

McFetridge Subdivision

Transportation Assessment Report

PREPARED FOR CALAND HOLDINGS LIMITED | OCTOBER 2021

We design with community in mind

Revision Schedule

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Executive Summary

Caland Holdings Limited (CHL) proposes to subdivide rural zoned land at 66 McFetridge Drive and 89 Tauranga Direct Road north of Hamurana to create 100 rural residential lots. The concept plans for the subdivision include new roads for the subdivision based on access to Jackson Road via McFetridge Drive and a potential new intersection on State Highway 36 in the location of an existing paper road and farm access.

The assessment has investigated the effects of the subdivision progressing with and without direct access to SH36. Construction of a new intersection on SH36 represents a Discretionary activity under the District Plan Subdivision rules and will require approval from Waka Kotahi as the Road Controlling Authority. The investigation of the intersection location found that adequate sight distances could be achieved for the operating speed but that this would require control of vegetation outside the road reserve. It has also been identified that the location of barriers on each side of the road will also introduce some complexity into the design for a safe intersection and it is likely to be impractical to form an intersection in the proposed location.

The analysis of the potential traffic effects of the proposed subdivision on the road network with no direct connection to SH36 has concluded that the additional vehicle movements can be accommodated with little noticeable effects on the operation of roads and intersections. The main effect will be awareness of more traffic because of the very low volumes that are present now. On this basis, it has been concluded that the subdivision could proceed on the basis of all access being via Jackson Road. However, it is recommended that some minor intersection works are undertaken at the SH36 / Jackson Road intersection to create a right turn bay.

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Abbreviations

Abbreviation	Full Name
CHL	Caland Holdings Limited
AADT	Annual Average Daily Traffic Volume
SH36	State Highway 36
vpd	Vehicle movements per day
vph	Vehicle movements per hour
RLDC	Rotorua Lakes District Council
Waka Kotahi	Waka Kotahi New Zealand Transport Agency

Glossary

Term	Definition
Level of Service	Level of Service is a qualitative stratification of numerical performance measures to provide a simplified system to present road users' perceptions of the quality of service of a road or intersection.
LOS A	A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
LOS B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
LOS C	In the zone of stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
LOS D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
LOS E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
LOS F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

1 Introduction

Caland Holdings Limited (CHL) proposes to subdivide rural zoned land at 66 McFetridge Drive and 89 Tauranga Direct Road north of Hamurana to create 100 rural residential lots. The concept plans for the subdivision include new roads for the subdivision based on access to Jackson Road via McFetridge Drive and a potential new intersection on State Highway 36 in the location of an existing paper road and farm access.

The focus of this report is the external connections to the subdivision site. It provides an assessment of the expected travel demands of the subdivision and how these would be distributed on the road network with and without the direct connection to SH36. This provides the basis of the assessment of expected effects on the wider transport network.

The report has been structured to provide:

- Description of the existing transport environment;
- Description of the existing travel patterns;
- Assessment of expected traffic generation; and,
- Assessment of expected transport effects.

2 Existing Transport Environment

2.1 Site Location

Figure 2-1 shows the location of the site in the context of the wider region. It is located to the west of State Highway 36 (SH36) on the northern side of Lake Rotorua. Figure 2-2 shows the location of the subdivision site with respect to the road network. It shows Jackson Road and Central to the west of the site.



Figure 2-1: Subdivision Site Location within the Region

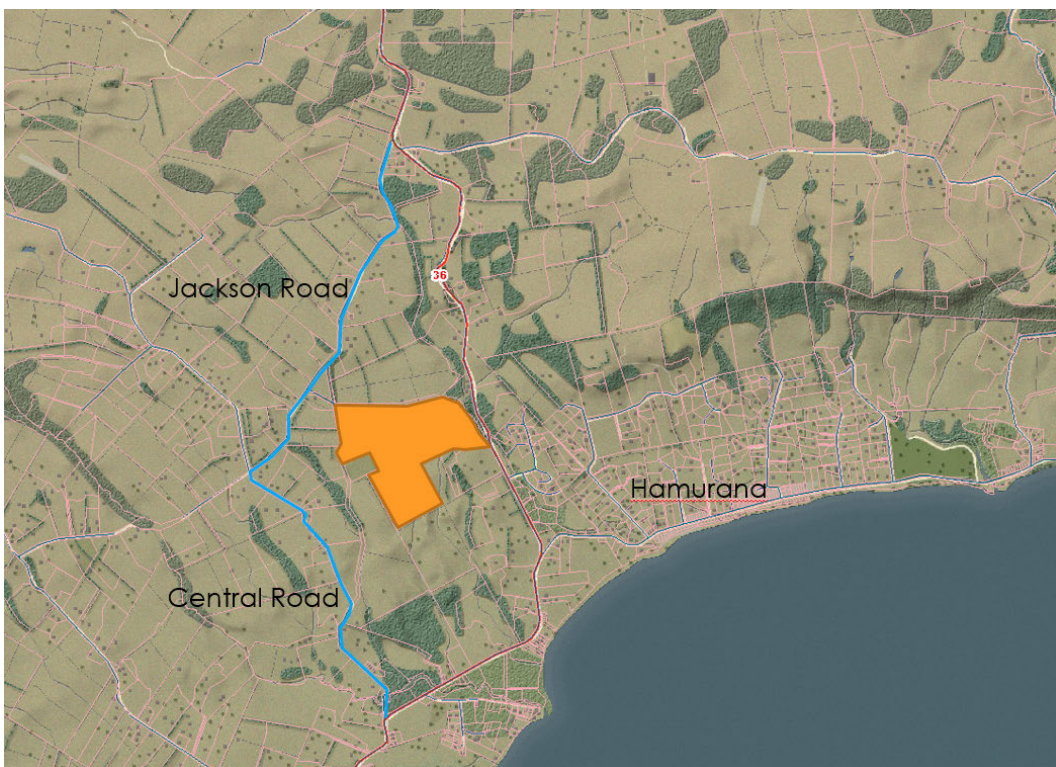


Figure 2-2: Subdivision Site Location

Figure 2-3 shows the subdivision site with respect to McFetridge Drive which forms the northern boundary of the site. McFetridge Drive is currently formed only between Jackson Road and the site boundary.

