

Kingseat School NOR ITA

Response to AC Section 92 RFIs

Prepared for: Ministry of Education (Marty Van Aken) and Incite Consultants (Chris Horne)

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Prepared by: Kate Brill, Principal Transportation Planner

Reviewed by: Jo Draper, Associate Transportation Planner

Thank you for the opportunity to respond to Auckland Council's Section 92 Requests for Further Information on the Kingseat NOR Integrated Transport Assessment (ITA). Please find below a response to the queries addressed to Incite on 03 November 2020.

Auckland Council RFIs are provided below in blue italics with Abley's response following each point in black text.

1. *Visibility Assessment on Linwood Road*

The ITA does not include an assessment of visibility from the proposed site accesses onto Linwood Road. This would be dependent on the future speed limit along this section of Linwood Road and it is acknowledged that this is expected to change in the future, commensurate with future urban development along this route. Please provide an assessment, which could be based on a sensitivity test covering an appropriate range of speed limits, ranging from the current 80km/hr limit to a future urban design speed as part of the AEE to consider what the potential effect is/will be.

You are also advised that it is noted that the ITA erroneously records the existing speed limits along this section of Linwood Road as being 100km/hr outside the subject site, transitioning to 70km/hr a short distance to the west. The correct respective speed limits at the time of writing are 80km/hr outside the subject site, transitioning to 50km/hr to the west.

At time of writing the ITA and attendance at a site visit in May 2020, the speed limit was 100km/hr outside the site, transitioning to 70km/hr west of the site. However, it is understood that the speed limit has since reduced and there is a likelihood that it will reduce further once development in Kingseat commences. A detailed visibility assessment was not undertaken at this high level stage of assessment due to the many unknown variables, such as future speed limits, location of access points, location of future roads etc. In addition to this, there was the reassurance that Linwood Road is long, straight and flat with excellent sight lines from any point along the site frontage.

For completeness sake, we have undertaken a visibility assessment to confirm the sight lines from the site. Appropriate sight distance between drivers exiting the site and approaching drivers on the frontage road should be provided at all accessways. The Austroads Guide to Road Design Part 4A provides the types of sight distance to consider when designing intersections. The Safe Intersection Sight Distance (SISD) has been adopted which is the distance for a driver on a major road to observe a vehicle on a minor approach moving into a collision situation and to decelerate to a stop before reaching the collision point.

The guidelines on the SISD is based on Austroads 2017, Guide to Road Design Part 4A (Unsignalised and Signalised Intersections). The minimum sight distance should be provided on the major road at any intersection. A range of traffic speeds have been taken into consideration to account for the current (80-100km/hr) and future (50km/hr) speed expected on Linwood Road outside the site. Two locations along Linwood Road have also been considered to account for the potential Pick up / Drop Off zone exit point; and the potential for a new side road intersection along the eastern boundary of the school site.

The scenario where the greatest sight distance is required is a design speed of 100km/h, where Austroads recommends a minimum SISD of 248m. The sight distance from both the pick up/drop off zone exit and the new road intersection both exceed the minimum recommended SISD requirement, as shown in **Table 1**.

| Direction | Speed limit (km/hr) | Recommended Sight Distance | Available Sight Distance (from PUDO Exit) | Available Sight Distance (from proposed road) |
|---------------|---------------------|----------------------------|---|---|
| West approach | 100 | 248 metres | >300 metres | >270 metres |
| East approach | 100 | 248 metres | >300 metres | >270 metres |
| West approach | 80 | 181 metres | >300 metres | >270 metres |
| East approach | 80 | 181 metres | >300 metres | >270 metres |
| West approach | 50 | 97 metres | >300 metres | >270 metres |
| East approach | 50 | 97 metres | >300 metres | >270 metres |

Table 1 Safe Intersection Site Distance along the site frontage on Linwood Road

2. Travel Modal Split

The travel modal split presented in the ITA appears to have a strong bias towards travel to and from the school by active modes and a comparative underestimate of vehicular trips, given the comparatively rural nature of the site compared to other areas of Auckland.

While the rural context of the subject site is expected to change over time with the development of Kingseat, the opening roll for the school would correspond with less than 2000 dwellings being developed within Kingseat. It is additionally noted that the catchment area for the school extends as far as Clarks Creek and Glenbrook Road, which includes rural residential lifestyle blocks for which vehicular travel would be the only realistic mode of travel to the subject site.

A comparison with NZ Transport Agency Report 453 'Trips and parking related to land use' Section 6.4 indicates that schools in Rural Areas would be expected to have an active modes travel share of around 16% to 39%, compared with the 39% to 50% suggested in the ITA (ref. Figure 6.1). This would result in a corresponding vehicular mode share of around 50% to 75%, on the basis that the subject site is not expected to be served by public transport trips.

