Powell Fenwick

241415

Ryans Road Industrial Land Development

Noise Report

Acoustic

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Issue Authorisation

Issue	Description	Date
D	Fast Track Application	07 Mar 2025

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1. Introduction

1.1 Background

Powell Fenwick has been engaged by Carter Group Limited (Carter Group) to provide noise assessment related to rural land on Ryans Road in Christchurch, proposed by Carter Group to be subdivided and used for industrial purposes.

Carter Group applied under the Fast Track Approvals Bill 2024 for the proposed development to be listed for referral to an expert consenting panel as per Schedule 2 Part A of the (now) Act, and were successful. This noise report is expected to accompany the application to the Environmental Protection Agency under that Act.

1.2 The Proposal

The site is generally located at 104 Ryans Road, Harewood, Christchurch 8042. The site/location relates to an approximately 55.5 hectare parcel of land on the north side of Ryans Road, adjacent to Christchurch International Airport. The land is legally described as Pt Lot 3 DP 22679, Lot 4 DP 22679 and Pt Lot 1 DP 2837 and is currently zoned Rural Urban Fringe Zone in the Christchurch District Plan (CDP/District Plan).

The purpose of this project is to deliver an industrial development generally consistent with Industrial General Zone activities that meets the specific demands for industrial land in the immediate vicinity of and in association with Christchurch International Airport. This includes providing land suitable for the establishment of logistics, warehousing, and other airport-related businesses. Manufacturing activities with high water requirements and residential activities are specifically excluded from the application.

The project activities primarily involve subdivision and land development to create the specified industrial sites and associated infrastructure development, including roads, utilities, and other necessary facilities.

The local context is shown below:

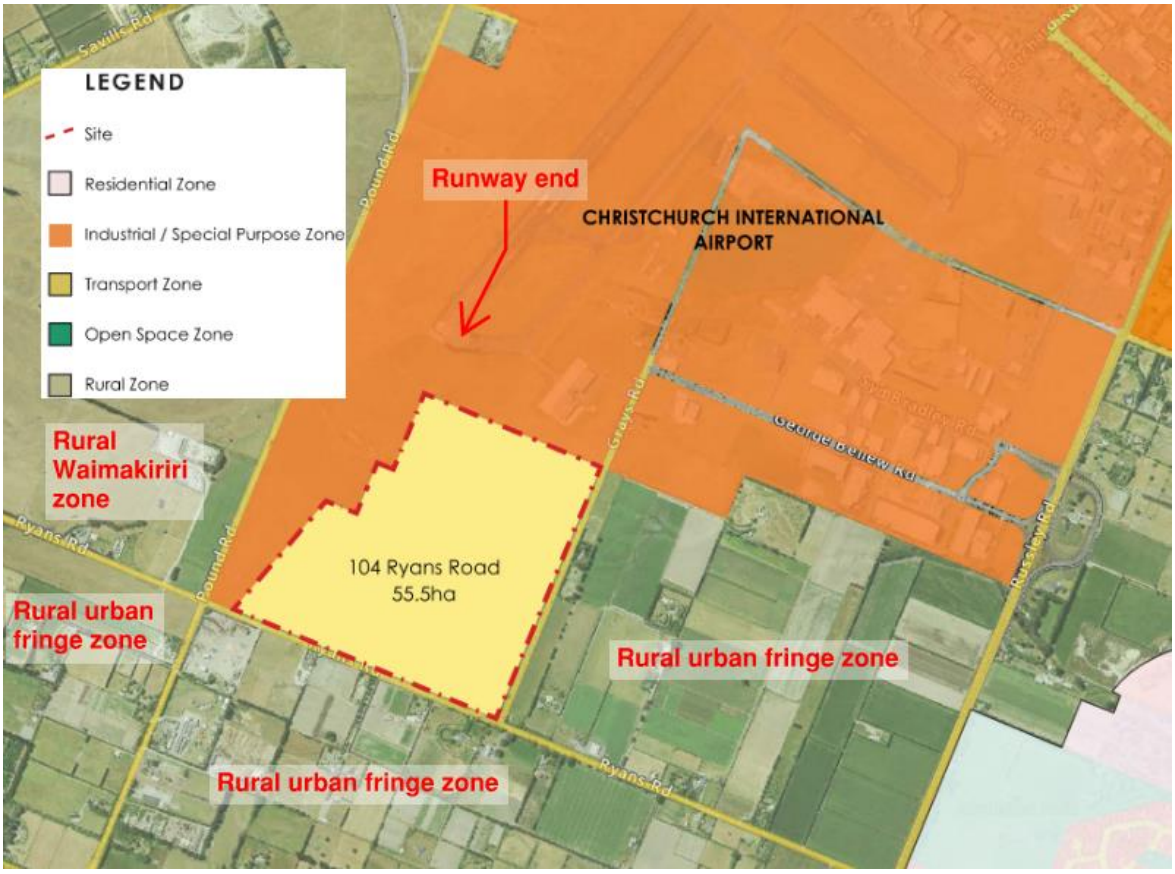


Figure 1.1 Local context to the Ryans Rd industrial area. (From Fast-Track referral application, our notes in red. Note that the Site also extends to include land on the other side of Grays Rd to be grassed and used for stormwater management)

Key area features include:

+ Christchurch International Airport Limited (CIAL) land shown in orange, with the south end of the "north-eastern" main runway terminating north of the proposal site. CIAL land as shown, and continuing to the north, includes a wide range of airport and industrial activities.
+ Generally rural zoned land around the site, either Rural Waimakariri or Rural Urban Fringe Zones. Some rural dwellings are near to the proposed development.
+ However, there are lawfully established industrial/ commercial activities on the sites at 614 Pound Road (Outdoor Storage and Truckyard) and at 22 Ryans Road (Wood Incineration Activity).
+ Russley Road to the east, which forms part of State Highway 1.
+ Residential areas to the east are a significant distance from the development.

1.3 Noise Considerations

Considerations related to noise that are investigated in this report are:

1. Noise generation from future operational activities within the industrial development as this may affect amenity of nearby existing noise sensitive activities i.e. people living in rural dwellings.
2. Noise from traffic generation on nearby public roads due the development as this may affect people living in rural dwellings.
3. Reverse sensitivity effects related to establishing industrial activities adjacent to aircraft taking off and landing.
4. Construction noise effects on rural dwellings.

This report first looks into relevant CDP planning direction and rules, then describes the surrounding existing noise environment including as relates to noise surveys undertaken. Each acoustic consideration above is then addressed, and a summary is provided. Appendices are included at the rear of the report.

1.4 Author

The principal author of this report, Mark Lewthwaite, is the Head of Department for the Acoustic Team at Powell Fenwick. Mark completed a Bachelor of Engineering with Honours from the University of Canterbury in 2002.

His expertise, from well over 15 years undertaking acoustic engineering work, is broad across building and environmental noise fields. Relevant areas of experience include:

+ Measurement and assessment of environmental noise
+ Prediction of noise from proposed activities, including industrial equipment and processes
+ Prediction of noise from road and air traffic sources
+ Interpretation of District Plan and other planning rules, and New Zealand Standards
+ Reporting related to rezoning / Notice of Requirement etc. for changing land uses
+ Peer review of noise reports accompanying applications, on behalf of Councils

In addition to Affiliate membership with the Acoustical Society of New Zealand, Mark has been a Chartered Professional Engineer with Engineering New Zealand (formerly the Institute of Professional Engineers New Zealand) for 16 years, his practice field descriptions reflecting he has demonstrated his acoustic competence across multiple reassessments.

Some noise measurement, data processing and populating of parts of the report has been undertaken by other members of the Powell Fenwick team under Mark's supervision.

2. Christchurch District Plan

2.1 Introduction

The following objectives, policy and rules relate to operational noise from Christchurch International Airport (CIA) and generation of noise from industrial activities.

2.2 Objectives

The Objectives are reproduced from CDP Chapter 3 – Strategic Directions and Chapter 6 – Noise.

3.3.12 Objective - Infrastructure

Proposed new 3.3.13

a. *The social, economic, environmental and cultural benefits of infrastructure, including strategic infrastructure , are recognised and provided for, and its safe, efficient and effective development, upgrade, maintenance and operation is enabled; and*

b. *Strategic infrastructure , including its role and function, is protected from incompatible development and activities by avoiding adverse effects from them, including reverse sensitivity effects. This includes:*

   …

   iii. *avoiding new noise sensitive activities within the 50dB L_{dn} Air Noise Contour and the 50dB L_{dn} Engine Testing Contour for Christchurch International Airport, …*

The day-night average level (dB Ldn) penalises noise by 10 dB during a defined night-time period due to increased noise sensitivity during night-time. It could therefore be considered a weighted average rather than a true average over a 24 hour period.

Most of the development site falls within the operative 55dB L_{dn} Air Noise Contour (and is therefore also within the 50dB L_{dn} contour). The north-western area of the site is within the Air Noise Boundary. The airport noise contours have recently been subject to an independent review process and updated contours have been agreed between CIAL and Environment Canterbury. However based on comments in the Christchurch Airport Remodelled Contour Independent Expert Panel Report dated June 2023, there is only a subtle shift in the Air Noise Boundary to be further east in the location of the development, which would not significantly change quantitative assessment or conclusions.

Most of the site is outside the 50 dB L_{dn} On-Aircraft Engine Testing Contour, though the northern part of the site is within the contour.

Therefore, the site is within an area where sensitive activities are to be avoided.

The District Plan definition for sensitive activities means:

a. *residential activities, unless specified below;*

b. *care facilities;*

c. *education activities and preschools, unless specified below;*

d. *visitor accommodation, unless specified below;*

e. *health care facilities which include accommodation for overnight care;*

f. *hospitals; and*

g. *custodial and/or supervised living accommodation where the residents are detained on the site;*

but excludes in relation to airport noise:

h. *any residential activities, in conjunction with rural activities that comply with the rules in the relevant district plans as at 23 August 2008;*

i. *flight training or other trade and industry training activities located on land zoned or legally used for commercial activities or industrial activities, including the Specific Purpose (Airport) Zone; and*

j. *commercial film or video production activities; and*

k. *visitor accommodation which is designed, constructed and operated to a standard to mitigate the effects of aircraft noise on occupants.*

As above, sensitive activities are those broadly residential or educational in nature. Industrial activities are therefore not noise sensitive for the purposes of the District Plan and may be provided for in this location within the context of Objective 3.3.12/3.3.13.

3.3.14 *Objective - Incompatible activities*

Proposed new 3.3.15

a. *The location of activities is controlled, primarily by zoning, to minimise conflicts between incompatible activities; and*

b. *Conflicts between incompatible activities are avoided where there may be significant adverse effects on the health, safety and amenity of people and communities.*

6.1.2.1 Objective - Adverse noise effects

a. *Adverse noise effects on the amenity values and health of people and communities are managed to levels consistent with the anticipated outcomes for the receiving environment.*

The effects of noise from the proposed development will be considered in later sections of this report.