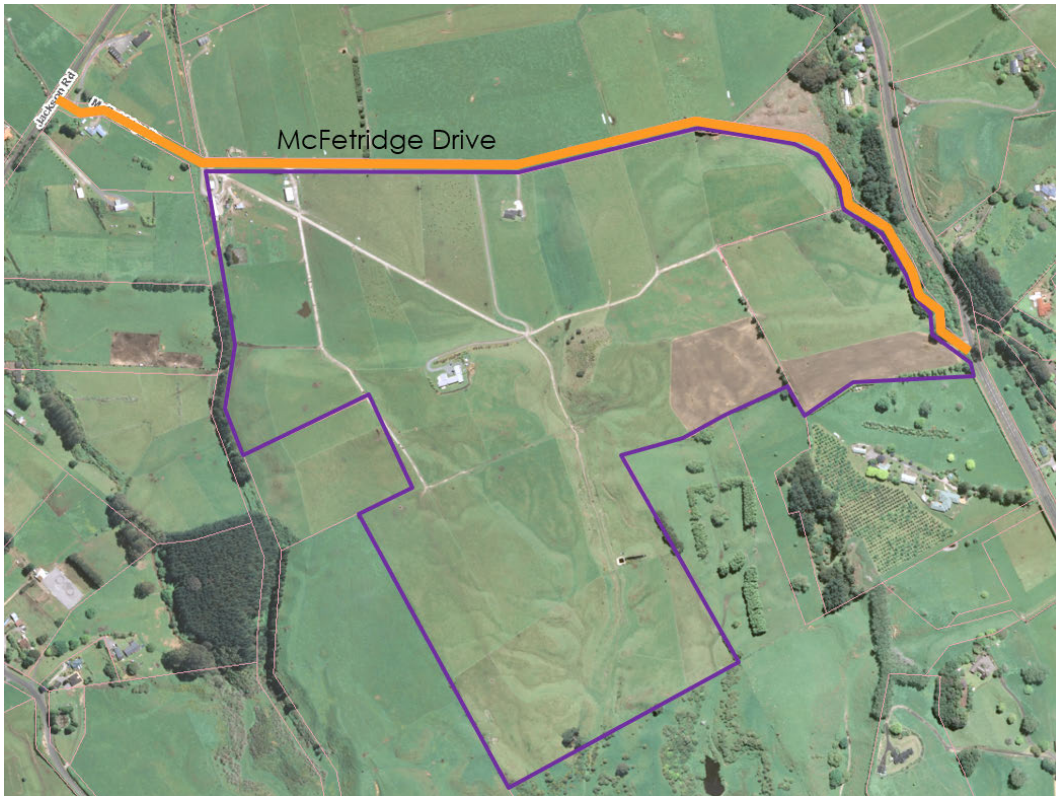


Figure 2-3: Subdivision Site Boundaries

2.2 Road Network

State Highway 36 provides the main strategic link between Tauranga to the north and Rotorua to the south. Within the vicinity of Hamurana and the site, it has been formed as a rural two-lane highway with a single traffic lane in each direction. Photograph 2-1 shows SH36 as it descends a shallow gradient towards the unformed McFetridge Road intersection. This shows a safety barrier on the western side of the road to provide fall protection from the gully beside the road.



Photograph 2-1: SH36 North of McFetridge Drive - View South

The speed limit on SH36 east of the subdivision site is 100 km/h. The speed limit reduces to 80 km/h about 100 m south of the unformed McFetridge Drive intersection as shown in Photograph 2-2. The curves on SH36 mean that the operating speed of the road is less than 100 km/h and has been estimated to be about 90 km/h.



Photograph 2-2: Sh36 / McFetridge Drive sightline south

Photograph 2-2 also shows that the sightline to the south of the intersection is unrestricted. Photograph 2-3 shows that the vegetation on the western side of SH36 within the gully obstructs the sight line to the north. The currently available sight distance is about 150 m but this could be extended to 250 m if this was cleared.



Photograph 2-3: SH36 / McFetridge Drive sightline north

Photograph 2-4 shows SH36 north of McFetridge Drive with barriers on both sides of the road.



Photograph 2-4: SH36 View north

The road-side barriers on SH36 are set back about 1.2 m from the carriageway edge lines. The carriageway is about 6.5 m wide opposite McFetridge Drive.

The western end of McFetridge Drive has been formed as a gravelled road between the subdivision site and the approach to Jackson Road. The road has been sealed for a distance of about 20 m on the approach to Jackson Road. Photograph 2-5 shows a view of the Jackson Road / McFetridge Drive intersection. It has been noted that there are post boxes located on the eastern side of Jackson Road, south of the intersection. The berm adjacent to the post boxes has been damaged by vehicles accessing the post boxes.



Photograph 2-5: Jackson Road / McFetridge Drive Intersection

The McFetridge Drive / Jackson Road intersection has been formed to a rural access design standard and is currently unmarked and unsigned. The sight distance to the north is 180 m and to the south is 220 m. Photograph 2-6 provides views of the available sightlines at the intersection. The speed limit on Jackson Road has recently been reduced to 80 km/h which is consistent with the operating speed of 80-90 km/h. The available sight distances at the intersection are sufficient to meet the Austroads Safe Intersection Sight Distance requirements for the operating speeds on the road.



Photograph 2-6: Sightlines from McFetridge Drive

Jackson Road meets SH36 at a Give-way controlled T-intersection about 90 m north of another T intersection on the opposite side of the road (Te Waerenga Road). The Jackson Road approach to the intersection is skewed and meets SH36 on the outside of a horizontal curve. There is no right turn bay on SH36 but it does have a wide shoulder on the inside of the curve which provides sufficient width for a southbound vehicle to pass a vehicle that stops in the carriageway before turning right.