Please provide further assessment using Travel Mode split data in Report 453 as the basis for a sensitivity test for trip generating potential, and in turn, intersection performance in order to assess the effects on the site.

As discussed in Section 5.4 in the ITA, at least 95% of the school catchment is expected to reside within the new Kingseat development area. The rural residential lifestyle blocks between Clarks Creek and Glenbrook Road currently house approximately 30 dwellings which is estimated to account for less than 10 primary school aged children.

The modal share adopted in the ITA uses the Household Travel Survey (HTS) Data which is widely accepted as the main dataset for school travel in New Zealand as it relies on a sample size of over 2000 households. Section 6.4 of the NZ Transport Agency Report 453 'Trips and parking related to land use' on the other hand uses three schools as a sample size and not considered the appropriate reference to determine school modal splits.

As discussed above, the school will effectively operate as an urban school with approximately 95% of the catchment living within 2 kms of the school. However, it is acknowledged that travel patterns may be more reliant on vehicle use in the early stages prior to the full buildout of infrastructure. We have therefore modelled a scenario with the opening roll of the school which is estimated to be 350 students. A modal split of a very conservative 85% vehicle use has been applied along with 2028 traffic volumes on Linwood Road. The modelled intersection of Linwood Road/New school road operates very efficiently with a LOS of A-B. All movements operate at a LOS of A with the exception of the right turn out of the side road which is expected to operate at a LOS of B, as shown in the SIDRA results in **Figure 1** at the end of this memo.

As the township matures and the full buildout of infrastructure is in place, we refer to the scenario we have modelled in the ITA with a 50% vehicle mode share.

It should also be noted that the modelled scenarios provided in the ITA are considered very conservative and present the worst-case scenario in many respects, including:

- At full buildout of the local road network, there is likely to be several streets in vicinity of the school that will facilitate access for school traffic. The ITA assumes all school traffic will be channelled through the one intersection which is unlikely to be the case.
- The intersection modelled in the ITA assumes **every vehicle** travels through the one intersection.

- The ITA assumes a school roll of 900 students. The planning rules currently allow for residential development which is estimated to accommodate 600-700 Year 1-8 school students. Major Plan Changes would need to take place in order to reach a roll of 900 students which may never eventuate.

In conclusion, the ITA assumes the worst-case scenario and therefore inherently allows for sensitivity testing. It is unlikely that the variables discussed above (a school roll of 900 students, only one access road etc) will be the case when the development is at full buildout.

Note: Additional modelling undertaken as part of this response has only been applied to the scenario of school access via a side road intersection. The proposed scenario of a Pick up / Drop off zone accessed off Linwood Road operates very efficiently with a separate entry and exit and not considered necessary to apply sensitivity testing.

3. Staged Approach towards transport infrastructure provisions

The ITA notes that the school is expected to have an opening roll of 300 to 350 students, rising to an eventual roll of 900 students, and it provides an indication of how many new dwellings within Kingseat would correlate with numbers of school students. However, it does not provide an overview of expected transportation provisions associated with these school rolls.

Please provide an indicative overview of transportation infrastructure provisions that would be expected to support the opening school roll, in order to achieve the desired outcomes associated with a 'compact and walkable area' for the future settlement.

The staging of the infrastructure in Kingseat will be determined by the surrounding development. It is expected the following infrastructure external to the site will be required if not already incorporated into the design of the surrounding development:

- A safe crossing point on Linwood Road outside the school
- A footpath on one side of Linwood Road linking the school and the Kingseat town centre
- Localised widening on Linwood Road outside the school site to facilitate vehicle turning movements into the school site; or for access off a side road.

4. Growth Assumptions behind background traffic data

Please confirm the underlying assumptions in relation to background growth for traffic on Linwood Road, including what level of growth this takes account of within the South Auckland sub-region. This is required in order to assess the effects of the proposal.

Forecasted traffic volumes were collected from two sources, with the highest traffic volumes adopted in the ITA. The table below presents the source of the modelled traffic counts and the development year.

As shown in **Table 2**, the Kingseat Structure Plan estimated 765vph in the AM peak on Linwood Road at full development of the area i.e. 2,000 households. The Auckland Forecasting Centre at AT estimated a higher 930vph on Linwood Road when the development reaches 632 households. However, the AFC's model is a region wide model which doesn't appear to take the future local road network into account. It therefore assumes that all traffic generated by the new Kingseat development will be passing the school site on Linwood Road. At the time of writing, the AFC data is the latest forecast data model available from AT.

| Source | Forecasted Year | Forecasted Traffic Vols | Growth Assumptions |
|----------------------------------|-----------------|-------------------------|--------------------|
| Auckland Forecasting Centre (AT) | 2028 | 930vph | 632 Households |
| Kingseat Structure Plan | 2051 | 765vph | 2000 households |

