and no changes are proposed to the application.

12. The s67 response dated 17 July 2025 does, however, note that the applicant is working with NZTA and looking to provide additional assessment and transport modelling, although this will be received (if provided) after AT's due date for a response to the Fast Track Panel. It is considered that expert conferencing on certain matters,

such as transport modelling, infrastructure upgrades, road flooding, and required conditions, is highly desirable.

13. The following sections explain the significant adverse impacts identified by AT in its assessment.

Mill Road

14. As noted, NZTA has lodged Stage 2 of the Mill Road project as a NoR on 13 June 2025. This stage of the project includes approximately 21km of road, extending from the Redoubt Road interchange on SH1 in Manukau to the proposed Drury South Interchange on SH1 in Drury. The project involves a new corridor, comprising a mix of new roads and roading upgrades. This will include upgrades to numerous existing intersections and potentially involve work on existing local roads that will intersect with the new corridor. The project is expected to occur over the next decade, with construction earmarked for 2026.

15. The Mill Road route is a government-approved road of national significance[6] and a listed fast-track project. The following benefits of this road are highlighted:

    - The Mill Road project will provide a crucial north/south roading link for transport provision to cater for the region's rapid housing and business growth, which includes unlocking certain sites for development.
    - The project will improve congestion and safety in the wider area and will act as an alternative route to the congested Southern Motorway and Great South Road, improving efficiency and resilience for both commuters and freight traffic.
    - The project also integrates with the NZTA Papakura to Bombay project.
    - Mill Road is also considered to provide alternative options for inter-regional travel and has substantial bus network benefits.
    - Mill Road will also allow other corridors to be focused on place-making and local functions, reducing their emphasis as primary movement corridors.

16. The s67 response dated 17 July 2025 acknowledges that the application's Transport Assessment needs to be updated with regard to Mill Road Stage 2's layout. However, the s67 response (dated a month after the NoR lodgement) has not provided any updates on the matter. The effect of Mill Road Stage 2 on the proposal from a transport perspective remains unclear, especially on the following matters:

    a) Trip generation and internalisation due to the loss of sections of the employment precinct.
    b) Stormwater (specifically flooding) matters due to the loss of sections earmarked for stormwater purposes in the original proposal.

17. AT obtained designations for Stage One of the Mill Road project in 2016, encompassing the northernmost 7.1km of the corridor between the SH1 Redoubt Road interchange and the Mill Road-Alfriston Road intersection (top end of the designation shown in red in Figure 3 below). This Designation (1836) is in the process of being transferred to NZTA as the delivery agency.

[6] Roads of National Significance (RoNS) are a series of major transport projects designed to enhance the country's infrastructure and improve key transport corridors.

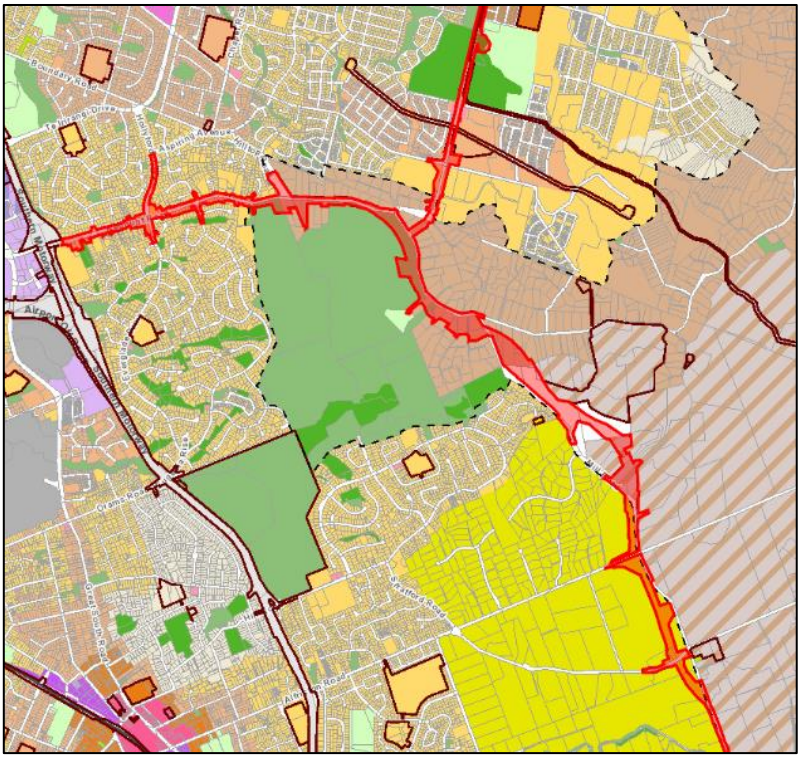


Figure 3: AT Designation 1836 as per AUP GeoMaps

18. It is important that development does not proceed ahead of the upgrade/construction of the required transport network, which includes Mill Road Stage 2. Without Mill Road Stage 2, the development relies on the existing transport network, which, as discussed in the Beca Report – **Annexure 1**, results in significant network congestion that has not been identified as requiring mitigation by the applicant.

Public Transport

19. There is a strong emphasis on public transport within the transport assessment, as the proposal is premised on very low car ownership (1 car per 11.5 dwellings). A frequent public transit service will be required for any significant development on this site. AT does not have the funding for this service and will not provide this service, and it remains uncertain when and if AT will have funding for any future bus services through or close to this site.

20. The applicant's s67 responses by both Tattico and Commute now confirm that the applicant is proposing to fund and operate a public bus service which will operate on their proposed dedicated busway and link the site to both the Papakura and Takanini train stations. It is understood from the Commute ITA that this service requires an average headway of 400m between services.

21. There is however outstanding information regarding the provision, operation, and supporting infrastructure requirements of such a bus service as well as what exactly what the applicant means but a public service (i.e., will it stop at bus stops along the way to the Papakura and Takanini trains stations, and how will ticketing work, etc). This remains a significant concern if not adequately addressed and secured through this application.

Funding and contracting

22. The Commute s67 response, section 1.10, indicates that the proposed bus service will be provided by a Winton subsidiary company Sunfield Development Limited (**SDL**), and then transferred to an incorporated

society. No date for this transfer is provided and it is uncertain how the requirements of this service will transfer from SDL to the incorporated society.

23. The Tattico s67 response, section 2.4.4 indicates that the bus service will be provided by Winton and managed by the applicant 'SDL'. It is understood through the applicant's Planning Report that Winton is the applicant and not SDL. An incorporated society is not mentioned in this s67 response.

24. Proposed condition 114 indicates that the consent holder will be responsible for providing the bus service. This condition does not reference the incorporated society as noted in the Commute s67 response.

25. There is concern with the informal manner in which such a significant public transport undertaking is proposed. Operating a public transport service requires specialised expertise and ongoing regulatory compliance. Concerns are raised that this undertaking is underestimated and not well considered by the applicant.

26. Additionally, the Council may not be able to effectively monitor compliance or take enforcement action without a clear identification of the responsible party for each aspect of the service. Condition 114 does not provide any measures that must be undertaken by the applicant should the service not function at an acceptable standard.

27. Any public transport service will require the relevant approvals under the Land Transport Management Act from the public transport service provider (currently AT) and will need to comply with the NZTA Requirements for Urban Buses (2024). Any service provided will need to be provided and maintained to AT's requirements/standards which includes a high level of bus punctuality and reliability as well as penalties for the operator for failure to reach certain metrics.

28. It is recommended that the applicant provide concise information on the provision of public transport from one source that specifically indicates who will provide the service, when they will provide the service, to what standard of performance the service needs to operate (including what penalties will apply if this standard is not achieve) and how AT can have confidence that the service will be provided when required and function as intended. It is further recommended that Condition 114 be redrafted as a clear and enforceable condition or conditions (e.g., so that a particular stage of development cannot proceed until the service is established and operational). Contingency also needs to be added to the condition in the case of service disruptions.

Timing of service

29. The Commute transport assessment, at section 14, and condition 123 indicate that the service will be provided at 890 dwellings constructed (445 occupied), which is noted as the conclusion of stage 3. By contrast, the offered Condition 114 indicates that the service will be provided "as part of stage 4".

30. It is considered that, to ensure the service is provided at the right time, the trigger should relate to a specific dwelling number and recommends that the occupation of dwelling 445 be the trigger point for the requirement of this service to be functional as opposed to a stage.

31. The information provided on this service does not indicate what level of service is required during various stages of the development. As currently presented, the full 44 bus service at a headway of 400m seems to be proposed for more than 890 (445 occupied) dwellings.

Public Transport Infrastructure Requirements

32. The assessment of effects and mitigation described in the ITA relies on assumptions around mode share and car use that cannot be achieved with the current proposal and its associated conditions offered by the applicant. The infrastructure requirement for a public transport service understated and requires additional work and commitment by the applicant. The following paragraphs provide an overview of this concern.

33. The Takanini and Papakura Rail stations' capacity to accommodate additional bus services needs to be investigated. AT has not been consulted in this regard and notes that both these stations will have bus capacity issues in the peak hours.

34. This matter must be discussed with AT, and the requirements for this investigation and the required upgrades must be secured through conditions.

35. The Commute s67 response, at item 1.8, notes that the residents of the development, prior to 890 dwellings being constructed (445 occupied), will make use of the existing public transport. The response also mentioned AT's planned service #364. It is acknowledged that this service is planned to be provided in 2026 and will be able to cater to some of the public transport demand from the site. However, this service can only serve dwellings in close proximity to the southwestern portion of the site and will require these residents to walk 650m–900m. This distance is considered on the cusp of an acceptable walkable catchment and will not encourage significant uptake in public transport for the residents of this site. The Commute s67 response notes that the first stages of the proposal are within this southwestern portion of the site. It is recommended that this be included as a condition of consent, i.e., that Stages 1, 2, and 3 must be completed before the occupation or use of any further stages.

36. It remains unclear how residents of the initial 890 dwellings will travel, particularly if the development aspires to "car-less" living, given the initial lack of public transport and potentially inadequate walking and cycling facilities. Consequently, private vehicle trip rates are likely to be higher during initial development stages, making the applicant's aspiration of a 60%[7] public transport mode share is unachievable for a long period of time.

37. In terms of the applicant's proposal to provide private bus services, these can generally operate on public roads; however, this will require the relevant registration approvals from NZTA. Additionally, the requirements of operating autonomous[8] vehicles on the public road need to be verified with NZTA.

38. The proposed bus lanes within the 'Sunfield loop' will need to be legally established for the intended purpose through the appropriate resolution process. This process will need to address the legalisation of autonomous vehicle use, and the applicant will need to demonstrate that these vehicles can safely and efficiently function on AT's network. Particular attention should be paid to locations where the dedicated bus lane intersects with other vested roads, specifically concerning the intersection of autonomous vehicles with general traffic.

    a) The applicant's s67 response confirms that they do not own all the land required to provide the proposed 'Sunfield loop'. They note that turning facilities are provided for vehicles and buses in this regard. AT is concerned with the lack of continuity for all modes of this missing link if the 'loop' is not provided. This would result in less reliance on active modes and public transport due to longer travel times.

Active Modes Network

39. It is noted that the roading plans provided are large files, extensive that do not specifically focus on actives modes to the extent expected for such a significant proposal. A dedicated active modes plan showing proposed upgrades on the periphery of the site and on the existing transport network is recommended. This plan should provide certainty on what exactly is proposed where and should ensure that the required upgrades are captured for delivery in subsequent stages.

[7] Commute Transport Assessment section 9.1.6

[8] Commute Transport Assessment section 3 "*residents will be able to jump on the Sunfield autonomous electric bus that continuously runs to link with the train station*."

Internally to the site

40. Please refer to **Appendix 2** for a review of the internal walking and cycling network design. Additional commentary from a planning perspective is provided below.

41. Road to road vested active modes connections internal to the site do not seem to be provided. The application drawings seem to indicate certain locations where these are possible, but these are not labelled. Figure 4 below shows in red the locations where it is considered that vested road to road accessways should be provided as part of the road network. This is considered a requirement of any large subdivision application[9] [10], especially since the proposal has significantly reduced reliance on general vehicle travel. The proposal, as presented, does not indicate an efficiently connected neighbourhood, rather isolated residential blocks that do not allow for a connected and efficient layout of street patterns (legally).

42. In this regard 8m wide road to road accessways (as per AT's design standards) is recommended. The recommended road to road accessway locations are provided in the red lines on Figure 4 below. The connections offer significantly reduced travel time around the neighbourhood and key destinations. The yellow lines in Figure 4 below indicate where these connections could be beneficial, where the applicant can investigate providing a connection through an accessway or easement.

43. The missing link in the 'Sunfield loop' significantly detracts from achieving a connected development.

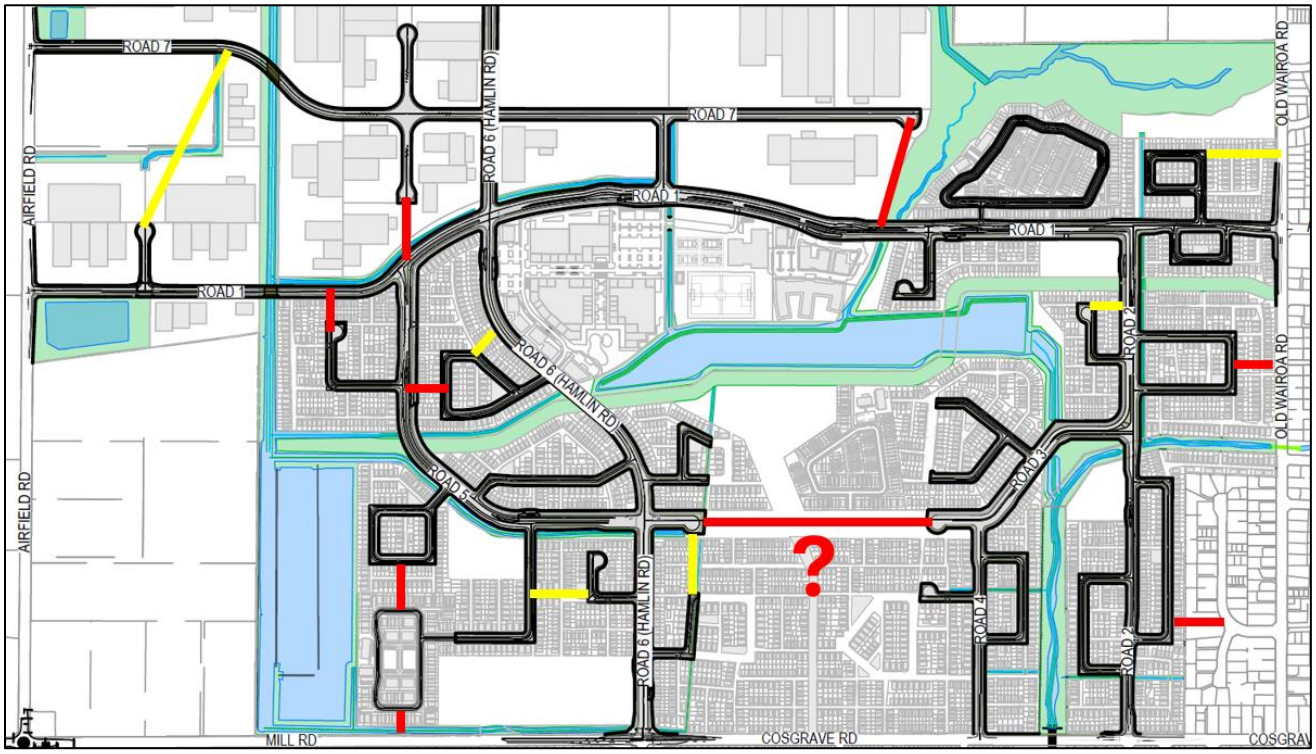


Figure 4 – Red - locations where road to road walkways should be provided. Yellow – locations where road to road access can be explored.

Active modes infrastructure surrounding the site and externally

[9] AUP – E39.2 Objective (6): "*Subdivision has a layout which is safe, efficient, convenient, and accessible*"
[10] AUP – E38.2 Objective (10): "S*ubdivision to provide street and block patterns that support the concepts of a liveable, walkable and connected neighbourhood*"

44. The Commute transport assessment section 11.2 states that part of the vision includes linking the site with Papakura town centre and rail station, and the Takanini town centre and rail station. The Commute s67 response point 1.11 similarly notes the site connects to AT's future cycling network.

45. However, the Commute Transport Assessment section 7.1.2 only includes minor active modes upgrades to achieve this link, please refer to Figure 5 below. It is considered that the approach will not achieve the stated vision or reduce reliance on private vehicles. It is also noted that this proposal was not considered in any of AT's future plans, given that the majority of this site sits within rural land, and therefore AT's future cycling plans are not relevant to this proposal. The proposal must provide the active modes network that would have been in place by the time the site might have become development ready. In this regard, AT considers that the following active modes upgrades referenced in the below paragraphs need to be provided by the applicant.

46. The transport assessment[11] notes that the Takanini Train Station needs to be upgraded for sheltered bike storage. The draft conditions proposed by the applicant do not include this as a requirement, and the designs provided also do not seem to address this required upgrade as well. The transport assessment should identify the bike storage location and design (minimum number of bikes to be accommodated within the facility) and include its implementation as a condition.

47. It is unclear to what extent the applicant proposes to upgrade the site's frontage in terms of active mode upgrades. The applicant plans show limited sections of frontage upgrades – generally where the red dashed lines are presented in Figure 5 below. However, with the site not being earmarked for development, it is required that this site provide upgrades along the entire site 'block' to connect the site to the surrounding network, as this is required but unlikely to be provided by any other parties.

48. It is difficult to ascertain exactly what forms these upgrades should take. However, when attempting to link the development into the surrounding site, the following are recommended as a minimum:

- Shared path on Airfield Road (3m wide minimum)
- Separated cycling and walking facilities or shared path on Mill Road and Cosgrave Road.
- Separated cycling and walking facilities on Old Wairoa Road is preferred and will need to link in with the proposed path on Okawa Avenue and the existing on-street cycleway in Old Wairoa Road north of PA karaka Drive.

[11] Commute Transport Assessment – section 7.1.2

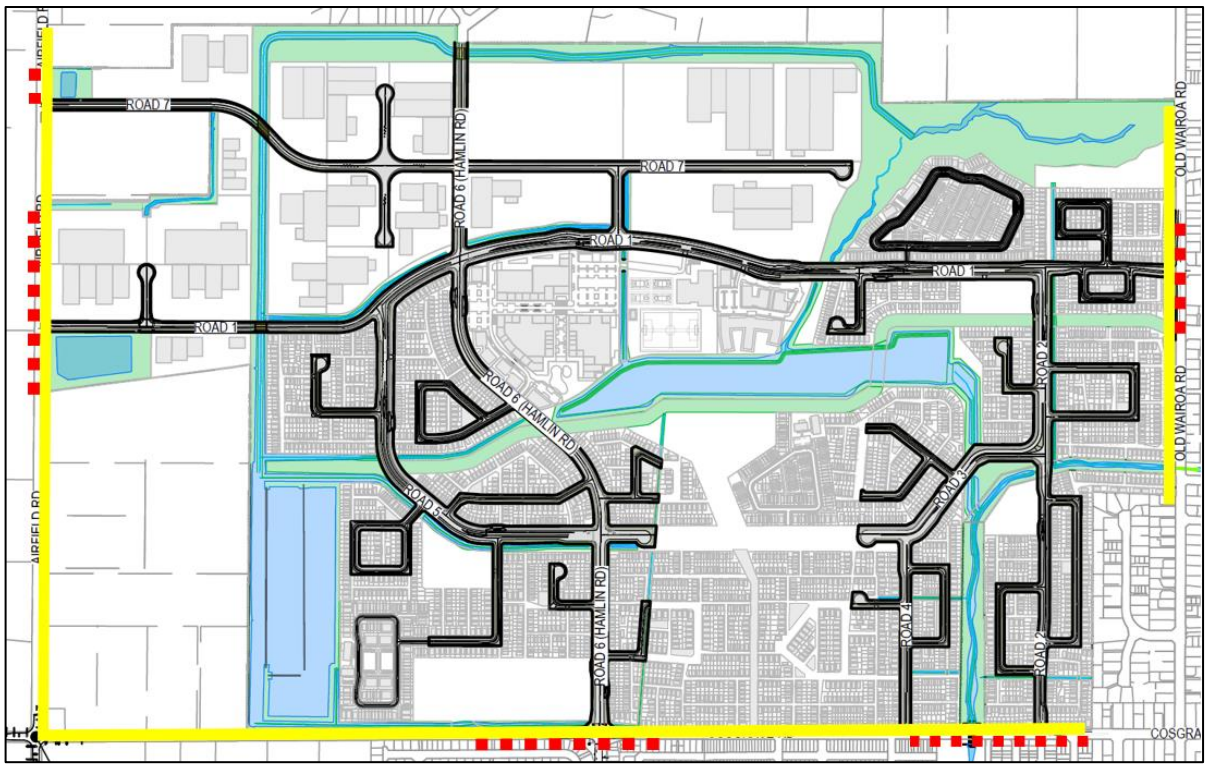


Figure 5 – frontage upgrades proposed in red, with yellow indicating AT's required upgrades areas.

49. With regard to connecting the site to the wider road network from an active modes perspective, as mentioned above, the statement that the proposal attempts to align with AT's cycling strategy for the area is considered less relevant. Transport strategies for this area does not take into account that this (unanticipated) development will occur. Figure 6 below (Commute transport assessment figure 7-2) shows the proposed active modes links (dark orange dashed lines) provided by the applicant. In this regard, AT considers the following:

    a) The active modes links on Pakaraka Drive and Cosgrave Road are acceptable and considered to assist in integrating with the neighbourhoods to the south and west. Connecting to the Papakura Rail station is preferred, but extensive and not required.
    b) No active mode links are provided on the northern side of the site. It is assumed that this is the case due to the lack of existing infrastructure on that end of the site. However, as mentioned throughout this document, the lack of infrastructure is expected in this area as this site is not earmarked for development in Council's FDS. As such, the applicant should provide the infrastructure that would have been in place by the time this site becomes developable.
    c) Based on the above, it is required the applicant to ensure active mode connectivity between their site and Takanini Train Station. This must be provided to assist in the reduction of private vehicle reliance for the residential and employment precincts.
    d) The recommended upgrades include active modes facilities on Airfield Road (south side), along the site boundary up to the northwestern boundary of 139 Airfield Road, where this facility will link into existing facilities.
    e) The recommended upgrades also include active modes facilities on Mill Road, between Airfield Road and Walters Road.

f) The upgrades as per items d. and e. above are illustrated in yellow in Figure 7 below.

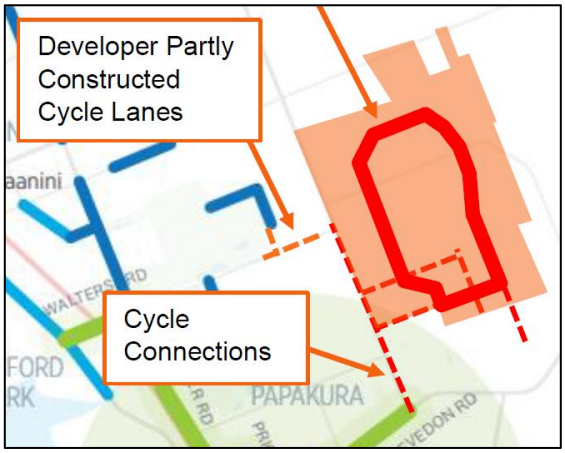


Figure 6 – applicant's suggested upgrades

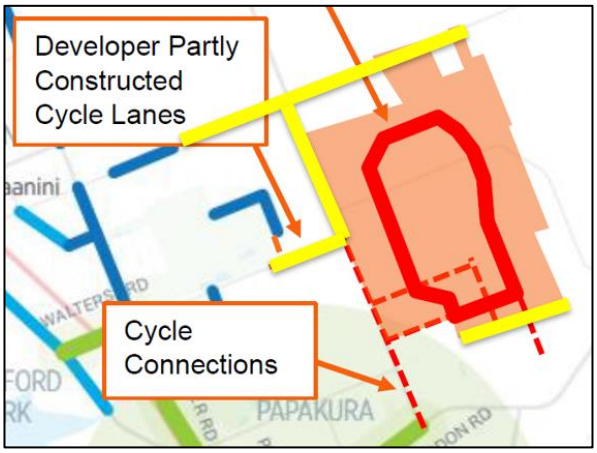


Figure 7 – AT recommended additional active modes upgrades

50. Significant concerns are raised regarding the ability of the proposed upgrades to allow sufficient land for active modes facilities and berms. For example, the Airfield Road/ Mill Road intersection will require more land (on all approaches) to cater for walking, cycling and berm requirements. AT is unlikely to accept intersections at design and traffic resolution stage that do not sufficiently cater for all modes of transport.

Parking

51. The proposal includes a parking ratio of approximately two spaces for every dwelling (one for residents and one for visitors) to align with the intention of creating a low vehicle trip generation development. The Commute transport assessment at section 12.2 identifies the potential for illegal parking and proposes three ways to mitigate this, see below:

    a) Design internal roads so that berm parking is impossible.
    b) Residential parking scheme to be implemented by Council.
    c) Imposing covenants on homeowners/residents that restrict private car ownership.

    However, the Tattico s67 section 2.3.2 (other) indicates that points b and c above as per Commute's transport assessment are *not* proposed. The s67 response notes that design solutions include internal (body corporate) and external (Public Road) parking restrictions.