2.3 Policies

The Policies are reproduced from CDP Chapter 6 – Noise and Chapter 17 - Rural.

6.1.2.1.5 Policy - Airport noise

a. *Require the management of aircraft operations and engine testing at Christchurch International Airport, so that:*

   i. *noise generated is limited to levels that minimise sleep disturbance and adverse effects on the amenity values of residential and other sensitive environments so far as is practicable;*

   ii. *where practicable, adverse noise effects are reduced over time.*

b. *Mitigate adverse noise effects from the operations of the Christchurch International Airport on sensitive activities, by:*

   iii. *prohibiting new sensitive activities within the Air Noise Boundary and within the 65 dB L_{dn} engine testing contour; and*

   iv. *requiring noise mitigation for new sensitive activities within the 55 dB L_{dn} air noise contour and within the 55 dB L_{dn} engine testing contour; and*

   v. *requiring Christchurch International Airport Limited (CIAL) to offer appropriate acoustic treatment in respect of residential units existing as at 6 March 2017 within the 65 dB L_{dn} Annual Airport Noise Contour, and within the 60 dB L_{dn} engine testing contour.*

As per the previous page under Objectives, industrial activities are not noise sensitive for the purposes of the District Plan and may be provided for in this location within the context of Policy 6.1.2.1.5.

From the rural chapter:

17.2.2.5 Policy - Establishment of industrial and commercial activities

a. Avoid the establishment of industrial and commercial activities that are not dependent on or directly related to the rural resource unless they:

   …

   v. *will not have significant adverse effects on rural character and amenity values of the local environment or will not cause adverse effects that cannot be avoided, remedied or mitigated.*

The effects of noise from the proposed development will be considered in later sections of this report.

2.4 Rules and Standards

The Rules and Standards are reproduced from Chapter 6 – Noise and Chapter 8 - Subdivision, Development and Earthworks.

6.1.7 Rules - Activities near infrastructure

6.1.7.2 Activity standards

6.1.7.2.2 Activities near Christchurch Airport

a. *The following activity standards apply to new buildings and additions to existing buildings located within the 55 dB L_{dn} air noise contour or the 55 dB L_{dn} engine testing contour shown on the planning maps:*

   i. *Any new buildings and/or additions to existing buildings shall be insulated from aircraft noise and designed to comply with the following indoor design sound levels:*

      A. *Residential units, hosted visitor accommodation and unhosted visitor accommodation:*

         I. *Sleeping areas – 65 dB L_{AE}/40 dB L_{dn}*

         II. *Other habitable areas – 75 dB L_{AE} /50 dB L_{dn}*

      B. *Visitor accommodation (other than hosted visitor accommodation and unhosted visitor accommodation), resort hotels, hospitals and health care facilities:*

         III. *Relaxing or sleeping - 65 dB L_{AE} /40 dB L_{dn}*

         IV. *Conference meeting rooms - 65 dB L_{AE} / 40 dB L_{dn}*

         V. *Service activities – 75 dB L_{AE} /60 dB L_{dn}*

      C. *Education activities:*

         VI. *Libraries, study areas – 65 dB L_{AE} /40 dB L_{dn}*

         VII. *Teaching areas, assembly areas – 65 dB L_{AE} /40 dB L_{dn}*

         VIII. *Workshops, gymnasiums – 85 dB L_{AE} /60 dB L_{dn}*

      D. *Retail activities, commercial services and offices:*

         IX. *Conference rooms – 65 dB L_{AE} /40 dB L_{dn}*

         X. *Private offices – 70 dB L_{AE} /45 dB L_{dn}*

         XI. *Drafting, open offices, exhibition spaces - 75 dB L_{AE} /50 dB L_{dn}*

         XII. *Typing, data processing – 80 dB L_{AE} /55 dB L_{dn}*

         XIII. *Shops, supermarkets, showrooms - 85 dB L_{AE} /60 dB L_{dn}*

      E. *Sound stages, studios for filming and/or sound production for Commercial film or video production activities - 47 dB L_{AE}*

   ii. *Noise insulation calculations and verification shall be as follows:*

      A. *Building consent applications shall be accompanied with a report detailing the calculations showing how the required sound insulation and construction methods have been determined.*

      B. *For the purpose of sound insulation calculations, the external noise levels for a site shall be determined by application of the air noise contours L_{dn} and L_{AE}. Where a site falls within the contours the calculations shall be determined by linear interpolation between the contours.*

      C. *If required by the Council, in conjunction with the final building inspection the sound transmission of the façade shall be tested in accordance with ISO 16283-3:2016 to demonstrate that the required façade sound insulation performance has been achieved, and a test report is to be submitted to the Council's Head of Building Consenting (or any subsequent equivalent position). Should the façade fail to achieve the required standard then it shall be improved to the required standard and re-tested prior to occupation.*

Activity categories A-C are unlikely to occur within an industrial area, however category D – defined retail activities and offices ancillary to industrial uses would be expected to occur on all or parts of some lots and assessment of the acoustic insulation properties of the exterior envelope of the listed spaces would be required in order to ensure the required internal design sound levels are achieved.

6.1.5.2.1 Zone noise limits outside the Central City

a. *Outside the Central City , any activity that generates noise shall meet the Zone noise limits in Table 1 below at any site receiving noise from that activity, as relevant to the zone of the site receiving the noise.*

Table 2.1 (CDP Table 1): Zone noise limits outside the Central City

Zone of site receiving noise from the activity	***Time (hrs)***	***Noise Limit (dB)***	
		L_{Aeq}	L_{Amax}
…	*07:00-22:00*	*50*	*n/a*
b. *All rural zones, except Rural Quarry Zone, assessed at any point within a notional boundary*			
…	*22:00-07:00*	*40*	*65*
…	*07:00-22:00*	*55*	*n/a*
g. *All rural zones, except Rural Quarry Zone, assessed at the site boundary*			
…	*22:00-07:00*	*45*	*70*
l. Industrial General Zone	*07:00-22:00*	*70*	*n/a*
…	*22:00-07:00*	*70*	*n/a*
…			

The above receiving rural zone limits would apply to noise generation from activities on sites within the proposed development. If these limits cannot be complied with, resource consent will be required as either a restricted discretionary activity (where noise limits exceeded by 10 dB or less) or a non-complying activity (where noise limits exceeded by more than 10dB) as set out in Chapter 6.1.5 CDP.

In CDP Section 6.1.4.1.a: *'…noise shall be measured in accordance with NZS 6801:2008 "Acoustics – Measurement of environmental sound", and assessed in accordance with NZS 6802:2008 "Acoustics-Environmental noise", except that provisions in NZS 6802 referring to Special Audible Characteristics shall not be applied'.* The time average noise level (dB L_{Aeq}) is therefore an average assessed over a 15 min period in accordance with NZS 6801 – though may be subject to corrections as per NZS 6802. The maximum noise level (dB L_{Amax}) best reflects the loudest noise event during a period, which if short, may not contribute significantly to the time-average level. The maximum noise night-time limit protects against events that may cause awakenings.

Where assessment at a notional boundary is required (see b. above), the CDP definition of notional boundary *"… means a line 20 metres from any wall of a residential unit or a building occupied by a sensitive activity, or the site boundary where this is closer to the residential unit or sensitive activity."* Most typically this means that in the case of a rural dwelling more than 20 m from the site boundaries, a notional boundary assessment would consider noise levels 20 m from the dwelling (on the side exposed to noise) rather than at the legal boundaries. In this case, unusually, the CDP requires assessment in rural zones at the site boundary and the notional boundary, with slightly different noise levels.

8.9.2.1 Permitted activities - earthworks

a. *The activities listed below are permitted activities if they meet the activity standards set out in the following table.*

b. *Activities may also be controlled, restricted discretionary, discretionary, non-complying or prohibited as specified in Rules 8.9.2.2, 8.9.2.3, 8.9.2.4, 8.9.2.5 and 8.9.2.6.*

Activity		***Activity Standard***
P1	*Earthworks:* *a. not for the purpose of the repair of land used for residential purposes and damaged by earthquakes; and* *…* *…*	*(e) Earthworks involving soil compaction methods which create vibration shall comply with DIN 4150 1999-02 and compliance shall be certified through a statement of professional opinion provided to the Council from a suitably qualified and experienced chartered or registered engineer.* *…* *(f) Earthworks involving mechanical equipment, other than in residential zones, shall not occur outside the hours of 07:00 and 22:00 except where compliant with NZS 6803:1999.*

The District Plan does not have an overarching requirement for assessing vibration as related to construction activities, however the above standard is an example of assessment requirement for the specific case of vibration creating soil compaction methods. Reference is given to DIN 4150 1999-2 *Structural vibration – Human exposure to vibration in buildings* in this case.

Part (f) also specifies earthworks to be limited to day-time hours, consistent with those defined in CDP noise rule 6.1.5.2.1.

If the activity standards for P1 above are not met, then the earthworks will be an RD activity with discretion limited to considering the matters set out in 8.9.4.1.

8.9.4 Matters of discretion

8.9.4.1 Nuisance

…

f. The extent to which any adverse effects from noise and vibration associated with earthworks and land improvement can be avoided or mitigated, and the effectiveness of any methods to mitigate such effects.

…

3. Existing Noise Environment

3.1 Noise Sources

The existing noise environment is relevant both to the acceptability of new industrial noise in the environment as well as for assessment of reverse sensitivity effects of the environment on the proposed industrial activities.

Generic rural environments are typically subject to noise such as nearby road traffic, occasional/seasonal farming activities including use of substantial equipment such as harvesters, light aircraft movements – sometimes related to farming or tourism, and noise from processing plant or other activities permitted within district plans or otherwise undertaken with resource consent, as well as ad-hoc or temporary activities.

Known significant noise sources specific to this area that make it different to the 'generic' rural environment above include the following:

+ Aircraft approaching and departing CIA, and readying and taxiing before flight (refer Figure 1.1 for proximity to south end of main north-eastern runway)
+ Engine testing within CIA
+ Industrial activities to the north of the site, either directly related to CIA operation or within CIAL owned industrial land
+ Russley Road / State Highway 1 and Yaldhurst Road / State Highway 73, and traffic on immediate busy rural roads
+ Industrial/ commercial activities on the sites at 614 Pound Road TW Transport yard and at 22 Ryans Road (Wood Incineration Activity)
+ Ruapuna Speedway, to the south-west
+ Quarries further north up Pound Road

The latter two noise sources are not expected to be significant given the distance to the rural dwellings and proposed industrial development, the occasional nature of the Speedway operation, controls on quarry noise, and as there are closer and more regular/continuous noise sources, however they are examples of louder activities allowed to be established in the area.

The area therefore includes a number of notable noise sources, in particular the significant immediate and distant roads and major airport which would be expected to result in higher noise levels than most rural environments that are more remote from significant infrastructure.