Table 2 Source of forecasted traffic volumes on Linwood Road

In reality, traffic will be accessing the new residential developments via the local road network as proposed in the Precinct Plan which will significantly reduce traffic volumes on Linwood Road. The forecasted volumes of 930vph are therefore considered appropriate for assessment. However, we have run a SIDRA model showing an additional 25% of peak traffic volumes on Linwood Road i.e. 125% of the forecasted volumes of 930vph. The results show Linwood Road continuing to operate at a Level of Service (LOS) of A as shown in **Figure 2**. The only movement

affected by the increase in traffic is the right turn out of the side road which operates at a LOS of F with a delay of 56 seconds. This is considered acceptable given delays of less than a minute only affects traffic on the side road and will not impact on the operation of the arterial road. It is also only for a short period (15-30mins) of the day at school peak times.

SIDRA RESULTS

Figure 1: SIDRA OUTPUT FOR LINWOOD ROAD / SIDE ROAD INTERSECTION IN AM PEAK FOR OPENING SCHOOL ROLL OF 350 STUDENTS AND 85% VEHICLE USE

MOVEMENT SUMMARY

▼ Site: 101 [Kingseat AM Side Road - stage 1 -350 roll, 85% veh (Site Folder: General)]

■ Network: N102 [Side Road AM - 350 roll, 85% veh (Network Folder: General)]

PUDO Entry
Site Category: (None)
Give-Way (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID | Turn | DEMAND FLOWS | | ARRIVAL FLOWS | | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE | | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
| | | [Total veh/h | HV] % | [Total veh/h | HV] % | v/c | sec | | [Veh. veh | Dist] m | | | | km/h |
| South: School Entry | | | | | | | | | | | | | | |
| 1 | L2 | 276 | 0.0 | 276 | 0.0 | 0.288 | 5.9 | LOS A | 0.5 | 3.5 | 0.38 | 0.60 | 0.38 | 43.3 |
| 2 | T1 | 218 | 0.0 | 218 | 0.0 | 0.391 | 10.6 | LOS B | 0.9 | 6.1 | 0.68 | 0.91 | 0.91 | 21.4 |
| Approach | | 494 | 0.0 | 494 | 0.0 | 0.391 | 8.0 | LOS A | 0.9 | 6.1 | 0.51 | 0.74 | 0.61 | 38.5 |
| East: Linwood Road East | | | | | | | | | | | | | | |
| 4 | L2 | 128 | 0.0 | 128 | 0.0 | 0.175 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.21 | 0.00 | 47.3 |
| 5 | T1 | 208 | 2.0 | 208 | 2.0 | 0.175 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.21 | 0.00 | 48.7 |
| Approach | | 336 | 1.2 | 336 | 1.2 | 0.175 | 1.8 | NA | 0.0 | 0.0 | 0.00 | 0.21 | 0.00 | 48.3 |
| West: Linwood Road West | | | | | | | | | | | | | | |
| 12 | R2 | 328 | 0.0 | 328 | 0.0 | 0.251 | 6.0 | LOS A | 0.5 | 3.5 | 0.47 | 0.64 | 0.47 | 37.3 |
| Approach | | 328 | 0.0 | 328 | 0.0 | 0.251 | 6.0 | NA | 0.5 | 3.5 | 0.47 | 0.64 | 0.47 | 37.3 |
| All Vehicles | | 1158 | 0.4 | 1158 | 0.4 | 0.391 | 5.6 | NA | 0.9 | 6.1 | 0.35 | 0.56 | 0.39 | 41.7 |

MOVEMENT SUMMARY

▼ Site: 101 [Kingseat AM Side Road - stage 2 - 350 roll, 85% veh (Site Folder: General)]

■ Network: N102 [Side Road AM - 350 roll, 85% veh (Network Folder: General)]

PUDO Entry
Site Category: (None)
Give-Way (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID | Turn | DEMAND FLOWS | | ARRIVAL FLOWS | | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE | | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
| | | [Total veh/h | HV] % | [Total veh/h | HV] % | v/c | sec | | [Veh. veh | Dist] m | | | | km/h |
| South: Median storage area | | | | | | | | | | | | | | |
| 3 | R2 | 218 | 0.0 | 218 | 0.0 | 0.278 | 5.9 | LOS A | 0.5 | 3.4 | 0.58 | 0.82 | 0.63 | 41.6 |
| Approach | | 218 | 0.0 | 218 | 0.0 | 0.278 | 5.9 | LOS A | 0.5 | 3.4 | 0.58 | 0.82 | 0.63 | 41.6 |
| West: Linwood Road West | | | | | | | | | | | | | | |
| 11 | T1 | 529 | 2.0 | 529 | 2.0 | 0.272 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 49.9 |
| Approach | | 529 | 2.0 | 529 | 2.0 | 0.272 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 49.9 |
| All Vehicles | | 747 | 1.4 | 747 | 1.4 | 0.278 | 1.8 | NA | 0.5 | 3.4 | 0.17 | 0.24 | 0.18 | 48.2 |