52. Although it is noted that roads can be designed to prevent berm parking, it is expected that this will result in a significant increase in enforcement requirements from AT, at the general ratepayers' expense. This is especially the case since typical and relatively wide berms of one or both sides of the proposed roads are provided. Measures to avoid berm parking are identified in the Commute Transport Assessment – sections 12.2 and 12.3 – including bollards, fences, planting, and parking restrictions. The Commute s67 response at item 1.4 expands this list by adding "design led restrictive" pavements and notes that this parking restriction will be enforced by the incorporated society that is formed for each individual Joint Owned Access Lot. None of the provided measures are detailed or indicated on the roading drawings in the application, nor secured via the draft conditions, and therefore considered not to be effective.

53. The applicant also acknowledges that spill-over parking will likely occur in the adjacent neighbourhoods. The Commute transport assessment at section 12.2 notes that Council can look to implement residential parking restrictions. In this regard, AT considers that the applicant must mitigate the effects associated with spillover and not rely on Council or AT to do so. Furthermore, residential parking zones were largely discontinued in

2007 by the legacy Auckland Council. These zones were intended for areas adjacent to the city and locations that did not allow on-site car parking, such as heritage buildings. They are not intended for new greenfield developments, and it is unlikely that AT or the local residents of surrounding communities will agree to support such a proposal. If this development is reliant on restricting parking in other neighbourhoods, it is considered that the residents of these affected neighbourhoods are parties adversely affected by this proposal. It is not supported that a development mitigates its effects by creating adverse effects on other adjacent sites.

54. Covenants were initially suggested by the Commute transport assessment but subsequently dismissed by the Tattico s67 response in section 2.3.1.

55. It is considered that with the current draft conditions devoid of specific and restrictive car parking controls that can be enforced by AT, there is a high likelihood of uncontrolled parking creating safety and amenity effects on internal and nearby external roads. Furthermore, it is considered that the extent of parking restrictions required is unrealistic and would require substantial parking restriction infrastructure, operational expenditure (by AT) and commitment by private entities (individual incorporated societies) and monitoring review by the applicant and Council. It is not considered that the proposal could achieve the envisaged 1 car per 11.5 dwellings, regardless of the measure proposed by the applicant.

Vehicle Trip Generation, Modelling, and Effects

56. The transport assessment is predicated on an unprecedentedly low level of vehicle trip generation. It is considered (and both Beca and Progressive Transport Solutions have reached the same conclusion) that the trip generation assumptions provided in the Commute Transport Assessment – Section 9.1 to be aspirational and highly unlikely. AT has commissioned Beca to undertake a review of the application's trip generation assumptions and subsequently investigate more realistic trip generation assumptions that are possible with robust mitigation and consent conditions. Please refer to **Annexure 3** for this report. To summarise this Beca report, the lowest that the expected trip generation rate could be is approximately 3,000 peak hour trips. This figure is still considered less than half of what industry trip generation standards would suggest but is still significantly higher than the Commute rate of 1,100 peak hour vehicle trips.

57. As noted above, applicant's transport assessment is based on a single aspirational trip generation rate. The applicant has not accounted for or assessed any other potential future scenario should their given trip generation rate not eventuate. Based on the unprecedented low trip generation rate it is consider likely that future scenarios other that than suggested in the transport assessment will likely occur. It is recommended that the applicant investigate these other potential scenarios, assess them in a systematic fashion and provide mitigation measures according to these scenarios to ensure that whatever trip generation scenario eventuates, its effects on the transport network is mitigated.

58. In the absence of the applicant providing any assessments on alternative future scenarios, AT and the Auckland Forecasting Centre have undertaken a SATURN network related transport model to obtain some insight into what the effects on the wider transport network could be if a more realistic trip generation rate eventuates. This network model is based on the year 2041[12] And a 3000 peak hour vehicle trips trip generation rate identified by Beca - see **Annexure 3**. The Beca report in **Annexure 1** assesses the findings of this network model and has subsequently undertaken individual intersection Sidra modelling for certain intersections to further understand the effects and infrastructure requirements of this development. Please refer to **Annexure 1** for this report.

[12] Excludes Mill Road Stage 2 due to uncertainty when this road will occur but also due to ensuring that effects are managed with or without the Mill Road Stage 2 project.

59. In summary, the report highlights eight intersections significantly affected by the proposal. Five of these have not been assessed by the applicant but it is likely that these will require upgrades and must be investigate by the applicant, these five are summarised as:

- Ranfurly Road / Alfriston Road,
- Walters Road / Porchester Road – This intersection is likely to see significant performance issue regardless of what future trip generation scenario eventuates and would likely need to be signalised by the applicant,
- Porchester Road / Kuaka Drive,
- Mill Road / Popes Road – Beca has undertaken Sidra modelling of this intersection and additional lanes to the roundabout will likely be required,
- Mill Road / Alfriston Road - Beca has undertaken Sidra modelling of this intersection based on the increase in traveling times shown by the SATURN model, additional lanes to the roundabout will likely be required.

Three of the eight have been assessed by the applicant but have been identified in the Beca report as likely requiring further upgrades, these three as summarised as:

- Mill Road / Airfield Road - Beca has undertaken Sidra modelling of this intersection indicates that it will likely require an additional western lane and widened intersection footprint (land),
- Waters Road, Cosgrave Road - Beca has undertaken Sidra modelling of this intersection indicates that it will likely require an additional western lane and widened intersection footprint (land),
- Old Wairoa Road / Pakaraka Drive - Beca has undertaken Sidra modelling of this intersection, and it is likely that a roundabout will be the required upgrade at this intersection. In addition to Beca' finding it is recommended that the applicant investigate the feasibility of shifting this access to the Okawa Avenue intersection as the gradients, on-street parking, and direct connection to the Okawa Avenue/ Clevedon Road to-be-signalised intersection is better.

60. Please refer to **Annexure 1** for more information on these suggested upgrades.

61. Beca's intersection modelling and findings indicate that the scale, cost, and land requirements of required infrastructure has been significantly underestimated.

Road Safety

62. The transport assessment identifies a relatively high record of crashes on the external road network, including serious and fatal crashes over the last five years (Section 4.6). There are limited recommended safety upgrades to address this issue. Trips from the development may be accessing an unsafe road environment and increasing the risk of crashes occurring on a similar trend in the future. The transport assessment should include recommendations to address safety deficiencies.

63. The recommendation to provide traffic calming on Old Wairoa Road to lower speeds and improve cyclist safety (Section 7.1.2) has not been carried through into the implementation plan or draft conditions.

64. A Safe Systems Assessment approach to road and intersection design is recommended. This will require the applicant to undertake Safe Systems Audits for all intersection upgrades, except when exempt by AT. It is recommended that the requirement for Stage 3 Safe Systems Audits is provided for in the conditions.

Road Design

65. Note* The Airfield Road / Mill Road intersection is included as a roundabout in the engineering drawings. It is understood that the applicant proposes to signalise this, and comments (this document and **Annexure 1**) are provided on the basis of signalisation.

66. Design comments are covered in the PTSL technical note attached as **Annexure 2**. The technical note highlights key areas that must be addressed at the fast-track approval stage because they relate to boundaries which are set at this stage and would require subsequent consent amendment if they are not adequate at subsequent detailed design stages.

    - For example, vehicle tracking provided by the applicant is inadequate and does not indicate whether the internal intersection design can work safely or whether road widening in certain areas is required. An unsafe and inefficient design will not be accepted by AT.

67. The Beca report (**Annexure 1**) indicates that two intersections proposed to be upgraded by the applicant will require additional land to ensure feasible upgrades. This includes the Airfield Road/ Mill Road signalisation, where more land is required on all approaches, specifically the eastern leg. The second intersection is the proposed signalisation of the Pakaraka Drive/ Old Wairoa Road intersection with proposed Road 1. This intersection is recommended to be a roundabout. Additionally, it is unclear why the Okawa Avenue/ Old Wairoa Road intersection is not used as an access point instead of Pakaraka Drive. Okawa Avenue provides a more level gradient and has no existing kerbside parking. It will also link in directly with the to be (future) signalised intersection with Clevedon Road. It is recommended that conferencing occur between AT's experts and the applicant's road designers to ensure that the consent allows for feasible solutions to be progressed at design stages.

68. It is recommended that the applicant revise the detailed design aspects of their proposal in line with the requirements of **Annexures 1 and 2**. The applicant is also encouraged to workshop or conference with AT's experts regarding the design requirements suggested as part of **Annexures 1 and 2**. However, given the scale and absence of detailed design related discussion with the applicant, it is likely that further design issues could occur at subsequent stages of this development.

69. As per the Active Modes comments, significant concerns are raised regarding the ability of the proposed upgrades to allow sufficient land for active modes facilities and berms. For example, the Airfield Road/ Mill Road intersection will require more land (on all approaches) to cater for walking, cycling and berm requirements. AT is unlikely to accept intersections at design and traffic resolution stages that do not sufficiently cater for all modes of transport.

70. AT is in the process of signalising the Okawa Avenue/ Clevedon Road intersection. This upgrade does not take into account the proposal and will not be able to cater for the additional traffic following the development. It is strongly recommended that the applicant engages with AT in this regard and looks to provide AT with certainty that this intersection will be upgraded within a certain timeframe. If this is not done, AT will likely upgrade the intersection, causing significant delays to the areas and then in a few years, the applicant will need to redo the upgrade at significant cost and more delays to the residents.

71. As noted previously in the active modes section, the use of shared paths instead of separated walking and cycling facilities on major roads will be for AT's consideration at the detailed design stage. It is likely that AT will require separated walking and cycling facilities on the main roads and not shared paths.

72. It is requested that the applicant engages with AT on road design matters. This is recommended as part of this application, but also prior to lodgement of Engineering Approvals (detailed design review stage). It is recommended that, if the application is approved, a condition or at least advice is provided in any approval

that requires the applicant to engage with AT to ensure road design is discussed before detailed design approval lodgements.

Travel Demand Management

73. The Commute Transport Assessment at section 11.5 notes that a travel plan (Travel Demand Management Plan – TDMP) would be beneficial for the employment district within the site. The Commute s67 response at item 1.25 reiterates this. Although AT agrees, it is recommended that a wider TDMP be provided that includes each precinct proposed and not only the employment precinct. A TDMP will ensure that ongoing transport and mode choice education and advice are provided to all residents, school children and workers within the Sunfield development.

74. AT requested that a draft TDMP be provided to AT for comments. The Commute s67 response at item 1.25 responds by saying that it can be done. However, a draft has not been received. It is recommended that the applicant provides TDMPs for all precincts and that the following be incorporated into the consent conditions, if the application is approved:

- Condition 193 offered by the applicant notes the establishment of an Incorporated Society or equivalent to own and manage community assets. AT recommends that this Incorporated Society is also a forum through which travel demand management initiatives across the area are coordinated and delivered. If there is an annual charge for residents, commercial tenants, etc., a portion of this charge could be ring-fenced to delivering sustainable travel initiatives and events. The annual charge could go towards paying for a travel management coordinator, for example. AT recommends that Condition 193 be expanded so that the Incorporated Society must contribute towards travel demand initiatives to reduce private vehicle travel.
- Individual workplaces, schools, and retirement villages should develop their own travel plans, which are focused on managing travel demand from deliveries, visitors, etc.
- Residential TDMP can support/incentivise local trip making, especially for new neighbourhoods such as this proposal, which is the ideal point for creating new behaviours and travel habits.
- Providing welcome packs to new residents that include information about transport options and incentives for new residents to set up the right travel behaviours from the beginning will be key. For example, AT HOP cards with credit for new residents, free trials for different transport modes such as scooters, bikes or carshares.
- Many people's travel decisions are based on household commitments. This will be a new way of living – the Commute Transport Assessment at section 3 provides context that this development is the first development of its kind – therefore, a large-scale, residential personal travel planning programme should be investigated.
- Measures to ensure that plan remains effective. I.e., how will the plan be reviewed and monitored, especially if higher vehicle usage is identified.

Construction Traffic

75. Construction traffic effects have not been assessed in terms of potential impacts on the pavement condition of existing roads that will carry earthwork and construction related to heavy vehicles.

76. The applicant proposes 30,000m^3 of net fill of earthworks to be imported to the site and an additional 100,000m^3 of imported fill based on preloading one superlot at a time. Assuming a standard truck load of 12m^3, this requires approximately 11,000 truckloads of earthworks to be imported into the site across the 10+

years of construction. This excludes construction vehicle traffic, which does not seem to have an estimate in the application.

77. Roads likely to be affected include Airfield Road, Walters Road, Old Wairoa Road and Clevedon Road. The roads in the vicinity of the site, especially adjacent to the site, have not been provided with the expectation that this site will be developed and have not necessarily been built to withstand a significant number of heavy vehicles. Superficial and structural damage is likely to occur on the road network based on the construction and earthwork traffic of this development. This matter has not been assessed in this application. Video surveys and Falling Weight Deflectometer tests are recommended prior to, during and post development to ascertain the damage caused by the construction and earthworks traffic of the proposal. These damages should then be rectified by the consent holder within a reasonable timeframe, depending on their severity or must be mitigated through a financial contribution appropriate to the damages to the road controlling authority.

78. A pavement Impact Assessment (PIA) and subsequent reinstatement by the applicant are recommended as a consent condition to address these matters, if the application is approved. Reference is made to a previously approved Covid fast track development, "Upland Road Retirement Village". This approval includes the condition that pavement damage for a certain stretch of road due to earthworks and construction traffic must be surveyed and repaired by the applicant.

Stormwater

79. Significant sections of the site are situated within a 1 in 100-year Flood Plain. Please refer to Figure 9 below, which shows the extent of the flood plan as per the Auckland Council GeoMaps. This indicates significant risk to all new roads proposed within the site as well as to existing roads downstream of the site. It is considered that the applicant has not demonstrated that adverse flooding issues will not occur on any new and existing roads and recommend that conferencing with the applicant, Healthy Waters and AT occur on this matter to ensure a safe roading environment and fit for purpose stormwater infrastructure is provided.

Figure 9: Auckland Council GeoMap with Flood Plain Overlay and site boundaries

80. The stormwater and flooding response is captured in Awa Environmental's memo at **Annexure 4** to these comments. Please refer to this for commentary on all road flooding and AT stormwater asset management related matters. Awa Environmental's conclusion is as follows:

> *"The stormwater design as currently proposed does not demonstrate sufficient technical robustness or flexibility to mitigate flood and safety risks to acceptable levels. The gaps in modelling, infrastructure detailing, and conflict with strategic transport infrastructure (Mill Road NoR) raise significant concerns. Without substantial revision and further detailed assessment, the application cannot be supported from a flood risk or stormwater management perspective. We recommend the application be put on pause so there is the opportunity to collaborate with Auckland Transport, Auckland Council, NZTA and other stakeholders to provide an integrated design that enhances the outcomes of the development and ensures that negative impacts can be mitigated."*

81. It is understood that the Applicant's flood modelling was recently provided to Healthy Waters. However, as Andrew Chin notes in his memorandum for Healthy Waters, there has been insufficient time for Healthy Waters to conduct a detailed review of this flood modelling. The Healthy Waters memo also notes that the proposed corridor of the Mill Road NoR intersects the eastern portion of the Sunfield development site, overlapping a critical area of the proposed stormwater system intended to capture and convey flows from eastern catchments northward to the Papakura Stream. Mr Chin notes that this overlap necessitates a fundamental reconsideration of Sunfield's stormwater management approach.

Monitoring and Review of Transport Matters

82. The Commute transport assessment at section 11.6 suggests the monitoring of initial stages of the development to ensure the measures proposed have the desired result (reduce external and internal private vehicle travel). The report also notes that this "monitoring should measure the travel modes of residents / workers including a continuous traffic count of the external links to the wider roading network to ensure private car travel is minimised as planned."

83. The provided conditions do not include a specific condition in this regard.

84. It is recommended that a robust condition or conditions be imposed requiring measures to address deviations from the required level of vehicle trip generation rate.

Conclusion

85. The proposal does not consider or integrate with the NZTA Mill Road upgrade works, including the recent NoR issued by NZTA.

86. The predominantly rural zoning of the site makes the matter of the potential unmitigated effects more significant, as strategic planning efforts such as the Supporting Growth programme have not accounted for the possibility of higher trip-generating outcomes for this site (i.e., cumulative effects). The effects of any trip generation above the assumed zoning will have implications for the planned strategic network and significant upgrades, such as Mill Road. There is a risk that the efficiency of the strategic Mill Road upgrade is diminished by additional traffic that has not been assumed in the design process.

87. The transport assessment's underlying trip generation assumptions are considered too aspirational and likely to result in adverse operational and illegal parking effects. Incomplete and inadequate modelling is provided in this regard. AT's modelling indicates significant increases to travel times on the surrounding road network from 15 to 95% increases, extending across roads to the north and west of the development site in particular. Beca's detailed analysis identifies eight specific intersections requiring upgrades, with several needing more

extensive works and land acquisition than proposed by the applicant. As Beca conclude in their report (**Annexure 1**):

> "*In conclusion, there is high risk that the assumptions applied in the ITA are not achievable and if the development proceeds, then there is likely to be significant adverse effects (and, in terms of section 85 of the FTAA, significant adverse impacts) on transportation safety and efficiency.*"

88. No wider transport infrastructure is provided besides intersections leading into the site and the active modes upgrades on Cosgrave Road.

89. The development cannot rely on AT to provide public transport services and should mitigate their own effects.

90. Beca's independent intersection modelling and the combined Beca and Auckland Forecasting Centre's network modelling confirms that the applicant has underestimated both the number of intersections requiring upgrades and the extent of works needed. Material gaps include no assessment five likely affected intersections and limited assessment of three intersections summarised below:

    - The five intersections that are likely to experience delays requiring mitigation/upgrades but not assessed by the applicant:
        - Ranfurly Road / Alfriston Road
        - Walters Road / Porchester Road
        - Porchester Road / Kuaka Drive
        - Mill Road / Popes Road
        - Mill Road / Alfriston Road,
    - The three intersections that requires further assessed and upgrades:
        - Airfield Road / Mill Road
        - Cosgrave Road / Walters Road
        - Pakaraka Drive / Old Wairoa Road (noting that the Okawa Avenue as opposed to Pakaraka Drive could be a better access point onto the network).

91. There are significant deficiencies and unverifiable assumptions in flood modelling and stormwater management.

92. There has been inadequate assessment and presentation of flood risks, effects and associated mitigation measures.

93. No details are specified for on-street parking controls within the site and vicinity of the site.

94. No details have been provided on who will provide, subsidise, and operate the proposed bus service.

95. No details on wider network upgrades required to provide the necessary level of service for walking and cycling have been provided.

96. External upgrades are proposed for Cosgrave Road over stages 1, 2, 23, 24, and 25. Staging will not deliver the necessary connectivity for pedestrians and cycling. External road upgrades will need to be delivered in full early in the staging to achieve the desired outcomes.

97. No monitoring provisions are included to assess actual outcomes and necessary additional mitigations over time.

98. No conditions are proposed to upgrade the cycling parking facilities at the Takanini Train Station, although mentioned as a requirement by this proposal.

99. Finally, while AT has sought to provide initial comments on the proposed conditions throughout this memorandum to assist the Panel:

    a) The information provided by the applicant is insufficient to allow AT to undertake an informed review of the proposal and provide definitive feedback on appropriate conditions. In this regard, AT notes that the information requested in Council's 17 June section 67 memorandum relating to transport and traffic remains outstanding.

    b) Its comments are offered without prejudice to AT's / the Council's ability to make more comprehensive comments on any draft conditions under section 70 of the Fast-track Approvals Act 2024, should the Panel decide to grant approval.

Comments on Conditions

100. Should the application be further considered by the Panel, AT provides the following high-level comments with regard to the conditions of consent. The provision of these comments should not be viewed as indicating support of the application, and AT kindly requests that they be included in any future discussions regarding transport related conditions.

Public Transport

101. AT recommends that condition 114 be redrafted as clear and enforceable conditions (e.g., so that a particular stage of development cannot proceed until the service is established and operational). Contingency also needs to be added to the condition in the case of service disruptions.

102. This condition does not, but needs to, reference the incorporated society as noted in the Commute s67 response.

103. The condition should be based on a specific, unambiguous trigger and not a stage number. Based on the Commute assessment, occupation of dwellings 445 is recommended to be the trigger point for needing to have this service in operation.

104. The condition will also need to indicate what level of service will be required during what stages of the development.

105. The investigation of the required bus infrastructure capacity upgrades and the provision of these upgrades must be conditioned. This includes bus stop capacity upgrades as well as active modes upgrades and cycle parking.

Active Modes

106. The AT recommended active modes infrastructure, as per paragraphs 40-49 should be appropriately conditioned.

107. The application must upgrade the southern side of Airfield Road from the northernmost corner of the site to the northwestern corner of 139 Airfield Road in consultation with the Road Controlling Authority.

108. The application must upgrade the eastern side of Mill Road, from Airfield Road, from the northernmost corner of the site to the northwestern corner of 139 Airfield Road, in consultation with the Road Controlling Authority.

Road Safety

109. It is recommended that conditions be provided that the internal road be designed to speeds aligning with the safe systems approach and AT's requirements. This will include local roads to be designed to a 30km/h design speed.

110. It is recommended that a condition be imposed to ensure that the pedestrian crossing deficiencies in the applicant's design raised in **Annexure 2** can be addressed at subsequent stages.

Construction Traffic

111. It is recommended that the applicant prepares and provides a Pavement Impact Assessment which includes the requirement to monitor pavement condition and subsequent reinstatement by the applicant of damage to road pavement as a result of the earthworks or construction component of this development. A draft Pavement Impact Assessment must be provided to AT for review and comments prior to Lodging the final assessment.

Stormwater

112. It is unclear how conditions can address the identified stormwater issues. In this regard, AT recommends that a condition be imposed that ensures new and existing roads will not be negatively affected when compared against the AT Transport Design Manual – Chapter on Road Drainage's guidance on road flooding depth and velocities.

113. Additionally, a condition should be imposed requiring the applicant to consider the network-wide impacts and whole of life costs for any stormwater asset proposed to be vested to AT to ensure that the asset is the best practical solution.

114. Conferencing is recommended between AT, the applicant, and Healthy Waters to establish an agreed on approach to managing road flooding for new and existing roads as well as for stormwater assets to be maintained by AT.

Travel Demand Management

115. It is recommended that the requirement for TDMP be applicable to all precincts and conditioned accordingly.

116. It is recommended that the CTMP condition include the requirements for managing bodies to continually reinforce the car-less principles for all the precincts.

Intersection Upgrades (including Additional Upgrades), Review and Monitoring

117. There has been no opportunity to discuss intersection upgrades with the applicant which generally requires a comprehensive iterative process to ensure appropriate upgrade solutions are identified and designed with sufficient road reserve to allow for delivery. Beca's independent analysis has identified eight specific intersections that will require upgrades under realistic trip generation scenarios, including five (Ranfurly Road / Alfriston Road, Walters Road / Porchester Road, Porchester Road / Kuaka Drive, Mill Road/Popes Road and Mill Road/Alfriston Road) not assessed by the applicant.

118. Conferencing is recommended between AT and the applicant to establish the transport modelling (that could include a range of further future scenario's) and subsequent upgrade requirements and the land requirements/road reserve boundaries required for acceptable upgrades (which is relevant to all new intersections proposed and existing to-be-upgraded intersections).

119. Beca's independent analysis confirms that additional intersection capacity upgrades will be required under realistic trip generation scenarios. Given the scale of infrastructure underestimation identified, it is recommended that the following intersections require upfront assessment and commitment, with detailed

design and land requirements confirmed prior to development commencement, supported by review and monitoring conditions to ensure timely delivery and assess the need for any additional mitigation:

- Ranfurly Road / Alfriston Road roundabout
- Walters Road / Porchester Road roundabout
- Porchester Road / Kuaka Drive traffic signals
- Mill Road / Airfield Road (additional to that provided by the applicant)
- Mill Road / Popes Road
- Walters Road / Cosgrove Road (additional to that provided by the applicant)
- Mill Road / Alfriston Road
- Old Wairoa Road / Pakaraka Drive (additional to that provided by the applicant).

120. Review/monitoring conditions are required to ensure the following, if the application is approved:

a) Trip Generation and associated effects remain in line with what is required to keep the transport network operating at an optimal level.
b) Travel Demand Management remains effective.
c) Address/avoid any potential future adverse effects.

121. It is recommended that these conditions be carefully drafted to ensure their effectiveness, including clear triggers and processes for determining appropriate mitigation measures should monitoring identify that potential future adverse effects are materialising.

Annexure 1:

Sunfield Fast Track Application Review – Beca

32 Harington Street,
PO Box 903, Tauranga,
3140, New Zealand
T: +64 7 578 0896 // **F:** +64 7 578 2968
E: info@beca.com // www.beca.com

30 July 2025

Auckland Transport
PO Box 5848 Wellesley Street
Auckland 1141
New Zealand

Attention: Neil Stone

Dear Neil

Sunfield Fast Track Application Beca Review - Transport

Beca has been engaged by Auckland Transport (AT) to provide a review of transportation matters in regard to a proposed mixed use development in Papakura, Auckland (the Sunfield application). The application is being progressed under the Fast Track Approvals Act (FTAA).

