



**Kingseat Primary School Notice of Requirement
Integrated Transport Assessment**

Ministry of Education



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Quality Assurance Information

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1. Introduction

The Ministry of Education (MOE) commissioned Abley Limited (Abley) to prepare an Integrated Transport Assessment (ITA) for the Notice of Requirement (NoR) for a full primary school (Years 0-8) in Kingseat. The MOE serve NoRs to designate land for educational purposes and protect the land for future development. In the case of schools, the designation authorises the MOE to undertake property projects on designated school sites within the scope of 'education purpose'.

The site of interest is located within the Kingseat rural village located in west Franklin approximately 45km southwest of central Auckland and 15km west of Papakura township. The site is located approximately 300m from the planned local town centre to the west which will feature an upgraded, controlled intersection. The Kingseat School Site Selection plan was prepared by Abley on 17 August 2018 and indicated this site as a potential school site. The purpose of this ITA report is to evaluate and assess the transportation effects of Kingseat Primary School.

A pre-application meeting with Auckland Council (AC) and Auckland Transport (AT) was held on 21 May 2020. AT followed up with feedback from internal specialists on 27 May 2020. Client response to AT's specialist comments are provided in Appendix A.

1.1 School Overview

The proposed school will have a masterplan roll of up to 900 students with an estimated first build roll of around 300-350 students. It is anticipated that the school will be open by 2025. The school will require an assumed staff of 45 based on a 1:20 staff to pupil ratio^[1], plus an additional five teachers for the satellite unit.

A satellite unit and an Early Childhood Centre (ECE) is proposed on-site. The satellite unit will cater for approximately 18 students which is included in the masterplan roll of 900. The Early Childhood Education (ECE) centre will cater for approximately 50 pre-school children.

As is typical for a school catering for Years 0 to 8, some or all of the following are expected to be developed on the site:

- Buildings; including classrooms, hall, library, administration office space, staff workspace, caretakers' facilities, sick bay etc.
- Playing fields, hardcourts, playground structures
- Vehicle accessways, parking space for staff and visitors; and temporary pick-up and drop-off areas
- Footpaths, landscaping and fencing
- Servicing; including water, sewer, stormwater, electricity, heating, telecommunications and outdoor lighting

The Kingseat area is currently rural with minimal development. The Kingseat Precinct Plan allows for future development estimating a population of approximately 5,000 in a relatively compact area surrounding the future town centre. The need for a primary school in the area is based on this future residential growth.

[1] Milne, A, S Rendall and S Abley (2011) National travel profiles part B: Trips, trends and travel predictions. NZ Transport Agency research report 467.94pp.

2. Site Description

2.1 Site Location

The proposed school site is located on the northern parcel of land at 1043 Linwood Road in Kingseat and shown in **Figure 2.1**, which has a total area of 4.4 hectares. The local town centre is located approximately 300m to the west of the site, where Linwood Road intersects with Kingseat Road.

The site has a 140m frontage onto Linwood Road. Linwood Road is a sealed rural road, which has one lane in each direction. There are currently no footpaths, cycle facilities or on-street parking however it is anticipated that Linwood Road will be upgraded by local developers. The current speed limit outside the site is 100km/hour which reduces down to 70km/hour just west of the site. AT have confirmed that the speed limit will reduce in the future to cater for a built-up environment expected as the area develops.

The neighbouring property to the east of the site is understood to be a Council reserve, with the likelihood of sports grounds occupying the site in the future.



Figure 2.1 Site Location

2.2 Zoning and Surrounding Land Use

The Kingseat Primary School site spans over two zones being Residential – Mixed Housing Suburban Zone and Residential – Single House Zone under the Auckland Unitary Plan Operative in Part (AUPOP), as shown in **Figure 2.2**.

The land directly to the west of the site is also zoned as Residential with Business - Local Centre Zone and Business – Light Industry Zone further to the west where the future town centre will be located. The land directly east and south of the site is zoned as Open Space – Sport and Active Recreation zone, with the vast area further south remaining rural with a Rural – Rural Production zoning. The area to the north of the site is zoned as Residential.

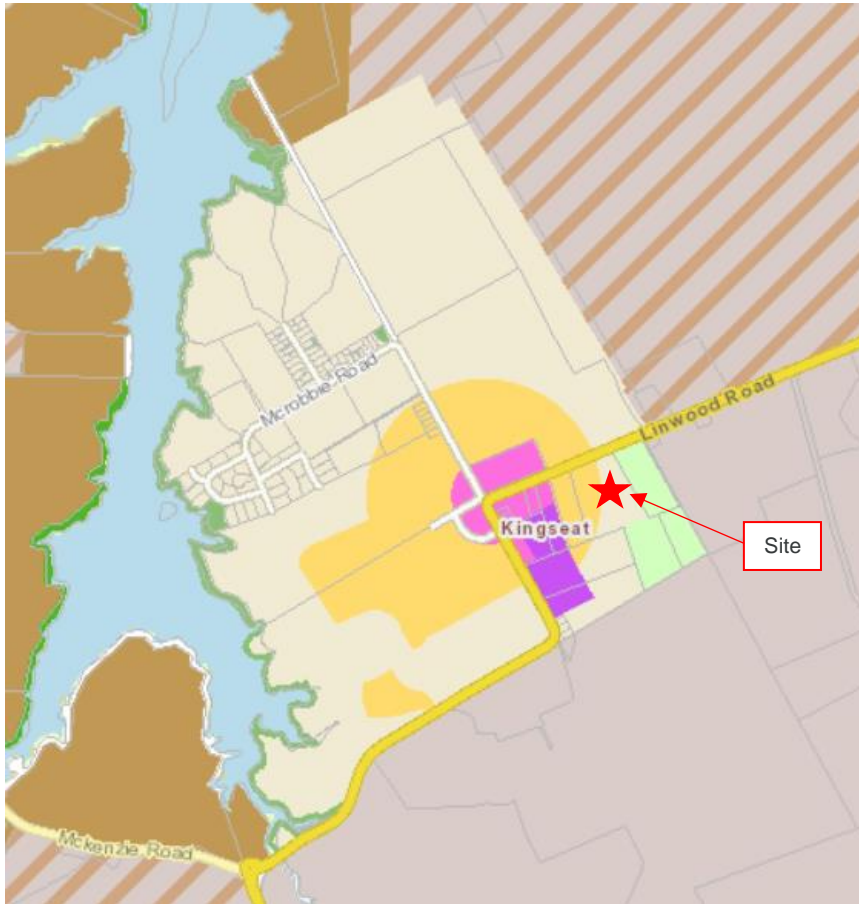


Figure 2.2 Zoning Map

2.3 Kingseat Precinct Plan

Chapter I of the AUPOP includes a Precinct Plan for Kingseat (I418) and a Kingseat Precinct Appendix (I418.11.5). Precinct I418 provides a vision for the area and identifies areas for future development. It also provides an indicative future road network and typical road cross-sections for the new roads. Specific details of the Precinct Plan are referred to throughout this ITA.

3. Transport Environment

The application site is located in Kingseat, approximately 45km southwest of Auckland central. The majority of the existing roads in the area are rural roads without footpaths or cycle facilities for the most part. This will change as development occurs along with the urbanisation of the roads in accordance with the Kingseat Precinct Plan.

3.1 Existing Road Network

The majority of the roads in the Kingseat area are rural roads, with one lane in each direction and narrow shoulders. There are no footpaths, cycleways, on-street parking or kerb and channel for the large part, with the exception of limited facilities near the town centre.

Linwood Road

Linwood Road generally runs west to east and is the key route into Kingseat and the wider area from the east. It is classified as an arterial road in the AUPOP. Linwood Road is a sealed two-way road with centreline and edge line markings. There is no footpath or on-street parking facilities. The posted speed limit is 100km/hour which reduces to 70km/hr as it reaches Kingseat town centre. The vehicle operating speeds as identified in the Speed Management Framework are between 80km/h to 84km/h.

Linwood Road is long, straight and relatively flat. It has a total road reserve width of 25 metres outside the site which increases to 30 metres at the western end. The carriageway of Linwood Road is approximately 7 metres wide with 3.5m wide lanes.

The most recent traffic volumes recorded on Linwood Road are dated February 2020. The total traffic volumes in both directions is 641 vehicles per hour (vph) in the AM peak; 407 vph in the interpeak hour and 673 vph in the PM peak.



Figure 3.1 Linwood Road looking west from the school site

Linwood Road / Kingseat Road / McRobbie Road Intersection

The three main roads in Kingseat intersect at the location of the town centre, approximately 300m west of the school site. Geographically, Linwood Road forms a T intersection linking into Kingseat Road and McRobbie Road. However, the layout of the intersection is somewhat unusual with the priority movement given to Linwood Road and Kingseat Road around a relatively tight bend in the road. Vehicles on McRobbie Road give way to Linwood Rd – Kingseat Road traffic.

Kingseat Road

Kingseat Road is classified as an arterial road in the AUPOP. Like most of the roads in the area, it is currently a two-way sealed road with no pedestrian or cycling facilities with the exception of some limited footpath at the town centre. The posted speed limit is 70km/hour at the eastern end of the road.

The most recent traffic volumes recorded on Kingseat Road are dated February 2020. The total traffic volumes in both directions is 592 vph in the AM peak; 363 vph in the interpeak hour and 597 vph in the PM peak.

McRobbie Road

McRobbie Road is a collector road that runs north-south which connects into the main intersection at the town centre. There are no footpaths or kerb and channel, with a posted speed limit of 70 km/hour.

There are no recent traffic volumes available for McRobbie Road. According to traffic counts on the Auckland Transport website, traffic volumes in 2007 on McRobbie Road were 54 vehicles in the peak hour.

Walking and Cycling Facilities

There are very few existing walking or cycling facilities in the area. The main roads do not currently have footpaths and there are no dedicated cycle facilities. This will change as the area develops.

3.2 Proposed Road Network

Local road network around school site

Chapter I of the AUPOP includes a Precinct Plan for Kingseat (I418) and a Kingseat Precinct Appendix (I418.11.5). Precinct I418 provides an indicative future road network as shown on *Precinct Plan 2 – Development Plan* in **Figure 3.2**. The *Development Plan* shows indicative roads on or near the western, southern and eastern boundaries of the school site. These are displayed as blue and black dashed lines. Given development has not started in proximity to the school site, it is still unknown whether the indicative roads are key to the future development in the area.

As shown on the site layout plan in **Figure 5.1**, the MoE have allowed for approximately 10 metres on the western and southern boundaries of the site if there is need for a future road on either boundary. It is understood that the property directly east of the school site is to provide access for the parcel of land on the southern boundary of the proposed site. It is unknown at this stage whether this will be a public or private access in future.

It is currently unknown when development and associated road upgrades will occur in proximity to the school. It should be noted that the school will open when/after development has occurred, that is, when there are school children living in the area to attend the school. It is anticipated that further knowledge on the infrastructure surrounding the school may be known at OPW stage. The requirement for appropriate infrastructure for the opening of the school may be addressed by way of NoR conditions.

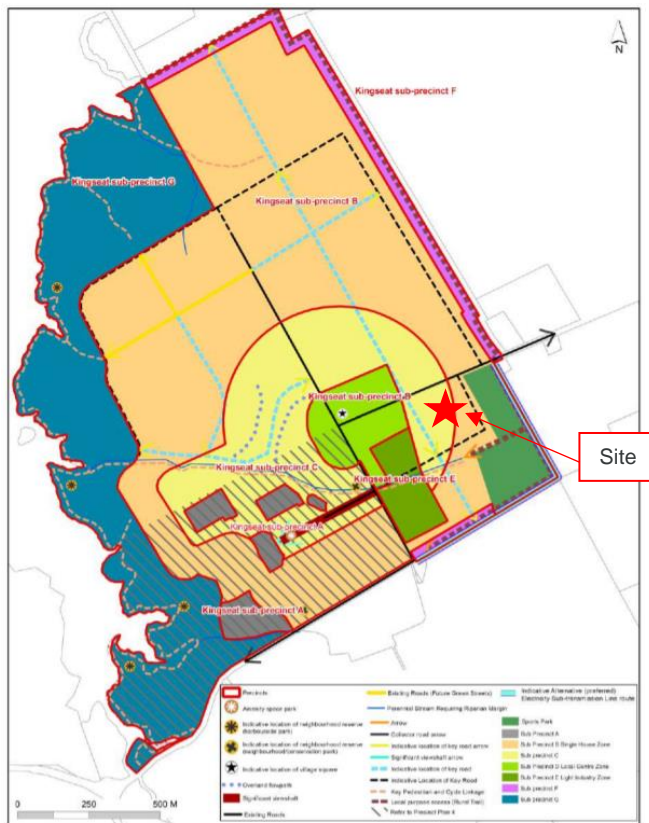


Figure 3.2 Precinct Plan 2 – Development Plan
Linwood Road

It is understood that the main roads throughout the precinct will be upgraded in accordance with the precinct plan, or where more appropriate, Auckland Transport’s Transport Design Manual. The Kingseat Precinct Appendix (I418.11.5) provides typical cross-sections for the upgrade of the main roads in the Kingseat area. The *Type A2 – Collector Route with Urban Interface* in the abovementioned appendix is likely the most appropriate cross-section in terms of the function of the road. However, the design of the new Kingseat area will also need to reference Auckland Transport’s Transport Design Manual (TDM).