3.2 Noise Survey

3.2.1 General

Environmental noise observations and measurements were undertaken by Daniel Harris of Powell Fenwick on 19 and 21 November 2024, using a handheld sound level meter to measure road traffic noise levels and general ambient noise levels at setbacks equivalent to the setbacks of rural dwellings along Ryans Road. The handheld short-term measurement locations are ST01 and ST02 respectively, shown in Figure 3.1 below.

Unattended sound measurements were also undertaken in two locations, LT01 and LT02 in Figure 3.1 below, using two Convergence Type 1 MK4 data loggers. These were setup on 19 November and collected on 21 November. The data from the unattended survey is summarised in Table 3.2 below and maximum noise levels are plotted in Appendix A.

Throughout the survey period the weather was clear/overcast with varying light winds, refer to Appendix B for the wind speed and direction. General measurement practice was in accordance with NZS 6801:2008 respectively. Meteorological data retrieved from Wunderground is presented in Figures B1 - B3 of Appendix B.

Conditions were not always within NZS 6801:2008 guidelines due to wind speed being higher than the recommended 20 km/h which occurred between 19 Nov 1100 – 1700 h, 20 Nov 1500 – 2100 h and 21 Nov from 0600 – 1400 h. While on site, at the locations of the measurements, it was noted the aircraft flyovers and traffic noise were louder than the wind noise. This can be seen in Figure A1 in Appendix A where the ambient

noise levels during the periods of higher wind speed (greater than 20 km/h) are not significantly louder than periods with lower wind speeds.

The sound level meters and data loggers were calibrated before and after each survey period. No significant calibration drift was observed.

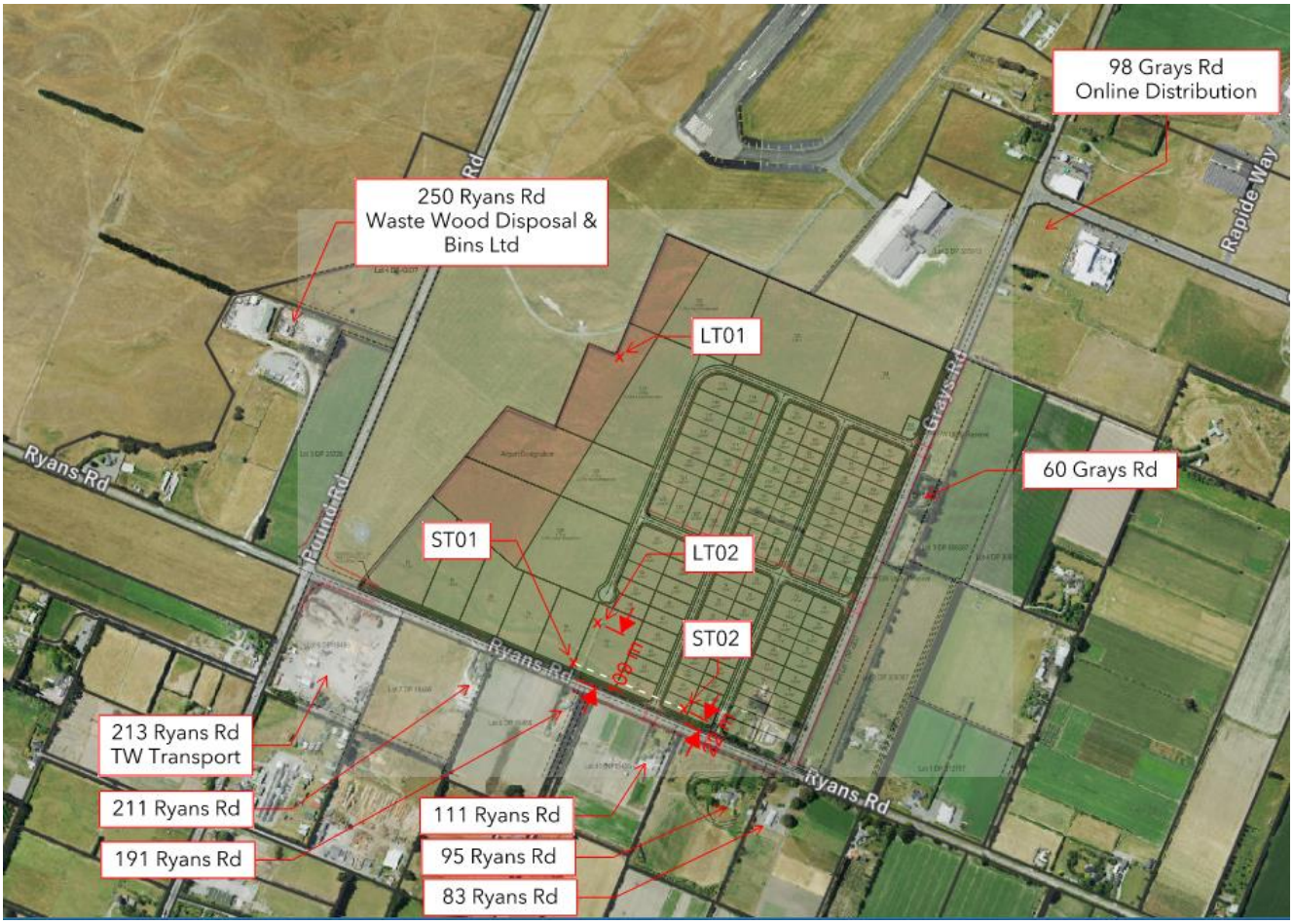


Figure 3.1: Locations of short-term (handheld) and long-term (unattended) measurements with adjacent commercial activities and sensitive receivers between 83-211 Ryans Road and 60 Grays Road.

The equipment used for the survey is presented in Table 3.1 below. Full calibration records can be provided upon request.

Table 3.1: Measurement Equipment

Location	Item	Manufacturer	Model	Serial No.	Calibration Date.
LT01	Data logger	Convergence	MK4	AnF0DnUY0109ojvg60rRlD	11 Nov 2023
LT02	Data logger	Convergence	MK4	CnLWDlW48d03ILHAS2rxvD	11 Nov 2023
	Calibrator	Castle Group	dB Cal	075733	11 Jul 2024
ST01 & ST02	Handheld sound level meter	NTi	XL2 TA	A2A-15282-E0	29 Nov 2022
	Calibrator	Svantech	SV-33b	58057	04 Dec 2023

3.2.2 Long-Term Measurements

A summary of the logger measurements are presented below in Table 3.2. The period of the day is noted i.e. either within the District Plan daytime period (0700 – 2200 h) or night-time period (2200 – 0700 h).

Table 3.2: Summary of Datalogger Measurements between 1145 h 19 Nov – 1345 h 21 Nov 2024

Activity Period	**Datalogger Location**	**Time period**	**Time Average Noise Level, dB $L_{Aeq(t)}$**	**Maximum Noise Level, dB L_{AFmax}**	**Time Average Noise Level, dB $L_{Aeq(24hr)}$ (midday-midday 19 – 20 Nov & 20 – 21 Nov)**
Part Day	LT01	Tues 19 Nov 2024 1145 - 2200 h	61.0	85.9	60.5 dB $L_{Aeq(24hr)}$; 62.0 dB $L_{Aeq(24hr)}$
Night		Tues 19 Nov 2024 2200 – 0700 h Wed 20 Nov	56.2	85.4	
Day		Wed 20 Nov 0700 – 2200 h	62.7	92.3	
Night		Wed 20 Nov 2200 – 0700 h Thu 21 Nov	60.6	91.4	
Part Day		Thu 21 Nov 0700 - 1345 h	63.8	91.5	
Part Day	LT02	Tues 19 Nov 2024 1145 - 2200 h	55.8	81.2	55.3 dB $L_{Aeq(24hr)}$; 57.0 dB $L_{Aeq(24hr)}$
Night		Tues 19 Nov 2024 2200 – 0700 h Wed 20 Nov	52.2	79.7	
Day		Wed 20 Nov 0700 – 2200 h	57.3	85.8	
Night		Wed 20 Nov 2200 – 0700 h Thu 21 Nov	56.4	86.6	
Part Day		Thu 21 Nov 0700 - 1345 h	59.4	84.9	

The louder noise sources measured by the dataloggers were predominantly from aircraft, but there was also wind and nearby road traffic and wildlife such as birds evident in the measurements. Road traffic noise from Pound Road was distinguishable in the LT01 data, particularly when a louder vehicle such as a loud motorcycle or car accelerated. Ryans Road traffic was more evident in the LT02 data due to the closer proximity to Ryans Road.

Generally, the daytime (0700 h – 2200 h) noise levels are louder than the night-time (0700 h – 2200 h) noise levels which would be expected with fewer vehicles on surrounding roads and fewer flights operating.

The differences between LT01 and LT02 time-average noise levels are approximately 4 - 5 dB across all periods where LT01 was measuring the louder noise levels. The differences between the maximum noise levels are approximately 5 – 7 dB across the Ryans Road site for all periods. The higher levels at LT01 were due to aircraft being the dominant source of noise at the data logger locations, and LT01 being closer to the runway.

The maximum noise levels from each datalogger, LT01 and LT02, are overlaid in Figure A1 of Appendix A. LT01 was setup principally to measure the worst-case aircraft noise affecting the proposed industrial activities

whereas LT02 was setup to measure aircraft noise affecting more typical areas of the development site as well as Ryans Road rural dwellings.

For the majority of louder maximum noise events, the aircraft were the noise source - generally both loggers measured these events which occur at almost the same time though quieter at LT02. However, some louder maximum noise events indicated may be produced by wildlife or vehicles. One such event was on 20 Nov 2024 at 0220 h where the logger at LT02 measured a maximum noise level of 74 dB L_{AFmax} and the maximum noise level from LT01 during this event was 59 dB $L_{AFmax.}$

The 24-hour time average noise levels were 60.5 dB $L_{Aeq(24h)}$ and 62.0 dB $L_{Aeq(24h)}$ at LT01 and 55.3 dB $L_{Aeq(24h)}$ and 57.0 dB $L_{Aeq(24h)}$ at LT02 over the approximately two-day period of measurement. These 24-hour noise measurements do not penalise night-time aircraft movements as is the case when determining the day-night average sound level (dB L_{dn}) values. The day-night noise levels penalise night-time movements by 10 dB to reflect additional human sensitivity to noise during the night-time period.

Indicative runways used during the measurement period have been highlighted. The grey background indicates the planes were landing and taking off from the southwest side. The green background indicates the planes were landing and taking off from the northeast. The periods for these were based on tracking the flights from flightradar24.com in combination with anemometer data from wunderground.com, therefore the transitions between flight directions shown are indicative.

3.2.3 Short-Term Measurements

In Table 3.3 below is a summary of the daytime short-term hand-held measurements at locations ST01 and ST02, principally to determine road traffic noise exposure at rural dwellings. The measurement setbacks from Ryans Road were 22 m from the road edge to be equivalent to setbacks to closer rural dwellings on the south side of Ryans Road. Refer Figure 3.1 above.

