NORTHLAKE
wanaka

Proposed Plan Change Northlake

Transportation Assessment

CARRIAGEWAY
CONSULTING
traffic engineering | transport planning

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1. Introduction

1.1. Northlake Investments Limited proposes to lodge a private plan change request to allow for a small increase in the number of lots able to be developed towards the west of the Northlake subdivision, through extending Activity Area B2 area into Activity Area E1 and subsuming two of the Activity Area C1 'islands' in the current District Plan Structure Plan (as discussed further below).

1.2. The plan change will also allow for access to be provided through the Northlake subdivision to land to the immediate west, known as Sticky Forest.

1.3. This Transportation Assessment sets out a detailed analysis of the transportation issues associated with the proposed plan change including changes in travel patterns that are likely to arise. Where potential adverse effects are identified, ways in which these can be addressed are set out.

1.4. This report is cognisant of the guidance specified in the New Zealand Transport Agency's '*Integrated Transport Assessment Guidelines'* and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered.

2. Site Overview

2.1. Location

2.1.1. The plan change area (**the site**) is located towards the northwest of the Northlake subdivision, which itself is located around 3.2km northeast of Wanaka town centre. For context, the general location of the site in respect of the local area is shown in Figure 1 and the location is shown in more detail in Figure 2.

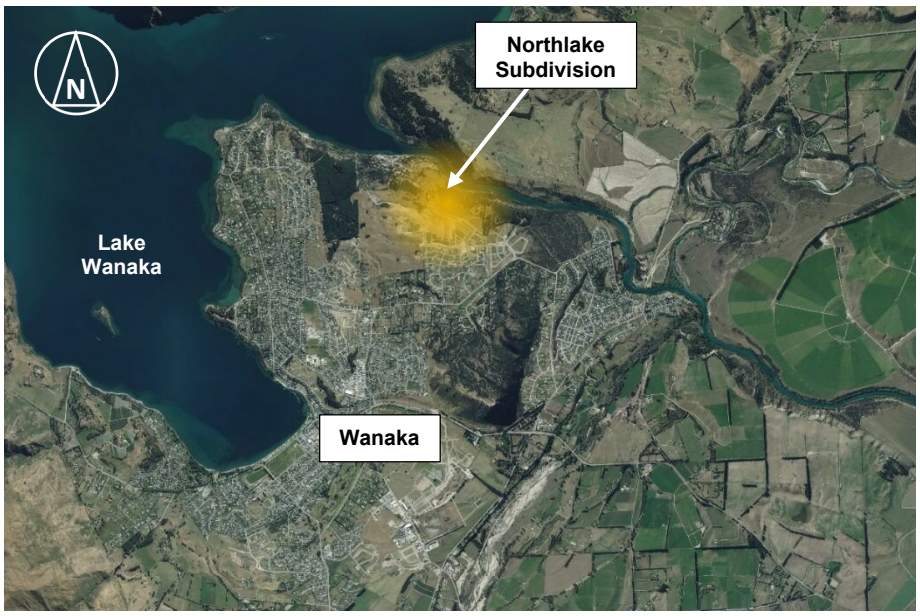


Figure 1: General Location of Plan Change Area

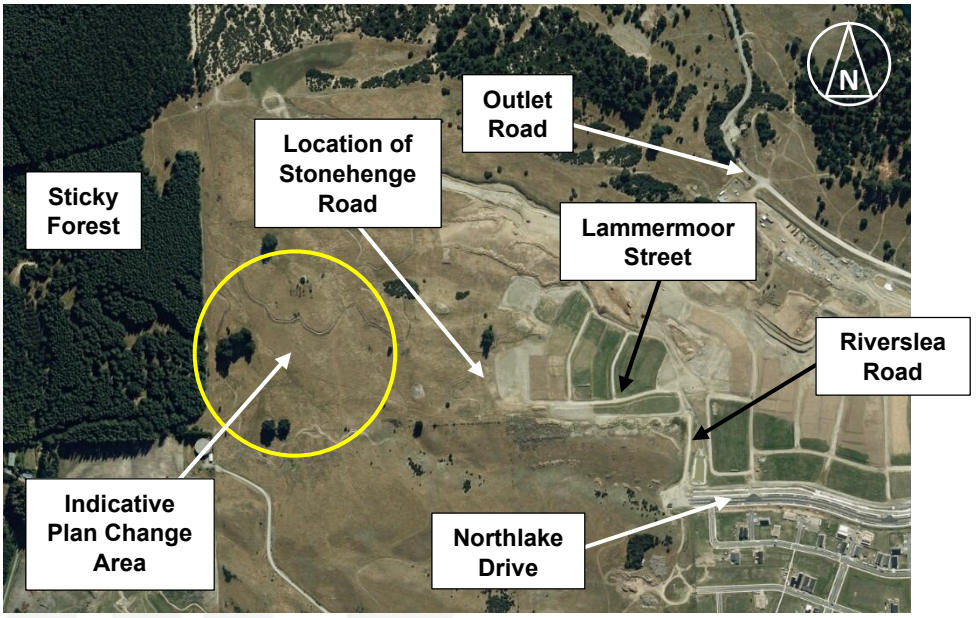


Figure 2: Aerial Photograph of Plan Change Area and Environs

2.1.2. The plan change area has frontage only onto Stonehenge Road, which is not yet constructed.

2.1.3. Further south, and as discussed further below, there are three potential routes that provide a connection between Northlake and Aubrey Road, being the route providing access to the wider roading network. These are Northburn Road, Mt Linton Avenue and Outlet Road.