Our review focusses on the potential for impacts on the surrounding transport network and whether the proposed conditions include adequate mitigation, or if there is a risk that AT will be responsible for mitigating future impacts. We understand that AT is also reviewing the application in regard to other transport matters such as design of internal networks for example.

The comments provided in this memo arise from our review of the application documents, in particular the Integrated Transport Assessment (Commute, February 2025) and the Proposed Roading Plans by Maven Associates. A supplementary Commute memo 'Specialist Comments Response…' dated 17 July has also been considered.

The applicant proposes a significant development with tight restrictions on car ownership and use along with provision of a dedicated public transport system and facilities for walking and cycling. The outcome in terms of transport network impact is highly dependent on the feasibility of car parking controls and the provision of alternative mode services and facilities. There is a risk to AT of significant impacts on the safe and efficient operation of the wider transport network if the assumptions adopted in the ITA do not eventuate.

1.1 Integrated Transport Assessment (ITA)

The ITA estimates the number of vehicle trips expected to be generated by the proposed development and uses this to inform an assessment of network impacts via traffic modelling, this in turn informs the mitigation strategy. If the ITA is not accurate then the effects on the road network could be more significant than assessed and this will not be appropriately mitigated.

Trip Generation

The ITA estimates the external peak hour vehicle trip generation to be in the order of 1,112 vehicle movements per hour[1] which is based on achieving a 20% private car mode share.

The applied mode share / trip rates are based on several assumptions including:

- Highly restrictive car parking and ownership controls
- High public transport uptake achieved by bus services privately funded and delivered
- High level of internal trips based on employment and retail /service opportunities within the development
- High level of travel demand management for employment activities
- Strong active mode uptake supported by cycle connections beyond the site to key destinations.

The ITA concludes that several factors are critical to achieving the assumed vehicle trip generation[2]:

- Significant limitations in the number of cars on the site (generally 10% of a more standard development)
- Provision of frequent and privately funded public transport system linking both internally within the site and the wider network (including town centres and major train stations)
- Encouraging active transport modes through reduction in car ownership
- The creation and introduction of a Traffic Plan across the employment zone
- Implementation of the requirement for 75% of the movements relating to the warehouse distribution operation to be confined to off-peak only (being the hours outside of Monday to Friday 7-9am and 4-6pm).

Whilst the ITA specifies these requirements, there is no assurance that they can be achieved as either the proposed conditions do not include the required activities and or these are not feasible. For example:

- The ITA states that the design of all areas should ensure parking on berms is impossible to occur (Section 12.2), however the proposed road designs include typical and relatively wide berms on one or both sides of the road, with sufficient space for cars to park off street or partially off street. There is no reference to bollards, planting or fencing as recommended in the ITA (Section 12.2) within the road designs or draft conditions
- The draft conditions do not include any requirement for car parking controls on internal roads and no provisions for the proposed external road upgrades to include parking restrictions, or wider area parking enforcement (2km radius is recommended in the ITA)
- AT has confirmed that it is not feasible to apply parking restrictions across existing urban areas as mitigation for this development
- Whilst the ITA suggests covenants will be placed on homeowners with regard to parking, this is not included in the conditions. It may be that covenants cannot be used to control car ownership / use
- The proposed public transport service is not required until at least 445 dwellings are occupied. Until this time there will be no public transport provision and car use is likely to be embedded
- It is unclear who will deliver and fund the 44 buses required to provide the service level assumed in the ITA between the development site and Papakura Train Station (one bus every 400m, or every 36 seconds at 40km/h)
- The ITA shows a walking and cycling network connecting to key destinations (Figure 11-2), however only a small section of this network is proposed to be delivered as part of this development. As such there will not be adequate or safe facilities for walking and cycling.

As a result, it is unlikely that the low private vehicle trip generation estimated in the ITA will be achieved.

[1] Section 9.1.7 Page 38

[2] Section 15, Page 77

ITA Traffic Modelling

Traffic modelling described in the ITA has been used to determine the transport network upgrades required on the external road network to accommodate the forecast trip generation and mitigate impacts. No other scenarios or sensitivity tests have been evaluated.

Other limitations of the ITA traffic modelling include:

- The traffic modelling assesses a 10 year forecast scenario using background traffic growth rates of 2% per year to estimate the future volumes. There is no basis for the 2% growth rate and this could be higher with potential growth in this area
- The development build out is estimated to be up to 15 years in the ITA, but the modelling only reflects a 10 year growth scenario
- Traffic distribution is based on historic census data and does not reflect the potential change in travel patterns in future as a result of growth in the area
- The ITA determines that 88 bus movements per hour are needed to accommodate the required PT uptake, but this volume of large vehicle movement has not been added to the traffic volumes in the ITA modelling.

In summary, the traffic modelling described in the ITA does not present a robust assessment of effects.

1.2 Trip Rate Comparison

In order to understand the actual potential impacts and mitigation on the surrounding road network we have undertaken a trip generation estimate using more typical rates for car use on the basis that the assumptions in the ITA are not achievable.

The proposed development includes several land uses that will generate vehicle trips from within and external to the development site;

- Residential, 3,400 dwellings
- Retirement living, 600 units
- Employment, 53.9 hectares as a mix of office (14%) and warehousing (86%)
- Town Centre, 7.6 hectares
- A School
- Medical centre, 7,610sqm.

Other land uses such as local retail hubs and open space, parks and reserves are expected to largely cater for local trips and not to generate significant weekday peak hour traffic movements on the surrounding road network. We anticipate that the relevant planning controls will limit the extent of these activities in the relevant zone consistent with this assumption.

A detailed description of our approach to estimating the vehicle trip generation is provided in **Appendix A**. In summary the approach adopted typical trip rates for the above land uses and followed three stages:

1. Trip generation for individual land uses
2. Application of linked trips (a trip with two purposes i.e. a work trip that includes a school drop off)
3. Application of internalisation (where people live in Sunfield and visit internal land uses without creating demand on the external network).

The following table provides a comparison of the external peak hour trip generation between our estimate and that assumed in the ITA. Our estimate is roughly 1,800 vehicle movements per hour higher than estimated in the ITA.

Table 1: External Vehicle Trip Generation

Land Use	ITA AM Peak	Beca AM Peak	ITA PM Peak	Beca PM Peak
Residential	640	1713	640	1726
Retirement	0	29	0	94
Employment	545	907	545	907
Town centre	0	43	0	85
School	0	63	0	0
Medical centre	134	288	134	288
	1319	**3042**	**1319**	**3100**

Distribution of the external trip generation has been determined by the Auckland Forecasting Centre (AFC) utilising an existing Saturn model of this area with a forecast year of 2041 as described below.

1.3 Transport Modelling of Alternative Scenario

The AFC has undertaken modelling of the alternative trip rate scenario using the existing Saturn model for this area. The Saturn model represents the 2041 forecast year with and without the Sunfield development. For more detailed intersection analysis we have also used Sidra traffic models (with traffic volumes taken from the Saturn outputs).

In the with Sunfield development scenario AFC has applied the intersection upgrades as proposed within the ITA. All other intersections remain as existing.

Saturn findings

The AFC modelling indicates significant delays are expected to arise on the surrounding road network as a result of this development. Key corridor level travel time impacts are summarised below:

1. Mill Road: 15 to 30% higher travel times in peak periods depending on time of day and direction
2. Airfield Road: 20 to 55% higher travel times
3. Walters Road 32 to 92% higher travel times.

The images on the following pages show the change in delays and then level of service at various locations in both the without and then with Sunfield scenarios for comparison.

Intersections that experience high levels of increased delay and are not mitigated by the proposed development improvements are:

- Ranfurly Road / Alfriston Road roundabout
- Walters Road / Porchester Road roundabout
- Porchester Road / Kuaka Drive traffic signals.

Intersections that have a poor level of service not mitigated by the proposed development improvements are:

- Mill Road / Popes Road intersection
- Old Wairoa Road / Pakaraka Road intersection.

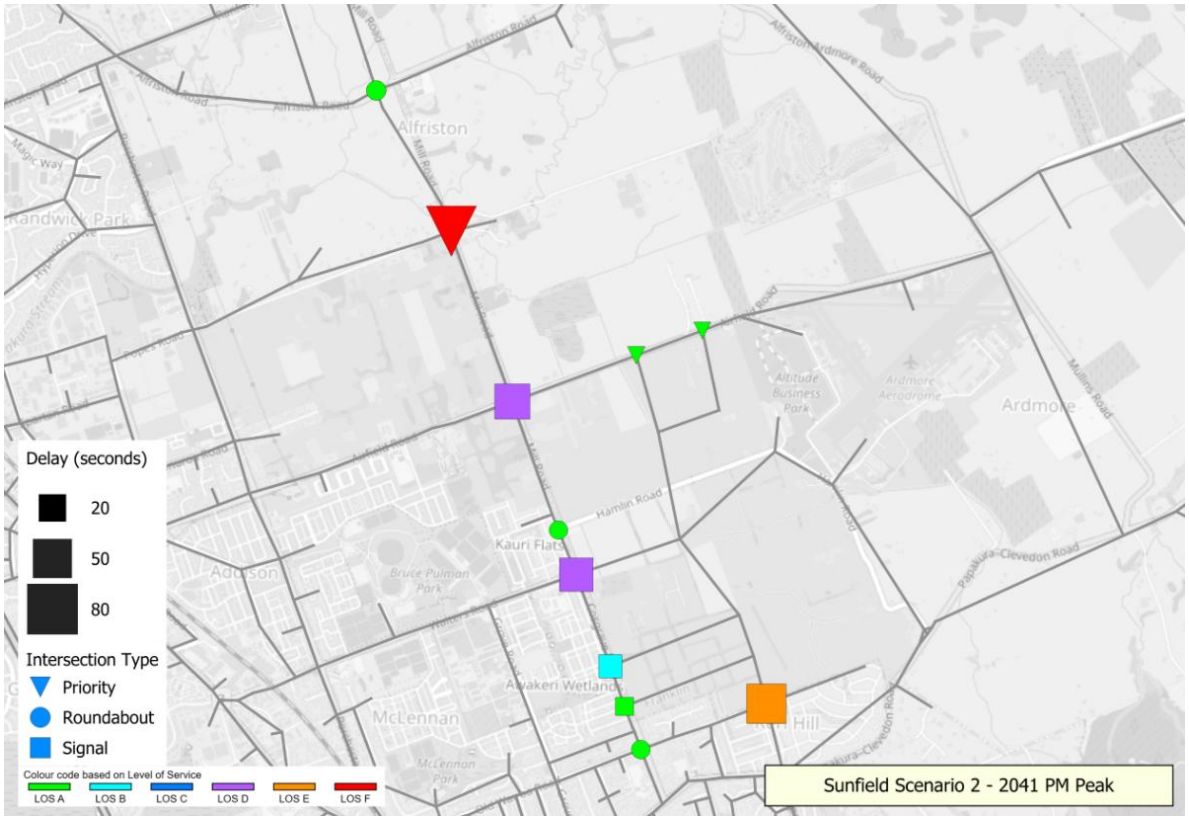
In summary the AFC modelling demonstrates that there will be significant impacts on the surrounding road network if the trip rates adopted in the ITA are not achieved and more typical levels of car use eventuate.

Saturn Delay Plot – No Sunfield Development

Saturn Delay Plot – With Sunfield Development

Saturn Level of Service Plot – No Sunfield Development (PM Peak)

Saturn Level of Service Plot – With Sunfield Development (PM Peak)



Sidra findings

We have utilised Sidra intersection modelling software for a more detailed review of potential intersection impacts and possible mitigation.

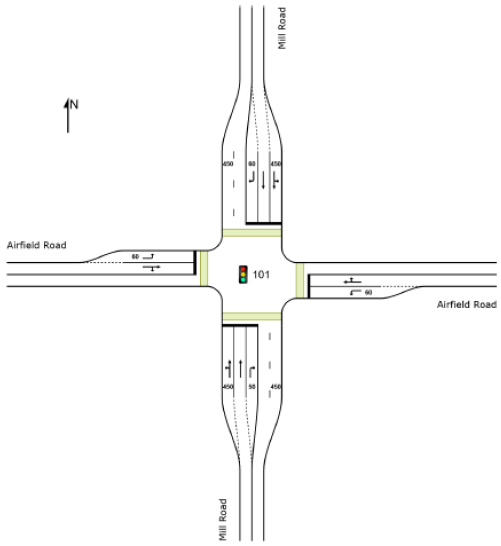
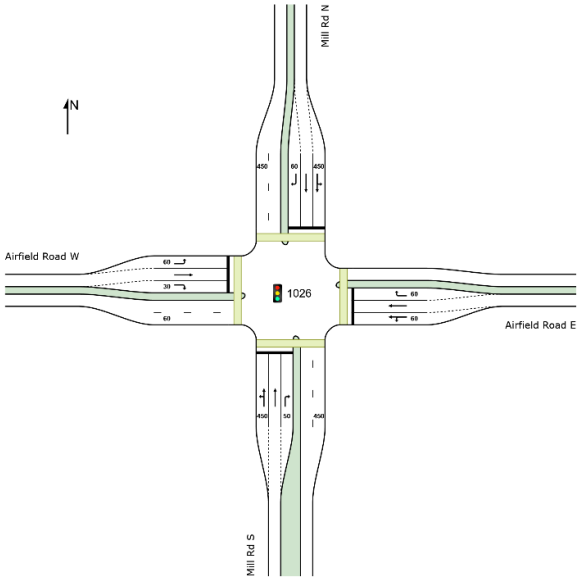
This has been carried out to investigate where impacts will arise and if these can be mitigated through intersection upgrades. The actual upgrades to be progressed will need to be confirmed through a more detailed investigation into options including land availability and other impacts.

We have focussed on intersections where the AFC Saturn modelling indicates that delays are likely to be higher than predicted in the ITA. This helps us understand the potential level of impact / suitability of proposed mitigation in more detail than the strategic Saturn model outputs provide.

The following intersections were examined in Sidra. This modelling uses traffic volumes from the Saturn model 2041 with Sunfiled development scenario and the proposed mitigation at each intersection in the ITA. For the purpose of the analysis, it is assumed that HCV comprises 5% of the total flows.

- Mill Road / Airfield Road
- Mill Road / Popes Road
- Walters Road / Cosgrove Road
- Mill Road / Alfriston Road
- Old Wairoa Road / Pakaraka Road.

The layout of the intersections has been modified from that in the ITA where the ITA layout was not able to accommodate the new traffic volumes.

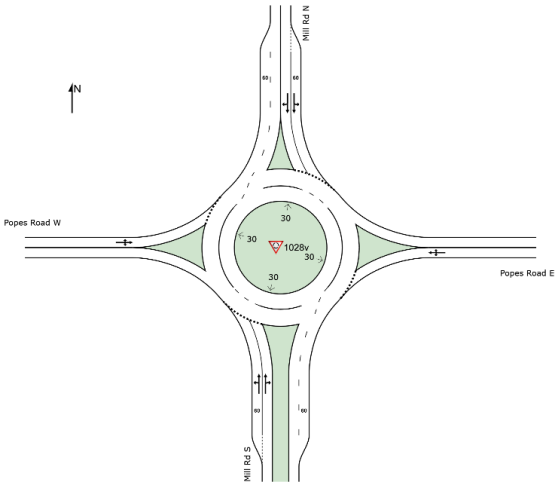
ITA layout	Beca Tested Layout
Airfield Road / Mill Road  *We tested with the ITA layout which was giving delay of 299s(AM) and 311s(PM).*	**Airfield Road/ Mill Road**  ***Comments** : Additional lanes included along Airfield Road on both sides to accommodate the increased traffic flows on the Airfield Rd. **Note this arrangement still has a poor LOS and will need further mitigation**. There is also a risk of additional land being required for the intersection footprint.*

Popes Road / Mill Road

Not assessed in ITA

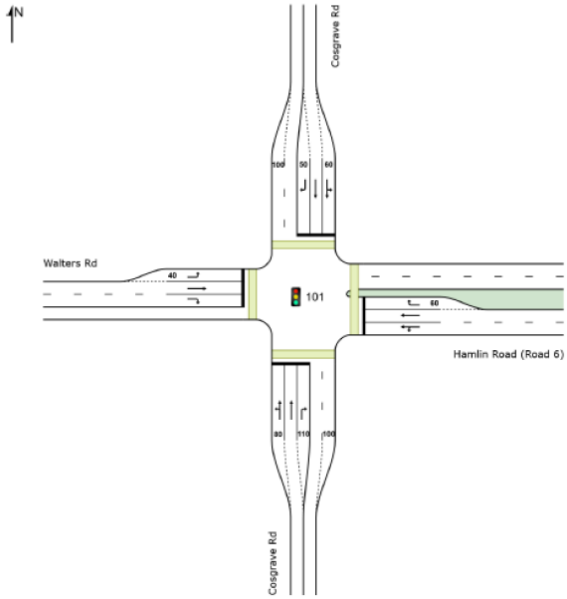
Existing layout

Popes Road/ Mill Road

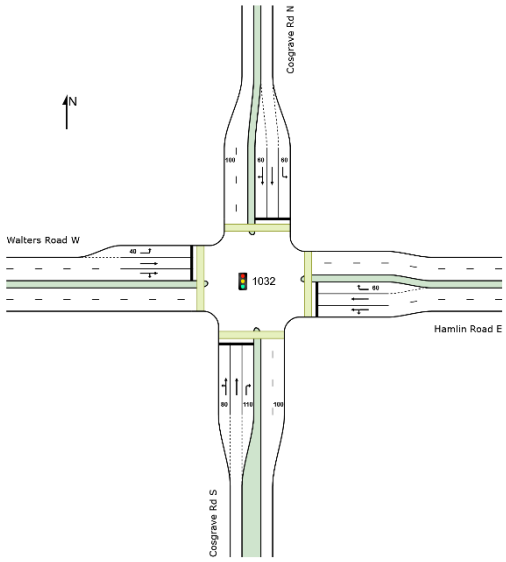


***Comments** : The roundabout has also been tested with a single lane along Mill Road but fails to accommodate the estimated 2041 volumes. Hence dual lanes for the roundabout have been considered with two lanes on the Mill Road. The 20 m roundabout diameter would deteriorate the LOS from B (current LOS for 30m diameter) to E. Note this may require land outside the current road reserve.*

Cosgrave Road / Walters Road / Hamlin Road (Road 6)



Cosgrove Road/ Walters Road/ Hamlin Road



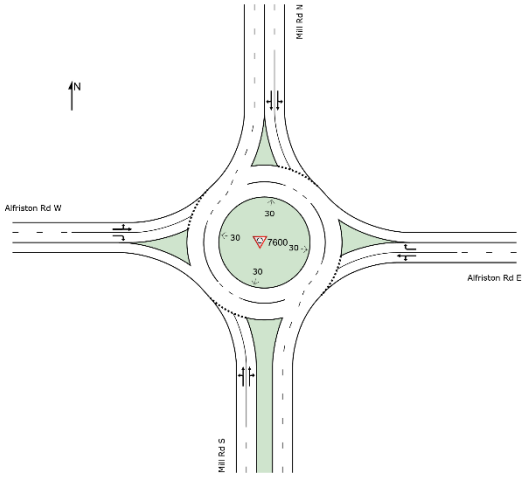
***Comments** : The lane arrangement has been altered along the North Arm and West Arm to accommodate the predicted volumes.*

Mill Road/ Alfriston Road

Not assessed in ITA

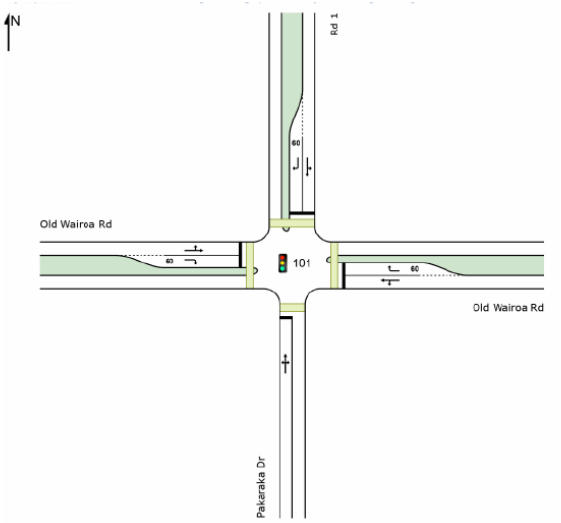
Existing layout

Mill Road / Alfriston Road

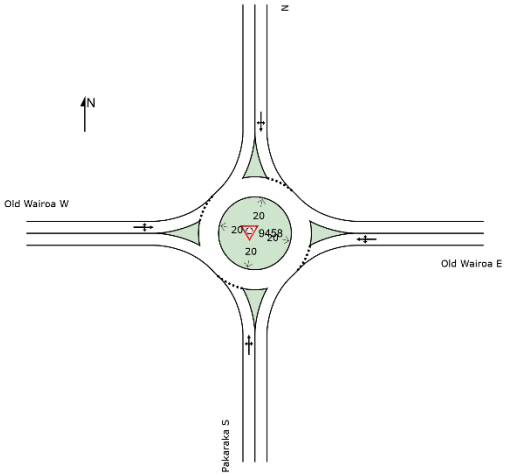


***Comments** : A dual lane roundabout have been considered for the analysis. The intersection fails in single lane configuration. Note this may require land outside the existing road reserve.*

Pakaraka Drive / Old Wairoa Road / Road 1



Pakaraka Drive / Old Wairoa Road / Road 1



***Comments** : The ITA layout gives an LOS of F but performs with an acceptable LOS as a single lane roundabout. Ped/cycle crossings would need to be considered seperatley.*

Intersection performance

The following table summarises the average intersection performance for the intersections assessed, measured by LOS, average delay, and the largest 95th percentile queue distance for each approach. More detailed SIDRA results are included in **Appendix B.**

Intersection	Approach	2041 AM				2041 PM			
		LOS	Avg Delay (s)	DoS	Max Queue (m)	LOS	Avg Delay (s)	DoS	Max Queue (m)
Mill road/ Airfield Road	Mill Road S	F	82	0.99	345	D	43	0.67	168
	Airfield Road E	E	78	1.02	168	F	96	1.07	205
	Mill Road N	C	32	0.45	95	F	220	1.18	693
	Airfield Road W	F	163	1.14	337	F	109	1.04	161
	Overall	**F**	**90**	**1.14**	**345**	**F**	**135**	**1.18**	**693**
Mill Road/ Popes Road	Mill Road S	B	15	0.96	250	A	4	0.66	49
	Popes Road E	A	8	0.09	3	B	17	0.25	9
	Mill Road N	A	4	0.39	21	A	4	0.82	118
	Popes Road W	F	74	0.96	88	C	25	0.81	66
	Overall	**B**	**17**	**0.96**	**250**	**A**	**7**	**0.82**	**118**
Cosgrove Road/ Walters Road/ Hamlin Road	Cosgrave Rd S	E	57	0.97	235	D	55	0.92	159
	Hamlin Road E	D	54	0.80	105	E	71	0.99	157
	Cosgrave Rd N	D	43	0.46	63	D	49	0.95	210
	Walters Road W	D	50	0.64	85	D	52	0.79	65
	Overall	**D**	**52**	**0.97**	**235**	**D**	**55**	**0.99**	**210**
Mill Road/ Alfriston Road	Mill Road S	E	58	1.03	297	A	8	0.71	56
	Alfriston Road E	B	13	0.58	31	C	22	0.63	29
	Mill Road N	A	4	0.28	12	C	27	0.96	163
	Alfriston Road W	C	28	0.54	24	B	17	0.59	29
	Overall	**D**	**37**	**1.03**	**297**	**B**	**18**	**0.96**	**163**
Pakaraka Drive / Old Wairoa Road / Road 1	Pakaraka S	A	9	0.27	13	A	8	0.30	15
	Old Wairoa E	B	10	0.44	24	A	8	0.21	10
	Road 1 N	A	6	0.49	34	A	8	0.60	43
	Old Wairoa W	A	5	0.47	29	A	5	0.46	27
	Overall	**A**	**7**	**0.49**	**34**	**A**	**7**	**0.60**	**43**

The Mill Road / Airfield Road intersection has not been mitigated in this analysis and would need further investigation of options.

We note that AFC is undertaking modelling for NZTA to consider the impact of the Mill Road project in this area in the longer term. We do not have the findings of this modelling at this time. There is no timeframe for this section of the Mill Road project to be constructed and as such the proposed development would most likely progress ahead of that upgrade if consent is approved, thus interim upgrades would be necessary.

1.4 Other Modes

Public Transport

There is a strong emphasis on public transport with a dedicated bus way and assumption that 44 buses will be provided at an average headway of 400m / 36 seconds.