Chapter 4 of Auckland Transport’s Roads and Street Frameworks (RASf) in the TDM provides typical road and street typologies based on place, movement and function. Based on the forecasted traffic volumes and the anticipated function of the road, it is expected that the cross-section of Linwood Road may be designed based on a Mixed-Use Arterial with 5,000+ vehicles per day. According to the RASf, the characteristics of a Mixed-Use Arterial is 2-4 lanes, a central median to separate traffic and accommodate turning movements, and walking and cycling infrastructure. The target design speed is 30-40kph. The school site is likely to be adjacent to future gateway treatment as Linwood Road enters the new town centre, where a lower speed of 30-40km/hr is appropriate. A typical cross-section for a Mixed Use Arterial is referred to in **Figure 3.3** below. It is unlikely that bus lanes would be required however given the limited public transport in the area.

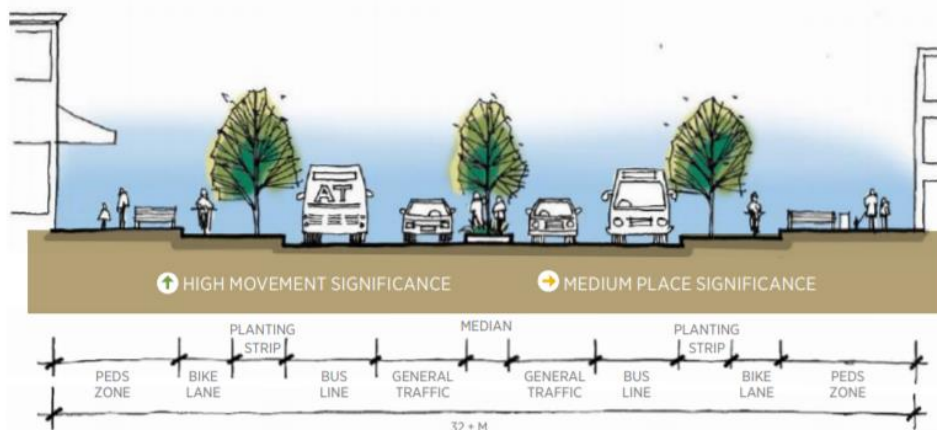


Figure 3.3 An example cross-section for a Mixed Use Arterial Road (Source: AT's Transport Design Manual)

Linwood Road / Kingseat Road / McRobbie Road Intersection

This key intersection lies at the hub of the town centre. Previous transport reports for development on Kingseat Road (former Hospital site) and McRobbie Road have modelled this intersection and determined the need for an upgrade to either a roundabout or a signalised intersection. It is understood that the type of intersection has not yet been confirmed. The upgrade will provide the additional capacity needed to support future development in Kingseat, and deliver a safer intersection.

Walking and Cycling Facilities

The Kingseat Precinct Appendix provides several cross-sections for the future Kingseat roading plan. All the cross-sections provide for footpaths on both sides of the street resulting in a connected and walkable road network. The cross-sections show cyclists accommodated within the carriageway.

When designing for walking, scooting and cycling the following key components need to be considered:

- **Desire lines** – children who travel by active modes are likely to follow their desire line. Crossing points and paths should be located on desire lines so that they are used. Desire lines can also assist with understanding where the pinch points, warranting detailed attention, will be.
- **Interactions with Other Modes** –The layout of a site needs to be designed so that interactions between children walking, scooting or cycling to school and motor vehicles are minimised. Crossing points and paths also need to be located so that no hazards are introduced along the route.
- **Path and Crossing Design** – Both within the site and outside the school gates, paths need to have the capacity to accommodate the expected flows and mix of uses.

3.3 Public Transport

There is currently one bus service that services the Kingseat area. Bus Service route no. 395 travels between Papakura train station and Waiuku via Linwood Road and Kingseat Road. The 395 route operates weekday peak services only with two AM and two PM services. The route can be seen in **Figure 3.4**.

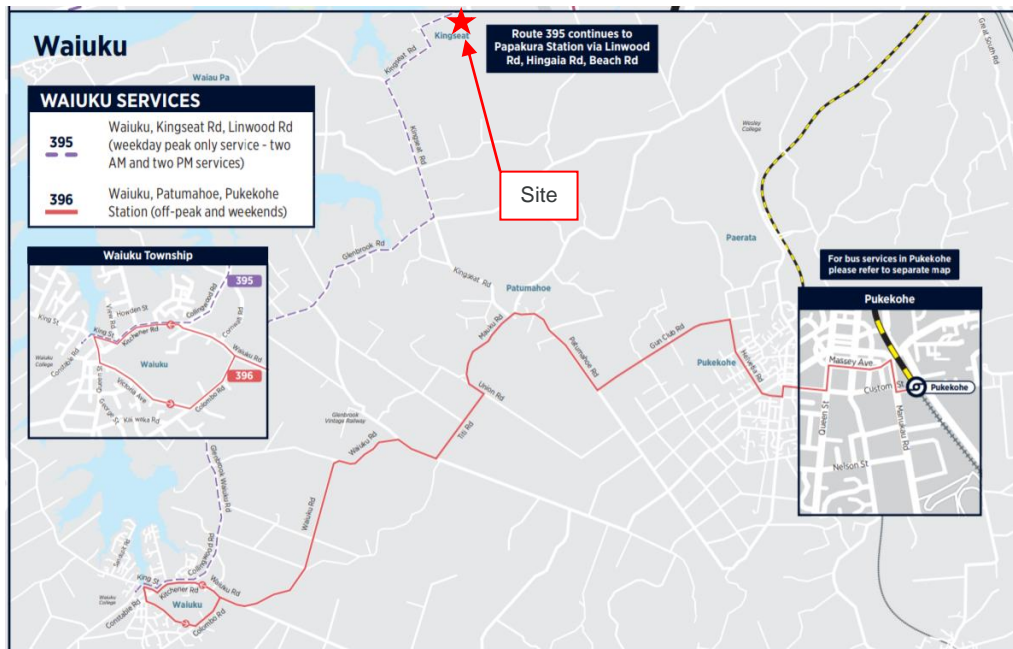


Figure 3.4 Bus Service in Kingseat

3.4 Road Safety

To understand the existing safety performance of the road network in the vicinity of the site, crashes that were recorded within the last five years (2015 – 2019 inclusive) were obtained through the NZTA Crash Analysis System (CAS) database. The extent of the crash search area is shown in **Figure 3.5**. A total of nine crashes were recorded, of which six crashes resulted in no injuries, two crashes resulted in minor injuries, and one crash resulted in a serious injury. Two crashes occurred along Linwood Road near the frontage of the site with no predominant crash type. The remaining seven crashes occurred at the intersection of Linwood Road and Kingseat Road, with the predominant crash type being loss of control and cutting the corner. This crash type can be attributed to the existing geometry of the intersection. The CAS collision diagram is shown in **Figure 3.6**.

The roading network is likely to undergo significant upgrades before the opening of the school. The upgrade of Linwood Road and the Linwood Rd / Kingseat Rd / McRobbie Rd intersection will provide a safer environment for a future school.



Figure 3.5 Crash Search Area

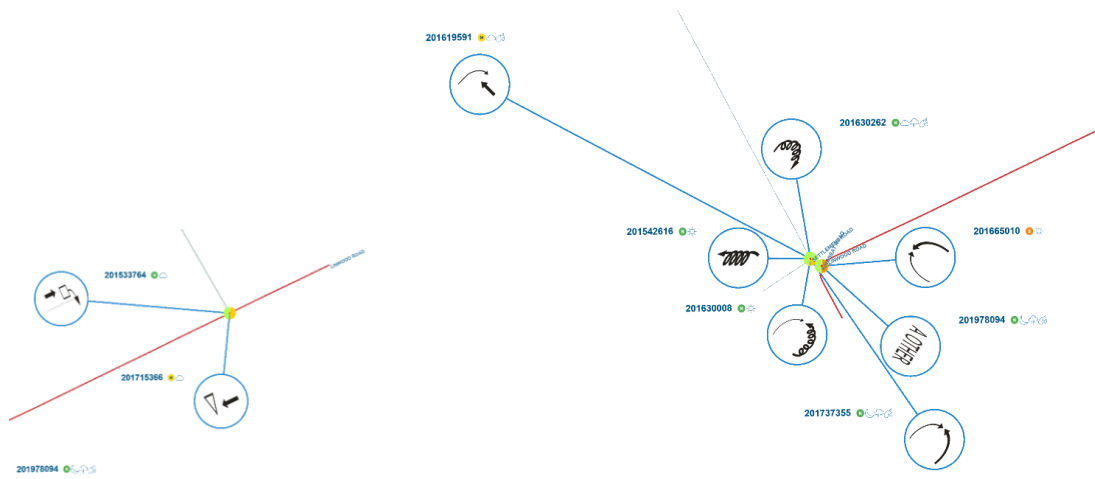


Figure 3.6 CAS Analysis - Collision Diagrams

4. Strategic Context

4.1 Relevant Strategies and Policies

The following relevant regional and local plans need to be considered from a transport perspective to ensure consistency with outcomes.

Auckland Plan

A 30-year strategy to manage Auckland's growth and development. The plan identified three major challenges facing Auckland:

- Population growth and its implications
- Sharing prosperity with all Aucklanders
- Reducing environmental degradation

Some of the transport related focus areas of the plan include making walking, cycling and public transport preferred choices, reducing death and serious injuries on the road, and developing a sustainable and resilient transport network. The plan acknowledges that not many Aucklanders use their bikes to travel to school. Getting more children to cycle will ease congestion, reduce the environmental impact of travel, and improve the health of those that cycle. Auckland Council has indicated cycling infrastructure as an area for increased investment.

Auckland Regional Land Transport Plan

A 10-year transport investment programme for Auckland. The programme aims to encourage a move away from single-occupant vehicles as the dominant mode of travel, and toward public transport, walking, and cycling. It will lead Auckland towards being a city where there is growth without increased congestion and one with multiple and genuine travel choices.

In order to address Auckland's challenges, the plan tracks the active and sustainable mode share at schools as a performance measure. The plan seeks to achieve 45% active and sustainable mode share by 2028.

Auckland Future Urban Land Supply Strategy

The Auckland Future Urban Land Supply Strategy sets out how and when new urban land is to be supplied for development. The Kingseat area has been tagged as 'Development Ready' and marked as a Live Zoned Area in the 2012-2017 time period. The anticipated dwelling capacity for the Kingseat area is approximately 1,842 dwellings.

Supporting Growth Alliance

The Supporting Growth Alliance is a collaboration between the NZ Transport Agency and Auckland Transport to carry out the planning phase of the Supporting Growth Programme, with focus growth areas in Warkworth, North, Northwest and South Auckland. The Alliance provides route protection for preferred future transport networks. Kingseat is outside of the current scope however the *South Indicative Strategic Transport Network* shows safety improvements along Linwood Road and Kingseat Road as shown in **Figure 4.1**.



Figure 4.1 South Indicative Strategic Transport Network

4.2 Engagement with Council

Engagement with key organisations has been undertaken as part of the preparation for this ITA and is expected to continue as the proposed school is developed. These are listed and summarised below in **Table 4.1**.