Photograph 2-7: Jackson Road approach to SH36

Photograph 2-8 and Photograph 2-9 show sight lines to the south and north from the Jackson Road approach. The available sight distances in both directions are in excess of 250 m.



Photograph 2-8: SH36 / Jackson Road intersection -Sightline South



Photograph 2-9: SH36 / Jackson Road Intersection - Sightline North

The curve in the SH36 alignment has a radius of about 100 m which is not consistent with the speed limit. The road has advance warning signs of the curve and an advisory speed of 55 km/h for the curve. The design of the curve includes a high degree of super-elevation. This could contribute to loss of control if vehicles travelled at high speed from Jackson Road onto SH36 because of the rapid changes in super-elevation.

Jackson Road meets Central Road south of McFetridge Drive at a Stop-sign controlled crossroads intersection with Jackson Road and Sharp Road under stop control. North of the intersection, Central Road

is signposted as a No-Exit Road. The sightline to the north from Jackson Road is unobstructed but is constrained to the south by the curve in Central Road to about 80 m.



Central Road is a rural road that traverses through rolling terrain (Photograph 2-10). The road has an open road speed limit over between SH36 and Jackson Road.



Photograph 2-10: Central Road - Typical Formation

Central Road has a marked centre line which is augmented with edge lines about 0.8 km west of SH36 through an S-bend in the alignment.

There is a one-lane bridge on Central Road about 100 m west of the SH36 intersection as shown in Photograph 2-11.



Photograph 2-11: Northbound approach to one-lane Bridge on Central Road

Sight distance between the limit line of the northbound Give-Way approach to the bridge and the oncoming traffic was measured to be 150m. The approximately 30m radius curve in Central Road north of the bridge restricts the forward sight distance and also has a significant effect on the operating speed of the priority southbound traffic. When southbound vehicles first observe the bridge they are midway around this curve with an operating speed of approximately 30km/h and are 95m from the location they would be required to stop to give way to a northbound vehicle on the bridge.

Photograph 2-12 shows the intersection of Central Road with SH36 on the outside of a curve. There is no localized widening or a right turn bay at the intersection but a left turn slip has been constructed. The geometry of this lane will allow for left turns to occur with little need for deceleration. The Central Road approach is Stop sign controlled.



Photograph 2-12: SH36 / Central Road intersection

The speed limit on SH36 either side of the intersection is 100 km/h. The curve in the highway alignment is the first in a series of three tight horizontal curves when approached from the east, and conversely is the third curve when approached from the west. The subject curve has a post 55 km/h speed advisory for travel in both directions. The operating speed approaching from the east is assessed to be 100 km/h, while from the west through the series of horizontal curves the operating speed is assessed to be 65-70 km/h.



Photograph 2-13: SH36 / Central Road Intersection

3 Existing Travel Patterns

3.1 Traffic Volumes

Figure 3-1 shows the annual average daily traffic volumes (AADT) recorded on SH36 north of Hamurana Road over the five-year period 2015-20. Over that period, the AADT showed growth of about 1% per annum. In practice, this growth calculation is likely to have been affected by the lower volumes recorded in 2020 due to the COVID19 pandemic.

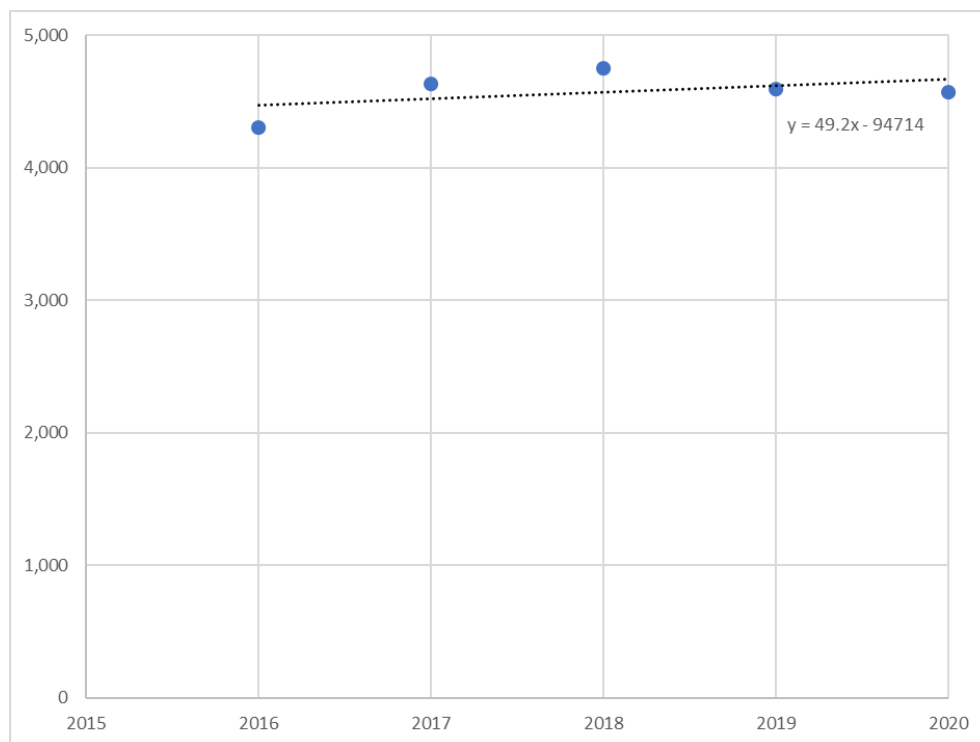


Figure 3-1: SH36 Annual Average Daily Traffic Volumes

Figure 3-2 shows the variation in hourly two-way traffic volumes on SH36 at the Waka Kotahi count site north of Hamurana Road (SH3600041) in June 2021. On weekdays, there are morning and evening peaks which are likely to be associated with work place travel. In the morning and evening peak periods, the peak hourly traffic volume was about 500 vehicle movements per hour (vph). On Friday, the peak hourly volume was higher at nearly 600 vph. Traffic volumes over the weekend were generally lower and showed a single broad peak in the middle of the day.