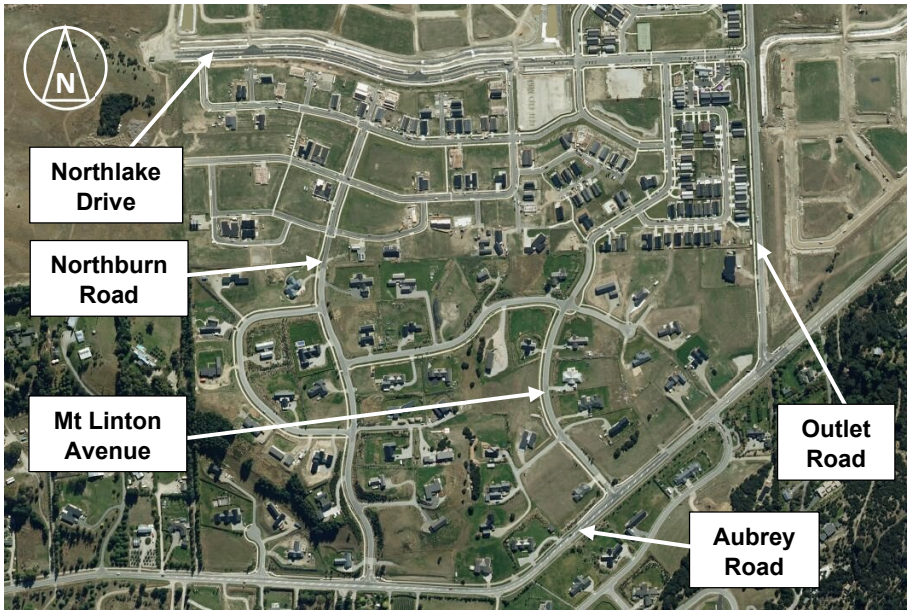


Figure 3: Routes Between Northlake and Wider Roading Network

2.2. Roading Classification

2.2.1. The District Plan classifies all roads in the immediate area of the plan change area as Local Roads, indicating a role in providing primarily for property access. Northlake Drive to the southeast of the plan change area is similarly presently classified as a Local Road, despite the role it provides within the subdivision. However Outlet Road towards the east and south of the plan change area is classified as a Collector Road, indicating a role in accommodating both property access and through traffic.

3. Current Transportation Networks

3.1. Roading Network

3.1.1. In the immediate vicinity of the site, the roading network is not presently constructed. However based on consented drawings, Stonehenge Road will have a 20m legal width and a formed width of 8.4m, with parking bays on each side of 2.5m width. This configuration meets the Council's Land Use Development and Subdivision Code of Practice (**Code of Practice**) requirements for a road serving up to 800 residences.

3.1.2. The drawings also show that at the eastern end of Stonehenge Road, it meets Riverslea Road at a priority intersection, with Lammermoor Street joining Riverslea Road just to the south of this. Riverslea Road has the same configuration as Stonehenge Road, with a 20m legal width and 8.4m formed width. At present this is 'stub' which runs southwards only as far as the Northlake boundary.

3.1.3. Lammermoor Street continues towards the east. This has a 15m legal width and is proposed to have a 5.7m formed width, with on-street parking within the movement lanes. This configuration meets the Code of Practice requirements for a road serving up to 100 residences. This is due to the absence of a parking lane parts of its length – with a parking lane provided, then Lammermoor Street would meet the Code of Practice requirements for a road serving up to 200 residences.

Photograph 1: Lammermoor Street (Looking West)

3.1.4. In turn Lammermoor Street connects to the eastern section of Riverslea Road, which then connects in turn to Northlake Drive.

3.1.5. The speed limits of these roads are not yet known but in common with other residential areas (and the wider Northlake subdivision) it can be expected that a 40km/h limit will be posted.