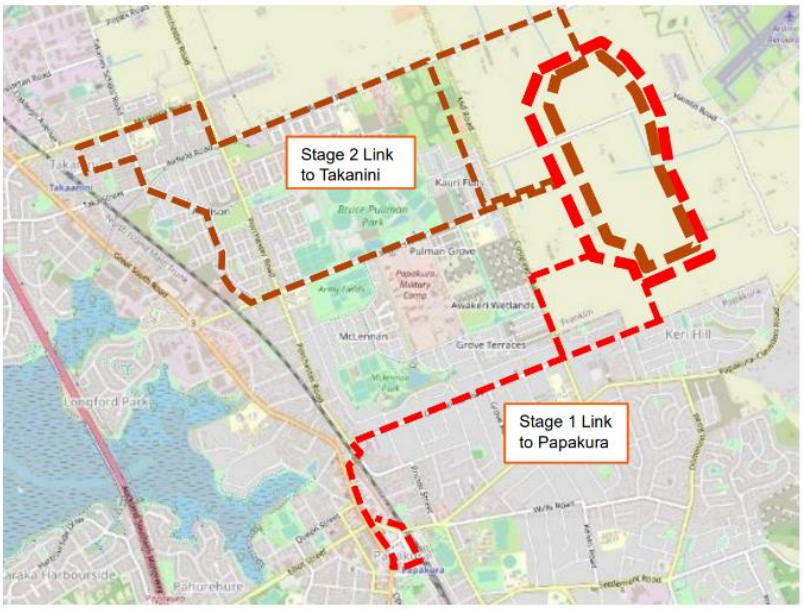
The draft conditions are unclear on who will be responsible for implementing this service. Descriptions of the Sunbus on the Sunfield website state that this will be electric and automated, which indicates it will not be an

Auckland Transport operated bus service. The proposed bus also looks to be smaller than the 40 seats assumed in the ITA.

The draft conditions state the bus will not be provided until 890 lots are completed. It is unclear how residents of the first 890 dwellings will travel, without cars, public transport or adequate walking and cycling facilities. Trip rates are likely to be higher in the initial stages and the aspiration of a 60% public transport mode share unachievable for a long period of time.

To achieve the necessary public transport uptake, the development will need to provide bus services from the inception of housing occupancy at a frequency appropriate to the level of demand increasing over time. Buses will need to service Takanini and Papkura as per the routes identified in the ITA and copied below

Figure 11-1: Public Transport Routes



Walking and Cycling

The ITA states that part of the vision includes linking the site with Papakura town centre and rail station and Takanini town centre and rail station via the active transport network, copied in the following figure.

Figure 11-2: Active Transport Network

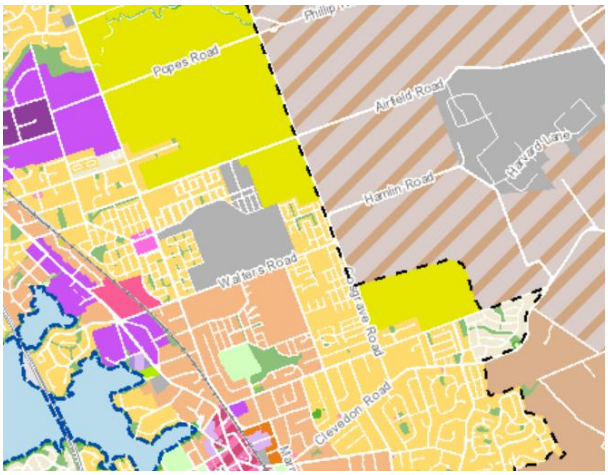
However, the ITA implementation plan and draft conditions only include cycle facilities (shared path) on Cosgrove Road between Walters Road and Clevedon Road and no requirement or triggers for wider network upgrades.

Pedestrian and cycle section from ITA implementation plan

Pedestrian and cycling links	Developer / Auckland Transport	Connect the development site to key local destinations by providing improved active mode facilities on Cosgrave Road between Walters Road and Clevedon Road.	Required with any development of the development site. To be completed as part of the Stage 2 works.

This will not achieve the vision as the necessary connections are not made. The proposed shared paths are also not suitable for the level of external commuter cycling anticipated (over 200 external cycle trips in the peak hour), which requires fully separated facilities.

The proposed network also does not recognise future growth in this area, for example the area shown in yellow as future urban zone below. There is a large area of future urban to the North of Airfield Road. Access to the Sunfiled site (employment zone for example) for these residents would be via Airfield Road which is currently devoid of walking and cycling facilities. An upgrade to Airfield Road is also warranted as part of this development to provide suitable access to/from surrounding areas including that not yet developed.



The development should provide separated cycle facilities along the length of Mill Road / Cosgrave Road between the northern extent of the development site and Old Wairoa Road, along the Old Wairoa Road frontage, and the Airfield Road frontage.

There are also no footpaths on Airfield Road and this road should be upgraded to an urban standard at least on the development side to provide for walking trips.

1.5 Conclusions

The assessment of effects and mitigation described in the ITA relies on assumptions around mode share and car use that cannot be achieved with the current conditions. As such the level of effect and proposed necessary mitigation is understated.

From the traffic modelling described in this memo the following intersections would need improvements to mitigate the impacts of the proposed development:

- Ranfurly Road / Alfriston Road roundabout
- Walters Road / Porchester Road roundabout
- Porchester Road / Kuaka Drive traffic signals.
- Mill Road / Popes Road intersection

- Old Wairoa Road / Pakaraka Road intersection.

From the Sidra modelling the following intersections may need revised mitigation to accommodate the traffic volumes:

- Mill Road / Airfield Road
- Walters Road / Cosgrove Road
- Mill Road / Alfriston Road

We have not identified adequate mitigation of the Mill Road / Airfield Road intersection and this will need further investigation.

If these effects are not mitigated the development is likely to have a significant impact on the local transport network.

Note some of the intersection upgrades we have tested would require land outside of the current road reserve and /or within the development site to be delivered.

If the application proceeds, then the conditions will need to be revised to address the potential effects and delivery of appropriate mitigation. Along with existing conditions, the following additional conditions should be considered:

- Monitoring of vehicle movements at access intersections as the development progresses
- Triggers for the upgrade of additional external intersections listed above as a minimum, based on the findings of traffic monitoring
- Provision for Bus services to be provided from the outset of development at an adequate frequency
- Provision of appropriate cycle facilities along other external roads to achieve the necessary network connections; Airfield Road, Mill/ Cosgrove and Old Wairoa Road as a minimum.
- Monitoring of car parking on external streets and triggers around further restrictions or upgrades to be provided if residents are parking in external areas.

In conclusion, there is high risk that the assumptions applied in the ITA are not achievable and if the development proceeds, then there is likely to be significant adverse effects (and, in terms of section 85 of the FTAA, significant adverse impacts) on transportation safety and efficiency.

Yours sincerely

Craig Richards

Technical Director - Transportation

on behalf of

Beca Limited

Phone Number: +647 577 3899
Email: Craig.Richards@beca.com

A

Appendix A – Trip Rate Methodology

Dwellings / Houses

The RTA Guide to Traffic Generating Developments provides a framework for assessing the traffic impact of new developments. The RTA Guide suggests that the trip rate for “medium density residential flats and buildings” is applicable where there is adequate public transport accessibility and connectivity to local shopping, schools and local social visits. Given the planned infrastructure and connectivity within the Sunfield development, this proposal trip generation aligns with the medium density residential flats and building in the RTA guide, 0.65 trips per dwelling per peak hour.

This rate is also similar to the residential trip rate defined by Supporting Growth Alliance for the Dury East and West Plan Changes.

Using the trip rate of 0.65 trips per dwelling for medium-density residential flat buildings, the Sunfield development is anticipated to generate approximately 2,200 peak hour vehicle trips across all dwellings.

Retirement

Typically, industry good practice estimates that retirement village trip generation is approximately one third of a similar sized residential development, i.e. the trip rate is around 30% of the residential dwelling trip rate.

On this basis we estimate that the 600 retirement units could generate 130 vehicles trips in the peak hours. This would be a mixture of staff and visitor trips and it is likely to be lower in the morning peak hour when there are fewer visitors.

Employment

The Sunfield development includes 53.9 hectares of employment land, with 86% dedicated to warehouse distribution and 14% allocated for office.

Based on typical industry experience and local data:

- The trip rate adopted for warehouse distribution is 16 trips per hectare, derived from observations around the Silverdale industrial area.
- For office spaces, we have retained the standard trip rate of 2 trips per 100 sq m as stated in the Sunfield ITA.

Using these trip rates, the peak hour employment trips are estimated as follows:

- Offices: The actual office floor area is not specified in the ITA. We have assumed a floor area to site area ratio of 30% (which allows for roads, parking, open space etc). This results in an office floor area of 22,600 sq m. This generates approximately 450 trips per hour.
- Warehouse Distribution: Across 46.354 hectares, this would generate approximately 740 trips (16 × 46.354).
- Total Employment Trips: Combining both categories, employment at Sunfield could generate up to 1,190 peak hour vehicle trips.

Local Shopping and Town Centre

The four retail hubs throughout the community are anticipated to serve local residents and not generate significant volumes of external vehicle trips.

While the Sunfield town centre is designed to cater primarily to local needs, it may also generate external trips as there is no control on external visitors travelling to shops within this centre.

Using insights from the Drury Transport Assessment[3], a trip rate of 1.8 trips per 100 sq m has been adopted for estimating the town centre vehicle trip demand.

The 7.6 hectare of town centre (76,000 sq m), with the retail/commercial area spanning about 25-30% of the footprint could generate up to about 340 vehicle trips in the peak hour.

School

There is no detail provided on the School in the ITA, i.e. primary / secondary and number of students and staff which may not be known at this time.

We have estimated that the school could accommodate 550 students based on an average Auckland school size and is most likely to be a primary school as the catchment may not warrant a secondary school.

Utilising the NZ Transport Agency School Travel Mode tool[4] and the assumptions noted above, the school could be expected to generate around 250 vehicle trips in the peak hours.

For school trips it is noted that this trip generation will coincide with the AM peak hour but there will be less overlap with the PM peak hour, i.e. school trips occur between 8am and 9am and 3pm and 4pm. There will not be many school trips during the commuter peak hour of 5pm and 6pm.

Medical

The site has a proposed medical centre of up to 7,610 sq m. Based on available survey results of medical centres in urban areas we have access to, the estimated trip rate for medical purposes is 6.3 trips per 100 sq m. Using this rate, the proposed medical centre is expected to generate approximately 480 peak hour vehicle trips.

Total Potential Trip Generation

The Sunfield development could generate approximately 4,300 peak hour car trips, across the residential, employment, medical and local trips as shown in the Table below:

Table 2: Expected Total Trip Generation (vehicle) for the Sunfield Development in peak hour

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	2,200	2,200
Retirement	33*	130
Employment	1190	1190
Town Centre	85*	340
School	250	0*
Medical	480	480
Total	**4238**	**4340**

* the retirement, town centre and school will have lower trip generation in AM or PM peak due to lower demands during these time of day where other uses will have similar AM and PM trip generation.

Linked Trips

[3] Reference to be inserted

[4] Reference to be inserted

There will be a proportion of linked trips between land uses, particularly for school trips, i.e. a parent drives to work and drops a child off on the way, creating one trip not two. Without robust information at this time, we assume the following trip proportions would be linked to residential or employment trips and not additional:

- 50% of school trips
- 50% of town centre (PM peak only)
- 20% of retirement; and
- 20% of medical centre trips.

The resulting trip generation is revised below.

Table 3: Total Trip Generation Minus Linked Trips

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	2200	2200
Retirement	33	104
Employment	1190	1190
Town Centre	85	170
School	125	0
Medical	384	384
Total	**4,016**	**4,048**

We consider this to be a reasonable, not worst case, reflection of potential trip generation if restrictive parking, car ownership and public transport measures are not applied as assumed in the ITA. The total trip generation could be higher if the mix of land use, public transport services and active mode facilities are less favorable than assumed.

Internalisation

As the focus of the AT traffic modelling will be on intersections external to the development site, it is therefore necessary to remove internal vehicle trips, i.e. trips between the residential land use and employment land use that would only travel on the internal road network, from the site trip distribution.

For now we have estimated internalisation assuming the following proportion of trips for internal land uses are generated by residents living within the Sunfield site.

- 10% of retirement village trips
- 30% of office employment trips and 20% of warehousing trips
- 25% of medical trips
- 50% of school trips
- 50% of town centre trips
- Residential trip generation will reduce to match the above internalisations.

These reductions have been applied and the reduction has also been removed from the residential trip generation to provide an indication of potential external trip generation.

The resulting external trip generation (trips either departing or arriving to the Sunfield site) is defined below:

Table 4: Resulting External Peak Hour Trip Generation

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	1713	1726
Retirement	29	94

Employment	907	907
Town Centre	42	85
School	62	0
Medical	288	288
Total	**3041**	**3100**

This estimate is roughly 160% or 1,800 vehicle movements higher than estimated in the ITA and used in the ITA traffic modelling in each peak hour.

B

Appendix B – Sidra Outputs

MOVEMENT SUMMARY

Site: 1026 [2041_4c_AM - MillRd/Airfield Rd - mitigated (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2041_4c_AM - MillRd/Airfield Rd
Site Category: (None)
Signals - Actuated Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	257	5.0	257	5.0	0.989	48.0	LOS D	47.3	345.4	1.00	1.11	1.25	25.5
2	T1	All MCs	1018	5.0	1018	5.0	* 0.989	89.8	LOS F	47.3	345.4	1.00	1.13	1.25	26.1
3	R2	All MCs	11	5.0	11	5.0	0.117	94.2	LOS F	0.6	4.5	0.96	0.67	0.96	25.7
Approach			1285	5.0	1285	5.0	0.989	81.5	LOS F	47.3	345.4	1.00	1.12	1.25	23.8
East: Airfield Road E															
4	L2	All MCs	11	5.0	11	5.0	0.274	41.5	LOS D	4.8	35.1	0.87	0.70	0.87	30.0
5	T1	All MCs	326	5.0	326	5.0	* 0.698	56.9	LOS E	13.5	98.5	0.94	0.78	0.94	29.6
6	R2	All MCs	299	5.0	299	5.0	1.020	103.1	LOS F	23.0	167.7	1.00	1.08	1.39	21.6
Approach			636	5.0	636	5.0	1.020	78.4	LOS E	23.0	167.7	0.97	0.92	1.15	24.1
North: Mill Rd N															
7	L2	All MCs	199	5.0	199	5.0	0.447	25.9	LOS C	8.9	65.3	0.83	0.77	0.83	35.2
8	T1	All MCs	331	5.0	331	5.0	0.447	35.2	LOS D	13.1	95.3	0.81	0.70	0.81	34.4
9	R2	All MCs	9	5.0	9	5.0	0.106	67.9	LOS E	0.6	4.1	0.96	0.66	0.96	25.7
Approach			539	5.0	539	5.0	0.447	32.3	LOS C	13.1	95.3	0.82	0.72	0.82	34.5
West: Airfield Road W															
10	L2	All MCs	169	5.0	169	5.0	* 0.597	54.4	LOS D	5.3	38.8	0.95	0.79	0.95	33.9
11	T1	All MCs	434	5.0	434	5.0	* 1.140	218.6	LOS F	46.1	336.8	1.00	1.70	2.01	14.2
12	R2	All MCs	72	5.0	72	5.0	0.177	79.9	LOS E	3.4	24.8	0.82	0.73	0.82	30.2
Approach			675	5.0	675	5.0	1.140	162.6	LOS F	46.1	336.8	0.97	1.37	1.62	15.5
All Vehicles			3135	5.0	3135	5.0	1.140	89.9	LOS F	47.3	345.4	0.96	1.07	1.24	22.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mill Rd S												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Airfield Road E												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Mill Rd N												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Airfield Road W												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians		200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1026 [2041_4c_PM - MillRd/Airfield Rd - mitigated (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2041_4c_AM - MillRd/Airfield Rd
Site Category: (None)
Signals - Actuated Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	186	5.0	186	5.0	0.670	22.0	LOS C	23.0	167.8	0.87	0.79	0.87	33.1
2	T1	All MCs	761	5.0	761	5.0	0.670	47.9	LOS D	23.0	167.8	0.87	0.78	0.87	33.8
3	R2	All MCs	11	5.0	11	5.0	0.117	82.7	LOS F	0.6	4.5	0.96	0.67	0.96	25.7
Approach			958	5.0	958	5.0	0.670	43.2	LOS D	23.0	167.8	0.87	0.78	0.87	31.5
East: Airfield Road E															
4	L2	All MCs	11	5.0	11	5.0	0.281	41.4	LOS D	5.1	37.4	0.87	0.70	0.87	30.2
5	T1	All MCs	352	5.0	352	5.0	0.718	58.4	LOS E	14.5	105.8	0.94	0.78	0.94	29.7
6	R2	All MCs	321	5.0	321	5.0	1.065	138.6	LOS F	28.0	204.6	1.00	1.20	1.61	18.1
Approach			683	5.0	683	5.0	1.065	95.8	LOS F	28.0	204.6	0.97	0.98	1.26	21.6
North: Mill Rd N															
7	L2	All MCs	340	5.0	340	5.0	* 1.177	194.0	LOS F	71.0	518.3	1.00	1.55	2.20	12.5
8	T1	All MCs	1105	5.0	1105	5.0	* 1.177	231.3	LOS F	94.9	692.7	1.00	1.81	2.20	12.9
9	R2	All MCs	27	5.0	27	5.0	* 0.305	96.7	LOS F	1.7	12.1	0.97	0.71	0.97	25.4
Approach			1473	5.0	1473	5.0	1.177	220.2	LOS F	94.9	692.7	1.00	1.73	2.18	12.3
West: Airfield Road W															
10	L2	All MCs	14	5.0	14	5.0	0.065	32.8	LOS C	0.4	3.0	0.90	0.67	0.90	34.1
11	T1	All MCs	272	5.0	272	5.0	* 1.040	129.7	LOS F	22.0	160.5	1.00	1.22	1.49	20.7
12	R2	All MCs	159	5.0	159	5.0	0.606	81.5	LOS F	8.7	63.5	0.94	0.80	0.94	28.1
Approach			444	5.0	444	5.0	1.040	109.4	LOS F	22.0	160.5	0.98	1.05	1.28	20.0
All Vehicles			3558	5.0	3558	5.0	1.177	134.8	LOS F	94.9	692.7	0.96	1.25	1.54	17.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mill Rd S												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Airfield Road E												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Mill Rd N												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Airfield Road W												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians		200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1028v [2041_4c_AM - MillRd/Popes Rd (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2041_4c_AM - MillRd/Popes Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	19	5.0	19	5.0	0.491	4.8	LOS A	3.5	25.4	0.56	0.45	0.56	46.1
2	T1	All MCs	1455	5.0	1455	5.0	0.963	14.4	LOS B	34.2	249.6	0.89	0.96	1.21	42.2
3	R2	All MCs	51	5.0	51	5.0	0.963	21.6	LOS C	34.2	249.6	1.00	1.14	1.42	40.5
Approach			1524	5.0	1524	5.0	0.963	14.5	LOS B	34.2	249.6	0.89	0.96	1.20	42.2
East: Popes Road E															
4	L2	All MCs	19	5.0	19	5.0	0.091	6.0	LOS A	0.4	3.0	0.61	0.67	0.61	45.0
5	T1	All MCs	20	5.0	20	5.0	0.091	5.7	LOS A	0.4	3.0	0.61	0.67	0.61	45.2
6	R2	All MCs	21	5.0	21	5.0	0.091	11.8	LOS B	0.4	3.0	0.61	0.67	0.61	44.6
Approach			60	5.0	60	5.0	0.091	7.9	LOS A	0.4	3.0	0.61	0.67	0.61	44.9
North: Mill Rd N															
7	L2	All MCs	19	5.0	19	5.0	0.201	3.5	LOS A	1.1	8.3	0.34	0.33	0.34	46.9
8	T1	All MCs	509	5.0	509	5.0	0.394	2.9	LOS A	2.9	20.8	0.36	0.37	0.36	46.7
9	R2	All MCs	120	5.0	120	5.0	0.394	8.2	LOS A	2.9	20.8	0.36	0.39	0.36	45.9
Approach			648	5.0	648	5.0	0.394	3.9	LOS A	2.9	20.8	0.36	0.38	0.36	46.5
West: Popes Road W															
10	L2	All MCs	194	5.0	194	5.0	0.956	74.4	LOS F	12.1	88.4	1.00	1.66	2.81	25.2
11	T1	All MCs	35	5.0	35	5.0	0.956	71.6	LOS F	12.1	88.4	1.00	1.66	2.81	25.3
12	R2	All MCs	11	5.0	11	5.0	0.956	77.1	LOS F	12.1	88.4	1.00	1.66	2.81	25.1
Approach			239	5.0	239	5.0	0.956	74.1	LOS F	12.1	88.4	1.00	1.66	2.81	25.2
All Vehicles			2472	5.0	2472	5.0	0.963	17.3	LOS B	34.2	249.6	0.75	0.87	1.12	40.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1028v [2041_4c_PM - MillRd/Popes Rd (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2041_4c_AM - MillRd/Popes Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	176	5.0	176	5.0	0.338	3.9	LOS A	2.1	15.4	0.43	0.41	0.43	46.7
2	T1	All MCs	896	5.0	896	5.0	0.663	3.7	LOS A	6.7	49.2	0.55	0.40	0.55	46.3
3	R2	All MCs	16	5.0	16	5.0	0.663	8.8	LOS A	6.7	49.2	0.57	0.40	0.57	45.7
Approach			1087	5.0	1087	5.0	0.663	3.8	LOS A	6.7	49.2	0.53	0.40	0.53	46.4
East: Popes Road E															
4	L2	All MCs	38	5.0	38	5.0	0.253	17.1	LOS B	1.3	9.3	0.86	0.89	0.86	40.9
5	T1	All MCs	21	5.0	21	5.0	0.253	14.7	LOS B	1.3	9.3	0.86	0.89	0.86	41.0
6	R2	All MCs	18	5.0	18	5.0	0.253	20.4	LOS C	1.3	9.3	0.86	0.89	0.86	40.6
Approach			77	5.0	77	5.0	0.253	17.2	LOS B	1.3	9.3	0.86	0.89	0.86	40.9
North: Mill Rd N															
7	L2	All MCs	27	5.0	27	5.0	0.417	2.9	LOS A	3.2	23.6	0.27	0.27	0.27	47.2
8	T1	All MCs	1515	5.0	1515	5.0	0.818	3.5	LOS A	16.1	117.9	0.46	0.31	0.46	46.6
9	R2	All MCs	83	5.0	83	5.0	0.818	8.2	LOS A	16.1	117.9	0.53	0.33	0.53	45.7
Approach			1625	5.0	1625	5.0	0.818	3.7	LOS A	16.1	117.9	0.46	0.31	0.46	46.6
West: Popes Road W															
10	L2	All MCs	380	5.0	380	5.0	0.814	24.5	LOS C	9.1	66.1	0.97	1.26	1.86	37.6
11	T1	All MCs	12	5.0	12	5.0	0.814	23.4	LOS C	9.1	66.1	0.97	1.26	1.86	37.7
12	R2	All MCs	12	5.0	12	5.0	0.814	29.1	LOS C	9.1	66.1	0.97	1.26	1.86	37.3
Approach			403	5.0	403	5.0	0.814	24.6	LOS C	9.1	66.1	0.97	1.26	1.86	37.6
All Vehicles			3193	5.0	3193	5.0	0.818	6.7	LOS A	16.1	117.9	0.56	0.48	0.67	45.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1032 [2041_4c_AM -Walters/Cosgrave/Hamlin (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Walter/Cosgrove
Site Category: (None)
Signals - Actuated Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Cosgrave Rd S															
1	L2	All MCs	45	5.0	45	5.0	0.562	33.1	LOS C	16.2	118.6	0.86	0.75	0.86	32.4
2	T1	All MCs	765	5.0	765	5.0	* 0.965	62.4	LOS E	32.2	235.1	0.95	0.94	1.06	29.4
3	R2	All MCs	211	5.0	211	5.0	0.371	40.0	LOS D	9.5	69.5	0.80	0.77	0.80	31.9
Approach			1021	5.0	1021	5.0	0.965	56.5	LOS E	32.2	235.1	0.91	0.90	1.00	28.3
East: Hamlin Road E															
4	L2	All MCs	58	5.0	58	5.0	0.374	25.9	LOS C	6.7	49.0	0.89	0.75	0.89	29.3
5	T1	All MCs	196	5.0	196	5.0	0.374	56.6	LOS E	6.7	49.0	0.90	0.73	0.90	29.9
6	R2	All MCs	249	5.0	249	5.0	* 0.795	59.2	LOS E	14.3	104.6	0.99	0.83	0.99	27.4
Approach			503	5.0	503	5.0	0.795	54.4	LOS D	14.3	104.6	0.94	0.78	0.94	28.5
North: Cosgrave Rd N															
7	L2	All MCs	209	5.0	209	5.0	0.312	34.0	LOS C	8.6	62.9	0.73	0.76	0.73	33.5
8	T1	All MCs	165	5.0	165	5.0	* 0.455	52.2	LOS D	6.9	50.6	0.92	0.73	0.92	29.1
9	R2	All MCs	37	5.0	37	5.0	0.455	57.6	LOS E	6.9	50.6	0.93	0.76	0.93	28.4
Approach			412	5.0	412	5.0	0.455	43.4	LOS D	8.6	62.9	0.82	0.75	0.82	31.1
West: Walters Road W															
10	L2	All MCs	264	5.0	264	5.0	0.440	41.9	LOS D	11.6	84.8	0.78	0.78	0.78	32.8
11	T1	All MCs	378	5.0	378	5.0	* 0.639	55.5	LOS E	11.2	81.6	0.96	0.79	0.96	29.0
12	R2	All MCs	11	5.0	11	5.0	0.639	57.8	LOS E	11.2	81.6	0.96	0.79	0.96	28.6
Approach			653	5.0	653	5.0	0.639	50.0	LOS D	11.6	84.8	0.89	0.79	0.89	29.6
All Vehicles			2588	5.0	2588	5.0	0.965	52.4	LOS D	32.2	235.1	0.90	0.82	0.93	29.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Cosgrave Rd S												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Hamlin Road E												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Cosgrave Rd N												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Walters Road W												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians		200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1032 [2041_4c_PM -Walters/Cosgrave/Hamlin (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Walter/Cosgrove
Site Category: (None)
Signals - Actuated Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Cosgrave Rd S															
1	L2	All MCs	11	5.0	11	5.0	0.537	39.6	LOS D	11.1	81.2	0.91	0.76	0.91	29.9
2	T1	All MCs	554	5.0	554	5.0	* 0.923	55.9	LOS E	21.8	158.9	0.97	0.88	1.02	28.9
3	R2	All MCs	57	5.0	57	5.0	0.152	47.9	LOS D	2.7	19.9	0.83	0.72	0.83	29.9
Approach			621	5.0	621	5.0	0.923	54.9	LOS D	21.8	158.9	0.96	0.86	1.00	28.6
East: Hamlin Road E															
4	L2	All MCs	22	5.0	22	5.0	0.392	29.2	LOS C	7.1	51.8	0.90	0.73	0.90	29.6
5	T1	All MCs	251	5.0	251	5.0	0.392	54.9	LOS D	7.1	51.8	0.90	0.73	0.90	30.1
6	R2	All MCs	302	5.0	302	5.0	* 0.990	87.1	LOS F	21.5	156.6	1.00	1.02	1.26	23.9
Approach			575	5.0	575	5.0	0.990	70.8	LOS E	21.5	156.6	0.95	0.88	1.09	25.3
North: Cosgrave Rd N															
7	L2	All MCs	476	5.0	476	5.0	0.515	25.0	LOS C	17.0	124.3	0.65	0.76	0.65	37.4
8	T1	All MCs	586	5.0	586	5.0	* 0.951	60.1	LOS E	28.8	210.3	0.92	0.86	0.99	30.7
9	R2	All MCs	171	5.0	171	5.0	0.951	74.4	LOS E	28.8	210.3	1.00	1.00	1.15	27.8
Approach			1233	5.0	1233	5.0	0.951	48.5	LOS D	28.8	210.3	0.83	0.84	0.88	29.9
West: Walters Road W															
10	L2	All MCs	106	5.0	106	5.0	0.129	25.5	LOS C	3.5	25.7	0.59	0.69	0.59	36.5
11	T1	All MCs	287	5.0	287	5.0	* 0.790	61.4	LOS E	8.9	65.1	1.00	0.80	1.00	27.2
12	R2	All MCs	11	5.0	11	5.0	0.790	66.0	LOS E	8.9	64.8	1.00	0.80	1.00	26.9
Approach			404	5.0	404	5.0	0.790	52.1	LOS D	8.9	65.1	0.89	0.77	0.89	29.2
All Vehicles			2833	5.0	2833	5.0	0.990	55.0	LOS D	28.8	210.3	0.89	0.84	0.95	28.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Cosgrave Rd S												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Hamlin Road E												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Cosgrave Rd N												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Walters Road W												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians		200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 7600 [2041_4c_AM - MillRd/Alfriston Rd (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