Since the count site is located about 500 m south of the unformed McFetridge Drive intersection and there are no major accesses in between, it is considered that the traffic volumes at the count site will be representative of traffic volumes passing the unformed intersection.

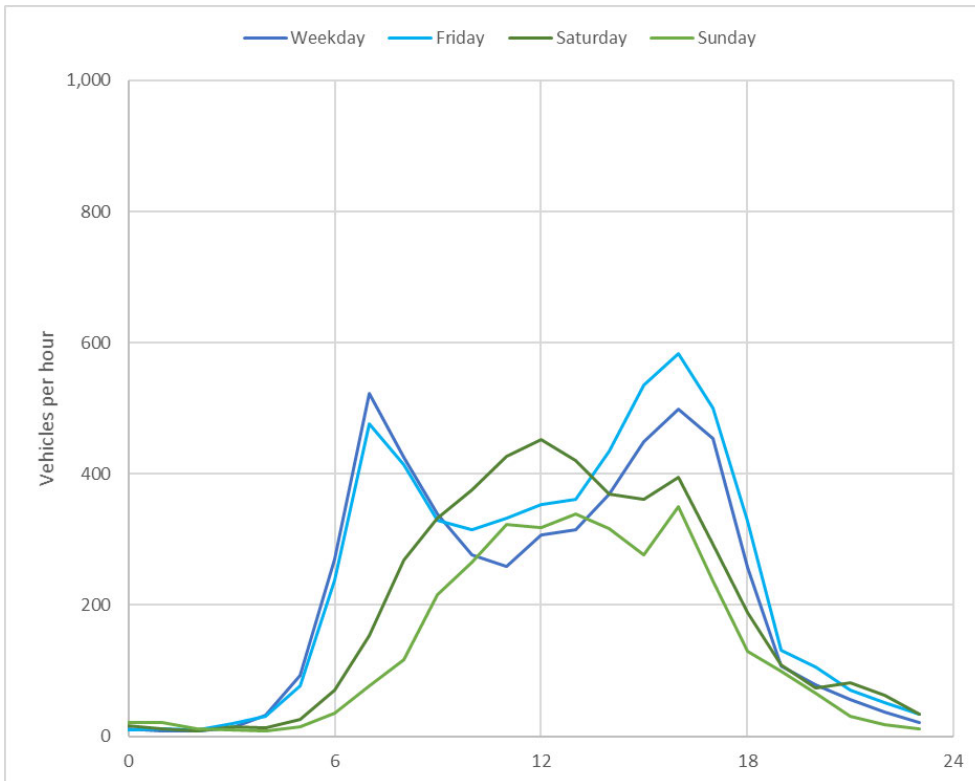


Figure 3-2: SH3600041 Hourly Traffic Volumes on SH36 – June 2021

Figure 3-3 shows the directional traffic volumes at the count site. During the morning peak period, there was a southbound volume of about 300 vph and a northbound volume of about 200 vph. In the evening peak period, the flows were more similar but with the northbound volume being greater than the southbound volume.

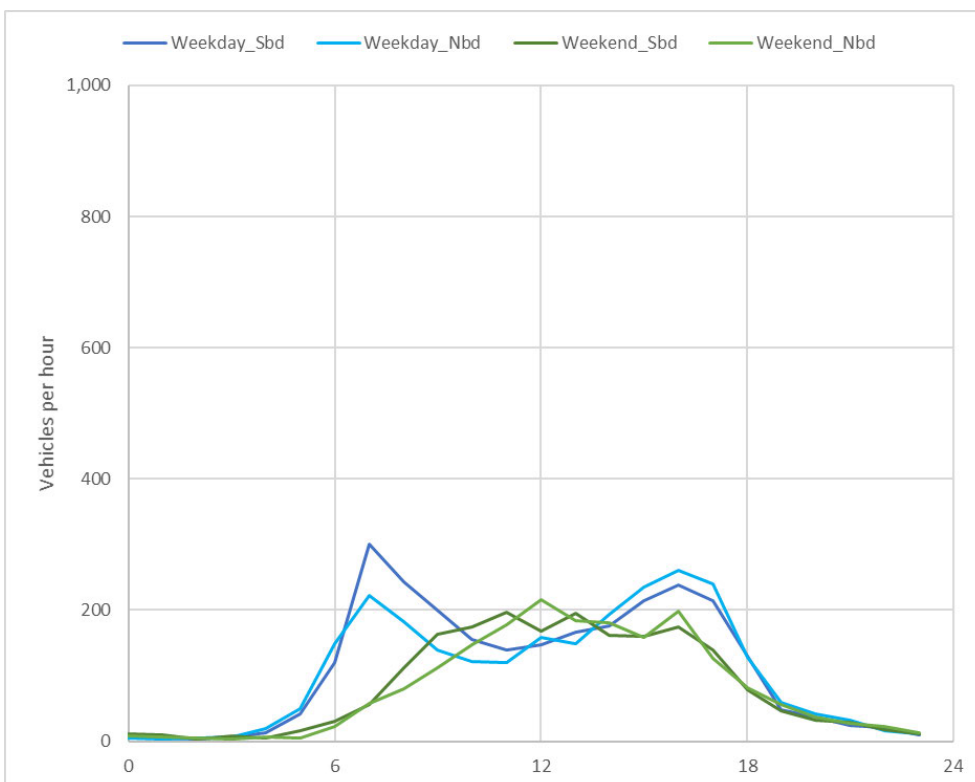


Figure 3-3: SH3600041 Directional Flows on SH36 – June 2021

Figure 3-4 shows the traffic volumes recorded by Council on Central Road 50 m west of SH36 in February 2021. The analysis of the data file and general pattern of hourly flows suggests that only one direction of travel was recorded. On this basis, it is likely that peak two-way traffic volumes would be in the range 50-60 vph.