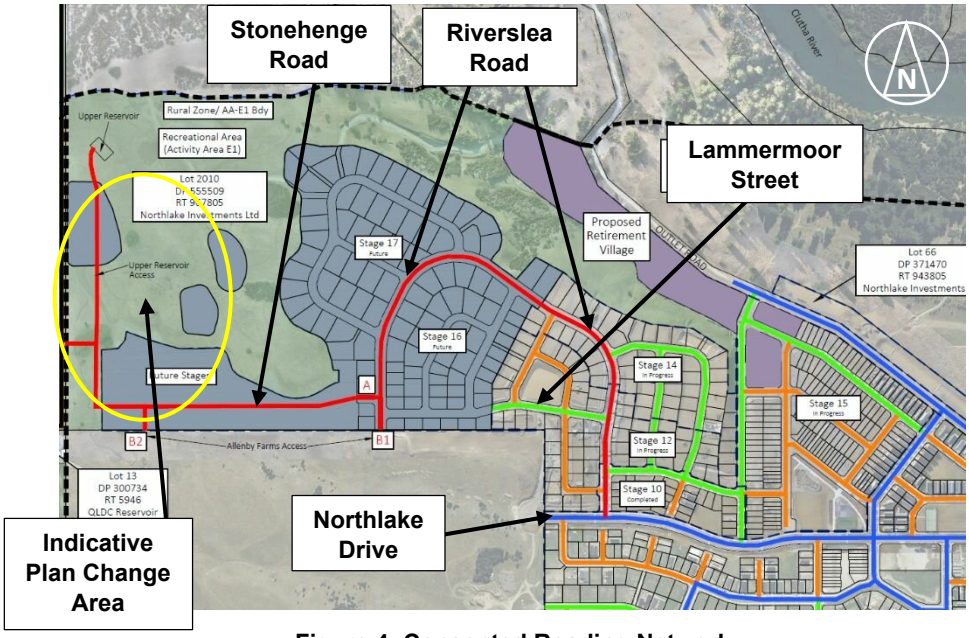
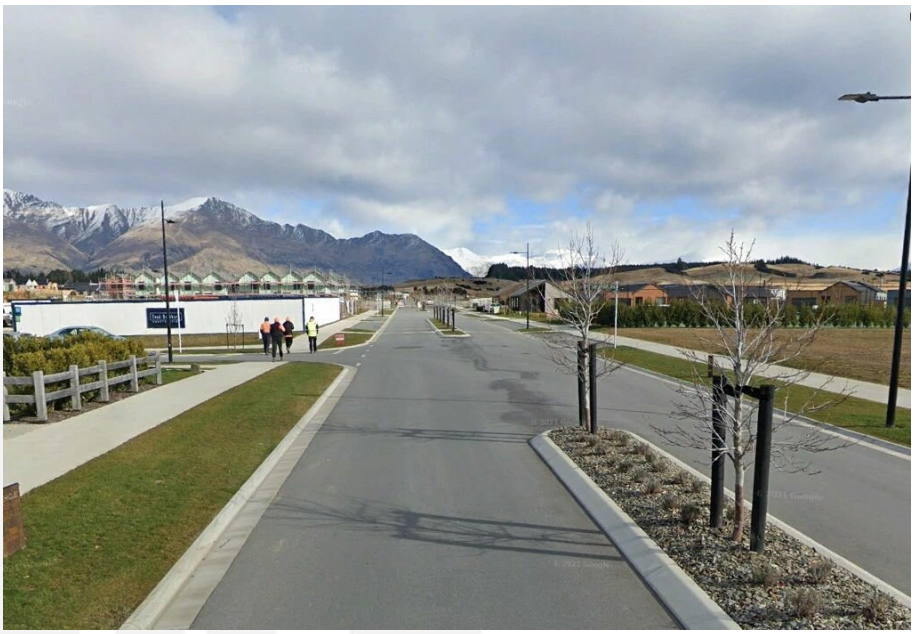


Figure 4: Consented Roading Network

3.1.6. Northlake Drive provides a key east-west route within the Northlake subdivision. It is a median divided road with one traffic lane in each direction, and a flat and gently curving alignment.



Photograph 2: Northlake Drive (Looking West)

3.1.7. At its eastern extremity, Northlake Drive meets Outlet Road at a priority ('give-way') crossroad intersection, with Joe Brown Drive forming an approach from the east (this serves the Hikuwai residential subdivision). The intersection does not have any auxiliary lanes for turning traffic, indicative of the generally low traffic flows that it carries. Sight distances in each direction are excellent.

Photograph 3: Outlet Drive Looking North, Northlake Drive on Left

3.1.8. Outlet Road has a sealed carriageway width of 6.4m, with shoulders of 1.0m (0.5m sealed and 0.5m metalled), and to the south of Northlake Drive, a straight horizontal alignment. It is subject to a 40km/h speed limit. Further south, Outlet Road descends and meets Aubrey Road at a priority ('stop') intersection. The intersection has an auxiliary right-turn and left-turn lane, with good sight distances in each direction.

Photograph 4: Aubrey Road / Outlet Road Intersection

3.1.9. Aubrey Road has a 60km/h speed limit and has the same cross-section as Outlet Road, with traffic lanes comprising a total of 6.4m, plus 0.5m sealed and 0.5m metalled shoulders in places.

Photograph 5: Typical Cross-Section of Aubrey Road

3.1.10. In turn, Aubrey Road provides a connection to Anderson Road and to State Highway 84.

3.1.11. Approximately 330m west of the Northlake Drive / Outlet Road intersection, Mount Nicholas Avenue joins Northlake Drive from the south. In turn, this connects to Northburn Road, and Northburn Road then connects to Aubrey Road approximately 680m west of the Aubrey Road / Outlet Road intersection.

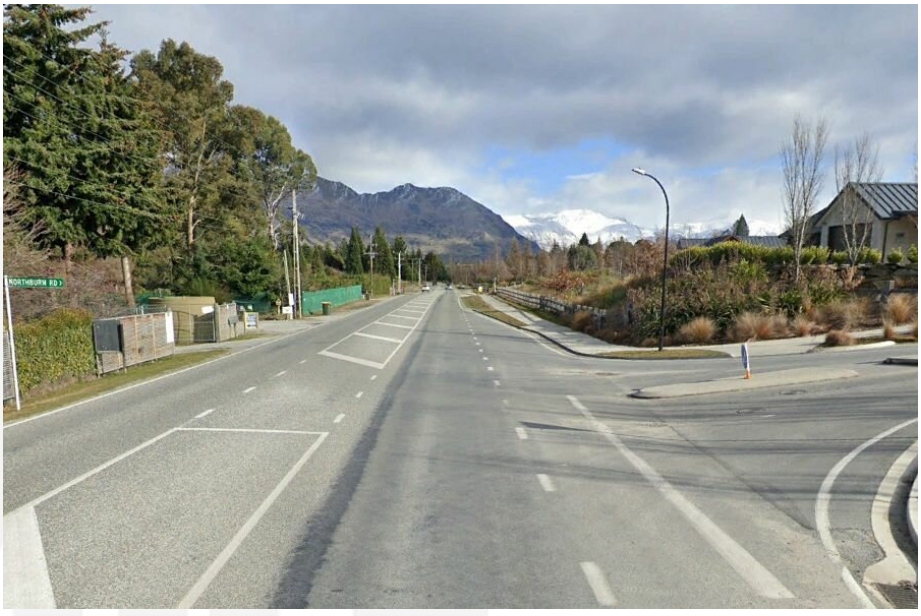
3.1.12. Northburn Road within the Northlake subdivision provides a 5.7m wide carriageway. However, at the southern end of the subdivision, the road meets the existing formation of Northburn Drive which has a 6.4m wide carriageway (between edgelines), with gravelled shoulders and swales on either side, and one 2m wide footpath.