MillRd/Alfriston Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	9	5.0	9	5.0	1.026	58.5	LOS E	40.7	297.1	1.00	2.45	4.04	28.1
2	T1	All MCs	1532	5.0	1532	5.0	1.026	58.1	LOS E	40.7	297.1	1.00	2.45	4.04	28.2
3	R2	All MCs	37	5.0	37	5.0	1.026	63.6	LOS E	40.6	296.7	1.00	2.44	4.04	27.9
Approach			1578	5.0	1578	5.0	1.026	58.2	LOS E	40.7	297.1	1.00	2.45	4.04	28.1
East: Alfriston Rd E															
4	L2	All MCs	53	5.0	53	5.0	0.288	9.6	LOS A	1.3	9.5	0.70	0.73	0.70	44.1
5	T1	All MCs	64	5.0	64	5.0	0.288	9.2	LOS A	1.3	9.5	0.70	0.73	0.70	44.3
6	R2	All MCs	426	5.0	426	5.0	0.581	13.5	LOS B	4.3	31.1	0.78	0.88	0.98	41.9
Approach			543	5.0	543	5.0	0.581	12.6	LOS B	4.3	31.1	0.76	0.85	0.92	42.4
North: Mill Rd N															
7	L2	All MCs	54	5.0	54	5.0	0.279	4.0	LOS A	1.6	11.9	0.51	0.43	0.51	46.3
8	T1	All MCs	473	5.0	473	5.0	0.279	3.5	LOS A	1.6	12.0	0.51	0.42	0.51	46.5
9	R2	All MCs	11	5.0	11	5.0	0.279	9.0	LOS A	1.6	12.0	0.51	0.42	0.51	45.8
Approach			537	5.0	537	5.0	0.279	3.7	LOS A	1.6	12.0	0.51	0.42	0.51	46.5
West: Alfriston Rd W															
10	L2	All MCs	13	5.0	13	5.0	0.499	26.8	LOS C	2.6	19.2	0.93	1.04	1.20	36.7
11	T1	All MCs	75	5.0	75	5.0	0.499	26.4	LOS C	2.6	19.2	0.93	1.04	1.20	36.9
12	R2	All MCs	127	5.0	127	5.0	0.542	28.4	LOS C	3.3	23.9	0.94	1.08	1.25	36.1
Approach			215	5.0	215	5.0	0.542	27.6	LOS C	3.3	23.9	0.94	1.06	1.23	36.4
All Vehicles			2873	5.0	2873	5.0	1.026	37.1	LOS D	40.7	297.1	0.86	1.66	2.58	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 7600 [2041_4c_PM - MillRd/Alfriston Rd (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

MillRd/Alfriston Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mill Rd S															
1	L2	All MCs	265	5.0	265	5.0	0.708	7.3	LOS A	7.6	55.7	0.83	0.74	0.99	45.1
2	T1	All MCs	915	5.0	915	5.0	0.708	6.9	LOS A	7.6	55.7	0.83	0.75	0.99	45.0
3	R2	All MCs	114	5.0	114	5.0	0.708	12.3	LOS B	7.6	55.7	0.83	0.75	0.99	44.3
Approach			1294	5.0	1294	5.0	0.708	7.5	LOS A	7.6	55.7	0.83	0.74	0.99	45.0
East: Alfriston Rd E															
4	L2	All MCs	48	5.0	48	5.0	0.606	18.5	LOS B	4.0	29.1	0.94	1.05	1.28	39.9
5	T1	All MCs	139	5.0	139	5.0	0.606	18.1	LOS B	4.0	29.1	0.94	1.05	1.28	40.1
6	R2	All MCs	165	5.0	165	5.0	0.631	26.9	LOS C	4.0	28.9	0.93	1.10	1.31	36.6
Approach			353	5.0	353	5.0	0.631	22.3	LOS C	4.0	29.1	0.93	1.08	1.30	38.4
North: Mill Rd N															
7	L2	All MCs	201	5.0	201	5.0	0.959	27.5	LOS C	22.3	162.5	1.00	1.64	2.50	36.4
8	T1	All MCs	1279	5.0	1279	5.0	0.959	27.1	LOS C	22.3	162.5	1.00	1.64	2.50	36.6
9	R2	All MCs	12	5.0	12	5.0	0.959	32.5	LOS C	22.3	162.5	1.00	1.64	2.50	36.3
Approach			1492	5.0	1492	5.0	0.959	27.2	LOS C	22.3	162.5	1.00	1.64	2.50	36.6
West: Alfriston Rd W															
10	L2	All MCs	6	5.0	6	5.0	0.412	13.3	LOS B	2.2	16.0	0.84	0.92	0.99	42.4
11	T1	All MCs	129	5.0	129	5.0	0.412	12.8	LOS B	2.2	16.0	0.84	0.92	0.99	42.6
12	R2	All MCs	257	5.0	257	5.0	0.585	18.6	LOS B	4.0	29.1	0.90	1.03	1.21	39.8
Approach			393	5.0	393	5.0	0.585	16.6	LOS B	4.0	29.1	0.88	0.99	1.13	40.7
All Vehicles			3531	5.0	3531	5.0	0.959	18.3	LOS B	22.3	162.5	0.92	1.18	1.67	40.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 9458 [2041_4c_AM - Old Wairoa/Pakaraka (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Old Wairoa/Pakaraka
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Pakaraka S															
1	L2	All MCs	11	5.0	11	5.0	0.271	8.5	LOS A	1.7	12.7	0.77	0.69	0.77	44.1
2	T1	All MCs	148	5.0	148	5.0	0.271	8.3	LOS A	1.7	12.7	0.77	0.69	0.77	44.4
3	R2	All MCs	17	5.0	17	5.0	0.271	12.9	LOS B	1.7	12.7	0.77	0.69	0.77	43.8
Approach			176	5.0	176	5.0	0.271	8.7	LOS A	1.7	12.7	0.77	0.69	0.77	44.3
East: Old Wairoa E															
4	L2	All MCs	31	5.0	31	5.0	0.444	9.4	LOS A	3.3	24.4	0.84	0.75	0.90	43.5
5	T1	All MCs	211	5.0	211	5.0	0.444	9.2	LOS A	3.3	24.4	0.84	0.75	0.90	43.7
6	R2	All MCs	54	5.0	54	5.0	0.444	13.8	LOS B	3.3	24.4	0.84	0.75	0.90	43.1
Approach			295	5.0	295	5.0	0.444	10.1	LOS B	3.3	24.4	0.84	0.75	0.90	43.6
North: N															
7	L2	All MCs	57	5.0	57	5.0	0.493	3.7	LOS A	4.7	34.4	0.43	0.49	0.43	45.1
8	T1	All MCs	220	5.0	220	5.0	0.493	3.5	LOS A	4.7	34.4	0.43	0.49	0.43	45.3
9	R2	All MCs	351	5.0	351	5.0	0.493	8.1	LOS A	4.7	34.4	0.43	0.49	0.43	44.7
Approach			627	5.0	627	5.0	0.493	6.1	LOS A	4.7	34.4	0.43	0.49	0.43	45.0
West: Old Wairoa W															
10	L2	All MCs	405	5.0	405	5.0	0.472	5.1	LOS A	3.9	28.6	0.65	0.54	0.65	45.8
11	T1	All MCs	56	5.0	56	5.0	0.472	4.9	LOS A	3.9	28.6	0.65	0.54	0.65	46.1
12	R2	All MCs	11	5.0	11	5.0	0.472	9.5	LOS A	3.9	28.6	0.65	0.54	0.65	45.5
Approach			472	5.0	472	5.0	0.472	5.2	LOS A	3.9	28.6	0.65	0.54	0.65	45.9
All Vehicles			1569	5.0	1569	5.0	0.493	6.9	LOS A	4.7	34.4	0.61	0.58	0.62	44.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 9458 [2041_4c_PM - Old Wairoa/Pakaraka (Site Folder: 2041)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Old Wairoa/Pakaraka
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Pakaraka S															
1	L2	All MCs	11	5.0	11	5.0	0.299	7.1	LOS A	2.0	14.6	0.74	0.65	0.74	44.7
2	T1	All MCs	175	5.0	175	5.0	0.299	7.0	LOS A	2.0	14.6	0.74	0.65	0.74	45.0
3	R2	All MCs	32	5.0	32	5.0	0.299	11.6	LOS B	2.0	14.6	0.74	0.65	0.74	44.4
Approach			217	5.0	217	5.0	0.299	7.7	LOS A	2.0	14.6	0.74	0.65	0.74	44.9
East: Old Wairoa E															
4	L2	All MCs	16	5.0	16	5.0	0.214	7.7	LOS A	1.4	10.3	0.77	0.68	0.77	44.4
5	T1	All MCs	97	5.0	97	5.0	0.214	7.5	LOS A	1.4	10.3	0.77	0.68	0.77	44.6
6	R2	All MCs	25	5.0	25	5.0	0.214	12.1	LOS B	1.4	10.3	0.77	0.68	0.77	44.0
Approach			138	5.0	138	5.0	0.214	8.4	LOS A	1.4	10.3	0.77	0.68	0.77	44.5
North: N															
7	L2	All MCs	68	5.0	68	5.0	0.604	5.4	LOS A	5.8	42.6	0.73	0.60	0.73	44.4
8	T1	All MCs	194	5.0	194	5.0	0.604	5.2	LOS A	5.8	42.6	0.73	0.60	0.73	44.6
9	R2	All MCs	359	5.0	359	5.0	0.604	9.8	LOS A	5.8	42.6	0.73	0.60	0.73	44.0
Approach			621	5.0	621	5.0	0.604	7.9	LOS A	5.8	42.6	0.73	0.60	0.73	44.2
West: Old Wairoa W															
10	L2	All MCs	262	5.0	262	5.0	0.455	5.2	LOS A	3.7	27.2	0.66	0.54	0.66	45.7
11	T1	All MCs	171	5.0	171	5.0	0.455	5.0	LOS A	3.7	27.2	0.66	0.54	0.66	46.0
12	R2	All MCs	11	5.0	11	5.0	0.455	9.6	LOS A	3.7	27.2	0.66	0.54	0.66	45.3
Approach			443	5.0	443	5.0	0.455	5.2	LOS A	3.7	27.2	0.66	0.54	0.66	45.8
All Vehicles			1419	5.0	1419	5.0	0.604	7.1	LOS A	5.8	42.6	0.71	0.60	0.71	44.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Annexure 2:

Sunfield Fast Track Application Review – Progressive Transport Solutions Limited

Technical Note

To:	Neil Stone, Principal Planner, Auckland Transport		
From:	Martin Peake, Director, Progressive Transport Solutions		
Project:	**Fast Track Application - Sunfield Development Ardmore**	**Project No.**	**P23005/S021**
Subject:	**Comments on traffic engineering aspects of Fast Track Application**		
Date:	29 July 2025		

1. Introduction

Auckland Transport has commissioned Progressive Transport Solutions Limited (PTSL) to undertake a review of the traffic engineering aspects of the Fast Track Application for the Sunfield Development, Ardmore.

In undertaking this review the primary documents examined are:

- Integrated Transport Assessment, Commute, 10 February 2025
- Roading Plans, Maven Associates, February 2025
- Specialist Comments Response, Commute, 17 July 2025

2. Qualifications and Experience

I hold the qualification of a Masters in Civil Engineering with Management from the University of Birmingham in the UK (1993). I am a Chartered Engineer (UK) and a member of the Institution of Civil Engineers, and a member of the Chartered Institution of Highways and Transportation.

I have over 30 years' experience as a traffic engineer. I have worked for several major consultant engineering firms, and as a Team Leader of one of Auckland Transport's Traffic Operations Teams. I have owned and operated my own traffic engineering consultancy since 2014. In these roles, I have worked in a variety of areas of transportation including traffic engineering, traffic modelling and temporary traffic management. I have provided expert traffic and transportation advice on a range of resource consents and plan changes across the Auckland region.

I am familiar with the site and have visited the site on a number of occasions with the most recent being on 18 July 2025.

3. Expert Witness Code of Conduct

I have read the Code of Conduct for Expert Witnesses outlined in the Environment Court's Practice Note (2023) (Code) and have complied with it in preparing this memorandum. I also agree to follow the Code when participating in any subsequent processes, such as expert conferencing, directed by the Panel. I confirm that the issues addressed in this memorandum are within my area of expertise, except where I state that I rely upon the memorandum/report of another expert. I also confirm that I have not omitted to consider material facts known to me that might alter or detract from my opinions.

4. Scope of Review

This review has sought to identify primarily those items that will have a bearing on the overall design of the roading layout, in particular intersections. Adjustments to road and intersections design may be required for safety or operational reasons; changes to intersections or road footprints may have an impact on proposed lot boundaries.

In particular the review has considered:

- The internal roading layout and proposed intersection designs;
- JOAL connections to the proposed public road network including their safety in terms of location and on active modes (pedestrians / cyclists);
- External intersection upgrades;
- Internal road connectivity and need for road to road accessways;
- General road safety.

This review does not consider the forecast operation of the external intersections as this element is being considered by others.

The Mill Road Notice of Requirement (NoR) was lodged by NZ Transport Agency (NZTA) on 13 June 2025. The alignment of the NoR is to the east of the Sunfield Development and will affect the design of the internal roading network, intersection designs and trip distribution from the site. At the time of writing the applicant is working with NZTA to consider the implications of the NoR on the development. The comments provided in this review are based on the lodged fast track application which does not take into account the NoR.

5. General Comments

5.1 Overall Comments on the proposed roading.

The design of the bus loop roads, including Roads 1, 2, 3 and 5 as well Road 6 is of a significant scale. The design of these roads (including the full extent of Road 1 and Road 6, the realigned Hamlin Road) will have the look and feel of an arterial road rather than a collector road which predominantly services a residential neighbourhood. Multiple complex signalised intersections are proposed along these roads. It will not be dissimilar to Pakuranga Road east of Ti Rakau Drive (with the exception of only a single general traffic lane in each direction).

These roads and intersections could become an impediment to residents adopting active modes due to their scale and complexity.

The scale and complexity of these roads is brought about by the dedicated busway. It is acknowledged that the busway is proposed to provide priority for buses around the development, however, the number and complexity of the signalised intersections will undoubtedly result in delays for buses.

No specific measures are proposed to moderate vehicle speeds on the roads within the development. The scale of these roads may result in higher than desirable speeds, although during busier times speeds may be moderated by the multiple signalised intersections.

Road 6 at its western end between Cosgrave Road and Road 5 is proposed to provide four general traffic lanes (two lanes in each direction). This is somewhat inconsistent with the surrounding

residential area. Furthermore, four lanes are considered to be somewhat incompatible with the proposed school located north of Road 6 in the north west corner of the site.

There are no proposed upgrades to the Cosgrave Road frontage between Road 6 and Road 4 to urbanise this section of road (including kerb and channel and active mode facilities). Cosgrave Road should be upgraded to urban standard and to provide pedestrian and cycle facilities along Cosgrave Road. These would be accessible from a number of JOALS that extend to the Cosgrave Road boundary.

5.2 Staging of Development

The documentation states that the development will occur in stages. Given that it is proposed to limit car ownership and usage and to promote active modes and public transport use, it will be essential that the development is designed to provide coherent active mode connections within the site and to the wider network. The development should be staged so that these connections within the development are logically extended. This will be particularly important in the initial stages of development when there may be more limited scope for bus services to travel through the development or use the bus loop.

The staged development will impact on the effectiveness of the bus loop. In the early development stages it will serve no particular purpose due to the limited area that it would serve. Furthermore, facilities will need to be incorporated into the bus loop to enable buses to be able to turn around as the loop is gradually extended.

The ability to achieve the 'car-less' objectives may be limited in the initial stages of development prior to the provision of supporting infrastructure such as the local centre, employment in the industrial zone and to provide well connected facilities for active modes and public transport. This could result in higher demand for private vehicle use than is envisaged, including once the full development and supporting transport network is complete as habits may already have been formed.

5.3 Active Mode Facilities

All roads are provided with footpaths and on key roads cycle paths. These provide a good level of provision for movements along the roads. However, other than at the signalised intersections there is little connectivity for active modes across the proposed roads, particularly the roads that are anticipated to have higher traffic volumes (Road 1, Road 2, Road 5, and Road 6). For instance on Road 6 there are no crossing facilities between the Road 5 / Road 6 intersection and the Road 1 / Road 6 intersection, pedestrian crossing facilities should be provided mid-block to provide access to the town centre for pedestrians and cyclists without having to walk to Road 1.

All bus stops should be provided with pedestrian crossing facilities to enable pedestrians to access the bus stops. These need to be provided across the busway and the adjacent general traffic lanes.

Cycle facilities are provided through a mix of separated and shared path facilities. Shared paths are not an Auckland Transport accepted form of facility, particularly in a greenfield development. Shared paths pose safety issues for pedestrians particularly where it is anticipated that there would be higher numbers of pedestrians and cyclists. Given that the design intent of the development is for residents to walk and cycle as much as possible, it is anticipated that there would be high risk of conflicts between pedestrians and cyclists on shared paths.

Of particular concern are the shared paths on Road 6 adjacent to the proposed school and by the main school vehicle and pedestrian entrance. 3.6m shared paths are shown on Road 6. It is expected that there will be significant pedestrian and cycle movements that would be using the shared path and thus be in conflict with each other. The cycle facilities should be modified from shared paths to separate footpaths and cycle paths.

It is noted that the cycle facilities on Road 6 would tie into separated facilities on Walters Road. For consistency in level of provision and to promote cycling, separated paths on Road 6 should be provided.

In general, separated facilities should be provided for cyclists rather than shared paths unless there are specific circumstances that will prevent them from being provided.

At the Road 6 bus stops between Cosgrave Road and Road 19, a zebra crossing is proposed. This is across four lanes of traffic plus flush median. Zebra crossings across multiple traffic lanes lead to safety issues for pedestrians and are not acceptable. An alternative crossing facility will need to be provided. In this situation the only alternative would be a signalised crossing. This would need to be carefully designed as it is likely to be well used due to the location of the school (see comments on school location in Section 5.4). With the pedestrian crossing, the anticipated vehicle crossing for the school and the Road 6 / Cosgrave Road / Walters Road intersection, this will result in complex operation of this area which may result in congestion and safety issues.

Alternative access arrangements for the school or location of the school should be considered to reduce the potential effects on Road 6 and on Cosgrave Road. In light of the Mill Road NoR being located to the east of the Sunfield Development, this is likely to alter the traffic demands on Road 6 at this location.

5.4 School Location and Connections

The school is considered to be poorly located in terms of the surrounding residential development and accessibility, particularly for active modes. It is understood that the purpose of the school is to serve the proposed development and therefore, a more central location would enhance its accessibility for active modes and reduce private vehicle trips.

The current location is adjacent to a four lane road (Road 6) on one of the main exit points from the residential area to Cosgrave Road and with shared footpath/cycle path on both sides. Road 6 is anticipated to include industrial traffic travelling either to the proposed industrial zones or to Ardmore airport. The main school access is indicated to be on to Road 6.

The shared paths would not be compatible with what is intended to be an area of high pedestrian and cycle activity. Separated cycle facilities should be provided.

High volumes of traffic are anticipated on Road 6 travelling to and from Cosgrave Road, including industrial traffic. These volumes together with the four lanes are likely to be a deterrent for caregivers to allow children to walk or cycle to the school.

The location of the school in relation to the surrounding transport network is likely to affect the safe and efficient operation of the proposed transport network, including the safety of students.

The school should be located in a more central location to enhance its accessibility, and the roads surrounding the school should be designed to be more compatible with active modes with convenient connections to public transport.

5.5 Bus Routes and Facilities

The ITA provides details of the proposed bus loop to be provided around the development. However, the roading plans show a gap in the loop; there is a section missing on the western side between Roads 4 and 6. Therefore, as currently proposed buses would need to turn around within the turning heads proposed within the bus loop road. This will limit the effectiveness of the bus facility. It is understood that the missing connection is because the land is outside of the ownership of the Applicant.

Bus stops are proposed on Road 2, Road 5, and Road 6. There are no obvious access points for buses to travel from the general traffic lanes into the busway and vice versa, although it may be possibly at the Road 5 / Road 6 intersection or the Road 1 / Road 6 intersection. Limited accessibility for buses to /from the busway may impact on the effectiveness of the bus routes through the development to provide the indicated bus links shown in Figure 11-1 of the ITA.

The accessibility of the industrial area to the proposed buses is limited. Much of the industrial development will be greater than a 400m walk from the proposed bus stops, taking into account the layout of the roading network and development. This may deter future workers from utilising public transport. Active mode links through the industrial zone between Roads 1 and 7 would improve the connectivity from the employment area to public transport e.g. a connection from the Road 1 / Road 5 intersection to the western end of Road 29.

Whilst the provision of public transport is the remit of Auckland Transport, the proposals do not clearly demonstrate how buses would be able to navigate the development including connecting to and from the bus loop.

5.6 JOALS

There are large numbers of dwellings that are accessed from either a single public road and / or JOAL. It will be necessary to ensure that these areas can be effectively accessed by emergency services. It is appreciated that some of these JOALs are not proposed to be accessed via vehicles and hence vehicle crossings appear not to have been proposed. However, they would still need to be accessed by emergency vehicles.

Across the development there are JOALs that are shown to extend to the boundary with the proposed public road reserve. In some cases the JOALs are not shown with any vehicle crossing and in other cases vehicle crossings are shown. Therefore, it is not always possible to determine how a JOAL is to be accessed from the public road reserve. The accesses from the public roads to the JOALs will need to be designed carefully to ensure that they operate safely, particularly where the JOALs provide access to a significant number of dwellings. These would lead to high traffic volumes (for a JOAL) conflicting with footpaths and cycle paths. This poses potential safety hazards for active mode users.

5.7 Wider Network Improvements

There are no specific details of wider network improvements for active modes or public transport. These facilities will be necessary to encourage the uptake of walking and in particular cycling. Current facilities between the development and the wider area (such as Papakura Train Station), are limited.

The ITA talks of the developer working with Auckland Transport to provide these facilities but there are no specific details of what these measures would be or details of any infrastructure funding agreements.

5.8 Cul-de-sacs

Roads 20, 21 and 22 terminate without providing a turning head. Whilst JOALs may connect directly to the end of these roads, there is no formal turning facility within the road reserve for vehicles to turn around, including refuse trucks.