Table 4.1 Summary of engagement

Organisation	Engagement	Feedback
Auckland Transport (AT)	<p>11 May 2020 Kick start meeting with Kevin Wong-Toi, Principal Planner and Liam Burkhardt, Planner</p> <p>15 May 2020 Modelling data from Auckland Forecasting Centre – Jojo Valero</p> <p>21 May 2020 Pre-application meeting</p> <p>27 May 2020 Feedback from AT's internal specialists</p> <p>11 August 2020 AT provided feedback on the draft ITA. AT requests for further information and MOE's response is summarised in Appendix A, and incorporated into the final ITA.</p>	Main discussion was the location of school access points given the area is currently undeveloped and the local road network is unknown. Refer Appendix A for detailed comments on AT feedback.
Auckland Council (Council)	<p>21 May 2020 Pre-application meeting.</p>	MOE to progress with preparation of the NoR application.
Supporting Growth Alliance (SGA)	<p>23 April 2020 Email from Angelene Burn, Engagement Manager</p>	Kingseat area is currently out of scope for SGA, although safety improvements are proposed for Linwood Road (refer section 4.1)

4.3 Summary

From the review of the strategies and plans the following transport aspects need to be considered in the development of the site for use as a school.

- **Accessibility** – The school site needs to have a high level of accessibility by all modes to support travel choice. This means that access by modes that encourage active modes and reduce dependence on private vehicle are provided for through a site that is well connected with the surrounding transport network.
- **Safety** – Access to the school is developed with safety as key criteria. This means measures such as suitable road crossings and safe pick up and drop off area. It is important that safe vehicle speeds around the school site be encouraged through road design, monitored, and enforced.
- **Efficiency** – The traffic generated by the site should not have an unacceptable adverse impact on the surrounding road network in terms of travel time. Fewer vehicle trips will lead to reduced environmental degradation.

Over the next 10 years, Auckland is expected to grow by 300,000 people, and existing and new transportation challenges will grow with it. The Kingseat development and Kingseat Primary School will help to support that growth. The planned school can comply with the objectives of the listed plans and strategies.

5. Proposal

A new full primary school (Years 0-8) is proposed in response to the future development in the Kingseat area. The school will grow as development occurs throughout Kingseat. The initial build will cater for up to 350 students, with a masterplan roll of up to 900 students. The school will provide both a satellite unit and an Early Childhood Education (ECE) facility.

5.1 Site Layout and Access

As the road network is not yet developed in the area, the only existing road frontage for the school site is Linwood Road. **Figure 5.1** shows a feasibility plan based on the existing road frontage to Linwood Road. This scenario has been prepared as a basis for assessing the effects of the school, although at the time school development proceeds there may be other road frontages available. From a transport effects perspective, the feasibility plan can be considered to be a worst case scenario. Based on the feasibility plan, the access to the staff / visitor car parking area and the pick-up, drop off (PUDO) zone are off Linwood Road. The PUDO will be a one-way system with two vehicle crossings, an entry only access at the eastern end of the site and an exit only at the western end of the school site. The one-way operation of the access points reduces traffic movements resulting in fewer conflict points and a safer access.

The access will be designed to accommodate tracking for buses, service vehicles and emergency vehicles. Linwood Road is straight and flat resulting in very good sight lines in both directions. Appropriate sight distance between drivers exiting the site and approaching drivers on the frontage road will be provided at the access points.

Pedestrian and cycle access will be separated from the vehicle access allowing for a separation between vehicles and school children entering and exiting the school grounds on foot. Further design of the pedestrian and cyclist access points will be developed at Outline Plan of Works (OPW) stage taking into account accessibility, safety and desire lines.

It should be noted that the location of the pedestrian crossing in the Feasibility Plan Layout is indicative only and the final location of the crossing will be determined by the queueing requirements needed for the access points. The SIDRA assessment demonstrates that the maximum queue experienced in all scenarios on the Linwood Road (West) approach is 2.4 vehicles (16.5m) which, factoring in the long frontage of 140 metres means that adequate separation between the pedestrian crossing and the access points can be comfortably achieved.

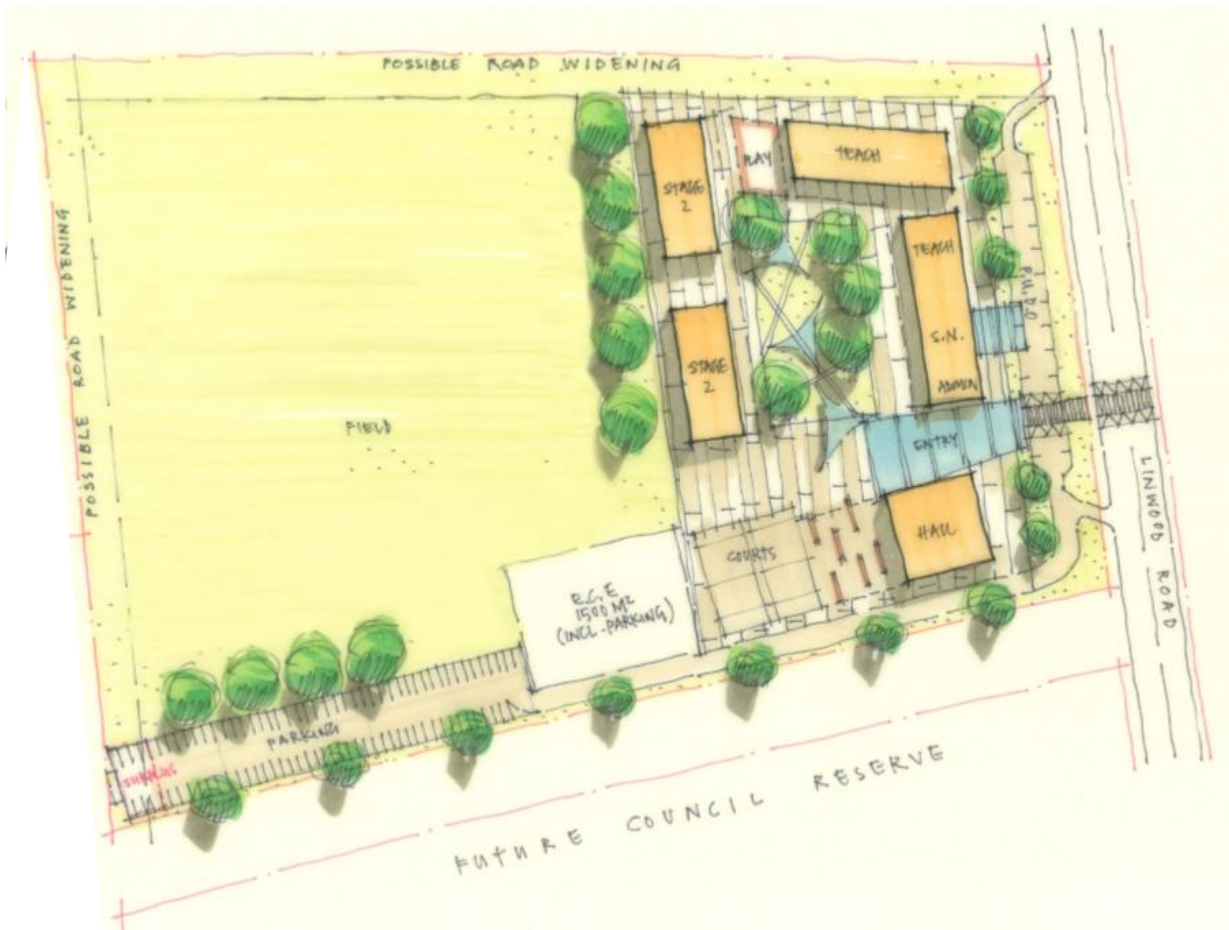


Figure 5.1 Feasibility Plan Layout

5.2 Pick Up Drop Off (PUDO) Area

The school site benefits from a 140-metre frontage along Linwood Road which provides for a generous PUDO area with a potential capacity of up to 30 parking spaces. Design options will be worked through at OPW stage which may include opportunities for access via other roads, that may be constructed in the future, in accordance with the Precinct plan. There are options for the PUDO to cater for pick up drop off; and P5 to allow for caregivers to escort their children into the school grounds. The PUDO can also be used during the school day for service vehicles, mobility access for students accessing the satellite school and buses for field trips etc.

5.3 School Roll

The proposed school is expected to have an opening roll of 300-350 students, with the potential of growing up to a masterplan roll of 900 students. The school build has an indicative opening date of 2025. The school is also catering for a satellite unit and an ECE centre on-site.

ECE Facility and Satellite School

An Early Childhood Education (ECE) centre is to be included on the school site and understood to accommodate up to an additional 50 pre-school children and up to 13 staff. The opening hours of the ECE are likely to be 7.30am – 6pm, with the peak drop off and pick up times expected to differ from the school start and finish times. The layout of the school will be confirmed at OPW stage. The ECE will have dedicated parking outside the centre, with a shared access with school traffic. The access arrangements may change with a future road layout.

A satellite unit is proposed on the school grounds. A satellite unit allows for students from a base special school to attend the satellite unit to receive specialist training or integration into a mainstream school. The satellite unit is expected to have a total gross area of 300m² and cater for 18 students and up to five teachers or teacher aides. The 18 students are included in the masterplan roll of 900 students. A likely car park requirement of 6 car parks including one visitor park and one accessible park is anticipated.

5.4 School catchment

The school catchment is relatively large due to the rural environment in Kingseat, with an approximate 6km length from Clarks Creek to the north to near Glenbrook Road to the south. The catchment spans approximately 3km with Kingseat Road bordering the western side of the catchment, as shown in pink in **Figure 5.2**



Figure 5.2 Kingseat School Catchment (Source: Ministry of Education)

The Auckland Future Urban Land Supply Strategy prepared by Auckland Council in 2017 flagged the Kingseat area as development ready in 2012-2017 time period. The anticipated dwelling capacity for Kingseat is 1,842 dwellings categorised as *Actuals, planned or contracted 2017*. The dwelling number was revised in 2019 as per the Kingseat Precinct Plan 11^[2], where the number of dwellings rose slightly to 1,944 dwellings over an area of approximately 300ha of live development zones.

Outside of the compact development area surrounding the centre of Kingseat, most of the land in the catchment area is rural farming land. There are approximately 25 – 30 houses sprinkled throughout the rural area which is not expected to change significantly in the future given the rural zoning.

For the purposes of this report, we have rounded up the expected number of dwellings to be serviced by the school as approximately 2,000 dwellings, with the breakdown provided in **Table 5.1**. We have also allowed for a scenario of future plan changes to increase the yield number in the area. Potential for an additional 500 dwellings has been assumed to allow for more intensive zoning in the future.

Based on advice from MoE's Network Planning team, 2,000 dwellings equates to 600 Year 0-8 students and 2,500 dwellings equates to 750 students. This is line with the masterplan roll for a primary school at Kingseat of 800-900 students. The maximum masterplan roll of 800-900 students would come into effect in the event of more intensive residential housing that the current zoning allows.

^[2] <https://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20I%20Precincts/4.%20South/I418%20Kingseat%20Precinct.pdf>

As development will happen over a number of years, the initial school build will cater for 350 students plus 18 satellite class students. Over time, when development demands the school will grow to a masterplan build with a maximum roll of 800-900 students.

Table 5.1 Estimated student numbers

Area/Source	No of dwellings	No. of Year 0-8 students
Kingseat Development Area – Precinct Plan 11	1,944	583
Rural farmland in catchment area	~28	8
Out of zone students	~30	9
Total (Planned)	2,000 dwellings	600 students
Allow for future plan changes to increase development	+ 500	~150
Total (Potential)	2,500 dwellings	~750 students

5.5 Modal Share

The Precinct Plan for Kingseat states that “The precinct should be of a sufficient size and mass to provide a range of facilities and services, and accommodate the demands of growth within a compact and walkable area for a population of approximately 5000 people.” The Isochrone map provided in **Figure 5.3** shows the majority of the future residential area is within a 20-minute walk of the school. The isochrone map is based on the existing road network and will cover a greater area when the future road network is developed resulting in a connected and walkable community.