Photograph 6: Northburn Road, Looking South (Near the Southern Boundary to Northlake)

3.1.13. Further south, Northburn Road descends to meet Aubrey Road. The road retains the same cross-section, with a 6.4m wide carriageway.

Photograph 7: Northburn Road, Looking South (Just North of Aubrey Road)

3.1.14. The Aubrey Road / Northburn Road intersection is a priority ('give-way') intersection. The intersection has an auxiliary left-turn lane, but no right-turn lane although there is a flush median that can be used by vehicles turning right. Sight distances in each direction are excellent.



Photograph 8: Aubrey Road / Northburn Road Intersection, Looking West

3.2. Non-Car Infrastructure

3.2.1. The proposed roads towards the west of the subdivision show that the provision for walking and cycling infrastructure is aligned with the requirements of the Code of Practice, with Stonehenge Road and Riverslea Road having footpaths on each side. Lammermoor Street has a footpath only on one side at present but it is understood a second footpath is required to be constructed as part of Stage 16 of Northlake.

3.2.2. Northlake Drive has footpaths on both sides, with a footpath provided on the western side of both Outlet Road and Northburn Road.

3.3. Future Changes

3.3.1. There are no known changes to the roading environment in the immediate area that are set out in any overarching strategies or guides. However, it is understood that the development of the adjoining Allenby Farms land, which is zoned for development and has Outline Development Plan approval, is to be taken into account within this analysis. This is discussed in more detail below, but lies within the wider Northlake area that was the subject of Plan Change 45 (**PC45**) which rezoned the area for residential use.

3.3.2. A retirement village has been recently consented within Northlake, located towards the northwest of the site and with frontage onto Outlet Road and several roads internal to Northlake. It is considered that due to the location of the site, traffic will typically use Outlet Road to reach the wider roading network because it is the most direct route and most intuitive for both visitors and residents, who will be infrequent travellers to/from the site. Accordingly, the traffic associated with this will not be present on the internal roading network within Northlake, but rather, on Outlet Road and Aubrey Road only. This has been allowed for within this assessment.

4. Current and Future Transportation Patterns

4.1. Existing Traffic Flows

4.1.1. The MobileRoad website records traffic count data throughout the country. This shows that in 2021, Northburn Road was assessed as carrying 710 vehicles per day.

4.1.2. Outlet Road towards the north of the subdivision carries approximately 330 vehicles per day (two-way). Further south however, the traffic volume is in the order of 810 vehicles per day. It is likely that the daily movements will comprise in part, recreational traffic associated with accessing the river mouth towards the west, and in part associated with construction traffic, plus residential traffic arising from both the Hikuwai and Northlake subdivisions.

4.1.3. As the peak hour traffic flows on a road are typically around 10-15% of the daily volumes, this suggests that at peak times, the Northburn Road carries 70-100 vehicles per hour (two-way) and the southern section of Outlet Road currently carries 80-120 vehicles per hour (two-way).

4.1.4. The MobileRoad website also shows that Aubrey Road east of Northburn Road carries 5,500 vehicles per day, indicating a peak hour flow of around 550 to 825 vehicle movements (two-way).

4.1.5. At present, the Northlake subdivision is still under construction. Consequently, one aspect of the wider roading network within Northlake is that traffic flows are not just associated with those living in the subdivision but are also currently affected by the presence of construction traffic, and will in due course be affected by new residences that are not yet built. Consequently, it is not possible to undertake any traffic surveys to ascertain the traffic flows on each road because the volumes will be different once construction is complete.

4.1.6. It is also relevant to note that the Northlake zone was underpinned by a private plan change request (PC45) that expected up to 1,600 residences to be constructed. The Northlake zone is larger than the development known as 'Northlake' and from information provided, currently comprises the following:

Stage	Residential Yield	Comment
1-12 & 15	523	100% constructed
14	46	100% constructed
16	55	ODP & subdivision RC approved. Stage under construction
17	48	ODP approved
18	54	Existing zoning for area of plan change request
C1 islands	10	
Retirement village	40	100 residential apartments, equivalent to 40 standard residences
Lot 1005	27	27 townhouses, construction commences 2022
Lot 1006	25	25 Apartments, construction commences 2022
AA-A	64	1 acre subdivision. 100% constructed.
Subtotal	*892*	
Allenby	354	ODP approved. No construction on site.
Hikuwai	200	ODPs approved for 200 residential lots. Est. 50% constructed.
Urquhart Land	23	Undeveloped. Calculated as 4.5ha @ 4.5 residences/ha) + 15%

Subtotal	*577*	
Total	***1,469***	

Table 1: Northlake Zone, Current Overall Yields

4.1.7. On this basis, up to 1,469 residences could be constructed as of right under current zonings/consents, meaning that the initial transportation assessments for the PC45 plan change request are more onerous than the development yield that has been achieved.