Table 3.3: Summary of Short-Term Measurements

Location	Time Period	Time Average Noise Level, dB L_{Aeq}	Maximum Noise Level, dB L_{AFmax}	Vehicle Count	Equivalent Daily Traffic	Christchurch City Council AADT	24 hr Time Average Noise Level, dB $L_{Aeq(24hr)}$ Corrected to CCC AADT
ST01	1213 – 1228 19 Nov 2024	57.2	75.0	78 cars, 15 heavy	8,928	3,400	53 dB $L_{Aeq(24hr)}$
ST02	1438 – 1453 21 Nov 2024	61.7	73.3	120 cars, 15 heavy	12,960	3,400	56 dB $L_{Aeq(24hr)}$

The time average noise levels during the two measurements at ST01 and ST02 were 57.2 dB L_{Aeq} and 61.7 dB L_{Aeq} respectively. The difference in noise levels between the two is due to measuring during a quieter period with fewer vehicles compared to a busier period with more vehicle pass-bys, as at ST02.

The measurements included a vehicle count which was linearly scaled up to 24 hours to give an equivalent daily traffic count, however it cannot be assumed vehicle flows are constant throughout a day or are the same each day of the week or during a year. Annual Average Daily Traffic (AADT) is a daily traffic average based on long-term data and is therefore used to calculate a longer-term daily average. Based on Council data showing 3400 AADT we can correct the measured noise levels using acoustic scaling to give predicted long-term daily average noise levels which were 53 dB $L_{Aeq(24hr)}$ and 56 dB $L_{Aeq(24hr)}$ at ST01 and ST02 respectively.

These predominantly road traffic noise measurements included two aircraft flyovers. If these flyovers are excluded from the noise data to best determine a road traffic only noise level, the 57.2 dB L_{Aeq} noise level at ST01 would become 56 dB L_{Aeq}. The same 1 dB difference could also be subtracted from the ST01 corrected data. Aircraft flyovers on this occasion during the ST02 measurement were reasonably masked by the road

traffic pass-bys and removing the flyovers would change the overall noise levels to a smaller degree again. (The aircraft events were not representative of louder aircraft movements however.)

Note that the Council AADT at 3,400 is lower than expected based on the short-term vehicle counts taken. In Section 5.1 later in this report, much higher estimates are provided by QTP. Corrected current noise levels would be in the order of 3 dB higher on the basis of the QTP data.

4. Noise Generated by Industrial Activities

4.1 General

Limits for noise generated by activities in Industrial General zone, which would be proposed to apply within the development site, are a time-average level of 70 dB L_{Aeq} any time of the day, with no maximum noise limit, as per District Plan rule 6.1.5.2.1. Noise generated by industrial activities will also be required to meet District Plan Rural Zone noise limits, most restrictively night-time limits of 45 dB L_{Aeq} at the rural site boundary, and 40 dB L_{Aeq} at the notional boundary where there are rural dwellings. (Refer section 2.4 for full information.)

As the dwellings at 211 Ryans Road and 60 Grays Road are relatively close to those roads the notional boundary night-time limit of 40 dB $L_{Aeq(15min)}$ and 65 dB L_{Amax} would apply at each site boundary which would be the strictest assessment periods and positions around the development. Rural sites where there is no dwelling or where there is a dwelling with a much greater setback from the development will tend to be subject to the 45 dB L_{Aeq} night-time limit at those boundaries.

Activities complying with the daytime and night-time limits should have acceptable effects particularly due to road and air traffic – our measurements indicating noise levels during the more sensitive night-time period were in the order of 12 dB above the most restrictive 40 dB $L_{Aeq(15min)}$ night-time limit. The lowest night-time level of 52.2 dB L_{Aeq} from Table 3.2 was used for this comparison.

As per Table 3.3, the maximum noise levels near to Ryans Road were measured at 75.0 and 73.3 dB L_{AFmax} respectively which exceed the District Plan night-time maximum noise level of 65 dB L_{Amax}. The 75 dB L_{AFmax} maximum noise event was from an aircraft flyover. Louder vehicle maximum noise levels were in the order of 70 – 73 dB L_{AFmax} and could occur at any time during the day or night.

Depending on rural dwelling location the above margins of existing noise exposure above CDP noise limits would vary slightly (more or less) at the different dwelling locations due to varying exposure to road and air traffic, but in any location would be significant.

Based on road and air traffic at the rural dwellings having that significant margin above the compliance limits, a specific future activity consent application noise assessment could determine that noise generation above compliance thresholds might also be reasonable.

4.2 Cumulative Noise

The potential for cumulative noise levels substantially higher than noise limits i.e. multiple industrial sites producing noise near the noise limit but together being well over the noise limits at a specific rural assessment location, is low, for a number of reasons including:

+ The most directly adjacent industrial site to a particular rural dwelling may generate noise some margin below the limits.
+ Other industrial sites *not* directly adjacent to the particular rural dwelling, will have to be compliant at a different rural dwelling, and screening and distance between that other industrial site and the particular rural dwelling will tend to reduce the noise levels.
+ Each site may generate noise intermittently or periodically and therefore noise generation may not coincide.
+ Sites may not operate at night when the more restrictive limits apply.

4.3 Likelihood of Compliance

Imposing noise limits does not guarantee compliance. Certainly industrial activities can include mobile or fixed machinery that could exceed boundary noise limits and even noise from people or light vehicles can exceed limits when near to immediate boundaries when appropriate attention is not given to noise control. It is our experience that the majority of commercial and general industrial activities can be designed to comply with residential/rural limits with appropriate acoustic input. Further, activities may comply without acoustic input through good luck based on site layout factors, default mass building construction and/or activities being modest in nature.

We have been asked to be involved in cases of noise complaints related to commercial or industrial activities. These complaints would typically be confirmed to have a non-compliance, but usually the issue(s) would have a reasonably practicable mitigation or management controls such as the addition of screening around a particular plant item, modifying an item of equipment or process, limiting truck deliveries to day-time hours or a particular more screened point of access, and closing exterior doors casually left open.

The Christchurch City Council Plan Change 14 considered potential effects of intensification of similarly sensitive residential activities next to industrial zones, and as part of that Acoustic Engineering Services were commissioned to observe the interfaces between industrial and residential activities, with outcomes as contained within noise report Industrial-Residential Interface – Review of Potential Noise Issues dated 20 January 2023. Relevant specific comments from the report included:

+ *Higher risks appeared to be involved with dwellings located across a road from an Industrial zone – as they were more likely to be exposed to the active / outdoor aspects of the Industrial activities and/or the heavy traffic which they attract, with no prospect of meaningful screening from interviewing structures. In some cases, if the road is wide and carries a high volume of traffic (for example, Shands or Maces Road) this arrangement did not appear to be particularly problematic.* (Section 4.1.)

+ *There were a moderate number of instances where Industrial site accessways run along the length of a Residential boundary. In addition, as above, on narrow low volume roads on- and off-site heavy vehicle noise can also be a distinct source at Residential receiver locations.* (Section 4.2.)

+ *… mechanical plant is typically a very easily quantified source during the design stage of a project, which should be always able to be designed to comply with the CDP limits. We did not observe anything during our site visits which suggested a different approach was needed – despite numerous examples being observed where mechanical plant did not comply with the CDP limits (sometimes by more than 20 dBA). This always appeared to be due to absence of any effort to implement any of the various mitigation which is routinely implemented by good operators… It is interesting to note that despite numerous on-going non-compliances, this type of mechanical plant noise does not feature highly in the complaints records discussed in the following section – suggesting neighbours are actually quite tolerant of that type of noise, even at levels above the CDP limits.* (Section 4.2.)

The noise report in Section 6.0 then included the following "general" comments on their review and analysis:

+ *The CDP noise limits which control the Industrial-Residential interface are in line with best practice (including the directives of the National Planning Standards) and put the onus on Industrial operators to comply with 'residential level' limits by the time their noise reaches residential areas. This in effect creates a 'buffer area' around the perimeter of, but within, each area of Industrial zoning. Within this buffer area, only low to moderate noise generating Industrial activities can locate and realistically expect to operate in compliance with the CDP, irrespective of the range of industrial activities permitted in the zone generally.*

+ *Many of the activities currently occurring in Industrial zones close to the Industrial-Residential interface are not high noise generating (potentially self-selected due to the close proximity of a boundary at which stringent noise limits apply), or have arranged their sites such that compliance with the CDP noise limits is readily achieved, and it is likely that residential neighbours in these areas rarely experience any noise adverse effects.*

+ *Some of the historic complaints involved situations where Industrial operators were not complying with the CDP noise limits. The fact that residential neighbours complained is not a failure of the noise limits in those situations…*

In summary as is most pertinent to this assessment, the noise report did not identify significant issues with current noise rules or outcomes related to industrial activities (see Section 6 and 7 of that report), often because active areas of industrial sites faced away from residential, in part because access was from the opposing side to direct residential interfaces. There were increased issues or risk of issues where active industrial areas faced residential areas such as across narrow or lower traffic volume roads from which access was gained.

Comparing risk factors for this rural to industrial interface to the residential to industrial interfaces in the study, rural dwellings and habitable outside areas should be further from the industrial activity than dwellings and outdoor areas on residential sites, meaning noise levels from equivalent industrial noise sources will generally be lower near rural dwellings in this rural receiving environment. Specifically Ryans and Grays Roads ensure setbacks to existing rural dwellings. The majority of the sites will not face those roads. Where sites do have direct access, Ryans and Grays Roads are neither narrow nor are lower traffic volume roads.

The application also has limited industrial activities to exclude potentially louder manufacturing.

4.4 Compatibility of Industrial Activities in Environment

It is therefore our conclusion that there is no fundamental incompatibility establishing general industrial zone activities (as defined in the application) within this rural environment, and that in the less likely case that any operator generates noise at non-complying levels that practicable mitigation and management measures are expected to be available. Given this lower risk, actions such as buffers, screening, limiting hours of activities would seem excessive and are understood to be detrimental to wider development outcomes.

If practicable mitigation and management measures did not exist, those specific operators would need to apply for a resource consent for their activities that would breach the standards, the effects from which could be appropriately considered by Council.

Activities that have a greater chance of resulting in nuisance/non-compliance would be activities with yards or truck manoeuvring areas at the road frontages, or factory building openings close to and facing the road frontages, where operations are proposed to take place during night-time hours. A condition of consent could be imposed on those road facing sites only, that where night-time operation is proposed a noise report by an appropriately qualified and experienced acoustic engineer shall be required.

We note that the Rural Urban Fringe Zone and Industrial General Zone do directly adjoin, or indirectly adjoin across roads in other locations, and the CDP therefore anticipates and accepts these activities will be in close proximity.