6. Vehicle Tracking

The vehicle tracking in the ITA shows that some intersections and mid-block links cannot accommodate the design and check vehicles and require adjustment to the design including kerb lines. The TIA states that minor adjustments to kerbs will be required but that this will not affect the overall lot layout and tracking should be checked at Engineering Plan (EP) approval stage. However, the vehicle tracking on drawings B1, B3, B4, B5, C1, C3, and C4 show significant deficiencies in the tracking at intersections. At these locations there would need to be sufficient width to provide for all the required design elements and space between cycle and bus lanes for pedestrians and cyclists to wait before crossing. It is difficult to see how this could be achieved without affecting the lot boundaries as currently proposed.

Insufficient vehicle tracking has been provided to demonstrate that the turning movements at all the intersections can operate safely. Whilst this could be left to EP stage, it is considered critical at the signalised intersections as this could impact on the safe and efficient operation of the intersections as well as on the lot boundaries.

Where tracking is shown in the diagrams in ITA Appendix B for two way vehicle movements (6.3m van and 10.3m truck), these movements have only been shown with the vehicles travelling in one direction. Tracking should also be provided for the vehicles travelling in the opposite directions to fully understand the extent of any widening required to accommodate the opposing vehicle movements.

7. Road Cross-Sections

Road 6 between Road 5 and Cosgrave Road is four lanes wide. The need for this road to be four lanes wide needs to be justified, particularly as it is immediately adjacent to the proposed school site.

Cross Section F (MC365) indicates that some of the roads on short cul-de-sacs would be three lanes wide. It is assumed that this is an error, and the central lane is intended to be a flush median.

Subject to the more specific comments, the road reserve widths generally appear to be appropriate. The exact dimensions of some of the street elements can be determined at Engineering Plan stage (e.g. provision of front berms on the 16m wide residential roads and general widths of rear and front berms).

Some roads are proposed to have combined footpaths/ cycle paths (3.6m wide). Shared paths are non an approved Auckland Transport cycle facility, particularly in greenfield sites. Separated cycle facilities should be provided.

8. Bus Loop Road and Bus Network

The loop road which includes Road 1, 2, 3 and 5, is intended to provide for bus routes around the development. However in the current proposals it does not connect on the western side of the loop between the intersections of Road 3 and 4 and intersection of Road 5 and 6. This will result in buses having to U-turn rather than being able to operate in a continuous loop. It will impact on the efficiency of services and connectivity. The missing connection should be provided.

If it is intended that the missing link is to be provided in the future, the intersections on Road 4 and Road 6 would need to be designed to future proof for the connection.

It is not clear how buses would practically enter and exit the bus way. As currently designed the only potential location appears to be from the Road 5 / Road 6 intersection. This could limit the flexibility of how buses would access the site from the surrounding road network.

Bus stops are provided on Road 2, however, there appears to be no convenient access point for these buses to be able to enter / exit the loop bus way on Road 2.

9. Bus Way Bus Stop Design

The bus stops have been designed in pairs and have pedestrian crossings (zebras) provided across the busway. This will provide access to the bus stops for pedestrians on the side of the road with the separated cycle path and footpath. However, for pedestrians on the opposite side of the road, in many cases the only facilities for pedestrians to access the bus stops is via neighbouring signalised intersections (refer to Figure 1 for an example). This would significantly increase the travel distance, travel time, and the number of times pedestrians would need to cross the road. This is likely to either be a deterrent for pedestrians to use the buses or to result in pedestrians crossing away from the signalised crossings. This will increase the risk of potential conflicts between pedestrians and vehicles. Consideration should be given to providing more direct and convenient crossing points to reach the bus stops from the side of the road opposite the bus way.

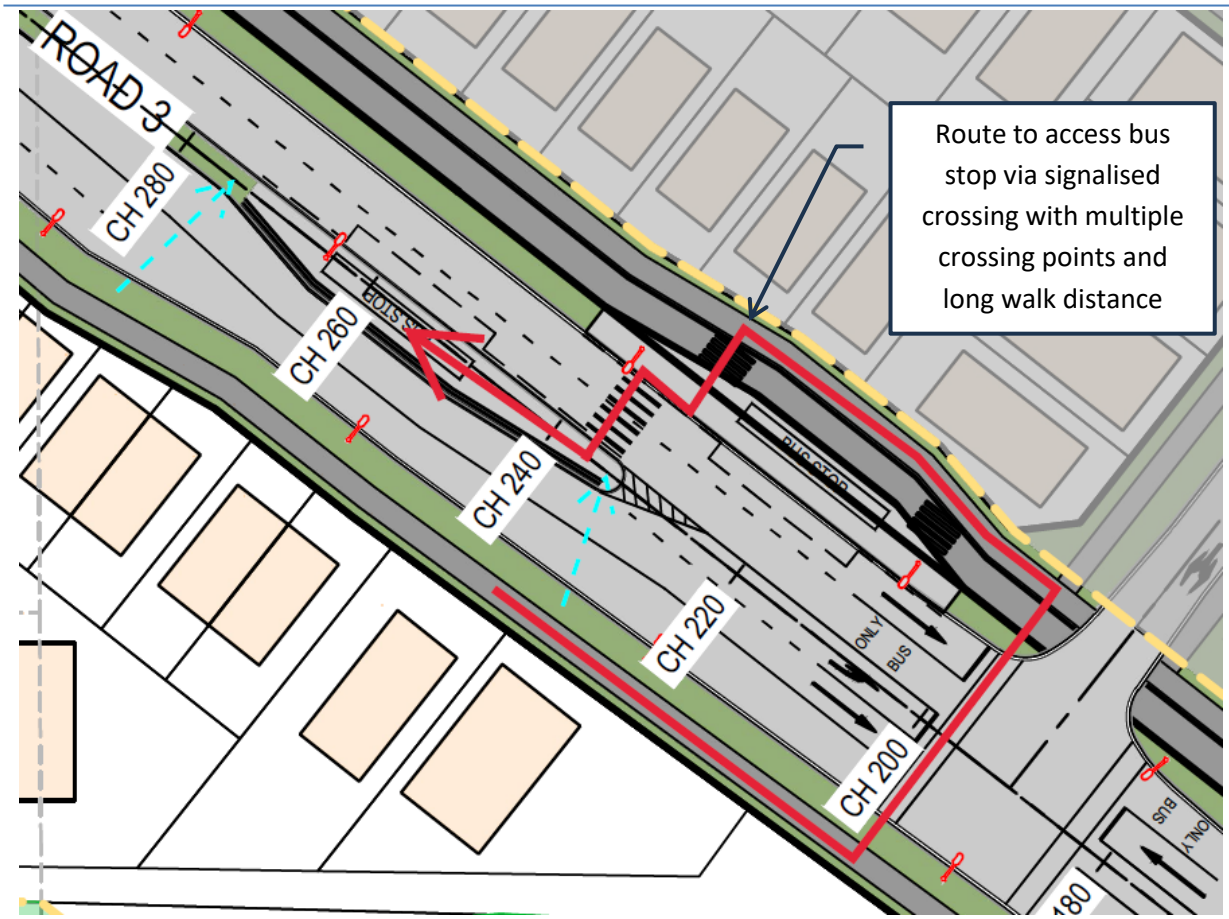


Figure 1 - Example of long pedestrian routes to access bus stops

Bus stops on Road 2 between Cosgrave Road and Road 3. A facility will need to be provided to enable buses from Road 2 to access the bus way. As currently designed, there does not appear to be a way for buses to access the bus way or for buses to exit the bus way to travel onto Road 2.

Bus stops on Road 6 west of Road 1. No pedestrian crossing facilities are shown for these bus stops. Pedestrian facilities should be provided to enable pedestrians to cross Road 6 to use the bus stops.

Bus stops on Road 1 between Chainage 1040 and 1100. The bus stops result in an abrupt change in alignment of Road 1. A more appropriate transition should be provided, particularly as this section of road is to be utilised by large vehicles. The swept path of large vehicles (19.45m semi-trailers and 23m HMPV truck and trailers) would need to be assessed.

A zebra crossing is proposed just to the south of the bus stops on Road 1 between Chainage 1040 to 1100. The bus stop to the north may impede visibility between pedestrians and approaching motorists. A refuge island with the crossing split into two halves would overcome this issue as pedestrians crossing from the western side would only need to have visibility to the south; there should be sufficient visibility to the north from the refuge island.

Bus stops on Road 1 at Chainage 1460 to 1530. These bus stops impact on the alignment of Road 1 for general traffic. The alignment should be reviewed and adjusted to provide improved transitions past the bus stop for traffic, including large vehicles. The alignment will also impact on visibility at the zebra crossing across the general traffic lanes for pedestrians crossing west to east. The design should

be adjusted to improve the lateral shift past the bus stops and improve visibility to/from the zebra crossing.

The bus stops on Road 1 at Chainage 1700 to 1740 may impede visibility to pedestrians crossing west to east across Road 1 at the zebra crossing due to the bus stop infrastructure and design of the bus stop. The bus stop should be designed to ensure that there is appropriate visibility between the pedestrians and the approaching vehicles from the south.

For the bus stop on Road 5 opposite Road 28, it is recommended that these bus stops are relocated to the west further way from the intersection. The eastbound bus stop may impact on visibility to pedestrians crossing south to north at the zebra crossing. The bus stop should be designed so that there is clear visibility to the zebra crossing.

10. Proposed Intersections with wider network

10.1 General Comment

Vehicle tracking at each of the external intersections with the wider network will need to be provided. This will be necessary to confirm that the proposed layouts are able to accommodate the required design and check vehicles. This is particularly the case where the intersections are required to accommodate heavy vehicles that would be travelling to and from the industrial area, or where roads are designed for industrial traffic and where intersections are required to accommodate buses.

10.2 Airfield Road / Road 7 – New Priority Controlled

Vehicle tracking is required to demonstrate that the turning movement for appropriate design and check vehicles can be accommodated.

The right turn bay on Airfield Road will need to be designed to accommodate long heavy vehicles and the anticipated number of vehicles queued. The bay is shown as only 10m which is not sufficient to accommodate a semi-trailer of 23 HMPV truck and trailer. Road 7 provides access to the industrial development and therefore heavy truck movements are expected to use this intersection.

10.3 Airfield Road / Road 1 – New Priority Controlled Intersection

Vehicle tracking is required to demonstrate that the turning movement for appropriate design and check vehicles can be accommodated.

The right turn bay on Airfield Road will need to be designed to accommodate long heavy vehicles and the anticipated number of vehicles queued. The bay is shown as only 10m which is not sufficient to accommodate a semi-trailer of 23 HMPV truck and trailer. Road 1 provides access to the industrial development and therefore heavy truck movements are expected to use this intersection.

10.4 Old Wairoa Road / Pakaranga Drive / Road 1 – New signalised intersection

Vehicle tracking is required to demonstrate that the turning movement for appropriate design and check vehicles can be accommodated.

The lane arrangement and length of turning bays should be designed for the anticipated turning movements and queue lengths. This could impact on lot boundaries within the site along Road 1.

10.5 Cosgrave Road / Walters Road / Road 6 – New signalised intersection

Road 6 has two through westbound approach lanes to the intersection, however, only one exit lane is provided. This would result in safety issues for merging traffic through the intersection.

If the kerbside Road 6 lane is intended to be left turn only, this will result in a trapped lane on Road 6 such that through motorists may inadvertently travel in the lane to travel through to Walters Road and have to make sudden lane changes. This will result in safety issues.

Road 6 eastbound has two lanes exiting the intersection. This is only fed by a single traffic lane from either Cosgrave Road or Walters Road. The need for two eastbound lanes is questioned.

There is concern on the shared paths on Road 6 which is discussed in Section 5.3.

10.6 Cosgrave Road / Road 4 – New Signalised Intersection

There is conflicting information in the documentation as to whether this intersection is to be signalised or a priority controlled intersection. The ITA states that it would be signalised but the Maven drawing M-C340 shows this is a priority controlled intersection.

There is insufficient detail on the provided plans for this intersection as only the approach on Road 4 is illustrated, particularly if this intersection is to be signalised.

Measures to enforce the left turn out only from Road 4 maybe required but this could mean that vehicles would not be able to turn right into road 4 and the intersection would be left in left out only.

Facilities are required to enable pedestrians and cyclists to cross Cosgrave Road to reach the wide shared path on the western side of Cosgrave Road and provide active mode connections to the wider community.

A right turn bay on Cosgrave Road for motorists to turn right into Road 4 will be required; the existing flush median is insufficient width to accommodate right turning traffic.

Parahau Road is located just to the north of this intersection. Due to the proximity of this priority controlled intersection this could result in safety and operational issues for vehicles turning to and from Parahau Road. This road may need to be incorporated into the signal control of the intersection, although due to the fact it is offset from Road 4 this could result in complex operation. Road 4 may be better aligned opposite Parahau Road so that the intersection would form a signalised cross-roads.

10.7 Cosgrave Road / Bellbird Street Road 2 – New Signalised Intersection

The southbound Cosgrave Road through lane is poorly aligned such that it partially conflicts with the Cosgrave Road right turn bay into Road 2. The southbound approach should be amended so that the through lane aligns with the southbound exit lane.

Facilities should be provided for pedestrians and cyclists to cross Cosgrave Road. There is a wide shared path on the western side of Cosgrave Road.

There are existing priority controlled intersections north and south of Bellbird Street (Tumu Road to the north and Farmland Road to the south). These intersections have not been taken into account in the design. Vehicles turning right to and from these intersections may affect the safe and efficient operation of the proposed signalised intersection.

The queue lengths for the right turn bay to Road 2 should be reviewed to determine whether they extend back to Farmland Road.

The right turn out of Tumu Road may need to be banned due to the proximity of the proposed signals, however, a physical island would be required to enforce this and that would impact on the right turn into Tumu Road.

The Road 2 approach is designed with the right turn lane as a trapped lane. The approach should be designed so that traffic is directed into the kerbside lane (through and left) and with the right turn lane developing. This is required for safety to avoid motorists changing lanes unnecessarily.

10.8 Mill Road / Airfield Road – Roundabout Upgrade

The proposals seek to provide two circulating lanes at the roundabout. Vehicle tacking needs to be provided to demonstrate that this can operate safely, particularly for heavy vehicles as Airfield Road will provide access to the proposed industrial development as well as other existing industrial developments. A larger roundabout may be required to accommodate the tracking of heavy vehicles. The roundabout would need to be provided with appropriate deflection on the entries to slow vehicles down when travelling through the roundabout.

10.9 Clevedon Road / Cosgrade Road – Upgrade to Signalised intersection

No comments.

10.10 Clevedon Road / Dominion Road / Okawa Avenue – Upgrade to Signalised Intersection

There appears to be insufficient width to provide a pedestrian footpath around the northwest corner of the intersection due to the proposed widening for the left turn lane from Clevedon Road to Okawa Avenue. The design should be altered to ensure that a footpath can be provided, this may include the removal of the dedicated left turn lane.

The right turn movements from Clevedon Road may need to be split phased as these movements may conflict due to the alignment of Dominion Road and Okawa Avenue. This could impact on the intersection operation. Vehicle tracking would need to be provided to demonstrate what turning movements are able to occur together and which movements conflict with each other.

11. Internal Intersections

11.1 General Comment on Priority Controlled Intersections

At the priority controlled intersections where the separated cycle path and footpath crosses these intersections, appropriate facilities are required to ensure that pedestrians and cyclist are able to cross safely. This could include, for instance, raised tables.

At priority controlled intersections, these intersections only indicate that pedestrians or cyclists are able to cross the side roads. There are no facilities, such as pram crossings to enable pedestrians / cyclists to cross the priority road. To improve accessibility for active modes through the development, pram crossings should be provided on the priority roads to enable pedestrians / cyclists to cross the road. Where pedestrians have to cross the cycle lane, facilities to provide priority for pedestrians and to enable them to cross the cycle lane safely should be included.

11.2 General Comment on Signalised Intersections Incorporating the bus way

Many of the signalised intersections with the bus way remove the median island between the general traffic lanes and the bus way (refer to Figure 2 of an example intersection).

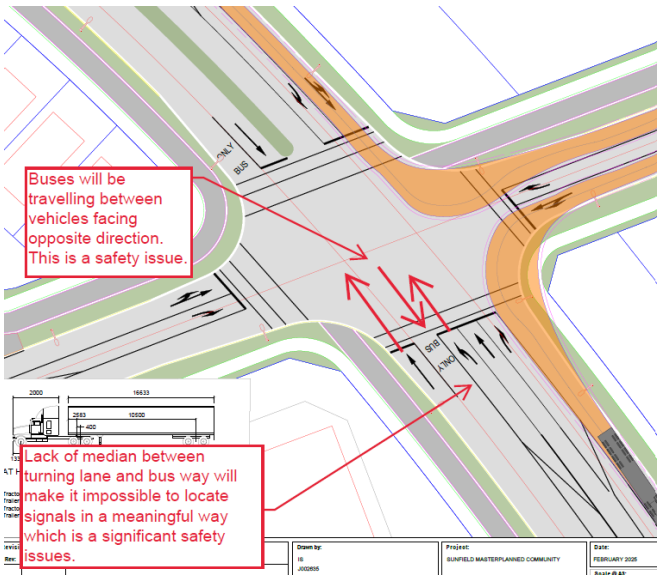


Figure 2 – Example Intersection of Issues Highlighted

The median has been removed to form a left turn lane. This lane is required as the left turn movement needs to be held on a red signal whilst the through movements along the bus way and the general traffic lanes run on a green signal. However the removal of the median island will result in:

- Safety issues with buses travelling in between two opposing traffic lanes (a bus lane and the left turn lane).
- The arrangement will be impractical to effectively and safely signalise the general traffic movements as there is no location to provide a primary signal for the general traffic left turn and through movements.
- The design results in long pedestrian crossing distances which will result in long clearance times. This will impact on the efficient operation of the intersections, including the efficient operation of the bus way.

A median island should be provided between the general traffic and the bus way lanes of sufficient width to accommodate the necessary traffic signals, and to accommodate pedestrians / cyclists, should they become stranded in this median area (due to the length of the crossings). The provision of the median may affect some lot boundaries to provide a wider road reserve.

The design of the intersections will need to ensure that traffic turning out of the side roads turns into the general traffic lanes rather than the bus way. If vehicles enter the bus way by mistake, this may result in vehicles making unpredictable and unsafe manoeuvres to exit the bus way. Clear signage and road markings will need to provided.

The signalised intersections with the busway are very complex and will require careful consideration for the signal phasing and layout of the signal equipment to ensure that they operate safely. Further detail is required to demonstrate how the intersections would operate safely. It is considered that

this cannot be left to EP stage as the intersections are a critical element to provide for the busway and to provide for the priority and frequency of buses through the development. This is a key strand to achieve the 'car-less' development and it will be essential that the intersections work safely and efficiently.

Some lots are proposed to be accessed via signal controlled intersections. This is for safety as vehicles will need to cross the bus way. However, it is not typical practice for private accesses (e.g. JOALs) to be controlled by traffic signals. Where this occurs, it is usually where an existing priority controlled intersection is to be signalised and there is an access that has sufficient traffic volumes that this is needed for safety. It would not normally be the case for greenfield development.

The proposed signalisation of the JOAL vehicle crossings raises safety concerns for pedestrians and cyclists. The movement of these users along the footpaths / cycle paths would need to be controlled by the traffic signals to control conflicts between vehicles and pedestrians/cyclists. Typically at JOAL vehicle crossings, priority is given to pedestrians and cyclists. However, this would not be the case for the signalised JOALs. If traffic movements from the JOALs are relatively low volume, then this may result in pedestrians / cyclists ignoring the signal control. Of particular concern is for the situation where motorists are entering the JOAL from the public road, as these vehicles assume the priority, may be travelling at a higher than desirable speed and pedestrians and cyclists may not be expecting vehicles, particularly as the general road carriageway is somewhat displaced from the footpath and cycle way. Specific comment on these locations is provided below.

11.3 Internal Intersection Specific Comments

The comments on the internal road intersections have generally been ordered by road number. To assist in navigating the comments, intersections have been ordered geographically along each road.

11.3.1 Road 1

The intersections have been ordered from north to south starting from the Airfield Road end.

Road 1 / Road 31 – Signalised Intersection

Road 31 is a short cul-de-sac serving two commercial lots. The need to signalise this intersection is questioned and should be justified as there is a flush median proposed on Road 1 which would provide for a right turn bay for vehicles to wait to turn right into Road 1.

There is a vehicle crossing located immediately north of the pedestrian crossing on the northern leg of the intersection. It is not clear what this vehicle crossing serves. Given the proximity to the intersection this vehicle crossing should be avoided. If it is to provide vehicle access for maintenance for the wetland and is low usage, then this may be acceptable.

Road 1 / Road 5 – Signalised Intersection

The road markings on the Road 5 approach indicate that the predominant movement is likely to be the right turn to Road 1. The road markings should be reviewed and the approach lanes marked so that traffic is directed into the lane that would be the predominant movement.

Road 1 / Road 6 – Signalised Intersection

Vehicle tracking is required at this intersection to demonstrate that there is sufficient width for vehicles to turn at the intersection. Of particular note are the left turns from Road 6 to Road 1 for large heavy vehicles as both Road 1 and Road 6 are designed for industrial traffic; the skewed approach angle of Road 1 to Road 6 will increase the swept path area for large turning vehicles. Additional width may be required to accommodate these vehicle movements which could affect lot boundaries.

Furthermore, it appears that this intersection could be used for buses to enter and exit the bus way as there are bus stops on Road 6 west of the intersection. Tracking for buses will need to be checked.

The cycle crossings do not align with the alignment of the separated cycle lanes along the western side of Road 1 or the northern side of Road 6. The crossing areas on each corner of the intersection should be designed to better cater for pedestrians and cyclists.

Road 1 / Road 32 – Signalised Intersection

A vehicle crossing is provided within the signal controlled intersection. This vehicle crossing will need to be signalised to allow for vehicles to negotiate the bus way and the separated cycle facility safely. The vehicle crossing would appear to be a high use vehicle crossing due to the number of lots and land uses it is proposed to service.

Signalised vehicle crossings can create safety issues for pedestrians and cyclists as the active mode movements need to be signalised to prevent conflicts between vehicles and pedestrians. As pedestrians and cyclists would normally have priority at vehicle crossings the signalised arrangement would be slightly unusual. Some pedestrians/cyclists may choose to ignore the signals and potentially come into conflict with a vehicle either exiting the vehicle crossing or turning into the vehicle crossing.

The layout does not show how pedestrians would cross the cycle lane at the intersection or navigate the vehicle crossing to reach the bus stops to the north when using the southern pedestrian crossing across Road 1. There are zebra crossings shown for the bus stops to the north, but these are not on the desire line for pedestrians at the intersection. For pedestrians using the southern crossing across Road 1, they would need to cross the vehicle crossing. As the vehicle crossing will be signal controlled, additional pedestrian signals would be required for pedestrians to cross the vehicle crossing.

There are two further signalised vehicle crossings to the south of Road 32. It is considered that these vehicle crossings should be consolidated into one and a new signalised intersection created to the south of Road 32. This would:

- simplify the complexity of the Road 1 / Road 32 intersection;
- minimise the risk of conflicts with pedestrians / cyclists;
- improve priority for pedestrians and cyclists;
- improve safety for pedestrians walking around the intersection, including accessing the bus stops to the north; and
- reduce the potential delays to buses along the bus way (by reducing the number of signalised intersections),

Road 1 / Vehicle Crossing Chainage 1300, and Road 1 / Vehicle Crossing Chainage 1420 – Signalised Intersections

It is recommended that these vehicle crossings, together with the vehicle crossing at the Road 1 / Road 32 intersection be consolidate into one vehicle crossing at a new signalised intersection south of Road 32 for the reasons outlined for Road 1 / Road 32 intersection.

The alignment of the northbound lane on Road 1 at each of the signalised vehicle crossings, is such that the lane is aligned to oppose the right turn bay for vehicles turning right into the vehicle crossings. The alignment has been proposed in order to provide separate left turn lanes. The alignment poses a safety risk of potential head-on crashes. The alignment of the through lane should not conflict with the opposing right tun bays. Of particular concern is the access at Chainage 1420 where there is little more than 10m for a northbound vehicle to move across into the northbound exit lane.

There are no pedestrian crossing facilities proposed across Road 1 at these signalised vehicle crossings. Pedestrians may attempt to cross at the signals. Pedestrian crossing facilities should be included within the intersections, particularly as the activities that the vehicle crossings serve may generate pedestrian movements.

Road 1 / Road 18 – Signalised Intersection

The northbound through lane is directly opposed by the right turn movement into Road 18. There is less than 20m for a northbound vehicle to make the transition across to the exit lane. The southern approach should be realigned to remove the potential conflict. This may affect lot boundaries.

Road 1 / Vehicle Crossing at Chainage 1740 – Priority Controlled Vehicle Crossing

A commercial vehicle crossing is proposed at Chainage 1740 which would provide access to a substantial number of residential lots.

There is only one vehicle access to the public road network. The ability for the vehicle crossing to accommodate the anticipated traffic volumes should be reviewed. The vehicle crossing will be high use, and this may impact on the operation of the pedestrian footpath along the eastern side of Road 1. Due to the extensive development that the vehicle crossing would service, this should be a formal intersection. The ability for the one access to safely service this large development should be demonstrated.

Road 1 / Vehicle Crossing Chainage 1890 – Signalised Intersection

The alignment of the northbound lane on Road 1 is such that the lane is realigned to oppose the right turn bay for vehicles turning right into the vehicle crossings. The alignment is proposed to provide a separate left turn lane. This poses a safety risk of potential head-on crashes. The alignment of the through lane should not conflict with the opposing right tun bays.