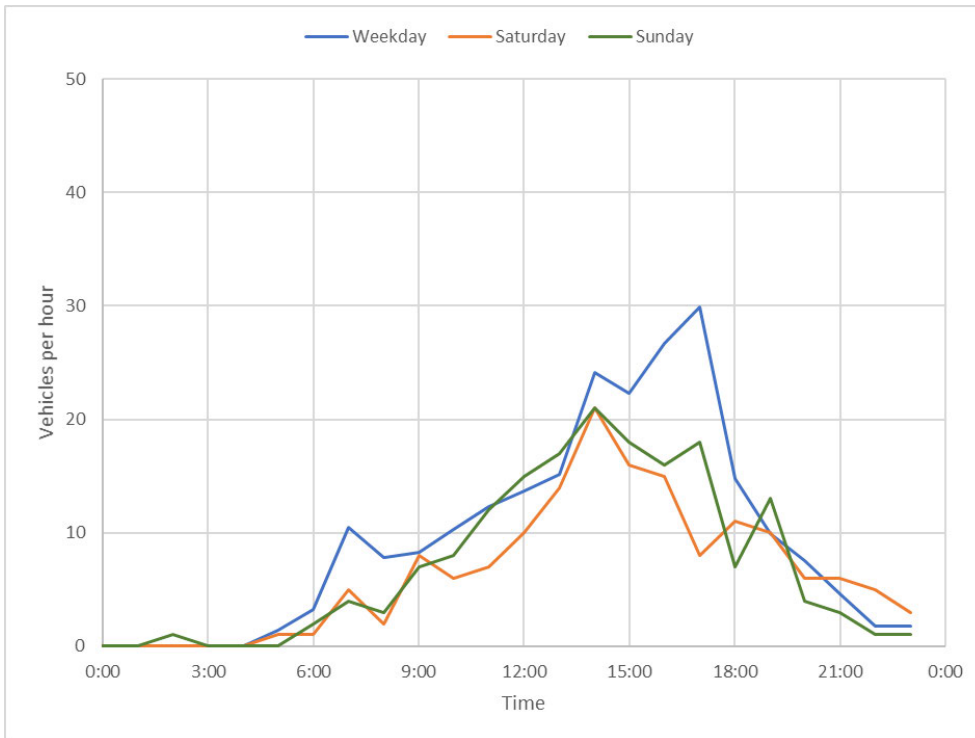


Figure 3-4: Hourly Traffic Flows on Central Road - February 2021

Figure 3-5 shows the hourly traffic volumes recorded on Jackson Road west of its intersection with SH36 in 2017. The traffic survey recorded volumes of less than 20 vph during day on weekdays and 20-30 vph on Sunday.

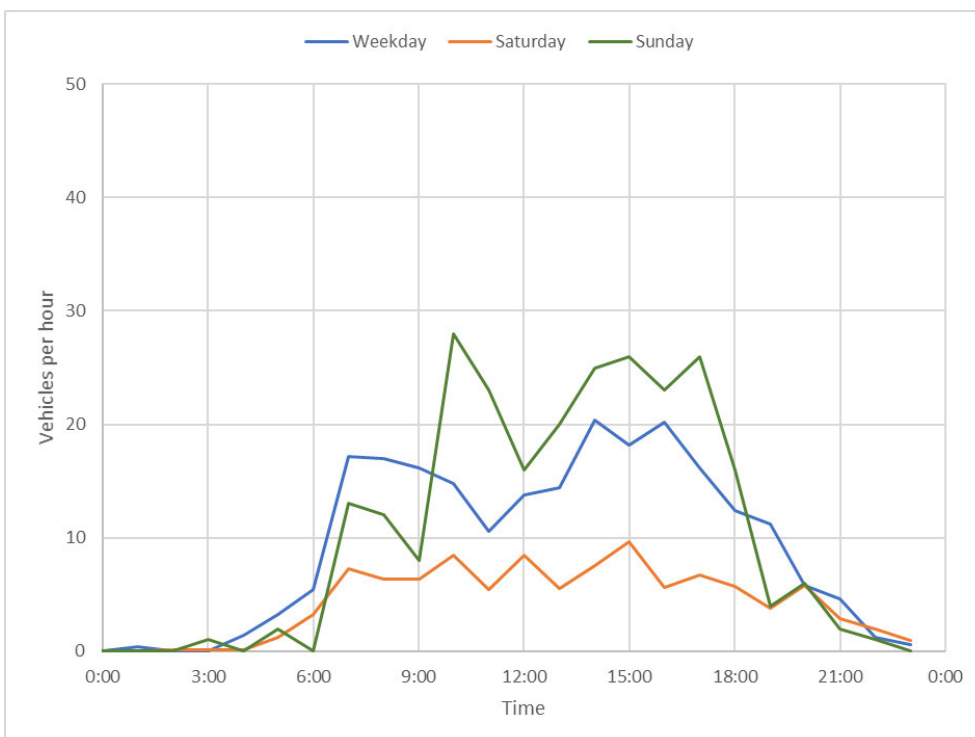


Figure 3-5: Hourly Flows on Jackson Road - November 2017

3.2 Road Safety

Figure 3-6 and Figure 3-7 show the personal and collective risk assessment maps provided by Waka Kotahi for roads surrounding the subdivision site. They indicate that SH36 has a Medium-High personal risk rating and Medium Collective risk rating. Jackson Road and Central Road both have medium personal risk ratings and low collective risk ratings.