5. Noise from Traffic Generation on Public Roads

5.1 Traffic Data and Predictions

To assess the effects of noise generation on public roads from traffic generation related to the proposed development, we consulted project traffic engineer Nick Fuller from Novo Group. He provided the following modelled traffic data courtesy of the QTP Traffic Modelling Report "Ryans Road Proposed Private Plan Change: Traffic Network Effects Modelling Technical Report – March 2025" (assessed using the CAST model as commonly acceptable to Council), supplemented by his own calculations of heavy vehicle percentage.

Notably, the model identifies points of traffic congestion and delay, with drivers being predicted to re-route to avoid congestion to generally optimise their travel times. As such, traffic volumes are not necessarily predicted to increase at all locations with the development traffic added to the network.

5.1.1 Current Road Traffic Volumes

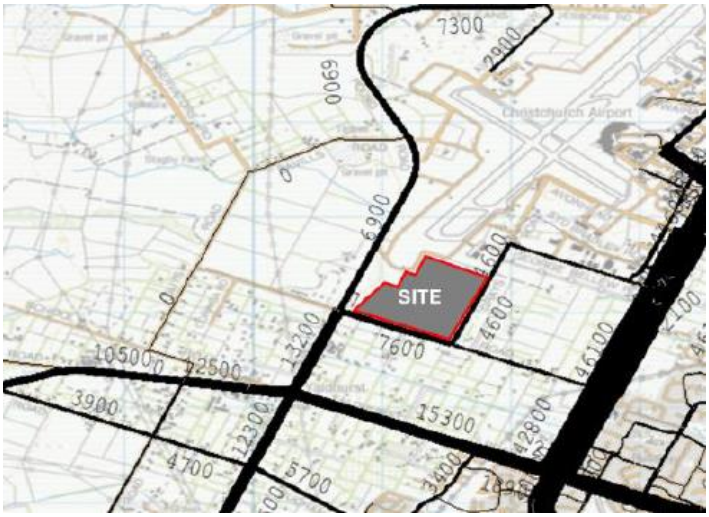


Figure 5.1. Current average two-way weekday traffic volume estimates (Figure 3.7 of QTP Report).

For the data contained in the above figure the proportion of heavy vehicles are:

+ Pound Road: 8% (from a Council count in 2019)
+ Ryans Road: 6% (from 12-hour count at the Pound Road / Ryans Road intersection in April 2023)
+ Grays Road: 4% (from Mobile Road)

5.1.2 Future 2038 Road Traffic Volumes, Without Development

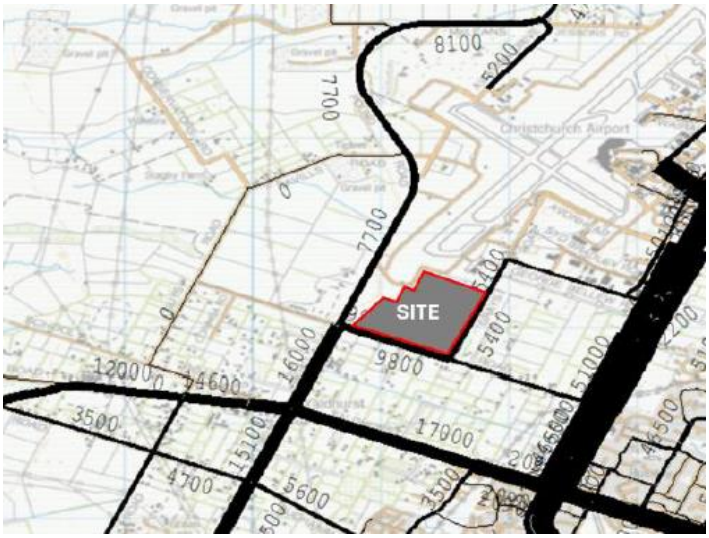


Figure 5.2. Predicted 2038 average two-way weekday traffic volume estimates without development (Figure 3.11 of QTP Report).

For the data contained in the above figure the proportion of heavy vehicles are (as per the base model):

+ Pound Road: 8% (from a Council count in 2019)
+ Ryans Road: 6% (from 12-hour count at the Pound Road / Ryans Road intersection in April 2023)
+ Grays Road: 4% (from Mobile Road)

5.1.3 Future 2038 Road Traffic Volumes, With Development

Figure 3 illustrates the predicted 2038 average daily traffic volumes with the proposed development traffic added to the road network, although without mitigation measures included.

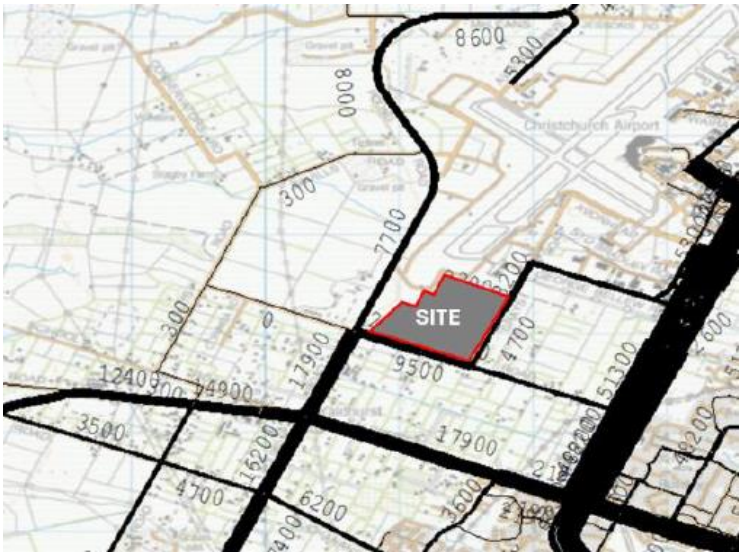


Figure 5.3. 2038 average two-way weekday traffic volume estimates with development, no mitigation to network (Figure 5.7 of QTP Report).

For the data contained in the above figure (2038 with development and no mitigation) the proportion of heavy vehicles are as follows:

+ Pound Road: 8% (from the base model)
+ Ryans Road: 6% (see Novogroup calculations in Appendix C)
+ Grays Road: 7% (see Novogroup calculations in Appendix C)

The QTP report sets out a range of mitigation measures, including:

+ Changes to lane markings at the SH73 / Pound Road roundabout;
+ Roundabout at the Pound Road / Ryans Road intersection; and
+ Capacity Improvements at the SH1 / SH73 traffic signal-controlled intersection.

The traffic volumes with the above mitigation measures are illustrated in Figure 5.4, which shows lower volumes on the key roads surrounding the development site.

Figure 5.4 2038 average two-way weekday traffic volume estimates with development, mitigation to network (Figure 5.8 of QTP Report).

As the mitigation measures are remote from the development and require planning and implementation by other parties, for the purposes of this noise assessment the future *with development, but without mitigation* scenario described in Figure 5.3 above is proceeded with.

5.2 Assessment

5.2.1 Current Road Traffic Noise Levels at Rural Dwellings

The expected daily average road traffic noise levels at rural dwellings, such as those located at 111, 191, and 211 Ryans Road, which are situated approximately 24-38 meters from the road edge and not located near any intersection, would likely range between 55 - 60 dB $L_{Aeq(24hr)}$ based on the calculated 24-hour time average noise levels in Table 3.3. Noise levels at 83-95 Ryans Rd which are set back further but near to the intersection are likely to be similar noise levels.

5.2.2 Predicted Future Road Traffic Noise Levels at Rural Dwellings

The road traffic volumes will increase slightly over time, without the site development, increases of 1 dB over a 24 hour period can be expected in 2038.

However, based on wider network factors, we understand, particularly related to increased delays exiting the area onto SH1 and SH73, a slight *reduction* in vehicle traffic on Ryans Road can be expected with the development (9500 AADT compared to 9800 AADT). Based on this information, on a daily average basis the noise generation from road traffic at nearby rural dwellings would be negligibly different with or without the development.

5.2.3 Predicted Future Night-Time Road Traffic Noise Levels at Rural Dwellings

We have also considered whether road traffic noise would significantly change during the more sensitive night-time period between 2200-0700 h due to the establishment of the industrial area. Nick Fuller estimates future predicted night-time movements along Ryans Road of 1005 (6% heavy) without the development in 2038. Again, based on scaling of the short-term measurements undertaken, we would expect future night time noise levels without the development at 111, 191 and 211 Ryans Road to range between 51-56 dB $L_{Aeq(9hr)}$. Noise levels at 83-95 Ryans Rd which are set back further but near to the intersection are likely to be similar noise levels.

The future average night-time vehicle movements (in or out) of the industrial area are estimated to be 444 (11% heavy) based on 1,071 vehicles per hour and 41.5% distribution from/to Pound Road. As a result of this 44% increase in overnight traffic due to the development, including 81% increase in heavy vehicles, the average noise level during the night-time period would increase in the order of 2 dB.

5.2.4 Maximum Road Traffic Noise Levels from Vehicles Passing Rural Dwellings

Maximum noise levels from passing heavy vehicles, relevant to night-time sleep disturbance, should remain in the same range, typically 65 - 73 dB L_{Amax} based on a range of heavy/louder vehicles using the roads presently, which were observed to include quarrying dump trucks and goods lorries.

5.2.5 Maximum Road Traffic Noise Levels from Vehicles at Intersections Near Rural Dwellings

We have considered maximum noise from additional accelerating/decelerating vehicles turning into/departing from proposed intersections at nearby existing rural dwellings. Noise from accelerating/decelerating heavy vehicles is common near intersections in the area already due to the flow of vehicles such as from Pounds, to Ryans to Grays Roads and vice versa, and would be highest at existing rural dwellings closest to intersections, for example at 104 Ryans Road (development site). 111, 191, 211 Ryans Road and 60 Grays Road will have increased maximum noise exposure from accelerating/decelerating vehicles due the development creating new intersections, with levels in the range of 65-70 dB L_{Amax} expected for the larger truck and trailer units, giving noise outcomes similar to rural dwellings closer to existing intersections. As road traffic pass-bys are of similar noise level, this would be experienced as an increased number of louder vehicle movements. The effect on time-average levels would be included in the 2 dB increase described in Section 5.2.3.

5.2.6 Road Traffic Volumes During Construction

Notwithstanding the lower traffic volumes along Ryans Road and Grays Road in 2038 with the land development, we acknowledge road traffic during the interim period may be higher earlier because of the development, however this would be no greater than the small specific increases noted above, except perhaps during intensive periods of land development works.

5.2.7 Road Noise Mitigation

If road surfaces are changed to asphalt and/or speeds are reduced, the interim daytime, or the "with development" night-time average noise level increases could be offset or possibly even result in reduced noise levels. Passing vehicle maximum noise levels would also be reduced.

Accelerating/decelerating maximum noise levels *might* also be reduced with a reduction in the speed limit, though, the benefit could instead be a shorter period under acceleration/deceleration rather than reduced maximum noise level.

Note that during initial discussions held between project representatives and Council, Council indicated the speed limit on Ryans Road (for at least the site frontage) and on Grays Road could be reduced to 50 km/h with the development from the existing 80 km/h limit.