Figure 5.3 Isochrone Map: 20-minute walking distance from school site

The school roll is expected to be a maximum of 900 students with an additional 50 pupils for early childhood education. The school will require an assumed staff of 45 staff based on a 1:20 staff to pupil ratio, plus an additional five teachers for the satellite unit. The New Zealand Household Travel Survey (NZHTS) indicates that for primary school (aged 5-12)

children in Auckland, the private vehicle passenger mode share is 54%^[3]. A total of 38% walk, while the balance either use public transport, bicycle or a combination of modes.

The mode share assumed for a future Kingseat school is provided in **Table 5.2**. The private vehicle use is slightly lower (4%) than the Auckland average at 50% in the mornings and 42% in the afternoons, for the following reasons:

- Given the compact nature of the school catchment and the ability to walk from almost anywhere in the future development area to the school within 20 minutes, it is expected that the school will enjoy a high percentage of students travelling to school by active modes.
- The area is also generally flat and will have new roading and cycling infrastructure throughout the village based on design requirements in the ATCOP/TDM.
- The school will have a travel plan which will encourage active modes including the walking school bus programme and discourage use of private vehicle use.
- It is understood that the Auckland average includes 'destination schools' for example private schools, which commonly have a very wide catchment and therefore a higher vehicle use, which in turn raises the average.
- The Kingseat school is a full primary school which includes intermediate years 7-8. This increases the chances of older siblings able to walk the younger children to school. A relatively remote community with one school is also likely to have a higher occurrence of carpooling and walking with friends.

Some examples⁴ of similar schools to the future Kingseat school where fewer than 50% of students travel to school by private vehicle, including:

- Hobsonville Primary is a full primary school (years 0-8) with a similar sized catchment area as Kingseat School. Active modes make up 55% of the modal split.
- Takanini School is a full primary school (years 0-8) where the catchment spans over urban and rural land-use. Active modes make up 53% of the modal split.
- Devonport School is a full primary school (years 0-8) with a similar sized catchment area as Kingseat School. Active modes make up 54% of the modal split.

It is understood that the school will not have allocated school buses and it unlikely that children will be using public transport given the small catchment and limited bus services.

It is well understood that vehicle use is higher during the morning drop off than in the afternoon due to caregivers dropping students at school on their way to work, and after school activities etc. The HTS School Travel Model allows for a 5% reduction of private vehicle use in the afternoons for primary schools and a significant 13% reduction for intermediate schools. This is reflected in the **Table 5.2**.

Table 5.2 Modal split

	Walk/Cycle/Scooter	Public Transport	Vehicle	Other
Auckland average full primary schools (aged 5-12)	39%	5%	54%	2%
Kingseat School (Mornings)	48%	N/A	50%	2%
Kingseat School (Afternoons)	55%	N/A	43%	2%

^[3] <https://www.transport.govt.nz/mot-resources/transport-dashboard/1-household-travel/hd011-mode-share-of-journeys-to-school-aged-5-12/hd013-mode-share-of-journeys-to-school-by-region-aged-5-12/>

⁴ Census 2018 data – Statistics NZ

5.6 Walking and Cycling Provision

The new school will be encouraging active modes to school including walking, cycling and scooting. As the Kingseat area develops, the roads will be urbanised with new facilities for walkers and cyclists. The Precinct Plan Appendix shows the various typical cross-sections for the different type of future roads.

As noted earlier in the report, it is currently unknown when development and accompanying road upgrades will occur in proximity to the school. It should be noted that the school will open when/after development has occurred, that is, when there are school children living in the area to attend the school. It is anticipated that further knowledge on the infrastructure surrounding the school should be known at OPW stage. The requirement for appropriate infrastructure for the opening of the school may be addressed by way of NoR conditions.

New developments in Auckland are generally planned and constructed to a design speed of 30 km/hr, which is also expected in the design of Kingseat. This expectation is outlined Auckland Transport's TDM (Chapter 4 of the Urban Street Road Design Guide) which provides target speeds for the design of new roads, as shown in **Figure 5.4** below. Linwood Road and Kingseat Road which is the central road which runs through the town centre will likely be categorised as a Mixed-Use Arterial which are designed to a 30-40km/h speed in centres, as discussed in Section 3.2 above and referred to in **Figure 3.3**. In addition to Linwood Road-Kingseat Road, the new development will be made up of local streets to service the residential development which should be designed to a desired speed of 30km/h, as per the table in **Figure 5.4**.






Desired speed	Appropriate location
 10 km/h	Shared spaces
 30 km/h	Main street Arterial or Collector. Local Streets. Some Mixed-Use Arterials in centres. Also any type near schools or other major pedestrian destinations. Points of conflict with vulnerable people (crossings, intersections).
 40 km/h*	Neighbourhood or Mixed-Use Collectors. Some Mixed-Use Arterials in centres. Any School Zones that have not been reduced to 30 km/h. *Prefer 30 km/h for safety, unless protected crossings provide good accessibility.
 50 km/h	Single Use Arterials. Mixed-Use Arterials with extended urban lengths. These streets must be provided with suitable safe crossing points with speed reduced locally.
 >50 km/h	Single use arterials with limited access, Urban expressways and motorways. Safe crossings should be grade-separated or at intersections with speed reduced locally.

Figure 5.4 Speed Targets table (AT's Transport Design Manual)

A design speed of 30km/hr can be achieved through various measures including traffic calming, narrow carriageways and gateway treatments. The local roads within the community will also have low traffic volumes as the roads will only be servicing the local housing development. This combination of low speed, low traffic volumes and a flat landscape will ensure a safe and attractive environment for students to walk and cycle to school.

A high proportion of students walking and cycling will be coming through the local town centre, located at the intersection of Kingseat Road and Linwood Road. It is understood that this intersection is proposed to be upgraded as part of the housing development at the former Hospital site and at a new housing development accessed off McRobbie Road. The upgrade undertaken by the local developers will ensure safe crossing points for pedestrians and cyclists at this intersection.

Safe crossing points outside the school and footpaths of an appropriate width along the school frontage are supported to ensure safe routes to school. Pedestrian and cycle access at the school frontage will be separated from the vehicle access allowing for adequate separation between vehicles and school children entering and exiting the school grounds. Further design of the pedestrian and cyclist access points will developed at OPW stage taking into account accessibility, safety and desire lines outside the school.

Provision of adequate on-site cycle/scooting facilities within the school grounds is important to encourage a high level of active travel. A school travel plan will also be instrumental in encouraging and educating active modes for students and staff.

5.7 Public Transport

Public Transport or a school bus is not considered appropriate for Kingseat School given the compact size of the catchment extending no further than 2 km from the school and a relatively level terrain. However, school buses required for field trips etc can utilise the PUDO area during the school day. Tracking for buses accessing the PUDO area will be provided at detailed design stage.

5.8 Travel Planning – School and ECE

A School Travel Plan (STP) is proposed to be developed prior to the school opening. The STP will be produced in conjunction with Auckland Transport's TravelWise programme. Engagement with Auckland Transport and the Council will help to support an overall integrated transport plan that covers the needs of all educational facilities in the area.

The STP will provide measures to encourage and incentivise safety for active travel to school and reduce vehicle dependence. The Travel Plan is envisaged to be a live document that addresses traffic-related and road safety concerns from school activities on an ongoing basis.

There may be an opportunity and benefits of developing a joint travel plan for the school and the ECE facility. The travel plan will also consider measures to manage pick up and drop off behaviours and safe practices for the ECE.

5.9 Parking

The 'AUPOP Chapter K – Designations - Minister of Education' conditions require that:

- On-site car parking shall be provided at the rate of two carparks per new classroom or classroom equivalent, except where the council accepts, on the basis of a specifically commissioned parking study by an appropriately qualified engineer and/or transportation planner, that a lesser level is appropriate.
- In addition to any car parking required for the school, on-site car parking for early childhood education (preschool) shall be provided at the rate of one car park per every 10 children the facility is licensed or designed to accommodate, plus one per each full time equivalent staff member required for the license or design capacity of the centre, except where the Council accepts, on the basis of a specifically commissioned parking study by an appropriately qualified engineer and/or transportation planner, that a lesser level is appropriate.

School – initial build and full build

The number of teaching spaces / classrooms at Kingseat Primary is estimated to be 15 for the initial school build and 36 teaching spaces for the full masterplan build of the school. At a rate of two car parks per teaching space as per the standard designation condition in the AUPOP, the requirement for parking would be 30 car parks for the initial build and 78 car parks for the full build of the school which are provided for on the site plan and shown in **Table 5.3**.

Satellite School

A further 10 car parks has been allocated to the satellite school. Based on other satellite schools of this size, MoE have confirmed that there will be up to five teachers/ teacher aides, and would require a visitor and an accessibility car park. The total demand for the satellite school is 6-7 car parks. The feasibility plan has allocated ten parking spaces at this stage, however this can be revised at OPW stage if the number of carparks is deemed excessive.

ECE facility

The ECE centre will have separate parking outside the facility. An area of 1,500m² has been provided within the school feasibility plan layout to provide sufficient space for the centre and associated parking. MoE's designation conditions require parking at the rate of one car park per every 10 children the facility is licensed or designed to accommodate, plus one per each full time equivalent staff member. For a ECE roll of 50 children, five car parks are to be provided for pick up and drop off. It is recommended that the pick up and drop off parks are provided directly outside the centre. A further 13 car parks may be required for staff, however these can either be provided in the main school car park or outside the ECE facility. The design of the ECE centre and associated parking will be detailed at the next stage of development.

Table 5.3 Parking Demand and Supply

School facility	Parking Demand / Requirement	Parking Supply
Primary School	78	78
Satellite Unit	7	10
ECE Facility	18	Can comply

6. Transport Effects

6.1 Forecasted traffic volumes

Two sources of forecasted traffic volumes have been collected to determine the future traffic counts along Linwood Road in proximity of the school site. Auckland Transport’s *Auckland Forecasting Centre* (AFC) provided two-way volumes for 2028. The Kingseat Structure Plan prepared by Wes Edwards Consulting in 2010 forecasted volumes at the full development in Kingseat. The forecasted traffic counts from both sources are provided in **Table 6.1** Forecasted traffic volumes for Linwood Road AFC has estimated 930 vehicles on Linwood Road in the morning peak hour, with 248 vehicles travelling westbound and 682 vehicles eastbound. The Kingseat Structure plan estimates were slightly lower with 765 vehicles forecast on Linwood Road for the morning peak.

In the interest of taking a conservative approach, we have adopted the higher forecasted traffic volumes from AFC’s estimates for the year 2028.

The morning peak demand is believed to occur earlier than the average peak hour likely due to the longer journey times to work/study. Fourteen out of 16 entries of Linwood Road traffic counts on AT’s website show that the peak hour demand is at 6.45–7.45am. Traffic flows at the school start time (between 8.45-9.00am) will therefore be slightly lower than the peak hour and have been estimated at 80% of the peak demand. It should be noted here that 80% of the AM peak hour is still nearly 60% higher than interpeak traffic volumes.

It is believed that future traffic volumes will follow a similar trend of experiencing an earlier peak hour in the mornings than the typical 7-9am peak period. The 2013 Census data suggests that residents in Kingseat travel relatively long distances to their place of work, as in **Figure 6.1** below. Residents travelling from Kingseat to employment areas such as Manukau, Mangere and Auckland central are likely to experience relatively long travel times resulting in an earlier peak hour.

The majority of the future development in the Kingseat area is residential, with employment activities such as commercial or industrial making up a relatively small part of the future development. It is considered reasonable to assume that future traffic flows will follow similar trends as existing, as the majority of residents will continue to commute out of the area to get to their place of employment or study.



Figure 6.1 2013 Census travel to work/study data from Kingseat

The end of the school day will experience interpeak traffic volumes on the surrounding roads. The AFC has estimated 473 vehicles on Linwood Road in the interpeak, with 250 vehicles travelling eastbound and 233 vehicles westbound on Linwood Road.

Table 6.1 Forecasted traffic volumes for Linwood Road (with 80% modelled volumes)

Source	Forecasted Year	Linwood Rd - AM Peak		
		Both directions	Westbound	Eastbound
Auckland Forecasting Centre (Auckland Transport)	2028	930vph (80% - 744vph)	248vph (80% - 198)	682vph (80% - 546)
Kingseat Structure Plan	2051	765vph	<i>Directional split not provided</i>	
		Linwood Rd – Inter-peak		
Auckland Forecasting Centre (Auckland Transport)	2028	473vph	223vph	250vph

6.2 Trip Generation and Distribution

The number of vehicles trips generated by the school are 580 (290 vehicles) in the morning peak and 490 (245 vehicles) in the afternoons, as shown in **Table 6.2**. The number of vehicle trips is estimated based on the anticipated modal split for the school and the average number of students per vehicle.