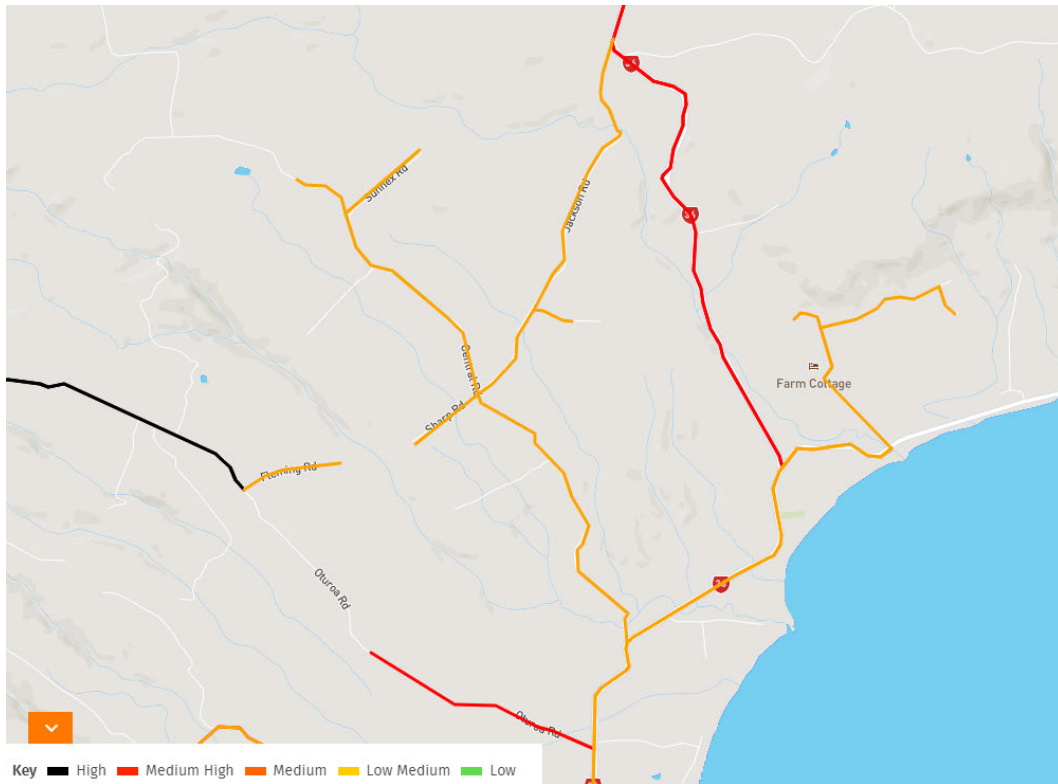


Figure 3-6: Personal Risk Map (Source: Waka Kotahi)

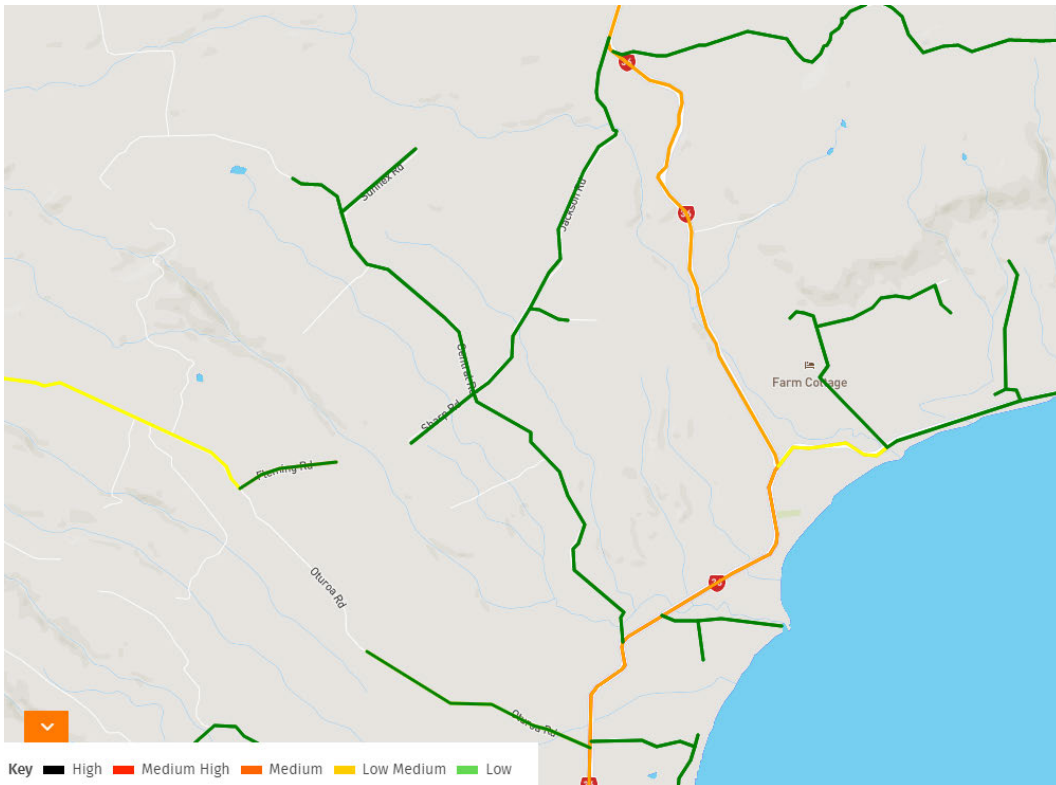


Figure 3-7: Collective Risk Map (Source: Waka Kotahi)

The Waka Kotahi Crash Analysis System has been used to investigate the number and types of crashes that have been reported on the road network over the five year period 2016-2020 and to date in 2021. Figure 3-8 shows the location and types of crashes that have reported. This indicates that the majority of crashes involve loss of control and only two crashes involved multiple vehicles. Eight crashes were attributed to excess alcohol and six to excess speed. Speed is likely to be a contributing factor in most of the other crashes as drivers have lost control on corners.

There are clusters of crashes at the SH36 / Jackson Road intersection and SH36 / Central Road intersection but these are related to movement along the state highway rather than turning movements.