Figure 2: SIDRA OUTPUT FOR LINWOOD ROAD / SIDE ROAD INTERSECTION IN AM PEAK FOR 25% ADDITIONAL TRAFFIC ON LINWOOD ROAD AND 50% VEHICLE USE

MOVEMENT SUMMARY

Site: 101 [Kingseat AM Side Road - stage 1 - 125% traffic vols, 50% modal (Site Folder: General)]

Network: N102 [Side Road AM - 125% traffic vols, 50% modal (Network Folder: General)]

PUDO Entry
 Site Category: (None)
 Give-Way (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|------------------------------|------|---------------|--------|---------------|--------|---------------|-----------------|------------------|-----------------------|----------|-----------|---------------------|------------------|------------------|
| Mov ID | Turn | DEMAND FLOWS | | ARRIVAL FLOWS | | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE | | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| | | [Total veh/h | HV] % | [Total veh/h | HV] % | | | | [Veh. veh | Dist] m | | | | |
| South: School Entry | | | | | | | | | | | | | | |
| 1 | L2 | 406 | 0.0 | 406 | 0.0 | 0.451 | 7.3 | LOS A | 1.1 | 8.0 | 0.49 | 0.73 | 0.60 | 42.4 |
| 2 | T1 | 306 | 0.0 | 306 | 0.0 | 0.955 | 55.7 | LOS F | 5.1 | 35.8 | 0.94 | 2.08 | 4.31 | 6.2 |
| Approach | | 712 | 0.0 | 712 | 0.0 | 0.955 | 28.1 | LOS D | 5.1 | 35.8 | 0.68 | 1.31 | 2.19 | 25.1 |
| East: Linwood Road East | | | | | | | | | | | | | | |
| 4 | L2 | 182 | 0.0 | 182 | 0.0 | 0.231 | 4.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.22 | 0.00 | 47.1 |
| 5 | T1 | 261 | 2.0 | 261 | 2.0 | 0.231 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.22 | 0.00 | 48.6 |
| Approach | | 443 | 1.2 | 443 | 1.2 | 0.231 | 2.0 | NA | 0.0 | 0.0 | 0.00 | 0.22 | 0.00 | 48.2 |
| West: Linwood Road West | | | | | | | | | | | | | | |
| 12 | R2 | 492 | 0.0 | 492 | 0.0 | 0.426 | 7.5 | LOS A | 1.2 | 8.2 | 0.59 | 0.81 | 0.74 | 36.6 |
| Approach | | 492 | 0.0 | 492 | 0.0 | 0.426 | 7.5 | NA | 1.2 | 8.2 | 0.59 | 0.81 | 0.74 | 36.6 |
| All Vehicles | | 1647 | 0.3 | 1647 | 0.3 | 0.955 | 14.9 | NA | 5.1 | 35.8 | 0.47 | 0.87 | 1.17 | 35.1 |

MOVEMENT SUMMARY

Site: 101 [Kingseat AM Side Road - stage 2 - 125% traffic vols, 50% modal (Site Folder: General)]

Network: N102 [Side Road AM - 125% traffic vols, 50% modal (Network Folder: General)]

PUDO Entry
 Site Category: (None)
 Give-Way (Two-Way)

| Vehicle Movement Performance | | | | | | | | | | | | | | |
|------------------------------|------|---------------|--------|---------------|--------|---------------|-----------------|------------------|-----------------------|----------|-----------|---------------------|------------------|------------------|
| Mov ID | Turn | DEMAND FLOWS | | ARRIVAL FLOWS | | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE | | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
| | | [Total veh/h | HV] % | [Total veh/h | HV] % | | | | [Veh. veh | Dist] m | | | | |
| South: Median storage area | | | | | | | | | | | | | | |
| 3 | R2 | 306 | 0.0 | 306 | 0.0 | 0.481 | 9.3 | LOS A | 1.1 | 7.6 | 0.71 | 0.99 | 1.06 | 38.7 |
| Approach | | 306 | 0.0 | 306 | 0.0 | 0.481 | 9.3 | LOS A | 1.1 | 7.6 | 0.71 | 0.99 | 1.06 | 38.7 |
| West: Linwood Road West | | | | | | | | | | | | | | |
| 11 | T1 | 662 | 2.0 | 662 | 2.0 | 0.340 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 49.8 |
| Approach | | 662 | 2.0 | 662 | 2.0 | 0.340 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 49.8 |
| All Vehicles | | 968 | 1.4 | 968 | 1.4 | 0.481 | 3.0 | NA | 1.1 | 7.6 | 0.22 | 0.31 | 0.34 | 47.2 |