5.2.8 Existing Air Traffic Noise Environment

Further, when considering noise effects, it is important to consider the existing noise environment from air traffic (as indicative of future noise from air traffic). The air noise boundary (65 L_{dn}) passes through 211 Ryans Road property, inside which residential development is prohibited as per District Plan Rule 6.1.2.1.5 (see section 2.3) – noting the existing dwelling at 211 Ryans Road is slightly outside the air noise boundary. 111 and 191 Ryans Road and 60 Grays Road are between the 55 and 65 dB L_{dn} contours which is in an area where new residential development is discouraged at a planning level and by CIAL, and what development occurs is required to have achieved a minimum acoustic insulation performance (see Rule 6.1.7.2.2 in section 2.5). Logged measurements at LT02 (see Table 3.2) show daily average noise levels more dominantly from aircraft of 55 and 57 dB $L_{Aeq(24h)}$ across the two days, at a similar level to existing road traffic noise of 53-56 dB $L_{Aeq(24h)}$.

In terms of expected 70 dB L_{Amax} maximum noise levels from accelerating/decelerating heavy vehicles at future new intersections, aircraft, with reference to Figure A1 for logged maximum noise events at the similarly exposed LT02 position, were sometimes above 70 dB L_{Amax} during the night-time periods, and potentially as high as 90 dB L_{Amax}. This would indicate that the existing and increased heavy vehicle movements are not as likely to result in night-time sleep disturbance as existing CIA air traffic.

This assessment has focussed on the immediately adjacent properties. Noise levels at, and effects on, rural dwellings further from the development site will be reduced.

6. Airport Noise Effects on Industrial Activities

While industrial activities are not particularly noise sensitive, and are not noise sensitive or prohibited based on the District Plan definition (refer section 2.2), consideration should be given to noise levels from a health and safety perspective, and establishing good indoor conditions for workers including undertaking office type work at the proposed development site.

Employers are encouraged to provide noise environments that are typically no greater than 85 dB $L_{Aeq(8hrs)}$ and 140 dB L_{peak} based on Regulation 11 of the Health and Safety in Employment Regulations 1995. The same thresholds typically apply to use of hearing protection. Noise levels measured were typically between 61 - 64 dB L_{Aeq} during the daytime periods and approximately 3-4 dB quieter during the night-time period, and could be expected to be up to 100 dB L_{peak} during the daytime periods based on the L_{Amax} data (over various periods with reference to Tables 3.2 and 3.3), all below the hearing protection thresholds, which is directly relevant to outdoor areas where noise is not reduced by a building envelope.

Longer term average noise levels can be understood by referencing the airport noise contours in the CDP Planning Maps, which are based on a day-night average (L_{dn}). The day-night measure is not a true time-average (L_{Aeq}) as night-time noise generation is penalised by 10 dB, therefore resulting in day-night levels being numerically higher than 24 hour time-average levels for the same measurement. Potential noise levels on the site of 59 dB L_{dn} to somewhat over 65 dB L_{dn} (inside the 65 dB Ldn contour where interpolation is not possible), are also well under the 85 dB $L_{Aeq(8hrs)}$ guidance for hearing protection.

There are precedents for industrial airport activities adjacent to the CIA runways, and industrial heavy activities in the location northeast of the runway near Logistics Road as per Figure 6.1 below. (There are also long-standing housing areas south-east of the airport that are within the 65 L_{dn} contour.)

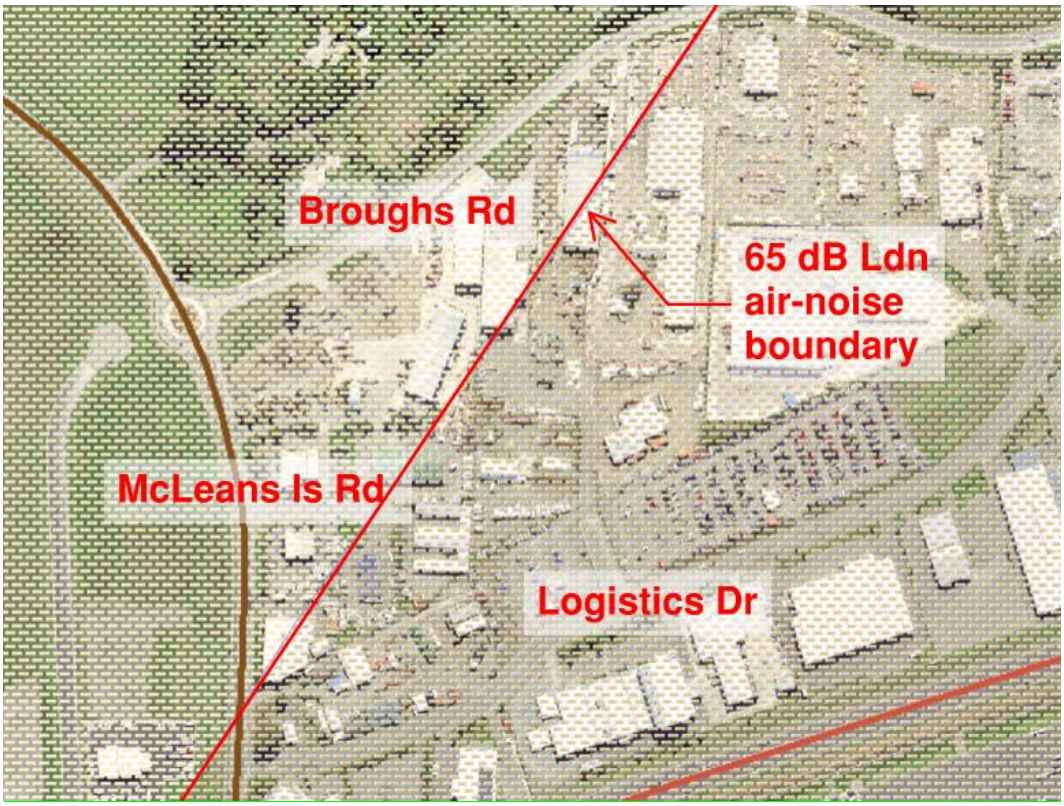


Figure 6.1. Industrial area near Logistics Dr with 65 L_{dn} contour passing through.

The proposed site is also partly within 50 dB L_{dn} engine testing contours however there is a longer list again of other activities with similar or greater exposure.

With regard to internal sound environment, retail activities and ancillary offices would be expected to exist on all or parts of some lots, and specific assessment of the acoustic insulation properties of the exterior envelope of applicable spaces would be required as per District Plan Rule 6.1.7.2.2 (see section 2.4), in order to ensure the required suitable internal design sound levels are achieved. The greatest sound reduction would be required for a conference room or private office in a building at the north-west side of the development, near the runway. At such a location a reduction in the order of 30 dB $D_{ntw} + C_{tr}$ would be

necessary to achieve the 40 dB L_{dn} criteria inside, which is achievable with practicable enhancements to light-weight construction elements. It is also a reduction level less than the highest 35 dB $D_{ntw} + C_{tr}$ required in the District Plan for sensitive activities in parts of the Central City including around Te Kaha.

Considering the above noise factors, the establishment of industrial activities within the development site is appropriate and has precedent.

7. Construction Noise and Vibration

Construction, particularly at scale, requires the use of heavy equipment. Such equipment produces noise and vibration effects levels exceeding those typically experienced in established environments. Although this may mean the noise is undesirable, it is not necessarily unreasonable with all factors considered, and in the context of construction being temporary and a necessary contributor to societal progress.

NZS 6803:1999 *Acoustics - Construction Noise* is commonly referenced in District Plans and by consultants as a governing document for managing noise effects from construction activities. The standard recommends noise limits and provides guidance concerning methods for predicting and managing construction noise.

In Table 2 of the standard (Table 7.1 below), recommended limits are provided for noise received at dwellings in rural areas.

Table 7.1 (Table 2 NZS 6803). Recommended upper limits for construction noise received in residential zones and dwellings in rural areas.

Time of week	Time period	Duration of work					
		Typical duration (dBA)		Short-term duration (dBA)		Long-term duration (dBA)	
		L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and public holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

As can be seen in Table 7.1, more lenient noise levels are recommended during core daytime periods (varying slightly from the day-time period in the District Plan or NZS 6802:2008 Acoustics – Environmental Noise). Evenings, night-times and Sundays – in grey – are given more protection with limits similar to those in District Plans and NZS 6802 for normal activities. It is worth noting that the above noise limits are at 1 m from a dwelling façade, not at the notional or legal boundary.

A similar table with less restrictive limits is included in NZS 6803 for noise at industrial or commercial activity locations.

Certainly the horizontal construction and likely the vertical construction will exceed six months and therefore need to meet the long-term duration limits in the table.

Construction tasks vary in equipment and are not always continuous resulting in stages where noise levels are close to limits for parts of the defined periods, and stages where noise levels are well below the limits. In this case with noise separation across Ryans and Grays Roads to the closest rural dwellings, and other dwellings being more remote, the majority of works can be expected to comply with the noise limits from NZS 6803. Exceptions might be works immediately around the south and east site edges and road corridor related works.

In Section of the Resource Management Act 1991, "*Every occupier of land … shall adopt the best practicable option to ensure that the emission of noise from that land … does not exceed a reasonable level*."

NZS 6803 anticipates that in some instances recommended limits cannot be met even where best practicable options for noise avoidance or mitigation have been investigated, and advises that these stages of works are identified to the relevant authority, in this case Christchurch City Council. This is so that scrutiny can be given and so that adequate notification can be given to the affected community.

Assessment of vibration is not required in the District Plan for general construction activities. At this stage, we would expect assessed vibration levels would not exceed cosmetic damage guidance limits with reference to DIN standards.

8. Summary

Powell Fenwick has been engaged by Carter Group Limited (Carter Group) to provide noise assessment related to rural land on Ryans Road in Christchurch, which is proposed to be subdivided and used for industrial purposes. This noise report is expected to accompany the application to the Environmental Protection Agency under Fast Track legislation.

The purpose of this project is to deliver an industrial development that meets the specific demands for industrial land in the immediate vicinity of and in association with Christchurch International Airport. This includes providing land suitable for the establishment of logistics, warehousing, and other airport-related businesses.

The most critical existing noise generating features of the area include Christchurch International Airport, with the south end of the "north-eastern" main runway terminating north of the proposal site, and immediate busy roads and more distant State Highway 1, which set the noise character of the area. Noise surveys were undertaken to observe and quantify noise in the receiving environment.

Rural dwellings such as 83, 95, 111, 191, and 211 Ryans Road and 60 Grays Road in adjacent Rural Urban Fringe Zone are the existing noise sensitive activities most relevant to the assessment.