4.2. Future Traffic Flows (Without the Proposed Plan Change)

4.2.1. There are two matters which will have a significant effect on the traffic flows in the immediate area. The first is that there has been a recent change in the prevailing speed limits, introduced by Queenstown Lakes District Council. Under PC45, and subsequent assessments of development within Northlake, the prevailing speed limit on Outlet Road has been 70km/h. Allowing for drivers to choose the fastest journey between their residence within Northlake and a destination towards Wanaka, it was therefore anticipated that Outlet Road would be the more preferable and therefore roading (and intersection) improvements were focussed towards the east of the site.

4.2.2. However the speed limit on Northlake Drive and Outlet Road has recently been reduced to 40km/h by the Council. This then means that the Outlet Road route has a similar operating speed to Northburn Road, but Northburn Road provides a route that is shorter by around 450m. Even allowing for drivers to encounter a greater amount of manoeuvring vehicles to/from driveways and kerbside parking on Northburn Road, and to have to slow for these, it is extremely likely that Northburn Road will become the preferred route for a large proportion of Northlake traffic, because it results in a reduced travel time.

4.2.3. The speed limit on Aubrey Road has also been reduced to 60km/h. This means that is also takes longer to travel along the section of Aubrey Road between Northburn Road and Outlet Road, again reducing the attractiveness of Outlet Road for a high proportion of residents.

4.2.4. Taking this into account, it is anticipated that Northburn Road is now the preferred route for around 40% of the dwellings at Northlake (around 380 dwellings) due to the revised speed limit.

4.2.5. It is also understood that the Outline Development Plan for the Allenby Farms land was approved by the Council in November 2018. This area of land lies in the southwestern part of the Northlake zone and gains access to the surrounding area via the Northlake roading network. Initially, the Allenby Farms land was expected to have access to Aubrey Road by a road towards the southwest, known as Peak View Ridge. However this was subsequently not approved and the documentation accompanying the Outline Development Plan identified that without this connection, the vast majority of the Allenby Farms traffic would be likely to use Northburn Road. This access arrangement was approved by the Council, and will lead to a further 354 lots using Northburn Road.

4.2.6. Overall then, the assessment of Northburn Road suggest that in due course it will accommodate the traffic from up to 735 residences, due to the change of routing associated with the reduced speed limit on Northlake Drive and Outlet Road, and the approval of the Allenby Farms Outline Development Plan. The road also serves around 25 lots which have direct frontage onto it. Hence in total, it is anticipated that around 760 lots will gain access to the Northlake area via Northburn Road.

4.2.7. Traffic generated by residential developments is known to vary for a variety of reasons, with one such reason being the proximity (or otherwise) to employment and community facilities. Where a dwelling is some distance from these types of facilities, the traffic generation rates tend to be lower than for residences that are closer due to 'trip chaining', that is, the tendency of a resident to carry out multiple visits to different destinations during the same trip away from the dwelling.

4.2.8. PC45 utilised a traffic generation rate of 0.9 vehicle movements per residence in each of the peak hours. Since that time, a small amount of commercial development has been constructed as consented within Northlake, which is likely to result in a slightly higher proportion of trips being made internally. It is also relevant to note the increased emphasis upon non-car modes of travel since PC45 was considered, and the presence of the shared walking and cycling route that runs along the northern side of Aubrey Road. The traffic generation rate has therefore been amended slightly to 0.85. Thus the 760 residences that are currently expected to use Northburn Road will generate around 645 vehicle movements in the peak hours (with the remainder of the permitted development continuing to use Outlet Road).

4.2.9. In the morning peak hour, PC45 allowed for 75% of the generated vehicles to be exiting the site, with 65% of the generated vehicle movements entering the plan change area in the evening peak hour. The same proportions have been adopted in this instance also. With regard to the distribution of these vehicles, PC45 noted that 20% of the traffic was expected to travel to/from the east with 80% travelling to/from the west.

4.2.10. The traffic generation for the extent of development anticipated in Northlake, under current zonings and the revised distribution discussed above, is shown below:

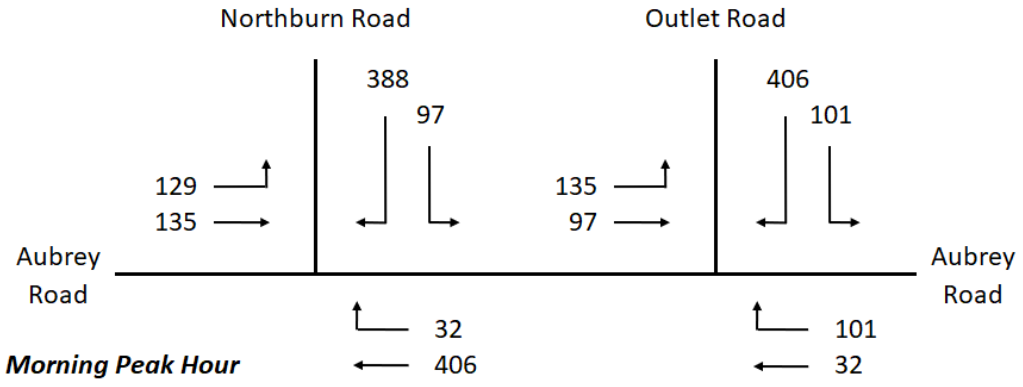


Figure 5: Traffic Generation of Wider Northlake Area, Taking Account of Different Trip Distribution, Morning Peak Hour