Table 6.2 Number of school vehicle trips

School start/finish time	Maximum School Roll	Vehicle use	Ave students per vehicle	No. of Vehicles/ trips
Kingseat School (Mornings)	900	50%	1.4	321 / 642
Kingseat School (Afternoons)	900	43%	1.4	276 / 552

A trip distribution exercise has been undertaken for the purpose of modelling the operation of the school access. The following assumptions have been made:

- The school is on the eastern side of the future development area resulting in the majority (75%) of the trips coming from the west along Linwood Road in the morning peak.
- The Precinct Plan shows an indicative road to the east of the school site which feeds into the development to the north. It has been assumed that traffic from the development to the north and out of zone students coming from the east will make up 25% of traffic coming along Linwood Road from the east.
- An assumption that 15% of caregivers will drop their children off on the way to work or study and continue travelling east to travel to work/study in the mornings. The afternoon pick-up assumes 15% of caregivers will pick up their children on the return from work or study, therefore travelling from the east on Linwood Road.
- Trip Distribution percentages and number of vehicles per hour are provided for school trips in **Figure 6.2** and for general traffic based on land-use in **Figure 6.4**.

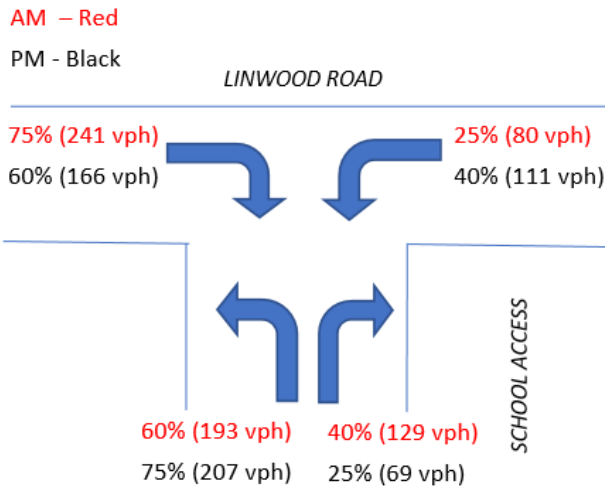


Figure 6.2 Trip Distribution for School Trips (Percentage and vehicles per hour)

- The Auckland Forecasting Centre (the modelling team at Auckland Transport) have modelled the future development in the Kingseat area. The supplied traffic counts for 2028 have been used for the SIDRA model of the school access.
- The Interpeak traffic counts for Linwood Road have been utilised for the school finish time. School finish time at 3pm in Kingseat is not thought to coincide with evening peak volumes.
- A side road intersection has been modelled as an alternative option for access to the school. The local traffic that would use this intersection has been estimated based on the anticipated land use surrounding the school. **Figure 6.3** shows a likely scenario of the future development serviced by a road bordering the eastern side of the school site. The following assumptions were made to determine trip generation and distribution:
 - Single house zone (as per AUPOP) has an average lot size of 600m², 10% of the area assumed for future road space resulting in an estimated 72 dwellings.
 - RTA rate adopted for single dwellings of 0.85 trips in the peak hour
 - Twenty-five trips assigned to Council Park in the morning with 50 trips in the afternoon
 - Residential AM inbound:outbound ratio 25:75; Residential PM inbound:outbound ratio 25:75 Council inbound:outbound ratio 50:50

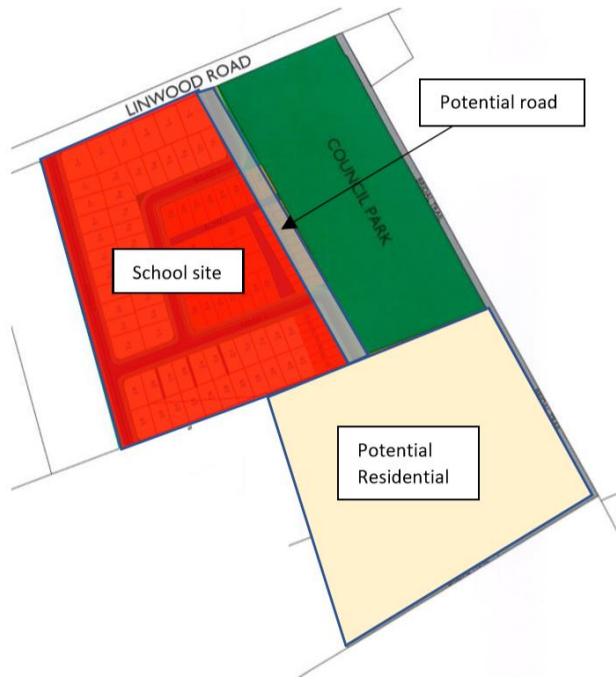


Figure 6.3 Example of anticipated land-use serviced by a future side road

AM vehicles per hour – Red
 PM vehicles per hour - Black

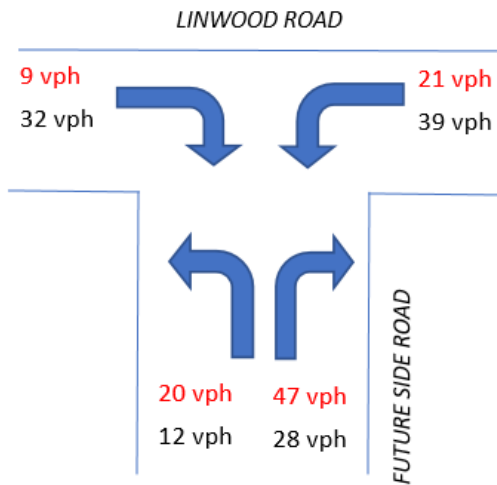


Figure 6.4 Estimated number of trips generated by the land-use in Figure 6.3

Trip Generation of ECE

The vehicular trip generation has been predicted for the proposed ECE facility. The rates have been sourced from the NZ Trips Database Bureau and RTA guidelines and an average has been used in this assessment as shown in **Table 6.3**.

The ECE facility is expected to generate 40 trips in the mornings and 34 trips in the afternoon. The peak times for the ECE facility are not expected to occur at the same time as the primary school, for the following reasons:

- The opening hours of the childcare facility is likely to be 7.30am-6pm, with the peaks likely to be 7.30-8.30 and 5-6pm which differ from the school travel times.
- Users of the ECE facility that do not have children at the school, will likely avoid travelling to the ECE at the school peak times and wait until the area is less busy to make their journey.

Table 6.3 Trip Generation Rates

Source	Morning Peak Trip Rates	Afternoon Peak Trip Rates
Early Childhood Education facilities		
RTA Guidelines	1.4 trips/child (2 hour)	0.8 trips/child (1.5 hour)
New Zealand Trips Database Bureau (TDB)	0.9 trips/child (1 hour)	0.8 trips/child (1 hour)
Average	0.8 trips /child / hr	0.67 trips/child / hr

6.3 SIDRA Modelling

Two scenarios have been modelled with SIDRA with the results and assumptions provided below. The two scenarios include:

Scenario 1: The school PUDO has two access points off Linwood Road with an entry only and an exit only, as shown in **Figure 6.5**.

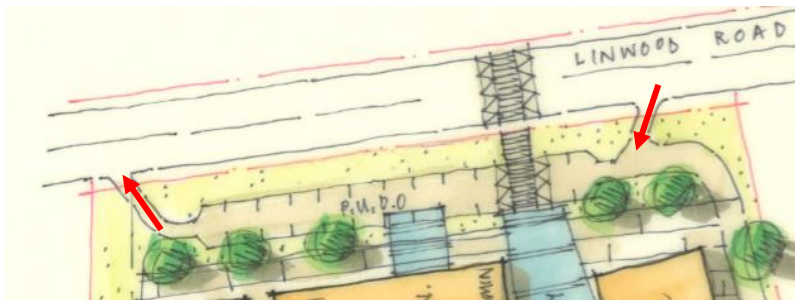


Figure 6.5 PUDO access

Scenario 2: A side road intersection with Linwood Road which all school traffic will utilise. This scenario will be dependent on a future north-south local road bordering the school site as a result of neighbouring development.

The two scenarios assessed result in all school traffic channelled through one access or intersection, therefore representing the worst case scenarios in terms of peak demand. Based on the Kingseat Precinct Plan there will likely be a future road on both boundaries of the school site which will spread the school traffic across two or more intersections; or several side roads in close proximity to the school where caregivers may choose to park and walk their children into the school grounds.

Assumptions for Sidra Modelling

The following assumptions and inputs were adopted for the Sidra models:

- The morning peak for school drop off has been modelled over a 30 minute period. This is based on the knowledge that schools typically allow students into the classrooms/school grounds at 30 minutes before the start of school.

- As per the Precinct Plan, the upgrade of Linwood Road will include a median.
- Staff and ECE trips are outside of the peak school pick up/ drop off period. However there may be a proportion of shared trips where school students have siblings that attend the ECE.
- The full development roll of 900 students has been modelled
- The higher of the two forecasted traffic counts i.e. AFC counts provided by Auckland Transport, were used to ensure a conservative approach.
- The modal split provided in **Table 5.2** was used with a vehicle use of 50% and 43% in the mornings and afternoons respectively, and an average of 1.4 students per vehicle.
- School drop off is assumed to occur between 8.15-8.45am or 8.30-9am depending on school start time. The hour of peak demand is 6.45-7.45am in Kingseat as discussed in Section 6.1. By 8.15am the peak demand is expected to have dropped off and therefore 80% of the peak hour volumes are used for the SIDRA models. This 80% traffic volumes of the AM Peak are still significantly higher than the interpeak i.e. nearly 160% of the interpeak traffic flows.
- The PUDO was modelled assuming every vehicle was entering the PUDO. This is again considered a conservative approach as it is likely that a proportion of vehicles may park on-street and walk their children into the school grounds.
- It is expected that the future cross-section of Linwood Road will have a median as shown in the Type A2 cross-section displayed in **Figure 3.3** of this report. The SIDRA model includes the provision of a flush median to allow a two-staged crossing.
- General traffic that will be serviced by a minor road has been estimated as detailed above in Section 6.2 and included in the SIDRA intersection model.

Scenario 1: School PUDO access off Linwood Road

The SIDRA model for the **entry only** access on Linwood Road in the morning and afternoon peak operates very efficiently with a Level of Service (LOS) A on every movement, with minimal or no delay. A flush median or right turn bay will facilitate right turn movements into the site. A summary of the SIDRA results are provided in **Table 6.4**.

The SIDRA model for the **exit only** access on Linwood Road in the morning and afternoon peak also operates very efficiently with a LOS A for each movement. The access has been modelled as a two staged crossing as the flush median will facilitate the right turn movements. A summary of the SIDRA results are provided in **Table 6.5** with more detailed results in Appendix B.

Table 6.4 Sidra results for School Access: Entry only

Approach	Movement	AM Peak Hour			Inter-Peak Hour		
		Flow (vph)	Avg Delay (seconds)	LOS	Flow (vph)	Avg Delay (seconds)	LOS
Linwood Rd West	Through	529	0	A	263	0	A
	Right	482	6.8	A	360	6.8	A
Linwood Rd East	Through	208	0	A	235	0	A
	Left	160	4.6	A	194	4.6	A

Table 6.5 Sidra results for School Access: Exit only

Approach	Movement	AM Peak Hour			Inter-peak Hour		
		Flow (vph)	Avg Delay (seconds)	LOS	Flow (vph)	Avg Delay (seconds)	LOS
Linwood Rd West	Through	529	0	A	263	0	A
Linwood Rd East	Through	208	0	A	235	0	A
School Access Exit	Left	386	1.7	A	594	4.2	A
	Right into flush median	258	1.6	A	138	1.7	A
	Right leaving flush median	258	5.0	A	138	2.2	A

Scenario 2: Linwood Road / future side road intersection

The intersection has been modelled as a two staged crossing as the flush median will facilitate the right turn movements. The SIDRA model for a priority intersection of Linwood Road and a future minor road operates at a LOS of A-D. The majority of the movements operate at a LOS A with the right turn out of the minor road at a LOS D at both school start and finish times. The average delay for the right turn is 28 and 13 seconds for the morning and afternoon peaks respectively. A summary of the SIDRA results are provided in **Table 6.6** with more detailed results in Appendix B.