Considerations related to noise that were investigated in this report are listed below, with summaries of the assessments bulleted underneath:

1. Noise generation from future operational activities within the industrial development affecting people living in rural dwellings.
    - Existing time-average and maximum noise levels in the environment principally from road and air traffic are a notable margin above the applicable Rural Zone noise limits e.g. in the order of 10 dB above during the more sensitive night-time period limits of 40-45 dB L_{Aeq} and 65 dB L_{Amax}.
    - Compliant activities will have minimal additional noise effects in this environment.
    - It is our experience that the majority of general industrial activities can be designed to comply with rural noise limits and there is no fundamental incompatibility establishing industrial activities (as defined in the application) within this rural environment, and that in the less likely case that any operator generates noise at non-complying levels that practicable mitigation and management measures are expected to be available.
    - Activities with yards or truck manoeuvring areas at the road frontages or factory building openings close to and facing the road frontages, where operations are proposed to take place during night-time hours, could have a condition of consent imposed that a noise report by an appropriately qualified and experienced acoustic engineer shall be required, to mitigate risk of non-complying activities being established.
2. Noise from traffic generation on nearby public roads due to the development affecting people living in rural dwellings.
    - The expected daily average road traffic noise levels at rural dwellings would likely range between 55 - 60 dB $L_{Aeq(24hr)}$ at the rural dwellings.
    - The road traffic volumes will increase in the future, *without the site development*, increases of 1 dB over a 24 hour period can be expected in 2038.
    - Based on wider network factors, we understand particularly related to increased delays exiting the area onto SH1 and SH73, a slight reduction in vehicle traffic on Ryans Road can be expected with the development (9500 AADT compared to 9800 AADT). The daily noise generation from road traffic at nearby rural dwellings would be negligibly different with or without the development.
    - Future (2038 projected) *nighttime* noise levels without the development at rural dwellings range between 51-56 dB $L_{Aeq(9hr)}$. Due to the development the average noise level during the night-time period would increase in the order of 2 dB.
    - Acceleration/deceleration at newly established intersections would be of similar maximum noise level to pass-bys, and would be experienced as an increased number of louder vehicle movements. The effect on time-average levels is included in the 2 dB increase described above.

- The 0-2 dB increases expected with the establishment of the industrial development will have minimal additional noise effects.

3. Reverse sensitivity effects related to establishing industrial activities adjacent to aircraft taking off and landing.
    - Time-average noise levels are expected to be between 59 - 65 dB L_{Aeq} during the daytime periods and approximately 3-4 dB quieter during the night-time period, and could be expected to be up to 100 dB L_{peak}. All levels are well below hearing protection thresholds of 85 dB L_{Aeq} and 140 dB L_{peak}, which is directly relevant to functional amenity and safety in outdoor areas where noise is not reduced by a building envelope.
    - There are precedents for industrial airport activities adjacent to the CIA runways, and industrial heavy activities in the location northeast of the runway near Logistics Road.
    - The internal sound environment of retail activities and ancillary offices would be required to meet District Plan Rule 6.1.7.2.2 (see Section 2.4). The greatest sound reduction would be in the order of 30 dB Dntw + Ctr which is achievable with practicable enhancements to light-weight construction elements.
    - Considering the above noise factors, the establishment of industrial activities within the development site near to Christchurch International Airport is appropriate and has precedent.
4. Construction noise effects on rural dwellings.
    - Construction, particularly at scale, requires the use of heavy equipment. Such equipment produces noise and vibration effects levels exceeding those typically experienced in established environments.
    - The Construction Management Plan is to include management of noise effects.

Based on the above assessments, the operation of industrial activities at the proposed Ryans Road site will result in minimal additional noise effects on rural dwellings, in the context of the existing and predicted future noise environments, and will be within a suitable noise environment for industrial activities to operate safely.

Appendix A.
Datalogger Noise Measurement Plot

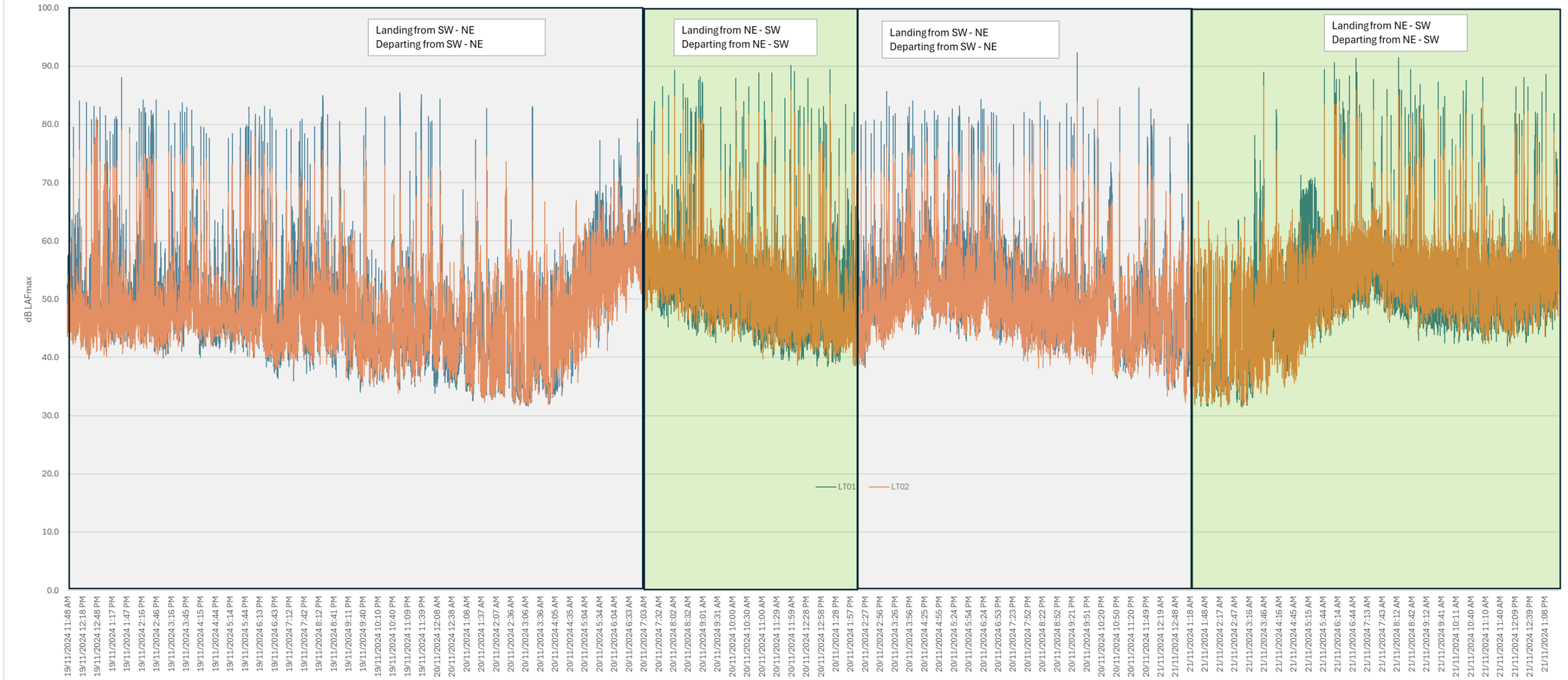


Figure A1: Maximum noise levels (dB L_{Amax}) from LT01 & LT02 measurements during the survey period 19 Nov 2024 – 21 Nov 2024 at the Ryans Rd site.

Appendix B.
Meteorological Data

Christchurch INTL Airport Weather Station

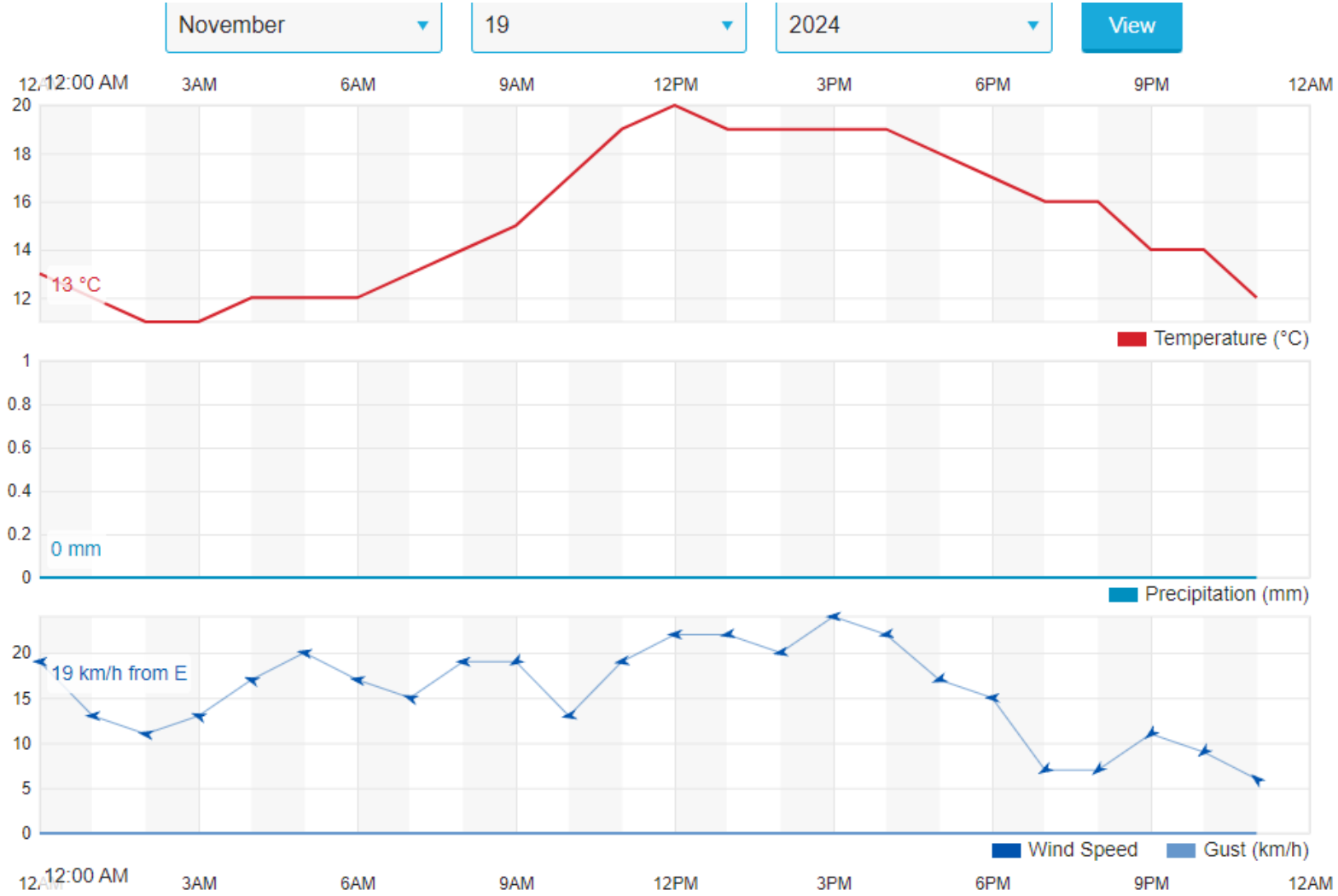


Figure B1: Meteorological data for 19 Nov 2024 from Chch Intl Airport weather station.