There are no pedestrian crossing facilities proposed across Road 1 at this signalised vehicle crossing. Pedestrians may attempt to cross at the signals. Consideration should be given to providing pedestrian crossing facilities within the intersections, particularly as the activities that the vehicle crossings serve may generate pedestrian movements and there is the access way to the substantial residential lot east of Road 1.

Road 1 / Road 2 – Signalised Intersection

JOAL S3-7 extends to the road reserve boundary at this intersection. Vehicle access between this JOAL and Road 1 should not be permitted as this will affect the safe operation of the intersection. Pedestrian and cycle movements should however be enabled between Road 1 and the JOAL.

Road 1 / Road 15 – North and South – Priority Controlled Intersection

No specific comments.

Road 1 / Road 16 – Priority Controlled Intersection

No specific comments.

11.3.2 Road 2

Road 2 intersections have been ordered in a west to east direction commencing from the Cosgrave Road end of the road.

Road 2 / Road 8 East and West – Priority Control

No specific comments.

Road 2 / Road 13 East and West – Priority Control

No specific comments.

Road 2 / Road 3 – Signalised Intersection

The primary movement from Road 3 onto Road 2 is marked as the right turn movement. However, (prior to the completion of the link on Road 3 between Roads 4 and 6), it is considered that traffic from Road 3 will be predominantly turning left. The allocation of the approach road markings on Road 3 should be reviewed to favour the predominant turning movement.

Road 2 / Road 14 East and West – Priority Control

These priority controlled intersections are either side of the signalised intersection of Road 2 / Road 12 and east of the traffic signalised intersection of Road 2 / Road 3. Vehicles turning right into these side roads would block the through movements along Road 2. Whilst this is anticipated on local roads where there is no flush median, this could impact on the efficient operation of this section of road due to the proximity of the signalised intersections. This is of particular concern as the intersections provide access to a considerable number of dwellings.

Two westbound lanes are shown on Road 2 on the exit from the Road 2 / Road 12 intersection. A shared through and right lane may create safety issues as through vehicles may choose to change lanes if stopped behind a right turner. The westbound lane configuration should be amended to simplify its layout and to reduce the potential for motorists to become confused and potential for lane changing behaviour.

11.3.3 Road 3

There is only one intersection on this road discussed in this section. The intersections at either end of Road 3 are discussed under Road 2 and 4.

Road 3 / Road 10 – Signalised Intersection

Refer to general comments on busway and bus stop design.

The alignment of the southbound through movement on Road 3 directly faces the right turn bay from Road 3 to Road 10. This could lead to potential head on crashes. The through lane and southbound exit should be aligned so that the through movement does not conflict with the right turn bay.

The northbound bus stop to the north of the intersection juts out into the traffic lane. The traffic lanes should be designed to have an appropriate lateral shift past the bus stop.

Road 10 / Road 11 – Priority Controlled Intersection

JOAL S3-15 is located almost opposite the priority controlled T intersection. Road 10 and Road 11 provides access to a considerable residential catchment, as does the JOAL. Visibility is good along Road 10 and to Road 11 from the JOAL and therefore this should operate safely. However, there will likely be significant volumes of traffic for a JOAL / intersection of this nature.

11.3.4 Road 4

Road 4 intersections have been ordered in a west to east direction commencing from the Cosgrave Road end of the road.

Road 4 / Road 9 West and East – Priority Control

No specific comments.

Road 4 / Road 17 – Priority Control

No specific comments.

Road 4 / Road 3 – Signalised Intersection

The intersection should be designed to be future proofed for the future completion of the connection of the bus loop road between Road 4 and Road 6.

A signal controlled pedestrian crossing facility should be provided on the southern approach to the intersection across Road 3 including the busway. The current design forces pedestrians on the southern side of Road 4 and western side of Road 3 to cross Road 4 to the north before then being able to cross Road 3.

The northbound Road 3 approach to the intersection widens to two traffic lanes before merging to a single lane for the left turn movement only. Whilst this may be an interim arrangement, it is considered that in the interim, only a single lane should be marked, the future through lane should be hatched out for its full length to avoid vehicles having to merge before turning left to Road 4.

11.3.5 Road 5

Road 5 intersections have been ordered in an east to west direction commencing from Road 1 (Road 1 / Road 5 intersection is discussed under the Road 1 section).

Road 5 / Vehicle Crossing JOAL S5-13 – Signalised Vehicle Crossing

This vehicle crossing is signalised. The comments for the other signalised JOALs are applicable to this JOAL in relation to the alignment of the westbound through movement conflicting with the opposing right turn bay and the provision of pedestrian crossing facilities.

Road 5 / Road 28 – Priority Controlled Intersection

A zebra crossing is located just west of the intersection which provides a connection to the bus stops on the south side of Road 5. Road 28 provides the only vehicle access to a substantial area of residential development. The zebra crossing will increase the complexity of the intersection and may impact on its safe operation. It is recommended that the bus stops and the pedestrian crossing be relocated to the west further away from the intersection. This may affect lot boundaries.

Road 5 / Road 26 – Priority Controlled Intersection

The intersection is close to the signalised Road 5 / Road 24 intersection. Queues from the signals may affect the ability for motorists to turn right out of the side road. The operation of the intersection should be reviewed to determine whether this intersection will be impacted by the traffic signals. The intersection may need to be relocated to the east to increase separation between the intersections.

Road 5 / Road 24 – Signalised Intersection

Signalised pedestrian crossing facilities should be provided on all legs of the intersection.

Road 5 / Road 25 – Priority Controlled Intersection

A zebra crossing is proposed immediately north of Road 25. The crossing is proposed to provide access to the bus stops. This arrangement is unsafe as there will be confusing priorities for pedestrians and for motorists.

The northbound bus stop will impede visibility to the zebra crossing.

The northbound lane on Road 5 is directed into the opposing right turn lane at the intersection and would require an abrupt movement across the intersection to avoid the conflict.

The intersection is on the outside of the bend and the general traffic lane feeds directly into the right turn bay. Southbound motorists negotiating the bend will have little visibility or warning that they would need to move across into the kerbside lane just south of the bus stop. This would exacerbate the risk of potential head on collisions with northbound vehicles.

The bus stops should be relocated and the pedestrian crossing moved away from the intersection.

The conflict between the northbound lane and the right turn bay into Road 25 should be removed.

The lane arrangement of the through and right turn bay should be modified so that motorists have clear visibility of the road ahead and of the lane to utilise when travelling southbound through the intersection.

Road 5 / Road 6 – Signalised Intersection

The southern leg of this intersection terminates just south of the intersection. It is assumed that this would be extended in the future to connect to Road 4. This section of road appears to be for bus use only.

The intersection will need to be future proofed for the proposed extension and would need to be designed so it operates safely in the interim period.

There is a through lane marked for southbound traffic on Road 5 although there is no access permitted to the southern leg. This will confuse motorists and will result in some motorists entering the cul-de-sac area and having to use the bus only exit to exit the cul-de-sac. The intersection should be designed in the interim with the through lane removed.

Similarly, if the left turn and right turn movements to the southern leg of the intersection are not to be used in the interim periods, these lanes should not be marked or should be hatched out so that vehicles to not inadvertently attempt to make the turn. The movements could be banned.

11.3.6 Road 6

Road 6 intersections have been ordered in an east to west direction commencing from Road 1 (Road 1 / Road 6 intersection is discussed under the Road 1 section).

Road 6 / Road 27 – Priority Controlled Intersection

A commercial vehicle crossing is proposed opposite Road 27. This vehicle crossing is proposed to provide access to a substantial area of development and is likely to have significant traffic volumes. The layout will effectively result in a priority controlled cross-roads arrangement and could result in safety and operational issues. The vehicle crossing should be repositioned into a location that does not affect the Road 6 / Road 27 intersection.

Road 6 / Road 24 – Priority Controlled Intersection

No specific comments.

Road 6 / Road 21 – Priority Controlled Intersection

A short right turn bay is provided from Road 6 into Road 21. Whilst this serves a relatively small residential area, this may not be sufficient to accommodate a queue of traffic turning right, particularly if there is a queue of traffic from the signals at the Road 5 / Road 6 to the west. Consideration should be given to Keep Clear markings on Road 5 or measures that would enable the right turn nay to be extended.

Road 6 / Road 7 – Signalised Intersection

No specific comments.

Road 26 / Road 26 – Priority Controlled Intersection

There are no defined priorities at this intersection. The normal road rules would apply.

Road 6 / Road 23 – Priority Controlled Intersection

No specific comments.

Road 6 / Road 19 – Priority Controlled Intersection

No specific comments.

Road 19 / Road 20 – Priority Controlled Intersection

No specific comments.

Road 21 / Road 22 – Priority Controlled Intersection

No specific comments.

11.3.7 Road 7

Road 7 intersections have been ordered in a north to south direction commencing from the Airfield Road end.

Road 7 / Road 29 / Road 30 – Roundabout

Vehicle tracking is required at the roundabout to demonstrate that appropriate design and check vehicles are able to negotiate the roundabout which has two circulatory lanes for the north/south movements and to allow for two vehicles to turn into the roundabout from Road 29 and Road 30 simultaneously.

Road 29 and Road 30 are short cul-de-sacs. Two lane approaches are proposed on all legs of the roundabout. Given the length of these cul-de-sacs, the need for two approach lanes for capacity is questioned. Single approach lanes are likely to suffice and would provide safer outcomes. The need for two approach lanes on Road 7 should be justified.

No pedestrian crossing facilities are shown for the roundabout. Facilities should include pram crossings at the roundabout and should enable pedestrians to utilise the approach splitter islands for refuge islands to enable pedestrians to cross the road in two stages.

Road 7 / Road 32 – Priority Control

The Maven drawings indicate that this intersection is to be priority controlled but a pedestrian crossing is shown across Road 32, but no limit lines or pedestrian crossings are shown on Road 7. The provision of the pedestrian crossing indicates that this intersection may be signalised.

If the intersection is to be a priority controlled intersection, the separate left and right lanes on Road 32 should be justified. Vehicles stopped side by side (particularly large heavy vehicles) can impede visibility along the main road for the other vehicle and this can create safety issues.

11.4 Road 16

Road 16 is located at the southern end of Road 1.

Road 16 / Road 16

JOAL S3-3 is located almost opposite the priority controlled T intersection. Road 16 is a local residential street that is loop road. JOAL S3-3 services around 50 dwellings. Due to the offset of the vehicle crossing with the intersection this should not result in significant safety or operational issues.

12. Miscellaneous Comments

The turning head at the end of Road 7 would need to be designed so that semi-trailers are able to turn around. A dimension of the radius of the turning head has not been shown on the drawings.

There are multiple culverts that extend under the proposed roads. Edge protection (such as guard rails or barriers) for pedestrians and cyclists will be required at these locations where they cross roads.

Martin Peake

29 July 2025

Annexure 3:

Sunfield Trip Generation Technical Note - Beca

File Note

By:	Apurba Ghosh and Craig Richards	**Date:**	04 July 2025
Subject:	Sunfield Trip Generation and Distribution Memo	**Our Ref:**	3018407

1 Introduction

Beca has been engaged by Auckland Transport (AT) to provide guidance on the potential trip generation and distribution of trips to/from the proposed Sunfield residential development (a proposed master planned community which borders Papakura and Takanini in South Auckland). Beca has reviewed trip rates using insights from the Integrated Transportation Assessment (ITA) Report, prepared by Commute Transportation Consultants, industry standard guidance and available data.

The purpose of this is to inform traffic modelling analysis to be undertaken by Auckland Forecasting Centre (AFC). This modelling will utilise the AFC Saturn model to identify potential transport network / system impacts of the proposed development should the trip generation be similar to a more typical development. The ITA concludes that the transport network effects of the proposed development are limited to the adjacent network and can be mitigated via specific intersection upgrades. However, this is predicted on a number of critical factors[1];

- Significant limitations in the number of cars on the site (generally 10% of a more standard development) via low car parking provisions
- Provision of frequent and privately funded public transport system linking both internally within the site and the wider network (including town centres and major train stations)
- Encouraging active transport modes through reduction in car ownership and some active mode facilities
- The creation and introduction of a Traffic Plan across the employment zone
- Implementation of the requirement for 75% of the movements relating to the warehouse distribution operation to be confined to off-peak only (being the hours outside of Monday to Friday 7-9am and 4-6pm).

A number of these measures are not specifically controlled through the proposed conditions and we consider these may not be achievable/feasible. In our opinion, AT would need to understand the potential transport network effects or impacts of the development should it proceed as proposed without the necessary car parking and trip making controls in place and effective.

2 Trip Generation

The proposed development includes several land uses which will generate vehicle trips from within and external to the development site;

- Residential, 3,400 dwellings

[1] Sunfield Masterplanned Community Fast Track Integrated Transport Assessment, Commute, February 2025, page 77.

- Retirement living, 600 units
- Employment, 53.9 hectares as a mix of office (14%) and warehousing (86%)
- Town Centre, 7.6 hectares
- A School
- Medical centre, 7,610sqm.

Other land uses such as local retail hubs and open space, parks and reserves are expected to largely cater for local trips and not to generate significant weekday peak hour traffic movements on the surrounding road network. We anticipate that the relevant planning controls will limit the extent of these activities in the relevant zone consistent with this assumption.

Each of the uses listed above is considered below in terms of anticipated trip generation. Linked trips and internalisation are considered subsequently.

2.1 Residential

Dwellings / Houses

The RTA Guide to Traffic Generating Developments provides a framework for assessing the traffic impact of new developments. The RTA Guide suggests that the trip rate for "medium density residential flats and buildings" is applicable where there is adequate public transport accessibility and connectivity to local shopping, schools and local social visits. Given the planned infrastructure and connectivity within the Sunfield development, this proposal trip generation aligns with the medium density residential flats and building in the RTA guide, 0.65 trips per dwelling per peak hour.

This rate is also similar to the residential trip rate defined by Supporting Growth Alliance for the Dury East and West Plan Changes.

Using the trip rate of 0.65 trips per dwelling for medium-density residential flat buildings, the Sunfield development is anticipated to generate approximately 2,200 peak hour vehicle trips across all dwellings.

Retirement

Typically, industry good practice estimates that retirement village trip generation is approximately one third of a similar sized residential development, i.e. the trip rate is around 30% of the residential dwelling trip rate.

On this basis we estimate that the 600 retirement units could generate 130 vehicles trips in the peak hours. This would be a mixture of staff and visitor trips and it is likely to be lower in the morning peak hour when there are fewer visitors.

2.2 Employment

The Sunfield development includes 53.9 hectares of employment land, with 86% dedicated to warehouse distribution and 14% allocated for office.

Based on typical industry experience and local data:

- The trip rate adopted for warehouse distribution is 16 trips per hectare, derived from observations around the Silverdale industrial area.
- For office spaces, we have retained the standard trip rate of 2 trips per 100 sq m as stated in the Sunfield ITA.

Using these trip rates, the peak hour employment trips are estimated as follows:

- Offices: The actual office floor area is not specified in the ITA. We have assumed a floor area to site area ratio of 30% (which allows for roads, parking, open space etc). This results in an office floor area of 22,600 sq m. This generates approximately 450 trips per hour.
- Warehouse Distribution: Across 46.354 hectares, this would generate approximately 740 trips (16 × 46.354).
- Total Employment Trips: Combining both categories, employment at Sunfield could generate up to 1,190 peak hour vehicle trips.

2.3 Local Shopping and Town Centre

The four retail hubs throughout the community are anticipated to serve local residents and not generate significant volumes of external vehicle trips.

While the Sunfield town centre is designed to cater primarily to local needs, it may also generate external trips as there is no control on external visitors travelling to shops within this centre.

Using insights from the Drury Transport Assessment[2], a trip rate of 1.8 trips per 100 sq m has been adopted for estimating the town centre vehicle trip demand.

The 7.6 hectare of town centre (76,000 sq m), with the retail/commercial area spanning about 25-30% of the footprint could generate up to about 340 vehicle trips in the peak hour.

2.4 School

There is no detail provided on the School in the ITA, i.e. primary / secondary and number of students and staff which may not be known at this time.

We have estimated that the school could accommodate 550 students based on an average Auckland school size and is most likely to be a primary school as the catchment may not warrant a secondary school.

Utilising the NZ Transport Agency School Travel Mode tool[3] and the assumptions noted above, the school could be expected to generate around 250 vehicle trips in the peak hours.

For school trips it is noted that this trip generation will coincide with the AM peak hour but there will be less overlap with the PM peak hour, i.e. school trips occur between 8am and 9am and 3pm and 4pm. There will not be many school trips during the commuter peak hour of 5pm and 6pm.

2.5 Medical

The site has a proposed medical centre of up to 7,610 sq m. Based on available survey results of medical centres in urban areas we have access to, the estimated trip rate for medical purposes is 6.3 trips per 100 sq m. Using this rate, the proposed medical centre is expected to generate approximately 480 peak hour vehicle trips.

[2] Reference to be inserted

[3] Reference to be inserted

2.6 Total Potential Trip Generation

The Sunfield development could generate approximately 4,300 peak hour car trips, across the residential, employment, medical and local trips as shown in the Table below:

Table 1: Expected Total Trip Generation (vehicle) for the Sunfield Development in peak hour

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	2,200	2,200
Retirement	33*	130
Employment	1190	1190
Town Centre	85*	340
School	250	0*
Medical	480	480
Total	**4238**	**4340**

* the retirement, town centre and school will have lower trip generation in AM or PM peak due to lower demands during these time of day where other uses will have similar AM and PM trip generation.

2.7 Linked Trips

There will be a proportion of linked trips between land uses, particularly for school trips, i.e. a parent drives to work and drops a child off on the way, creating one trip not two. Without robust information at this time, we assume the following trip proportions would be linked to residential or employment trips and not additional:

- 50% of school trips
- 50% of town centre (PM peak only)
- 20% of retirement; and
- 20% of medical centre trips.

The resulting trip generation is revised below.

Table 2: Total Trip Generation Minus Linked Trips

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	2200	2200
Retirement	33	104
Employment	1190	1190
Town Centre	85	170
School	125	0
Medical	384	384
Total	**4,016**	**4,048**

We consider this to be a reasonable, not worst case, reflection of potential trip generation if restrictive parking, car ownership and public transport measures are not applied as assumed in the ITA. The total trip generation could be higher if the mix of land use, public transport services and active mode facilities are less favorable than assumed.

2.8 Internalisation

As the focus of the AT traffic modelling will be on intersections external to the development site, it is therefore necessary to remove internal vehicle trips, i.e. trips between the residential land use and employment land use that would only travel on the internal road network, from the site trip distribution. **Although, it is worth noting there is no analysis in the ITA into the operation of the internal intersections and this may be warranted if traffic volumes eventuate to be higher than assumed in the ITA**.

For now we have estimated internalisation assuming the following proportion of trips for internal land uses are generated by residents living within the Sunfield site.

- 10% of retirement village trips
- 30% of office employment trips and 20% of warehousing trips
- 25% of medical trips
- 50% of school trips
- 50% of town centre trips
- Residential trip generation will reduce to match the above internalisations.

These reductions have been applied and the reduction has also been removed from the residential trip generation to provide an indication of potential external trip generation.

The resulting external trip generation (trips either departing or arriving to the Sunfield site) is defined below:

Table 3: Resulting External Peak Hour Trip Generation

Land Use	AM Peak Hour Vehicle Trips (8-9am)	PM Peak Hour Vehicle Trips (5-6pm)
Residential	1713	1726
Retirement	29	94
Employment	907	907
Town Centre	42	85
School	62	0
Medical	288	288
Total	**3041**	**3100**

This estimate is roughly 160% or 1,800 vehicle movements higher than estimated in the ITA and used in the ITA traffic modelling in each peak hour.

3 Trip Distribution

3.1 Inbound / Outbound

We understand that the AT traffic modelling will utilise the existing Saturn model and that the model will determine the distribution of vehicle trips to/from the site. The following is provided for information.

We agree with the ITA assumption that 70% of residential trips will be departures in the morning and 30% arrivals, with the reverse occurring in the PM peak. However this will be flipped around for employment, medical and retirement land uses. The school and town centre land uses are likely to have roughly 50/50 inbound and outbound trips in the AM and PM peak hours.

File Note

3.2 Trip Distribution

We have examined the latest 2023 Census data for the four SA2[4] zones surrounding the Sunfield region. These zones — Papakura North East (163301), Twin Park Rise (163302), Takanini South East (162601), and Takanini East (162102) — illustrated in Figure 1 below. The data has been analysed to inform potential trip distribution of vehicles departing / returning from the Sunfield development.

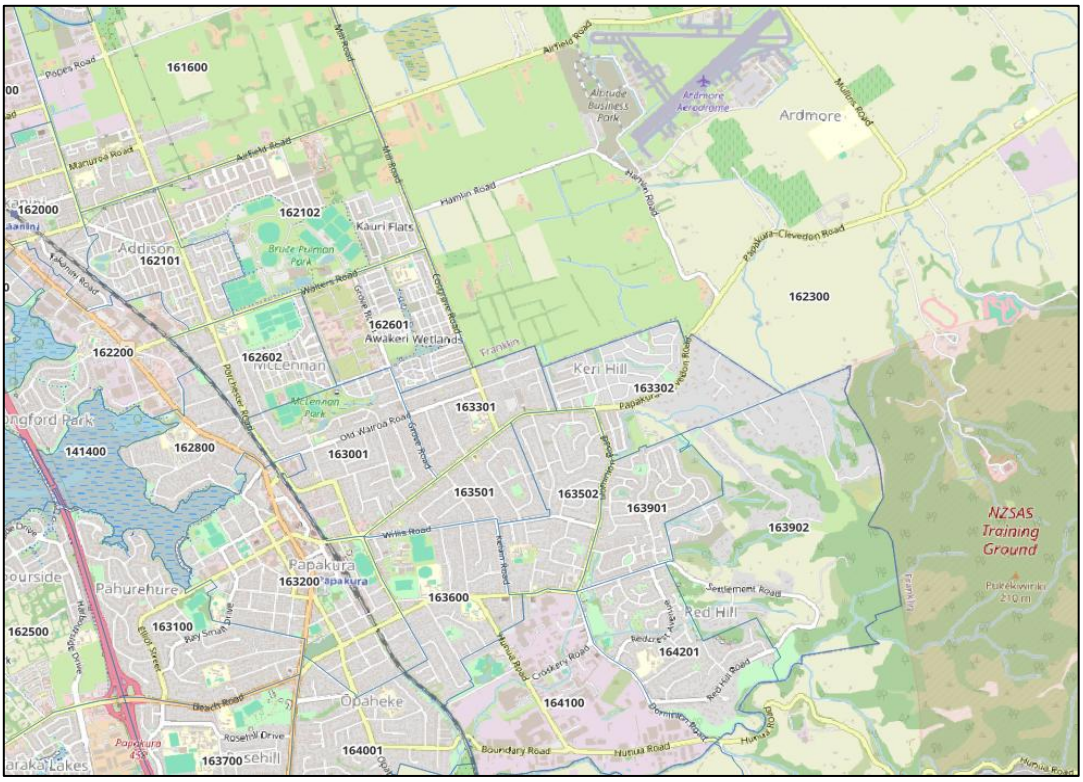


Figure 1: Statistical Area 2 (SA2 Zones) Map

The trip distribution of these four zones provides detailed insights into vehicle trip distribution patterns:

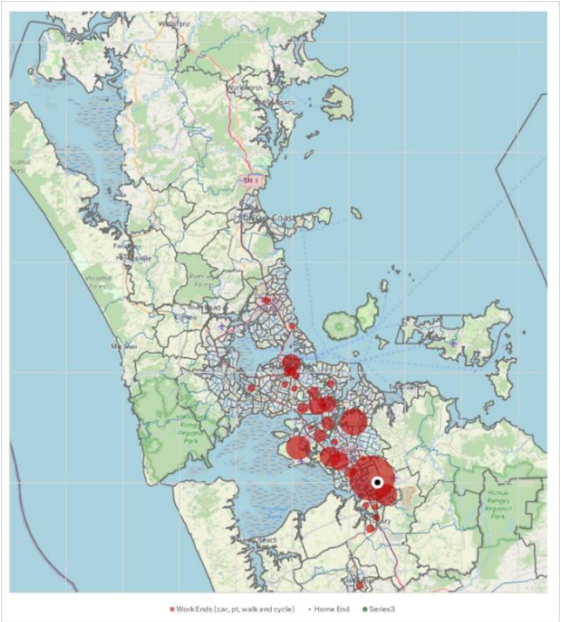
- **Internal Trips:** These account for a major portion of trips, around 35%, as residents prioritise travel within the zone for local activities such as work, school, and shopping. This aligns closely with the 32% internalisation estimated above.
- **External Trips:** Spread across key southern areas like East Tamaki, Takanini, Māngere, Wiri, and Manukau, highlighting strong connections to the wider region.
- **Additional External Destinations:** Includes trips to Penrose and Mt Wellington, reinforcing access to essential services and employment hubs.
- **Trips to Auckland City Centre:** Approximately 6-8% of trips extend to the Auckland City Centre indicating some interaction with the Auckland CBD.

[4] Statistical area 2 (SA2) boundaries set out in the Statistical standard for geographic areas 2023. An SA2 area usually has a shared road network, shared community facilities, shared historical or social links and socio-economic similarities

File Note

The trip distribution for these zones are shown in the following figures.