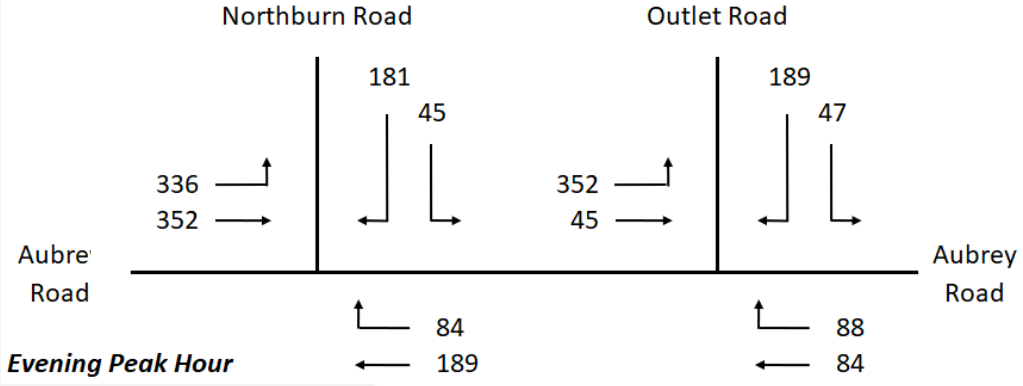


Figure 6: Traffic Generation of Wider Northlake Area, Taking Account of Different Trip Distribution, Evening Peak Hour

4.2.11. In addition to the development traffic, there will also be through traffic on Aubrey Road. As noted above, current peak hour volumes are in the order of 550 to 825 vehicle movements (two-way) but the currently-constructed total of 760 residences within the wider Northlake area (as discussed above) should generate around 650 vehicle movements. This would mean passing traffic volumes are within the range of 0 to 175 vehicle movements (two-way) in the peak hours. Traffic flows observed as part of PC45 showed peak hour volumes in 2013 of 130 to 160 vehicles (two-way)) which aligns with this, and the plan change documents also signalled that traffic growth in the area may be very low.

4.2.12. Consequently for this assessment, the volumes observed as part of PC45 have been adopted for the volumes of passing traffic on Aubrey Road:

- Morning peak hour:
  - 37 vehicles eastbound, 90 vehicles westbound
- Evening peak hour
  - 105 vehicles eastbound, 59 vehicles westbound

4.2.13. The volumes of traffic using the internal roading network within the Northlake subdivision will be determined by the number of lots served. Of relevance to the current proposal, the most direct route to the plan change area through Northlake would be via Lammermoor Street and Riverslea Road. Based on the number of lots served, these would be expected to have peak hour traffic flows in the order of 130 vehicles (two-way) on the easternmost part of Lammermoor Street and 220 vehicles (two-way) on the southernmost part of Riverslea Road respectively under the current zonings.

4.3. Current Levels of Service

4.3.1. The Austroads Guide to Traffic Management Part 3 ('*Traffic Studies and Analysis*') sets out a process by which the level of service of a road can be calculated. This showed that under these traffic flows, Northburn Road will provide Level of Service D. This is within the zone of stable flow.

4.3.2. The performance of the Aubrey Road / Northburn Road intersection has been modelled using the computer software package Sidra Intersection and the results are set out below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Aubrey Road (east)	R	6.9	0	A	9.7	0	A
Northburn Road (north)	L	3.6	0	A	5.6	0	A
	R	21.9	8	C	15.9	2	C
Aubrey Road (west)	L	6.0	0	A	6.0	0	A

Table 2: Performance of the Aubrey Road / Northburn Road Intersection (Under Current Zonings)

4.3.3. Under the full extent of development permitted within Northlake as noted above, this intersection provides a good level of service with relatively low queues and delays.

4.3.4. The levels of service indicate that the intersection has spare capacity (as Level of Service D is not uncommon for an urban intersection in the weekday peak hours, and only Level of Service C is attained).

4.4. Existing Volumes of Non-Car Modes of Travel

4.4.1. Given that the plan change area is largely undeveloped, it can reasonably be expected that pedestrians and cyclists will be infrequent road users. However, as the area becomes more developed in accordance with its underlying zoning, there will likely be an increase in walking and cycling. To that end, Outlet Road and the Local Roads within the Northlake subdivision include footpaths and where cyclist volumes are expected to be greatest, off-road cycling routes.

4.5. Existing Road Safety Record

4.5.1. The NZTA Crash Analysis System has been used to establish the location and nature of the recorded traffic crashes in the vicinity of the development site. Since the Northlake subdivision has only recently been developed, a wider area has been included within the search than would typically be the case for an established subdivision. Therefore, the length of Outlet Road has been assessed from Northlake Drive to Aubrey Road) plus the whole of the Northlake subdivision (and Northburn Road), for the past ten years.

4.5.2. There have been four crashes recorded:

- One crash recorded occurred on Mt Linton Avenue when a driver lost control on a curve and struck a lamp post. The police report notes that driver intoxication may have been a factor. The crash did not result in any injuries
- Three crashes have occurred at the Aubrey Road / Northburn Road intersection
    - One crash occurred when a southbound driver approaching the intersection lost control on loose gravel and left the road. The crash did not result in any injuries
    - One crash occurred when an eastbound driver on Aubrey Road turned onto Northburn Road and lost control. The police report notes the vehicle had no registration number plates and that the registered owner had emigrated.
    - One crash occurred when the rider of an e-bike collided with the rider of an e-scooter on the off-road route just to the west of the intersection. The crash resulted in serious injuries.

4.5.3. Based on the differing locations of the crashes and the different contributing causes, it is not considered that there are any road safety deficiencies on this part of the roading network.