Table 6.6 Sidra Results for Linwood Rd/ Side Rd Intersection

Approach	Movement	AM Peak Hour			Inter-Peak Hour		
		Flow (vph)	Avg Delay (seconds)	LOS	Flow (vph)	Avg Delay (seconds)	LOS
Linwood Rd West	Through	529	0	A	263	0	A
	Right	492	6.9	A	392	7.1	A
Linwood Rd East	Through	208	0	A	235	0	A
	Left	182	4.6	A	232	4.6	A
Future Side Road	Left	406	6.4	A	426	7.0	A
	Right into flush median	306	27.5	D	166	13.0	B
	Right leaving	306	6.8	A	166	3.6	A

flush median							
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7. Conclusions

It is considered that the land to be designated for educational purposes and the existing surrounding roading network can accommodate the anticipated traffic from the proposed school and can provide adequate access arrangements. It is also considered that a school on this site can satisfy the outcomes sought by the regional and local transport strategies and plans. Some key findings have been summarised below:

- The local road network in the Kingseat area is not confirmed at this stage. However the traffic generated by a school at this location can be accommodated on the existing road network without the reliance on future roads.
- Two scenarios have been modelled with school access off Linwood Road; and school access off a future side road. Both scenarios have been modelled and operate efficiently with forecasted traffic volumes.
- The site can cater for the required parking demand for staff and visitors, student pick up and drop off, the satellite unit and separate parking for an ECE centre. There are no issues with the planned school that would prevent a safe and appropriate car park design at the site.
- Detail of car and cycle parking, access arrangements and pedestrian crossings will be considered further during the OPW stage.
- A Travel Plan for the school and the ECE centre will be developed prior to the school opening to encourage active modes for travel to/from school.

This assessment concludes that Auckland Council can recommend confirmation of the NoR to designate the land for education purposes.

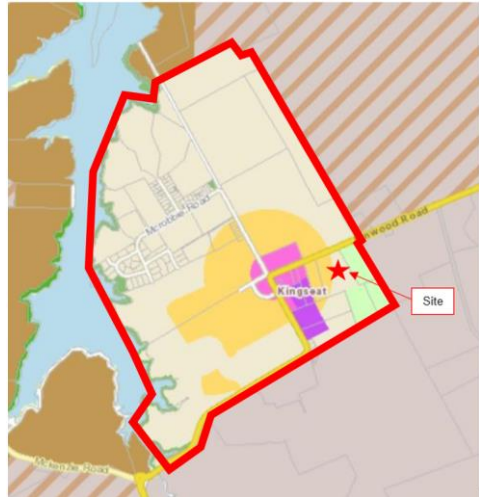
Appendix A

**1. Client Response to AT Feedback on Draft ITA
dated 11 August 2020**

**2. Client Response to AT Initial Consultation dated
27 May 2020**

AUCKLAND TRANSPORT FEEDBACK ON DRAFT ITA REPORT DATED 11 AUGUST 2020			
Topic	Comment	Source	Client Response
General	<ul style="list-style-type: none"> A summary of the items and matters identified throughout the draft ITA as being addressed at the OPW stage should be provided and assessed against the proposed draft conditions. 	Land Use Policy and Planning	<ol style="list-style-type: none"> The location of the school access will be determined when the future road network is known. Addressed by Condition 3 (a) ii Future design of pedestrian and cyclist access points Addressed by Condition 3(a)ii, 3(b)i and 3(b)iii(c) Design of Pickup Dropoff area Addressed by Condition 3(b)iii Layout of the school and ECE Addressed by Condition 3 (a) iv Requirement for appropriate infrastructure on school frontage before opening of school Addressed by Condition 3(b)iv and 4(b) Detail of car and cycle parking, access arrangements and pedestrian crossings Addressed by Condition 3(a) & 3(b)
3.1 Existing Road Network	<ul style="list-style-type: none"> Auckland Transport's strategic network does not feature in the vicinity of the school. Auckland Transport has no immediate plans to upgrade the roads and streets in the surrounding area to accommodate increased traffic volumes. Specifically, there are currently no plans to widen Linwood Road. Linwood Road appears in Supporting Growth's Indicative Business Case (IBC). However, the IBC indicates low cost safety improvements only. Please include any available information in terms of existing levels of traffic volumes / counts along Linwood Road, Kingseat Road & McRobbie Road. 	Integrated Network Planning Road Safety Engineering Supporting Growth Land Use Policy and Planning	<p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Existing counts along these roads are now included in the ITA</p>
3.2 Proposed Road Network	<ul style="list-style-type: none"> It is noted that the Kingseat Precinct Plan provides some guidance around the form and function of collector and local level roads through typical crosssections in I418 Appendix 1: Kingseat Precinct. The reference to "Type A2 Collector Route with Urban Interface" in the draft ITA should be qualified as mainly being in relation to the general functions that would be expected along this section of Linwood Road as an arterial road (with the school site frontage likely to form part of the westbound approach to the proposed local centre). In this regard, the Type A2 typical cross section would only provide an initial reference point on the development context expected in the vicinity of the proposed school site and not reflecting the status or classification of Linwood Road (as an arterial route). Figure 3.3 	Land Use Policy and Planning	<ul style="list-style-type: none"> This point is accepted and the reference to Type A2 road has been removed. Discussion regarding potential cross-sections and reference to the TDM is provided in Section 3.2 in the revised ITA.

	<p>should therefore be removed as it is potentially misleading. In the absence of any arterial road typical cross-sections, it should be noted that the future form of Linwood Road would also be informed by the relevant parts of Auckland Transport's Transport Design Manual (TDM).</p> <ul style="list-style-type: none"> The Ministry of Education will be responsible for upgrading the school's frontage to Linwood Road to ensure that it is safe for students. 	Road Safety Engineering	<ul style="list-style-type: none"> The Ministry supports a safe and functional access for all modes of transport. Provision for the appropriate infrastructure on the school frontage is covered in the NOR Condition 4(b).
5.2 Pick Up Drop Off (PUDO)	<ul style="list-style-type: none"> Section 5.1 notes that at the time school development proceeds, there may be other road frontages available. Auckland Transport agrees that this presents an opportunity to review the vehicle access and PUDO options at this point to avoid access off Linwood Road as an arterial road and this should be reflected in the NOR conditions. 	Land Use Policy and Planning	Agreed. This is addressed in the NOR Condition 3(b) iii (e)
5.3 School Roll	<ul style="list-style-type: none"> Indicative levels of on-site parking to support the proposed Early Childhood Education (ECE) facility should be provided, noting that the ECE will be implemented as part of the proposed NOR / designation and that the transport effects of this facility (including parking) will not be subject to the Auckland Unitary Plan Auckland-wide provisions. 	Land Use Policy and Planning	Section 5.9 provides indicative levels of parking for the ECE. There is ample space designated to the ECE to accommodate for future parking demand. NOR conditions under 3(b) address the requirement to accommodate for parking demand for the ECE facility.
5.5 Modal Share	<ul style="list-style-type: none"> What assumptions were made to calculate the modal split data for the school? For example, are these based on the patterns from surveyed schools operating in similar situations that are expected for the Kingseat site. 	Land Use Policy and Planning	Section 5.5 outlines the assumptions we made in determining the modal share for Kingseat School. Examples of similar schools achieving similar mode shares are provided in the same section.
5.6 Walking and Cycling Provision	<ul style="list-style-type: none"> The general statement that "New developments in Auckland are generally planned and constructed to a design speed of 30 km/hr, which is also expected in the design of Kingseat" should be qualified. For instance, what type of development and what is the location and context of where a 30km/h speed limit is appropriate. Refer to Auckland Transport's TDM. 	Land Use Policy and Planning	Auckland Transport's TDM provides target speeds for the design of new roads. This can be demonstrated in Chapter 4 of the Urban Street Road Design Guide and provided in Figure 5.4 in the revised ITA. Linwood Road and Kingseat Road which is the central road which runs through the town centre will likely be categorised as a Mixed-Use Arterial which are designed to a 30-40km/h speed in centres, as discussed in Section 3.2 above. In addition to Linwood Road-Kingseat Road, the new development will be made up of local streets to service the residential development which according to the TDM (Figure 5.4 in the ITA) should be designed to a desired speed of 30km/h.
6.1 Forecasted Traffic Volumes	<p>a)The ITA notes that based on expected timing of the general (average) and school peak traffic that "Traffic flows at the school start time will therefore be slightly lower than the peak hour and have been estimated at 80% of the peak demand". The relevance of relying on (existing) AT traffic count information to identify the peak hour demand is also queried, given that the travel patterns will</p>	Land Use Policy and Planning	a) School start time will be between 8.45-9.00am. Given the relatively remote location of Kingseat from employment hubs, the peak hour traffic in the morning peak is expected to be earlier than the school drop off time period. It is believed that future traffic volumes will follow a similar trend of experiencing an earlier peak hour in the mornings than the typical 7-9am peak period. The 2013 Census data suggests that residents in Kingseat

	<p>fundamentally change on the basis of the proposed precinct activities planned in Kingseat. Confirmation of the school start time and how the associated traffic generation potentially overlaps with the average peak hours is requested in the context of the future travel patterns.</p>		<p>travel relatively long distances to their place of work, as shown in Figure 6.1. The majority of the future development in the Kingseat area is residential, with employment activities such as commercial or industrial making up a relatively small part of the future development. It is considered reasonable to assume that future traffic flows will follow similar trends as existing, as the majority of residents will continue to commute out of the area to get to their place of employment or study.</p>
<p>6.2 Trip Generation and Distribution</p>	<p>b) The ITA notes that “The school is on the eastern side of the future development area resulting in the majority (75%) of the trips coming from the west along Linwood Road in the morning peak.” Based on the indicative school catchment and Kingseat Precinct development plan, the proposed school site appears relatively central. What is the basis for the assumption around 75% of trips originating from the west?</p> <p>c) It would be useful to indicate the distribution assumptions on a map.</p>	<p>Land Use Policy and Planning</p>	<p>b) Although the school site is central to the proposed school zone, it is not central to the new development area proposed for Kingseat. The figure below shows the school site in context of the future development in the area which is delineated by the red border. The rest of the future school zone is rural production zone under the AUPOP where land-use is unlikely to change in the future and will generate very minimal traffic.</p>  <p>The Precinct Plan shows indicative side roads off Linwood Road to the north and south, to the east of the school site. It has been assumed that traffic using these side roads and a nominal amount coming from the east make up 25% of the traffic.</p> <p>c) This is provided in Figure 6.2 and Figure 6.4 in the revised ITA.</p>