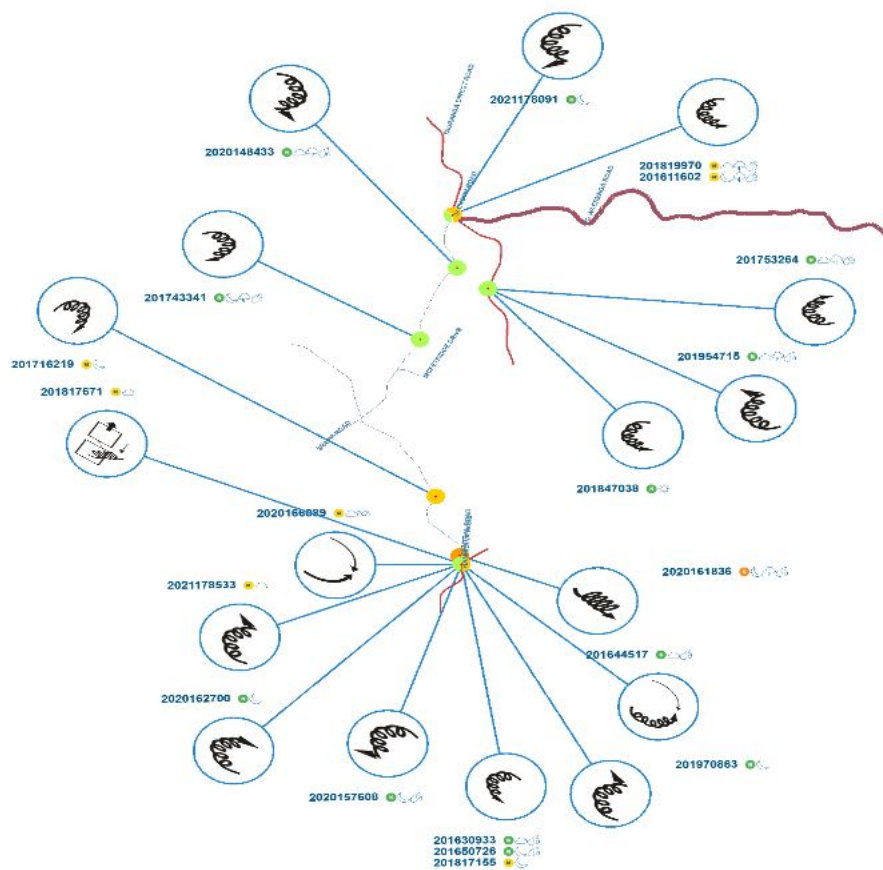


Figure 3-8: Collision Diagram - 2016-2021

4 Subdivision Proposal

4.1 Overview

Caland Holdings Limited has developed a concept plan for a subdivision on their land at 66 McFetridge Drive and 89 Tauranga Direct Road north of Hamurana to create 100 rural residential lots. The concept plans for the subdivision include new roads for the subdivision based on access to Jackson Road via McFetridge Drive and a potential new intersection on State Highway 36 in the location of an existing paper road and farm access.

4.2 Proposed Roads

The primary access route to the subdivision will be via McFetridge Drive. It is envisaged that this will be formed as a sealed road in accordance with Council standards generally along the alignment of the existing legal road. The alignment will move away from the legal road alignment at its eastern end so that it provides better access to proposed lots and fits better within the topography. A new intersection with SH36 is proposed to provide more direct access to the strategic network.

Within the subdivision, new local roads will be formed to provide access to the new residential lots. It is understood that the new roads will be constructed in accordance with Council design standards for rural residential roads.

5 Expected Travel Demands

5.1 Vehicle Movements

For the purpose of assessing the potential effects of the proposed subdivision on the road network, an average daily traffic generation rate of 10 vehicle movements per day (vpd) per lot has been adopted. This reflects the 85th percentile design rate recommended in the NZTA Research Report No 453¹ (RR453) for rural residential activity.

Based on this rate and 100 residential lots being formed within the subdivision, the proposed subdivision would be expected to generate about 1,000 vpd.

Residential activity typically has peak periods of traffic generation in the morning and evening associated with travel to and from workplaces. RR453 reports an 85th percentile peak hour traffic generation rate for rural residential activity of 1.4 vehicle movements per hour per dwelling. On this basis, the subdivision could generate 140 vph during the busiest hour in the morning and evening peak periods.

5.2 Movement Patterns

During the morning peak period, it is expected that about 75% of all vehicle movements will be outbound from the subdivision as residents travel to their workplace². In the evening, the dominant movement direction reverses with about 65% being towards the subdivision.

Based on the relative proximity of the subdivision to Rotorua, it is expected that most vehicle trips will be towards or from Rotorua rather than to the north. For the purposes of this assessment, a distribution pattern with 80% of the travel demands being associated with Rotorua and the south has been adopted.

Table 5-1 shows the expected peak hour travel demands for the subdivision based on the distribution pattern set out above.

Table 5-1: Expected Peak Hour Travel Demands

Origin / Destination	Morning Peak Period		Evening Peak Period	
	From Subdivision	To Subdivision	From Subdivision	To Subdivision
North	20	5	10	20
South	85	30	35	75
Total	105	35	50	90

¹ Trips and Parking Related to Land Use, November 2011

² ITE Trip Generation Manual

6 Expected Transport Effects

6.1 Access Options

The transport effects of the subdivision have been assessed under two access scenarios. The first scenario is based on all vehicle movements being via Jackson Road with the SH36 / McFetridge Drive intersection not being formed. The second scenario includes the SH36 / McFetridge Drive intersection.

6.1.1 Jackson Road Access Only

If all access is via Jackson Road, then this could increase the peak hour volumes north of McFetridge Drive by 20-30 vph and to the south by 110-120 vph. The traffic volume on Central Road would also increase by 110-120 vph. This will increase the two-way volumes on Jackson Road north of McFetridge Drive to 40-50 vph and to 130-150 vph to the south. These volumes are all well within the capacity of the road and would not be expected to adversely affect safety or efficiency.