5. Proposal

5.1. The proposed plan change relates to land towards the northwest of the Northlake Structure Plan area and has two aspects. Firstly, it facilitates access into Sticky Forest which at the current time is zoned for rural purposes. Secondly, it extends Activity Area B2 into Activity Area E1 and subsumes two of the Activity Area C1 'islands' in the Structure Plan included within the operative District Plan.

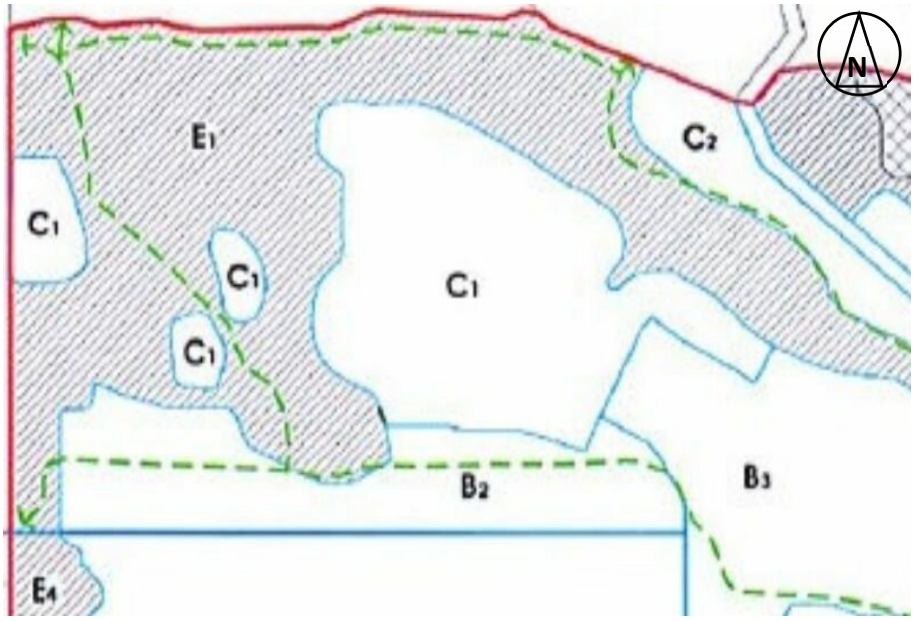


Figure 7: Extract from Approved Structure Plan in District Plan

Figure 8: Extract from Proposed Structure Plan

5.2. Since the proposal is for a plan change, there are no confirmed plans for the development pattern which may ultimately arise. However from information provided, it is understood that the plan change would permit an additional 63 residences, over and above the current zonings.

6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. As set out above, PC45 utilised a traffic generation rate of 0.9 vehicle movements per residence in each of the peak hours, and since that time there has been increased emphasis on non-car travel, and increase in working from home, and a high-quality walking/waling route has been constructed on the northern side of Aubrey Road. Accordingly, a slightly lower rate of 0.85 vehicle movements per residents in the peak hours has been adopted.

6.1.2. In the morning peak hour, PC45 allowed for 75% of these vehicles to be exiting the site, with 65% of the generated vehicle movements entering the plan change area in the evening peak hour. The same proportions have been adopted.

6.2. Trip Distribution

6.2.1. With regard to the distribution of these vehicles, PC45 noted that 20% of the traffic was expected to travel to/from the east with 80% travelling to/from the west.

6.2.2. The traffic generation for the additional 63 lots enabled by the plan change will therefore be:

Peak Hour	Traffic Volumes					
	East		West		Total	
	In	Out	In	Out	In	Out
Morning	3	8	10	33	13	41
Evening	7	4	28	15	35	19
Daily	50	50	202	202	252	252

Table 3: Traffic Generation of Proposed Plan Change (63 Additional Lots)

6.2.3. As with the traffic associated with the existing zoning, these vehicles can be expected to use the route of Stonehenge Road, Lammermoor Street and Northburn Road.

7. Effects on the Transportation Networks

7.1. Development Yield

7.1.1.1. It should be noted that at present (and as set out above), the anticipated development yield equates to 1,469 standard residences (allowing for the lower traffic generation associated with retirement units). The current proposal adds a further 63 residences to this, making a total of 1,532 residences. This is lower than the 1,600 residences modelled through PC45. As such, the traffic effects arising from the currently-proposed plan change are aligned with the yield initially expected for the wider area and assessed through PC45.

7.1.1.2. A summary of the yield of the Northlake Zone under the proposed zoning is shown below.

Stage	Residential Yield	Comment
1-12 & 15	523	100% constructed
14	46	100% constructed
16	55	ODP & subdivision RC approved. Stage under construction
17	48	ODP approved
18	125	Area of plan change request
C1 island	2	
Retirement village	40	100 residential apartments, equivalent to 40 standard residences
Lot 1005	27	27 townhouses, construction commences 2022
Lot 1006	25	25 Apartments, construction commences 2022
AA-A	64	1 acre subdivision. 100% constructed.
Subtotal	*955*	
Allenby	354	ODP approved. No construction on site.
Hikuwai	200	ODPs approved for 200 residential lots. Est. 50% constructed.
Urquhart Land	23	Undeveloped. Calculated as 4.5ha @ 4.5 residences/ha) + 15%
Subtotal	*577*	
Total	***1,532***	

Table 4: Northlake Zone, Proposed Overall Yields

7.2. Roading Capacity

7.2.1. Northburn Road

7.2.1.1. As noted above, Northburn Road is expected to carry the traffic associated with around 760 residences under current zonings[1], generating a peak hour traffic flow of 645 vehicle movements (two-way) in the peak hours. This would increase by 54 vehicle movements with development of the proposed plan change area.