	<p>d) Are the assumptions informed by surveys reflecting existing patterns of travel / behaviour for similar or comparable school sites?</p> <p>e) Does the Ministry of Education support after-school programmes and would the provision of such programmes impact on the trip generation peak periods?</p> <p>f) The assumptions around the operating peak period of school (8.15-8.45am or 8.30-9am) and the expected ECE peak period (7:30 – 8:30am) suggest that there is a potential overlapping period.</p>		<p>d) As the future road network is not yet known, it is not possible to undertake a precise trip distribution exercise. There is also very little or no data on how many diverted and pass-by trips can be allocated to schools. We assumed that 15% of trips are pass-by trips i.e. 15% of caregivers dropped off and picked up their children at school on the way to work or study. The assumptions made for the trip distribution are:</p> <ul style="list-style-type: none"> • Morning arrivals: 75% from the west, 25% from the east. • Morning departures: 60% to the west, 40% to the east (to account for pass-by trips) • Afternoon arrivals: 60% from the west; 40% from the east • Afternoon departures: 75% to the west, 25% to the east <p>e) The MOE supports after school programmes and many existing primary schools run them. Children can be picked up anytime throughout the 2.5 hour period typically between 3.30 – 6pm. The distribution of trips over a 2.5 hour period means there will be no peak as such and have a negligible effect on the road network.</p> <p>As per the research outlined in Section 5.5, we have allowed for a 7% reduction in vehicle use at school finish time, which equates to 45 families potentially staying on-site after school. With pick-up occurring over say a 2 hour period, that accounts for one vehicle every three minutes.</p> <p>f) It is understood that siblings that attend both the school and the ECE will arrive together in the same vehicle at school start and finish times. In the case of children that attend the ECE that don't have siblings at the school, it is very likely that the caregiver will pick up/ drop off their child outside of the relatively short school peak times to avoid being delayed.</p>
<p>6.3 SIDRA Modelling</p>	<p>a) It is assumed that the future cross-section of Linwood Road will have a median. The SIDRA model assumes the provision of a flush median to allow a two-staged crossing facilitating right turn movements into and out of the school site. Assessment of the right-turn movements into and out of the school site should also take into account the potential for a formal pedestrian priority crossing outside of the school (as reflected in the site feasibility sketch).</p> <p>b) What are the PM peak results? Does the ITA assume that these are the same as inter-peak in relation to the operation of the school?</p>	<p>Land Use Policy and Planning</p> <p>Land Use Policy and Planning</p> <p>Land Use Policy and Planning</p>	<p>a) Linwood Road is the main central road for east-west traffic through the Kingseat area and beyond, with the potential to have numerous side roads which would require a median to accommodate turning movements. The provision of a median aligns with the typical cross-section of a Mixed-Use Arterial in the TDM (refer to Section 3.2 of the ITA).</p> <p>The school benefits from a long 140m frontage on Linwood Road providing plenty of frontage to position the pedestrian crossing without it interfering with the operation of an access entry/side road intersection. The location of the pedestrian crossing on the feasibility sketch is indicative only. The final location of the pedestrian crossing will take into consideration any queues that may form for access to and from the school. The SIDRA analysis undertaken to date results in a maximum queue of 2-3 vehicles waiting to turn into the access. With the long frontage, there is opportunity to provide over 50m separation between the access and the crossing.</p> <p>b) The PM peak results have not been provided as the school finish time does not coincide with the PM Peak. School finishing time is expected to be</p>

	<p>c) For scenario 1, school access entry, the right and left turn movements from the Linwood Road approaches are assumed as movements into the PUDO access. Scenario 2 indicates the right and left turn movements from the Linwood Road approaches and left and right turning movements into a future side road. Clarification is needed in regard to what components of the scenario 2 movements to/from the Linwood Road approaches and side road are associated with the school site.</p> <p>d) Please clarify the movements for vehicles entering and departing the side road for the Linwood Road/ side road intersection? (assuming this side road is a cul-desac?). As part of this scenario, please also confirm that it is assumed there is no school access taken from the school site frontage to Linwood Road.</p> <p>e) SIDRA graphics (movement summary diagrams) should be provided in the ITA to accompany the movement summary.</p>	<p>Land Use Policy and Planning</p> <p>Auckland Forecasting Centre</p>	<p>at 3pm, whilst the typical PM peak is 4-6pm. As described in the ITA, the interpeak traffic volumes have been used to model school finishing time.</p> <p>c) The trip generation for the land-use serviced by the side road was based on the land-use shown in Figure 6.3 in the ITA, i.e. Council park and single house zone. The assumptions made for the trips generated by this land-use have been provided in more detail in Section 6.2. The trip generation for the proposed land-use and school traffic is provided in the revised ITA in Figure 6.2 and Figure 6.4.</p> <p>d) As above, the vehicle movements delineating school trips and general land-use traffic is provided in Figure 6.2 and Figure 6.4. To confirm, this scenario assumes no school access is taken from Linwood Road and all school traffic is using the side road.</p> <p>e) This is now provided in Appendix B in the revised ITA.</p>
Draft NOR conditions	<ul style="list-style-type: none"> Please see attached tracked changes. 	Land Use Policy and Planning	Noted.

AUCKLAND TRANSPORT INITIAL CONSULTATION DATED 27 MAY 2020

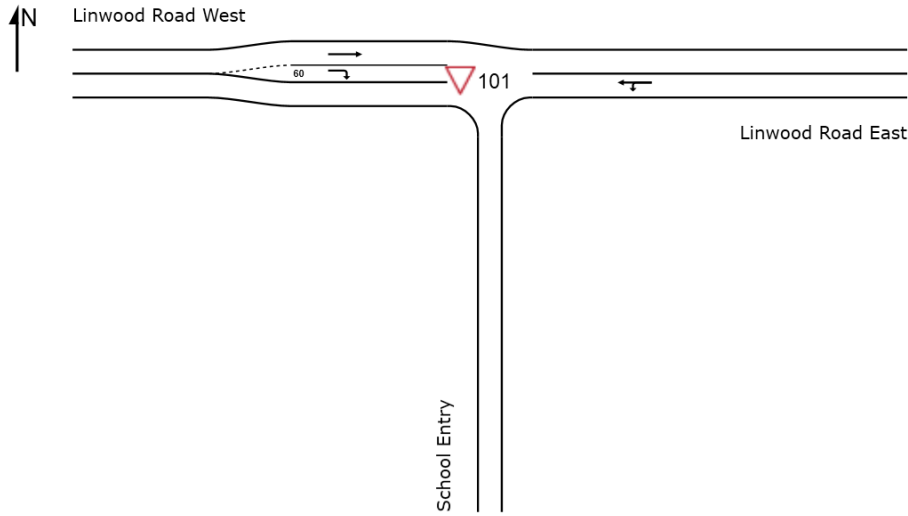
Topic	Comment	Client Response
General	<ul style="list-style-type: none"> • Please note that Auckland Transport reserves the right to make a submission on any future Notice of Requirement (NOR). • Please refer to Auckland Transport's Transport Design Manual (TDM) for specific design requirements. • The Auckland Unitary Plan Kingseat Precinct provisions (I418 Kingseat Precinct) provide the framework for transport related requirements. This includes I418.11.5. Appendix 1: Kingseat Precinct - I418.11.5.1. Design element 1: Movement and access networks. • The following comments are based on the "Linwood Road School Feasibility" concept drawing dated 22 April 2020 and Title Plan SO 544696 approved on 21 January 2020 circulated to AT 	Noted.
Future transport / roading network	<ul style="list-style-type: none"> • Auckland Transport has no immediate plans to upgrade the roads and streets in the surrounding area to accommodate increased traffic volumes. Specifically, there are currently no plans to widen Linwood Road. • Linwood Road appears in Supporting Growth's Indicative Business Case (IBC). However, the IBC indicates low cost safety improvements only. 	Noted.
Transport modes	<ul style="list-style-type: none"> • Active modes of transport and public transport are encouraged by Auckland Transport. The design of the school must ensure that these options are prioritised both safely and efficiently for students based on the anticipated school catchment. • Active modes of transport (i.e. walking and cycling) will require specific design interventions and must integrate well with the surrounding infrastructure and land use context. For instance, the school will need to provide secure bicycle parking. • The future school should work with Auckland Transport to create a School Travel Plan. School Travel Plans are generally designed to increase active modes of transport and decrease private vehicle traffic. • Public transport (i.e. school buses and public buses) will also require specific design interventions. For instance, the school site should be designed to accommodate at least three school buses. 	<p>Active modes will be encouraged by the following means:</p> <ul style="list-style-type: none"> • Adequate on-site provision of secure cycle parking • Safe pedestrian/cycle school access points which are separated from vehicles • Safe road crossing points • Low traffic speeds throughout the village • Footpaths of an appropriate width along school frontage on Linwood Road • A School Travel Plan encouraging and educating active modes for students and staff. A NOR condition to provide a school travel plan will be accepted. <p>Public Transport or a school bus is not considered appropriate for Kingseat School given the compact size of the catchment extending no further than 2 km from the school. However, school buses required for field trips etc can utilise the PUDO area during the school day. Tracking for buses accessing the PUDO area will be provided at detailed design stage.</p>
Vehicle access / management	<ul style="list-style-type: none"> • Depending on the layout and function of the future surrounding road network, alternative vehicle access to the school (e.g. from proposed side roads off Linwood Road to the west and east of the school site) is recommended, given that Linwood Road is an arterial road with high volumes of traffic. Any vehicle access from 	The Kingseat Precinct Plan shows indicative roads on all boundaries of the school site. As the area in proximity to the school site is still undeveloped, it is unknown where the future local roads will be located. The NOR ITA therefore assesses two scenarios. Firstly, in the event there will not be any future roads bordering the site, the ITA demonstrates that all school access can safely and efficiently be accommodated off Linwood Rd. The

	<p>Linwood Road could be limited (e.g. teachers only).</p> <ul style="list-style-type: none"> • Pick up and drop-off areas should ideally not be located along arterial roads (e.g. Linwood Road). If a pick up and drop-off area is planned, this should preferably be located on the school site but in a location that is not adjacent to an arterial road. Any pick up / drop off will also need to be well monitored and managed by the school to avoid congestion at or near the school gate. 	<p>second scenario includes school access restricted to a future local road bordering the school site, limiting access off Linwood Road.</p> <p>The NOR ITA demonstrates that access to the school site can operate efficiently and safely in all scenarios of a future road network. It is likely that the road network will be more conclusive at OPW stage which will allow for further assessment of a preferred access road.</p> <p>If the future road network allows for a road along the western or eastern boundary of the school site, the layout of the school site can be rearranged to provide PUDO access off the minor road.</p>
<p>Safety</p>	<ul style="list-style-type: none"> • The site is not ideally located from a safety perspective, due to the presence of multiple roads in the surrounding area that carry high traffic volumes. These roads pose significant safety risks for students, especially those who might walk or cycle to school. • Traffic on surrounding roads will likely need to be slowed. For instance, a speed limit on Linwood Road of 30 km/h will likely be required near the school. • It will be important that the ITAs provided with the upcoming NOR and future Outline Plan of Works identify safety issues and how they will be mitigated. This will ensure that students can arrive safely at school. For instance, the requirement for a safe priority pedestrian crossing (e.g. signalised crossing, raised table) across Linwood Road and adequate footpath widths for pedestrians. It is noted that the Kingseat Precinct Zoning (I418.10.8.) identifies future residential activity on both sides of Linwood Road and in this regard transport infrastructure is required to support safe local walking trips. • Any pedestrian crossing facilities involving vertical treatments (e.g. raised table) will need to accommodate bus movements. 	<p>Although Linwood Road is an arterial road, the traffic volumes are generally lower than a busy metropolitan area. In addition to this, all the traffic volume data suggests that the morning peak hour (6.45-7.45am) occurs a lot earlier than school start times, likely due to longer journey times for Kingseat residents.</p> <p>The new town centre is likely to have gateway treatment and other traffic calming measures to ensure traffic entering the Kingseat area slows down to an acceptable speed. Discussions with AT have indicated that the design speed for the section of Linwood Road between the school and the town centre is likely to be 30km/hr.</p> <p>It is currently unknown what the timing of this infrastructure is, however it is anticipated we may know more at OPW stage. The requirement for appropriate infrastructure to be in place before school opening can be covered in the NOR conditions.</p> <p>The majority of roads in the area will eventually have new footpaths, and the local roads will have low traffic volumes and low speed providing safe routes to school. The main intersection in the town (Linwood/Kingseat/McRobbie) where a significant proportion of the students will need to pass through will be upgraded as part of the housing development in the area. The upgraded intersection will provide safe crossing points for children walking and cycling to/from school. MOE supports a safe crossing point outside the school which will allow students to cross Linwood Road safely and will accommodate bus movements on Linwood Road.</p>

Appendix B SIDRA Results



SIDRA RESULTS – SCHOOL ACCESS ENTRY ONLY – MORNING AND AFTERNOON



MOVEMENT SUMMARY

Site: 101 [Kingseat AM PUDO Entry]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Linwood Road East												
4	L2	160	0.0	0.192	4.6	LOS A	0.0	0.0	0.00	0.24	0.00	47.0
5	T1	208	2.0	0.192	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	48.6
Approach		368	1.1	0.192	2.0	NA	0.0	0.0	0.00	0.24	0.00	48.1
West: Linwood Road West												
11	T1	529	2.0	0.274	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	482	0.0	0.383	6.8	LOS A	2.4	16.5	0.53	0.73	0.59	36.7
Approach		1011	1.0	0.383	3.3	NA	2.4	16.5	0.25	0.35	0.28	44.3
All Vehicles		1380	1.1	0.383	2.9	NA	2.4	16.5	0.19	0.32	0.21	45.3