The peak hour traffic volumes on Central Road could increase to 170-180 vph which is also within the capacity of the road. The primary constraint on Central Road is the one-lane bridge west of the SH36 intersection. Analysis of the bridge operational performance with a two-way volume of 180 vph suggests that 1 in 10 vehicles would need to stop to allow an opposing vehicle to continue across the bridge. The average delay when this occurs is expected to be less than 10 seconds. Although the higher volume of traffic will increase the frequency at which drivers will need to give way compared with the current environment, the level of delays are low and will have no noticeable effects on overall journey times.

In the morning, there could be an increase in the right turn demands at the SH36 / Central Road intersection by about 80 vph. The peak hour two-way volume on SH36 during the morning is about 500 vph. With these volumes, the average delay for the right turn movement from Central Road is expected to be 10-15 seconds. The 95th percentile queue length on Central Road is expected to be one vehicle long. Even allowing for 10 percent growth in state highway volumes, the average delays and queue lengths would not be expected to change significantly.

While the traffic volumes during the evening peak are marginally higher, the right turn demands at the intersection are lower and as a result, the average delays for right turning vehicles will still be less than 15 seconds.

While the increase in traffic volumes on Jackson Road north of McFetridge Drive is expected to be less than 30 vph at peak times, this could result in an extra 15-20 vph of right turn movements from SH36 during the evening peak period. This volume of right turn movements would exceed the warrant for provision of a right turn bay at the intersection. Since this would provide clearer guidance for drivers, it would be expected to improve road safety at the intersection. It has also been noted that safety could be improved with some minor realignment of the Jackson Road approach to reduce the likelihood of vehicles the intersection at high speed.

Since the average peak hour volumes on Jackson Road are currently less than 30 vph, average delays at the McFetridge Drive intersection are expected to be less than 10 seconds which represents a very good level of service, LOS A.

Analysis of the SH36 / Jackson Road intersection also suggests that average delays for all turning movements will remain less than 15 seconds which represents LOS B.

6.1.2 With SH36 / McFetridge Drive Intersection

The construction of a new intersection with SH36 will provide more direct access to the state highway network than the existing local road network.

For journeys to and from the North, use of the intersection could increase travel distances by about 0.5 km but with the higher vehicle speeds that would be possible, the differences in travel times are likely to be less than 10 seconds which would not be noticeable. This means that trips to and from the north are likely to be distributed between both options and will largely influenced by driver preferences.

For travel to and from the south, the travel distance by the state highway intersection would be similar to travel distance using Jackson Road and Central Road. The main difference is that vehicle speeds on the state highway route would be higher and could save about one minute on journey times.

Based on the analysis of delays at the SH36 / Central Road intersection, the average delays for right turn movements from the subdivision at the new intersection would be expected to be less than 15 seconds at peak times. One consequence of forming the new intersection would be an increased two-way volume on SH36 passing the Central Road intersection which will contribute to small increases in the average delays at the intersection.

6.1.3 Comparison of Access Options

Table 6-1 provides a summary comparison of constructing a new intersection with SH36 compared with a scenario with all access via Jackson Road.

Table 6-1: Summary Comparison of Access Options

With SH36 Intersection	
Advantages	Disadvantages
• Direct access to state highway network • Reduced travel times for journeys to or from the South • Reduced demand on one-lane bridge on Central Road	• Longer travel distances for journeys to or from the North • Substandard sight distances at SH36 intersection • Need to relocate speed limit threshold • Intersection design complexity • Need for Waka Kotahi approval

6.2 Road Safety

Road safety of any new intersection on SH36 would be a critical matter for Waka Kotahi. Based on the expected right turn demands in the evening peak, the new intersection would meet the warrant for a right turn bay to be provided. Construction of a right turn bay would affect 150-200 m of road north of the intersection and about 150 m south of the intersection. Even if a right turn bay was not provided, it would still be necessary to widen the carriageway to allow through moving traffic to safely pass any vehicle that needs to stop within the carriageway before turning right at the intersection.

The SH36 carriageway is constrained in the vicinity of McFetridge Road by the safety barriers that provide fall protection from the gully either side of the road. This will prevent the carriageway being widened without some realignment of the highway.

While traffic volumes on SH36 are moderate and the likelihood of a tail-end type crash will be low, the consequences of any crash are likely to be serious or fatal injury because of the high speeds on the road.

The assessment of sight distance at the proposed location indicates that adequate visibility could be achieved but will be reliant on maintenance of vegetation outside of the road reserve. This represents a potential risk for long term safety at the intersection unless the vegetation is controlled by the land owner.

If the subdivision is developed with all access via Jackson Road, then there will be an increased demand for the right turn movement from SH36 into Jackson Road. During the evening peak period, the volume of right turn movements would be sufficient to exceed the warrant for provision of a right turn bay.

7 District Plan

7.1 Subdivision Rules

The Rotorua District Plan includes specific rules relating to new roads for subdivisions. The roads proposed for this subdivision can generally comply with the rules with the exception that construction of a new access to SH36 is not a permitted activity because SH36 forms part of the strategic road network. (Rule SUB-S9 2a.viii). Construction of a new intersection onto SH36 would require resource consent for a discretionary activity.

8 Conclusions

The analysis of the potential traffic effects of the proposed subdivision on the road network has concluded that the additional vehicle movements can be accommodated with little noticeable effects on the operation of roads and intersections. The main effect will be awareness of more traffic because of the very low volumes that are present now.

The assessment has investigated the effects of the subdivision progressing with and without direct access to SH36. Construction of a new intersection on SH36 represents a Discretionary activity under the District Plan Subdivision rules and will require approval from Waka Kotahi as the Road Controlling Authority. The investigation of the intersection location found that adequate sight distances could be achieved for the operating speed but that this would require control of vegetation outside the road reserve. It has also been identified that the location of barriers on each side of the road would introduce some complexity into the design for a safe intersection and it may be impractical to form an intersection in the proposed location.

Overall, it has been concluded that development of the subdivision could proceed with all access being via Jackson Road. However, it is recommended that some minor improvements to the SH36 / Jackson Road intersection are undertaken to create a right run bay.

Appendices

We design with community in mind



Appendix A Subdivision Concept Plans

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CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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