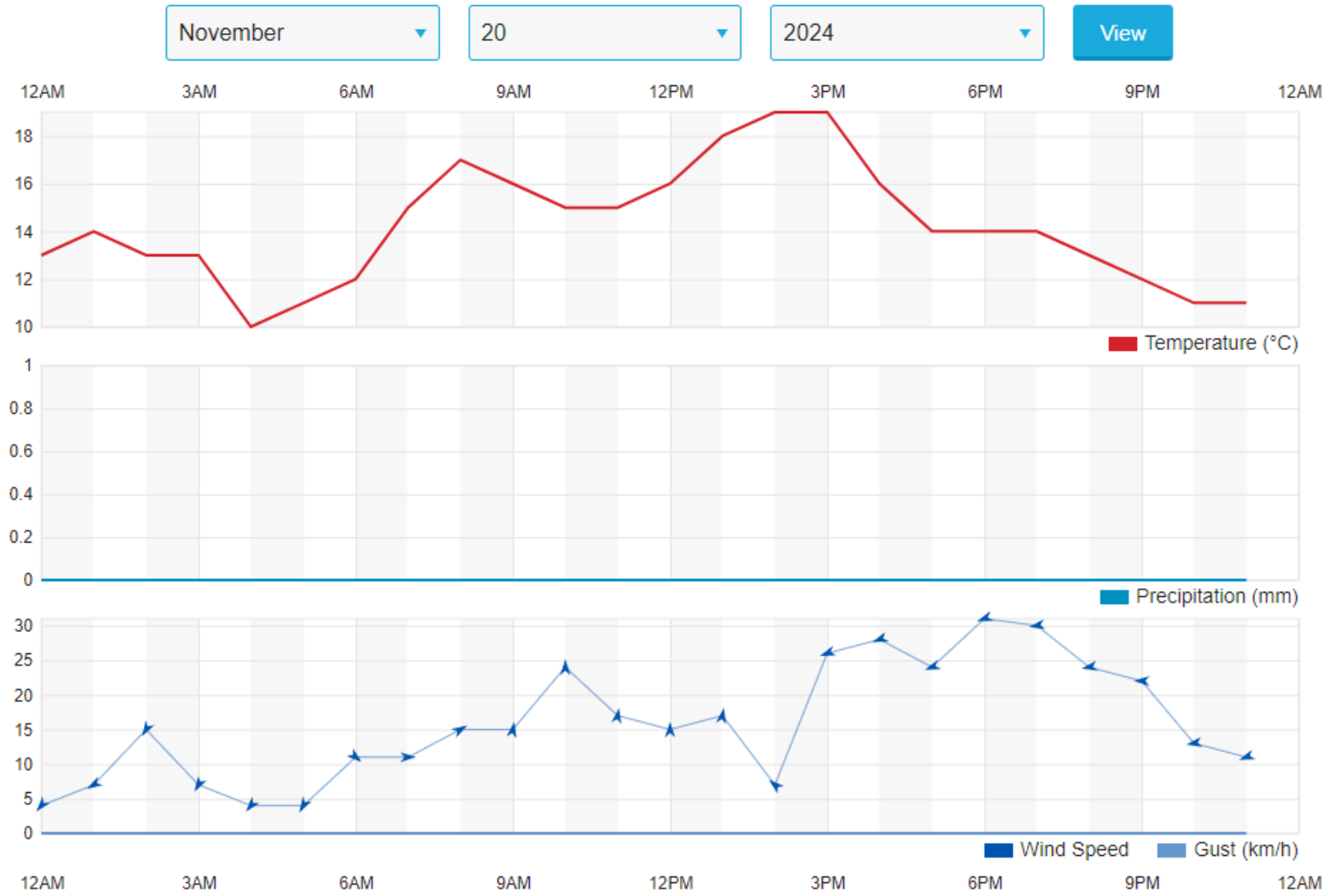


Figure B2: Meteorological data for 20 Nov 2024 from Chch Intl Airport weather station.

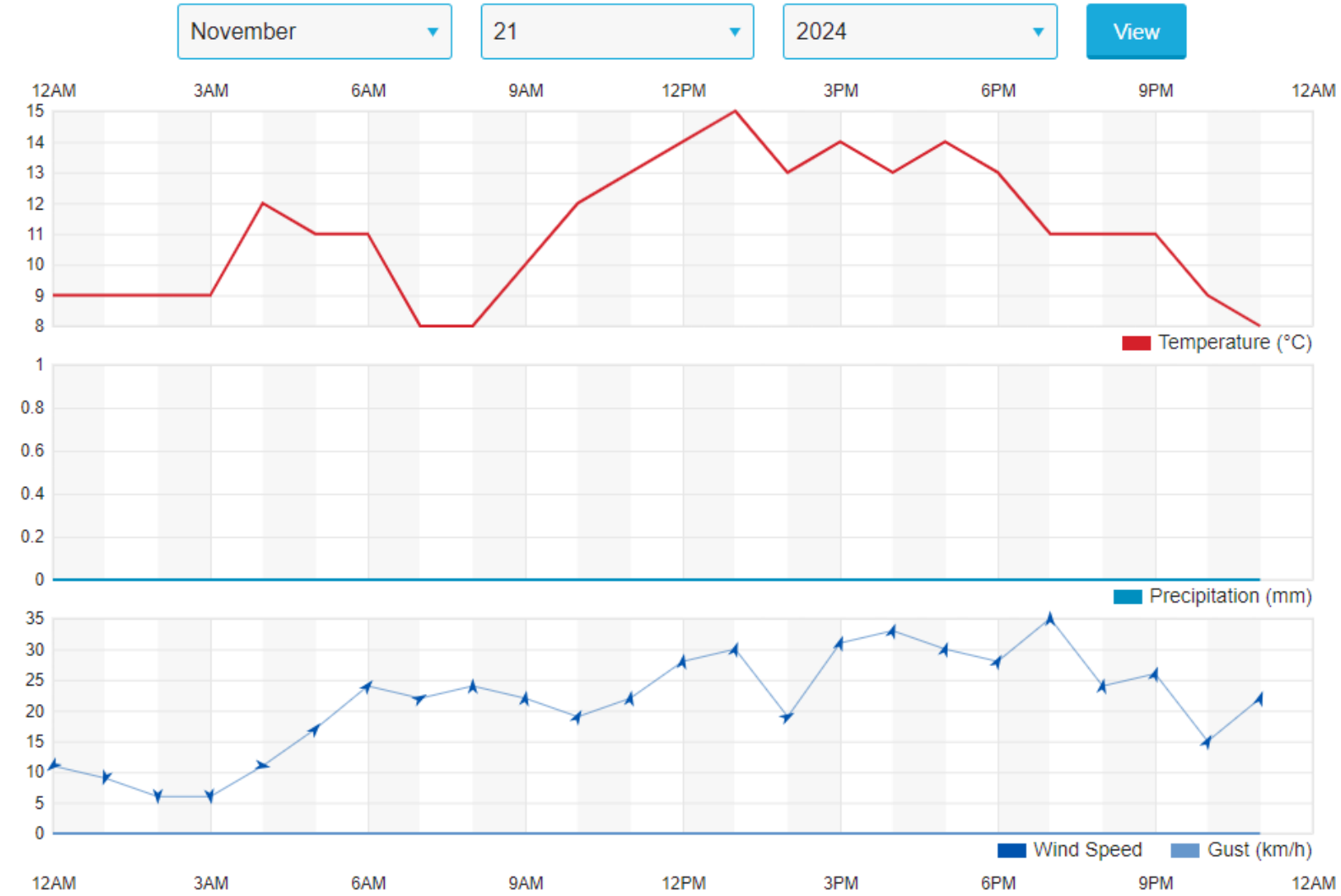


Figure B3: Meteorological data for 21 Nov 2024 from Chch Intl Airport weather station.

Appendix C.
Predicted Heavy Vehicle Percentages

(by Novo Group)

Predicted Heavy Vehicle Percentages

2038 With Development

14. The predicted 2038 baseline (i.e. no development) volume on Ryans Road is 9,800 vehicles per day with 6% heavies.

15. The proposed development is predicted to distribute[4]:

    i. 41.5% of peak hour traffic on Ryans Road to / from Pound Road;

    ii. 27.25% of peak hour traffic on Ryans Road to / from SH1[5]; and

    iii. 31.25% of peak hour traffic on Grays Road (north of the Site) [6].

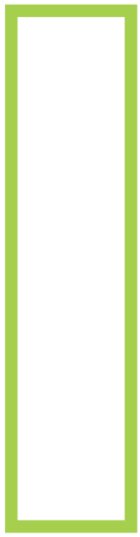
16. The traffic generation data for the site suggests 9% of the daily site traffic is heavy vehicles, and that the site would generate 8,804 vehicle movements per day. The existing traffic is assumed to displace existing traffic from surrounding the Site. This calculation is set out in the following table, along with the resultant traffic volumes and percentage heavy vehicle in the righthand columns.

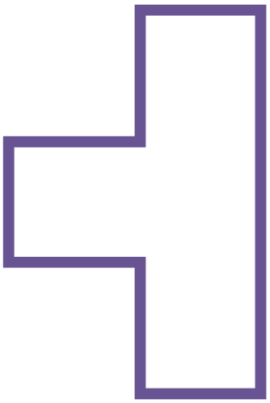
	2038 No Development Model		Development Traffic			2038 With Development Model		2038 With Development , Less Development Model		2038 With Development Model		
	AADT	% Heavy	% of Site Traffic	AADT	Heavy Vols (at 9%)	AADT	% Heavy	AADT	Heavy Vol	AADT	Heavy Vol	% Heavy
Ryans Rd (Grays to Pound Rd)	9,800	6%	41.5%	3,654	329	9,500	-	5,846	351	9,500	680	7%
Ryans Rd (Grays to SH1)	4,400	8%	27.25%	2,399	216	4,800	-	2,401	203	4,800	419	9%
Grays Rd (Ryans to Northern Boundary)	5,400	4%	31.25%	2,751	248	4,700	-	1,949	78	4,700	326	7%
Grays Rd (North)	5,400	4%	31.25%	2,751	248	8,200	-	5,449	218	8,200	466	6%

[4] This is the average of AM and PM Peak period arrival and departure routing in Figures 5.3 to 5.6 of the QTP report.
[5] This assumes that 50% of traffic to the north uses Ryans Road, as suggested in para 5.2.3 of the QTP report.
[6] This assumes that 50% of traffic to the north uses Ryans Road, as suggested in para 5.2.3 of the QTP report.

Figure C1. Heavy vehicle calculations provided by Novo Group.

Powell Fenwick





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