MOVEMENT SUMMARY

Site: 101 [Kingseat PM PUDO Entry]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

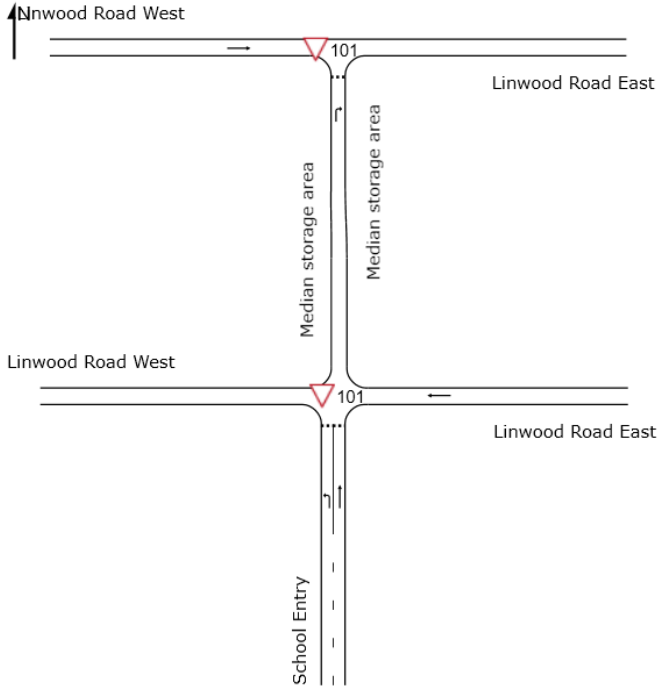
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Linwood Road East												
4	L2	194	0.0	0.224	4.6	LOS A	0.0	0.0	0.00	0.25	0.00	46.9
5	T1	235	2.0	0.224	0.0	LOS A	0.0	0.0	0.00	0.25	0.00	48.6
Approach		429	1.1	0.224	2.1	NA	0.0	0.0	0.00	0.25	0.00	48.0
West: Linwood Road West												
11	T1	263	2.0	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	360	0.0	0.306	6.8	LOS A	1.5	10.8	0.54	0.73	0.55	36.7
Approach		623	0.8	0.306	3.9	NA	1.5	10.8	0.31	0.42	0.32	43.0
All Vehicles		1052	0.9	0.306	3.2	NA	1.5	10.8	0.18	0.35	0.19	45.0

SIDRA RESULTS – SCHOOL ACCESS EXIT LAYOUT PLAN

NETWORK LAYOUT

Network: N101 [Network - PUDO exit]

New Network
Network Category: (None)



SIDRA RESULTS – SCHOOL ACCESS EXIT ONLY – MORNINGS

8741

MOVEMENT SUMMARY

▽ Site: 101 [Kingseat AM PUDO Exit - stage 1]

Network: N101 [Network - PUDO exit AM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
South: School Entry														
1	L2	386	0.0	386	0.0	0.402	1.7	LOS A	0.9	6.0	0.43	0.34	0.45	37.4
2	T1	258	0.0	258	0.0	0.269	1.6	LOS A	0.5	3.8	0.43	0.30	0.43	18.5
Approach		644	0.0	644	0.0	0.402	1.7	LOS A	0.9	6.0	0.43	0.33	0.44	33.7
East: Linwood Road East														
5	T1	208	2.0	208	2.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		208	2.0	208	2.0	0.107	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		852	0.5	852	0.5	0.402	1.3	NA	0.9	6.0	0.32	0.25	0.33	39.4

MOVEMENT SUMMARY

Site: 101 [Kingsseat AM PUDO Exit -Median]

Network: N101 [Network - PUDO exit AM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance m				km/h
South: Median storage area														
3	R2	258	0.0	258	0.0	0.330	5.0	LOS A	0.6	4.5	0.59	0.78	0.70	40.1
Approach		258	0.0	258	0.0	0.330	5.0	LOS A	0.6	4.5	0.59	0.78	0.70	40.1
West: Linwood Road West														
11	T1	529	2.0	529	2.0	0.272	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		529	2.0	529	2.0	0.272	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		787	1.3	787	1.3	0.330	1.6	NA	0.6	4.5	0.19	0.25	0.23	47.6

2412412

SIDRA RESULTS – SCHOOL ACCESS EXIT ONLY – AFTERNOONS

MOVEMENT SUMMARY

Site: 101 [Kingsseat PM PUDO Exit-stage 1]

Network: N101 [Network - PUDO exit PM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance m				km/h
South: School Entry														
1	L2	594	0.0	594	0.0	0.639	4.2	LOS A	2.7	18.7	0.59	0.76	0.87	35.9
2	T1	138	0.0	138	0.0	0.149	1.7	LOS A	0.3	1.9	0.41	0.29	0.41	18.5
Approach		732	0.0	732	0.0	0.639	3.7	LOS A	2.7	18.7	0.56	0.67	0.78	34.6
East: Linwood Road East														
5	T1	235	2.0	235	2.0	0.121	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		235	2.0	235	2.0	0.121	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		967	0.5	967	0.5	0.639	2.8	NA	2.7	18.7	0.42	0.51	0.59	39.2

MOVEMENT SUMMARY

Site: 101 [Kingsseat PM PUDO Exit-Median]

Network: N101 [Network - PUDO exit PM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

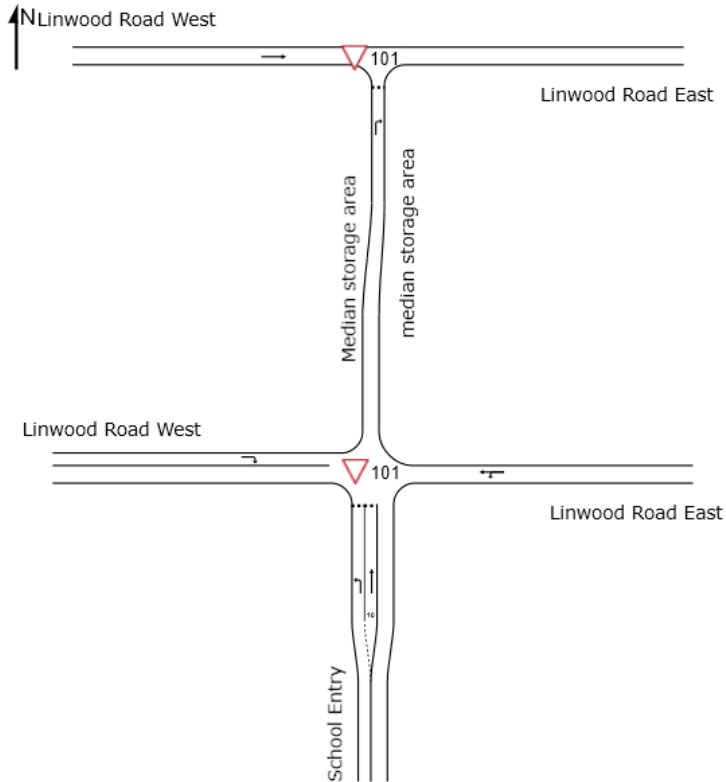
Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles	Distance m				km/h
South: Median storage area														
3	R2	138	0.0	138	0.0	0.125	2.2	LOS A	0.2	1.4	0.37	0.41	0.37	42.5
Approach		138	0.0	138	0.0	0.125	2.2	LOS A	0.2	1.4	0.37	0.41	0.37	42.5
West: Linwood Road West														
11	T1	263	2.0	263	2.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		263	2.0	263	2.0	0.135	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		401	1.3	401	1.3	0.135	0.8	NA	0.2	1.4	0.13	0.14	0.13	48.2

SIDRA RESULTS – LINWOOD RD / SIDE ROAD – LAYOUT PLAN

NETWORK LAYOUT

Network: N102 [Side Road AM]

New Network
Network Category: (None)



SIDRA RESULTS – LINWOOD RD / SIDE ROAD – MORNING

MOVEMENT SUMMARY

Site: 101 [Kingseat AM Side Road -stage 1]

Network: N102 [Side Road AM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %	Total veh/h	HV %				Vehicles	Distance m				
South: School Entry														
1	L2	406	0.0	406	0.0	0.423	6.4	LOSA	1.0	6.8	0.43	0.64	0.47	43.0
2	T1	306	0.0	306	0.0	0.806	27.5	LOS D	2.8	19.9	0.90	1.46	2.41	11.2
Approach		712	0.0	712	0.0	0.806	15.5	LOS C	2.8	19.9	0.64	0.99	1.31	32.2
East: Linwood Road East														
4	L2	182	0.0	182	0.0	0.204	4.6	LOSA	0.0	0.0	0.00	0.25	0.00	46.9
5	T1	208	2.0	208	2.0	0.204	0.0	LOSA	0.0	0.0	0.00	0.25	0.00	48.5
Approach		390	1.1	390	1.1	0.204	2.2	NA	0.0	0.0	0.00	0.25	0.00	48.0
West: Linwood Road West														
12	R2	492	0.0	492	0.0	0.400	6.9	LOSA	1.0	7.3	0.55	0.74	0.64	37.0
Approach		492	0.0	492	0.0	0.400	6.9	NA	1.0	7.3	0.55	0.74	0.64	37.0
All Vehicles		1594	0.3	1594	0.3	0.806	9.6	NA	2.8	19.9	0.45	0.74	0.78	38.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

MOVEMENT SUMMARY

Site: 101 [Kingseat AM Side Road - stage 2]

Network: N102 [Side Road AM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	m				km/h
South: Median storage area														
3	R2	306	0.0	306	0.0	0.391	6.8	LOS A	0.8	5.9	0.62	0.89	0.80	40.9
Approach		306	0.0	306	0.0	0.391	6.8	LOS A	0.8	5.9	0.62	0.89	0.80	40.9
West: Linwood Road West														
11	T1	529	2.0	529	2.0	0.272	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		529	2.0	529	2.0	0.272	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		835	1.3	835	1.3	0.391	2.5	NA	0.8	5.9	0.23	0.33	0.29	47.5

SIDRA RESULTS – LINWOOD RD / SIDE ROAD – AFTERNOON

MOVEMENT SUMMARY

Site: 101 [Kingseat PM Side Road-stage 1]

Network: N102 [Side Road PM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	m				km/h
South: School Entry														
1	L2	426	0.0	426	0.0	0.458	7.0	LOS A	1.2	8.3	0.48	0.70	0.56	42.6
2	T1	166	0.0	166	0.0	0.374	13.0	LOS B	0.7	5.2	0.74	0.94	0.97	19.0
Approach		592	0.0	592	0.0	0.458	8.7	LOS A	1.2	8.3	0.55	0.77	0.68	39.4
East: Linwood Road East														
4	L2	232	0.0	232	0.0	0.244	4.6	LOS A	0.0	0.0	0.00	0.27	0.00	46.7
5	T1	235	2.0	235	2.0	0.244	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	48.4
Approach		467	1.0	467	1.0	0.244	2.3	NA	0.0	0.0	0.00	0.27	0.00	47.8
West: Linwood Road West														
12	R2	392	0.0	392	0.0	0.349	7.1	LOS A	0.8	5.6	0.57	0.78	0.65	36.8
Approach		392	0.0	392	0.0	0.349	7.1	NA	0.8	5.6	0.57	0.78	0.65	36.8
All Vehicles		1451	0.3	1451	0.3	0.458	6.2	NA	1.2	8.3	0.38	0.61	0.45	41.7

MOVEMENT SUMMARY

Site: 101 [Kingseat PM Side Road-stage 2]

Network: N102 [Side Road PM]

PUDO Entry
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	m				km/h
South: Median storage area														
3	R2	166	0.0	166	0.0	0.151	3.6	LOS A	0.3	1.8	0.38	0.60	0.38	43.9
Approach		166	0.0	166	0.0	0.151	3.6	LOS A	0.3	1.8	0.38	0.60	0.38	43.9
West: Linwood Road West														
11	T1	263	2.0	263	2.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		263	2.0	263	2.0	0.135	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
All Vehicles		429	1.2	429	1.2	0.151	1.4	NA	0.3	1.8	0.15	0.23	0.15	48.3