7.2.1.2. The revised traffic flows mean that Northburn Road would have an average of 1 vehicle movement every 5.2 seconds, compared to an average of 1 vehicle movement every 5.6

[1] 380 from Northlake, 354 from Allenby Farms and 25 residences served directly from Northburn Road

seconds without development of the plan change area. This increase is small and unlikely to adversely affect the level of service provided by the road.

7.2.2. Other Roads

7.2.2.1. As set out above, the easternmost part of Lammermoor Street can be expected to carry 130 vehicles (two-way) in the peak hours, and this would rise to 184 vehicles (two-way). That is, Lammermoor Street would serve the traffic from around 208 lots rather than the traffic associated with 145 lots. Under the Code of Practice, the legal and formed width of Lammermoor Street are presently suitable for the expected number of lots. The Code of Practice indicates that a parking lane would normally be expected to be provided on a road of this nature, and the section of Lammermoor Street opposite the reserve (between Cambrian Street and Hawkdun Place) has an indented bay. On-street parking over the remainder of Lammermoor Street is likely to be very limited due to the small number of lots that have frontage, the size of the lots (which means ample on-site parking will be provided) and the presence of side roads where parking may also occur.

7.2.2.2. Riverslea Road would similarly be expected to accommodate the traffic arising from a further 63 lots, but the road already has a 20m legal width and 8.4m formed width, which under the Code of Practice is able to carry the traffic arising from up to 800 lots. It therefore remains complying with the Code of Practice.

7.2.2.3. Northlake Drive itself has a bespoke layout but is also easily able to accommodate the additional traffic.

7.2.3. Aubrey Road / Northburn Road intersection

7.2.4. The Aubrey Road / Northburn Road intersection has been re-modelled using the Sidra Intersection computer program with the additional traffic arising from the proposed plan change, and the results are summarised below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Aubrey Road (east)	R	6.9	0	A	9.9	1	A
Northburn Road (north)	L	3.6	0	A	5.6	0	A
	R	30.7	12	D	17.5	3	C
Aubrey Road (west)	L	6.0	0	A	6.0	0	A

Table 5: Performance of the Aubrey Road / Northburn Road Intersection (With Proposed Plan Change)

7.2.5. The difference in the queues and delays at the intersection with and without the proposed plan change is summarised below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Aubrey Road (east)	R	-	-	-	+0.2	+!	-
Northburn Road (north)	L	-	-	-	-	-	-
	R	+8.8	+4	C to D	+1.6	+1	-
Aubrey Road (west)	L	-	-	-	-	-	-

Table 6: Change in Performance of the Aubrey Road / Northburn Road Intersection Due to Proposed Plan Change

7.2.6. It can be seen that these changes are relatively small and largely confined to the right-turn movement from Northburn Road in the morning peak hour (as would intuitively be expected). The increase can be absorbed by the intersection, and as noted above, Level of Service D is not uncommon for an urban intersection in the peak hours.

7.2.7. Overall then, it is considered that the traffic generated by development of the plan change area plus the traffic arising from existing zonings, can be accommodated on the road network.

7.3. Non-Car Modes of Travel

7.3.1. The development of the plan change area is likely to result in increased levels of walking and cycling in the immediate area. However any increase will be modest, and the existing infrastructure is easily able to accommodate this.

7.3.2. The extent of development is not sufficient that a public transport service would be justified. However the width of Stonehenge Road and Riverslea Road is sufficient to accommodate a bus service, if one was to be introduced in future.

7.4. Road Safety

7.4.1. The crash history in the vicinity of the site does not indicate that there are any particular features or factors that would be affected by the proposed development. As set out previously, the transportation networks within the site have been designed to meet current codes and guidance, and therefore can be expected to function safely.

7.4.2. Consequently, the increase in traffic flows arising from development of the proposed plan change area is not expected to result in any adverse road safety effects arising.

8. Conclusions

8.1. This report has identified, evaluated and assessed various transportation matters arising from a proposed plan change to allow a small amount (63 lots) of additional residential development within Northlake.

8.2. The Northlake zone was considered on the basis of up to 1,600 residences being constructed in the area. The anticipated development yield equates to 1,469 standard residences and the current proposal adds a further 63 residences to this, making a total of 1,532 residences. This is lower than the 1,600 residences modelled through PC45. As such, the traffic effects arising from the currently-proposed plan change are aligned with the yield initially expected for the wider area.

8.3. The prevailing scenario following the change in speed limits in the immediate area mean that the likely route for a large proportion of Northlake traffic plus traffic from the Allenby Farms land is via Northburn Road. This results in Northburn Road carrying the traffic associated with some 760 lots[2], generating a peak hour traffic flows in the order of 645 vehicles (two-way) under existing zonings.

8.4. Northburn Road will also be the preferred route for traffic associated with the plan change area. The extent of increase in traffic arising from development of the plan change area is limited, and can be accommodated by the existing road configuration, as it equates to an increase of just 1 additional vehicle movement every minute in the peak hours.

8.5. The Aubrey Road / Northburn Road intersection has sufficient available capacity to accommodate the increase in traffic without poor levels of service arising, and although there will be an increase in delay and queues for right-turning vehicles in the morning peak hour, these are modest.

8.6. The existing/consented roading network within Northlake is able to accommodate the increase in traffic, and the crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal.

8.7. Provision for pedestrians and cyclists is expected to be appropriate.

8.8. Overall, and subject to the preceding comments, the proposed plan change can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why it could not be recommended for approval.

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[2] 380 from Northlake, 354 from Allenby Farms and 25 residences served directly from Northburn Road

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