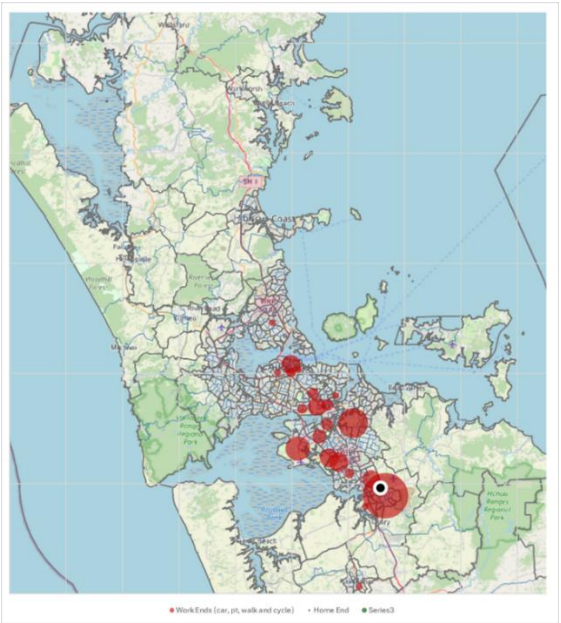
The **Takanini zones**, due to their close resemblance in household characteristics and total trips, are considered representative of the Sunfield zone. Hence, their trip distribution patterns can be adopted for future transport planning in Sunfield.



Trips from SA2 Zone: Takanini East (162102)

SA3 Zone Name	Trip Distribution %
Takanini	35%
East Tamaki	13%
Mangere	10%
Papakura	8%
Manukau	7%
Wiri	6%
Auckland City Centre	6%
Penrose	6%
Mount Wellington	5%
Mangere East	3%

Figure 2: Trip Distribution from Takanini East (162102)



Trips from SA2 Zone: Takanini South East (162601)

SA3 Zone Name	Trip Distribution %
Papakura	36%
East Tamaki	16%
Mangere	11%
Wiri	7%
Auckland City Centre	6%
Manukau	6%
Penrose	6%
Takanini	6%
Mangere East	3%
Mount Wellington	3%

Figure 3: Trip Distribution from Takanini South East (162601)

On this basis there will be a strong distribution to the north from the site, trips are likely to gravitate along Mill Road, Porchester and the SH1 corridor. With very few trips travelling south. However we note future

developments such as those planned in Dury may change this distribution, and the Saturn model is the best tool for predicting future trip distribution.

4 Other Modes

The car trips highlighted in **Section 2** provide the core of trip generation, but additional trips by public transport and active modes like walking and cycling must also be considered, especially with the development's focus on sustainability and accessibility. These will be additional to the aforementioned vehicle trips.

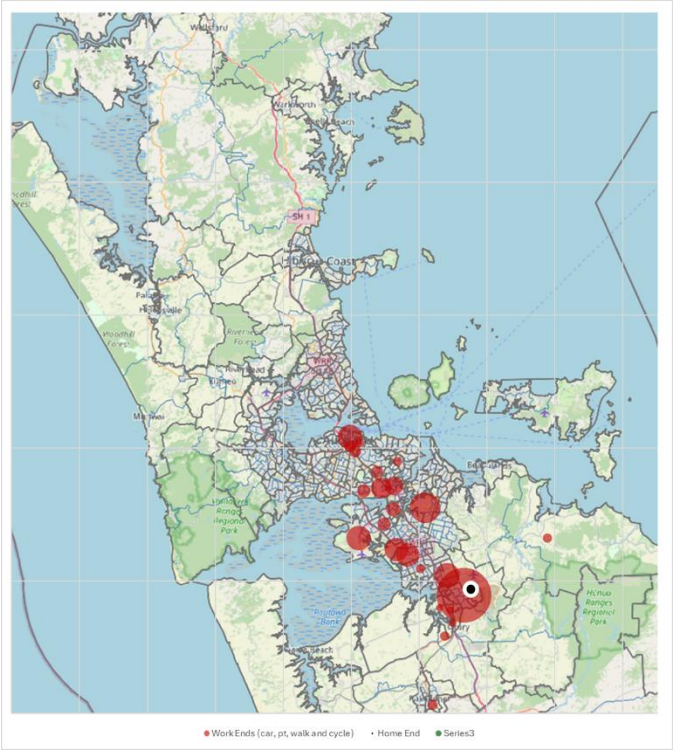
Public Transport – For public transport we assume there will be a regular bus service to and from the site and circulating within. This will not be the 'bus every 400m as assumed in the ITA' but a more likely outcome such as a bus every 5 – 7 minutes. Based on 2023 Census data, PT commuter trips range from 2–4% with school trips averaging 24%. The overall average PT mode share is anticipated to be 9.4%, rounded to 10%.

Walking and cycling – Using the census data the average active mode trips is about 3% for the four aforementioned SA2 Zones. With significant upgrades planned to encourage walking and cycling, mode share projections for Sunfield can increase. The total active mode share can be considered higher than the average of Takaanini and Papakura zones but acknowledging existing barriers to adoption to cycling. It is assumed that the mode share for active modes will be 10% (cycling will reach 3%, while walking is expected to achieve 7% of total active mode trips). While no direct evidence supports this figure, but higher cycle uptake is plausible due to improved cycle-friendly infrastructure such as shared lanes and traffic calming techniques. The walking share assumes a higher uptake compared to cycling, supported by new footpaths, Sunfield's 'Live Local' design principle.

On this basis there is estimated to be around 380 to 400 PT trips and a similar level of walk and cycle trips generated in each peak hour on the external network. The external network and transport system (bus service) design will need to provide for this level of alternative mode trips, otherwise the car trip generation outcome will be higher.

File Note

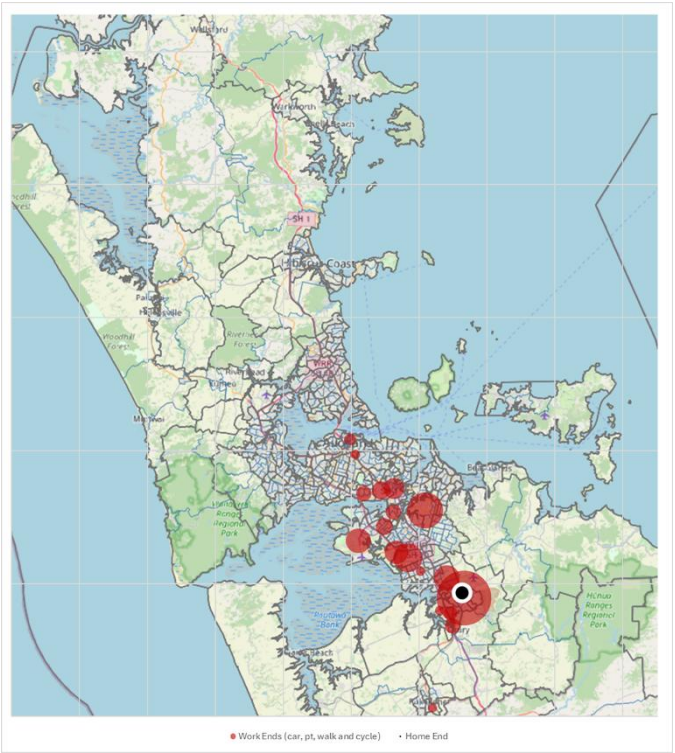
Other census distribution plots



Trips from SA2 Zone: Twin Parks Rise (163302)

SA3 Zone Name	Trip Distribution %
Papakura	38%
East Tamaki	12%
Takanini	8%
Mangere	8%
Auckland City Centre	8%
Wiri	7%
Manukau	7%
Penrose	6%
Mount Wellington	4%
Otahuhu	3%

Figure 4: Trip Distribution from Twin Parks Rise (163302)



Trips from SA2 Zone: Papakura North East (163301)

SA3 Zone Name	Trip Distribution %
Papakura	36%
East Tamaki	16%
Wiri	10%
Takanini	8%
Mangere	7%
Manukau	7%
Mount Wellington	5%
Penrose	4%
Mangere East	3%
Otahuhu	3%

Figure 5: Trip Distribution from Papakura North East (163301)

Annexure 4:

Sunfield Stormwater Review Memo - prepared by Awa Environmental

SUNFIELD STORMWATER REVIEW MEMO

TO:	Neil Stone	**DATE:**	1st August 2025
FROM:	Griffin Benton-Lynne	**PROJECT NO.:**	CS-3685
COPY:	Emad Al-Mundhiry		
SUBJECT:	Awa Environmental SME Stormwater Review of Sunfield Fast Track Application		

COMMENTS TO THE EPA

1. Auckland Council's Healthy Waters and Flood Resilience (HWFR) have undertaken a review of the applicant's flood model and design of stormwater management. While there has not been sufficient time to provide a full, detailed review of the model, it is still possible to draw some conclusions and identify shortcomings. The conclusion of the HWFR review to date of the applicant's model and design, as well as the concerns, questions and comments they have raised and recommendations they have provided are strongly supported by Auckland Transport. The application, as provided, is severely lacking in information, particularly as relates to flood hazard. It has not been demonstrated that the assessments on flooding have been undertaken properly and there are significant gaps in the analysis. There are also significant gaps in the design of the flood mitigation measures that are proposed based on the flood modelling undertaken by the applicant, and yet it has not been shown that the applicant can adequately mitigate the severe risk to the proposed properties, or properties downstream with current proposal nor that these issues can be resolved at detailed design.

Flooding comments:

1. The application is relying on a number of swales and basins to mitigate increased flooding. The design provided shows these devices to extend practically boundary to boundary with flat bases, meaning there is little to no additional space to adjust the design once boundaries are set. Pond 4 is shown as a green space park which has a meandering stream, vegetation and plant, and recreational value in the Masterplan, but this does not appear to be feasible with the current design and would require either compromising on flood mitigation or compromising the water quality treatment, ecological and recreational components of the design.
2. The proposed design relies on a significant amount of interacting infrastructure in a complex manner in order to function and there is insufficient detail provided to confirm whether the design will feasibly achieve the required goals once detailed design begins. No information at all has been provided for Pond 5 and 6, but these are stated as essential for attenuation and preventing worsening of the existing flooding downstream. Without a proper assessment and description of how the proposed infrastructure is to function it cannot be demonstrated that the application will not result in adverse effects for downstream roads and properties. The

applicant must provide sufficiently detailed plans, assessments and models to demonstrate the development can mitigate adverse effects and provide the intended benefits to the region.

3. No modelling of surface flows within the development has been undertaken, instead the model discharges flows from the development into the stormwater devices. The hazard from overland land flows presents to the future residents needs to be assessed to confirm these are within acceptable levels. This should be undertaken now as there is little space available to refine the design and mitigate these effects during detailed design. It is recommended that 2D surface flow modelling be provided as part of the application to ensure all internal overland flow risks are appropriately identified and mitigated and won't clash with or prevent a safe and effective design at detailed design.

4. NZTA has issued a Notice of Requirement (NoR) for the new alignment of Mill Road, which directly clashes with the applicants proposed diversion swale around the eastern edge of the development. Refer to Figure 1 below. It must be demonstrated the applicant's proposed strategy for management of stormwater and flooding can be achieved while meeting the requirements of NZTA's NoR. This does present and opportunity of collaboration between NZTA and the applicant to achieve overall better outcomes for stormwater management and provide improvements to the existing system. Given the existing system is inadequate for a high-density urban area, even if there are no additional flows to the network, which has not been demonstrated, this could be considered a worsening of hazard as more of the public will be exposed to the existing hazard once development is complete.

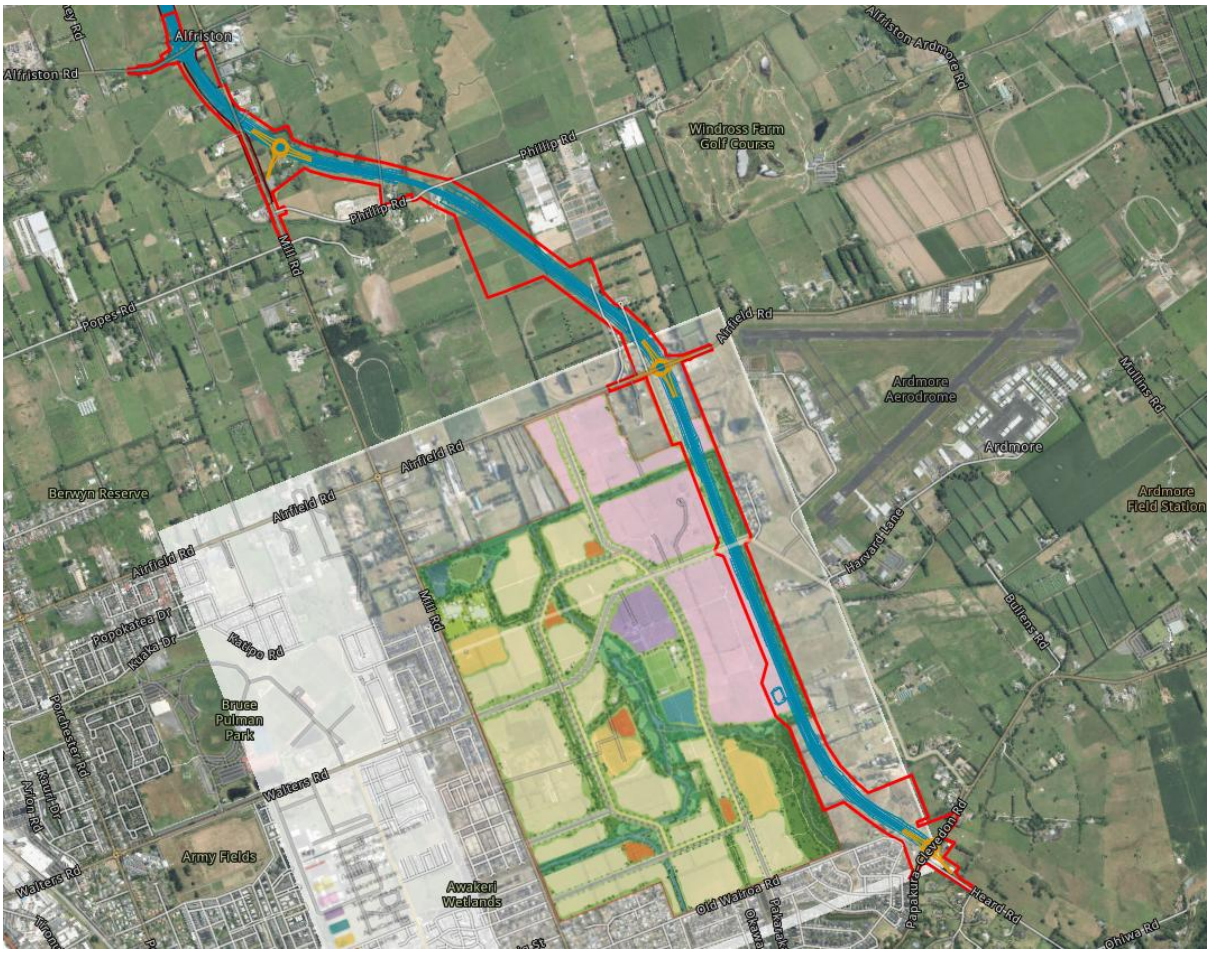


Figure 1: Overlay of NoR with the Applications Eastern Diversion Swale

5. The applicant has adjusted the Mannings values across their eastern HEC-RAS model so that the time of concentration in the eastern HEC-RAS model matches their HEC-HMS models. This is inappropriate as calculations miss the nuances that are represented in 2D hydraulic modelling. The Mannings used in the eastern model is 0.2, which is twice the value specified in the Stormwater Code of Practice for overland flow paths through properties/parcels of 0.1. Explanation on how times of concentration were determined and why the selected Mannings values were determined should be provided. The model should be provided to verify what was used.

6. The rain on grid HEC-RAS model is coarser than typically required for this type of model, as it appears to prioritise model run time at the expense of accuracy. We would expect a more detailed analysis be undertaken given the extent of catchment, flows and potential effects.

7. Catchment scale flood modelling is a mature field in New Zealand and this is a simplistic model. The Water NZ National Modelling guideline would classify the purpose of the model as for "plan changes", "infrastructure design and planning" and "resource consenting". The minimum model type they recommend they call an "integrated (dynamic/complex)". This is defined as "*Integrated models: Comprehensive representation of overland flow with representation of significant flood plain obstacles and major primary pipe networks. Significant topographic and primary stormwater features that influence flows outside the study area are explicitly represented (such as significant culverts and open channels). Direct rainfall or detailed lumped hydrology with allowances for infiltration and drainage systems."* Lack of representation of open channels to sufficient detail (e.g. agricultural drains) and culverts appear as a key gap when comparing to this national guideline. The applicant should update their model to include the open channels and culverts to ensure the proposed mitigation strategy will work as intended.

8. At Pond 1 there is a complicated assortment of infrastructure, and it is unclear how it is intended to function. There are three 'devices', being a swale, a pond and a wetland, that are connected by pipes and/or spillway. It is unclear where water actually comes from or how it enters each of the different sections. Single pipe invert levels are provided, indicating the pipes are flat, which means it's unclear in which direction the flows are intended to drain. At Outflow 1, it is assumed that flow passes forward; however, the mechanism for this is unclear. Are flows drained via pipes or is the spillway engaged? It should be clarified how much flow is attenuated or diverted and provide pre- and post-development hydrographs at Outflow 1 for various storm events and durations and a schematic or narrative explanation should be provided to clarify the hydraulic mechanism of this arrangement of devices and infrastructure prior to consent being granted to ensure there is sufficient space for the necessary infrastructure.

9. The applicant had engaged McKenzie & Co Consultants Ltd to undertake a peer review of the three waters strategy, including flooding. In their review they note:

> "*Given the large contributing catchment and extensive modifications proposed, it is recommended that an independent peer review by an experienced flood modeller is undertaken to confirm the preliminary assumptions and flood model outputs. This peer review should be included in the final report. "*

   AT agrees with this recommendation and requests that this information be provided.

10. McKenzie & Co Consultants Ltd listed the information they have reviewed, namely:

- Preliminary 3 Waters Strategy, Rev F Dated 10/9/2021 – Prepared by Maven Associates
- Preliminary 3 Waters Strategy Report, Rev B, dated 11/12/23 – Prepared by Maven Associates.

Both reports are earlier versions, not the versions submitted for the current application. It is unclear whether McKenzie & Co has reviewed the information submitted to the Environmental Protection Authority and the latest versions of the reports. Neither of the reports McKenzie & Co Consultants Ltd listed was included in the Fast Track application. This should be clarified and confirmed.

11. Flood depth and velocity should be compared across multiple storm events and durations (e.g. 10-year ARI + Climate Change 1hr duration, 6hr duration, 12hr duration, etc.), not just the 24hr. The characteristics of catchments can mean the impact of the development could vary for different durations and AEP levels and the applicant should assess and demonstrate that different durations and ARI levels will not result in hazardous conditions.

12. There are two existing stormwater attenuation ponds on Old Wairoa Road which discharge into the subject site. The Flood Modelling Report only references one of the two ponds which currently discharge into the subject site. It should be confirmed that both are included in the modelling and an assessment of the effects on these ponds should be provided to demonstrate the development will not impact the ability of these two ponds to function as intended.

13. The Flood Modelling Report states that Auckland Council's GeoMaps lists Old Wairoa Road Pond volume as 9,919 m^3. However, this differs from the volume currently showin in GeoMap, which is only 4,895m3. The correct volume should be confirmed.

14. It is unclear what the comparison results in Appendix 7 of the Flood Modelling Report are showing. In Section 5.11 where the results are discussed, the report states that red is a reduction in peak water levels but the appendix notes that red is an increase. What the legend represents needs to be clarified. It seems that blue represents an increase in water level as the channels are shown as blue, but there is also a significant amount of blue upstream (assumed to be flood level increases) of up to 0.5m, including in existing roads such as Pukeroa Place and Old Wairoa Road, as well as private properties. This could significantly increase the risk to road users and endanger private properties and residents.

15. Given there are significant earthworks proposed within the development, the water level/flood level maps do not show the full picture of flooding. Alongside these maps, water depth maps, water depth comparison maps, velocity maps, velocity comparison maps, and depth x velocity comparison maps should also be provided to show a clearer picture of the flood model results. The hazard posed by flooding is a function of depth and velocity, and both are required to determine the hazard.

16.

Non-flooding comments:

1. The applicant is proposing to discharge the 10-year ARI flows to existing farm and roadside table drains as means of primary conveyance for the development. No assessment has been made on the existing capacity in these drains by the applicant, but modelling undertaken by WPS has shown these to be undersized for even the 2-year ARI event, which results in flooding

in Airfield Road and Hamlin Road. The applicant is proposing to attenuate 10-year ARI flows, but no assessment of smaller design storms have been undertaken. Given the table drains are already undercapacity for the 2-year ARI event, additional flows in events less than the 10-year ARI could result in significant increases in hazard for road users. The existing situation is already considered hazardous, but this will be significantly increased with thousands of additional daily movements following the completion of the development. The applicant must provide a detailed assessment of the impact of events up to the 10-year ARI event (e.g., 2-year ARI, 5-year ARI), and different durations and demonstrate that this will not result in hazardous conditions for the residents of this development and the wider public. The applicant should also consider the cumulative effects downstream of the immediate area where the development is situated to ensure adverse effects are mitigated. This matter needs to be addressed now as the design of the stormwater network has practically no flexibility or contingency that could allow the system to be reconfigured to mitigate adverse effects once boundaries are set.

2. It is not clear how the catchment delineation was undertaken. The catchment extent also appears to be incorrect. It is evident in the applicant's assessment that the extent of the model is not appropriate, as there is flooding of at least 0.5 m depth across the model boundary (e.g. Catchment D2 boundary). The applicant is requested to confirm and address these matters.

3. The applicant has stated they intended to use a treatment train approach for managing water quality with catchpit inserts proposed for all public catchpits. Catchpit inserts involve a significant amount of cost due to the need for traffic management requirements for maintenance of these devices in public roads. Auckland Transport will not accept the vesting of these devices once Engineer Approval is applied for, meaning this element of water quality will not be included in the final design. Given the issues raised with the proposed treatment devices (i.e., the ponds and swales), the ability for the development to meet water quality treatments is questionable and could result in significant rework within the development and may lead to reapplying for Resource Consents to allow sufficient space for appropriate treatment devices. The applicant should demonstrate that the proposed stormwater system can achieve the mitigation requirements without compromising other requirements or features of the development.

4. It is a requirement for all bridges and major culverts (i.e., cross section area of 3.4m2 or more) to be designed in accordance with the NZTA Bridge Manual. It is likely some roads would be considered primary or secondary collector roads, such as Road 1. Major culverts under these roads need to comply with Section 2.3.4 (e) of the Bridge Manual, which for Road 1 Culvert 1 means the 1% AEP + CC water level needs to be below the soffit of the culvert. However, the culver currently has the 1% AEP + CC water level 1m above the culvert, meaning a much larger culvert will be required. This should be addressed prior to Resource Consent being granted and boundaries being set as assessment at detailed design stage could lead to boundaries needing to be adjusted if there is insufficient space allowed for. While full assessment and detailed design is not required now, the applicant should provide sufficient detail to demonstrate the culverts and bridges will be able to be designed in compliance with the required documents once detailed design begins.

5. Along with the above, fish passage assessments are required for assets to be vested to Auckland Transport/Auckland Council. Fish passage measures impact the hydraulics of culverts and if they are not considered and designed for, this could result in the proposed culverts having insufficient capacity and requiring redesign. As noted above, due to the limited

area available for changes to the design, this should be fully considered prior to consent being granted. The applicant should demonstrate the design meets requirements for the fish passage and that any fish passage measures proposed do not compromise the capacity of culverts.

6. No culvert blockage assessment has been provided as part of the application documents. Culverts can be susceptible to blockages, particularly in high density developments where debris such as rubbish bins can be swept into channels, fully or partially block culverts. The risk of blockage and the potential impacts of blockages should be considered now and it should be demonstrated the proposed design will be able to meet the requirements within the boundaries set by the Resource Consent.

7. Culverts and bridges require access for operation, maintenance and repairs which has not been covered in this application. This should be addressed now avoid the need for changes to the Resource Consent if insufficient space is allowed for.

8. Roads to be vested to Auckland Transport that have overland flow paths are to meet the hazard requirements set out in Table 3 of the Road Drainage chapter of the TDM, i.e., maximum depth x velocity products and maximum energy grade lines for transverse flows. The applicant should provide this assessment to demonstrate over land flows can be safely managed and integrated with the developments stormwater strategy.

9.

Summary:

The stormwater design as currently proposed does not demonstrate sufficient technical robustness or flexibility to mitigate flood and safety risks to acceptable levels. The gaps in modelling, infrastructure detailing, and conflict with strategic transport infrastructure (Mill Road NoR) raise significant concerns. Without substantial revision and further detailed assessment, the application cannot be supported from a flood risk or stormwater management perspective. We recommend the application be put on pause so there is the opportunity to collaborate with Auckland Transport, Auckland Council, NZTA and other stakeholders to provide an integrated design that enhances the outcomes of the development and ensures that negative impacts can be mitigated.

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GRIFFIN BENTON-LYNNNE

WATER INFRASTRUCTURE ENGINEER

a: 4 Williamson Ave, Grey Lynn, Auckland 1021

m: +64 22 035 1501 e: griffin.benton-lynne@awa.kiwi w: www.awa.kiwi