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Woolworths New Zealand Madras Street, Christchurch

Assessment of Environmental Noise Effects

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1.0 BACKGROUND AND PROPOSAL

Acoustic Engineering Services Ltd (AES) have been engaged to provide acoustic engineering advice relating to a Resource Consent application for a proposed supermarket and associated retail/ commercial tenancies to be located on Madras Steet in St Albans, Christchurch. The Applicant requires an Assessment of Environmental Noise Effects (AENE) for the activity with regard to section 104 (1) of the Resource Management Act (RMA), which requires the actual and potential effects of the activity to be considered.

We have based our analysis on our meetings and correspondence to date, along with the following documentation:

- Architectural package titled *Proposed Woolworths supermarket RMA, Woolworths Madras Street, Christchurch, New Zealand*, as prepared by Woodhams Meikle Zhan Architects and dated the 13th of September 2024
- ITA titled *Woolworths Supermarket Madras Street, St Albans, Integrated Transport Assessment* as prepared by Stantec NZ and dated the 24th of October 2024.
- Landscape plans for project titled *Proposed Woolworths Supermarket, Madras Street, Landscape Design Report – Resource Consent, Rev B*, as prepared by Boffa Miskell and dated the 8th of October 2024

The proposal is to establish a supermarket with a floor area of 3,550 m² (including mezzanine office, excluding plantroom and lobby (205 m²), an online pick-up area (150 m²), three to four retail/commercial tenancies within a total floor area of 1390 m², and a carpark. The supermarket and associated retail will operate between 0700 – 2200 hours daily and will include online order pick-up carparking spaces on the south side of the supermarket carpark. The development will be located on Madras Street to the north of Purchas Street with dual access from Madras Street and vacant residential lots to the north. To the south are a residential development and a vacant commercial site, beyond that is a commercial site that contains two-storey townhouses. There is a church adjoining the site to the east.

The supermarket is part of a wider development that is currently located. on the following sites: 109 Purchas Street (Pt Lot 21 DP 1212), 472 Madras Street (Lot 66 DP 953), 476 Madras Street (Lot 65 DP 953) 480 Madras Street (Lot 64 DP 953, Lot 1 DP77018) 81 Packe Street (Lot 2 DP 446696), 484 Madras Street (Lot 1 DP 565530), 486, 492 and 494 Madras Street Lots 62, 61 and 60DP953).

This overall site, currently owned by the Applicant (WWNZ), is part of a subdivision application that will create the supermarket site, and to the north Lot E and Lot 4 and to the south Lot 3

Under the Christchurch District Plan (DP), the site is zoned both Commercial Local (CL) (on the southern portion) and Residential Medium Density (RMD) on the northern portion. The majority of sites surrounding the development are also zoned RMD except for those to the southwest at Lot 3, and 1 – 4 / 466 Madras Street where there are two storey townhouses, that are zoned (CL). The site layout, zones and proposed new Lots 3, 4 and E are shown in figure 1.1. below.

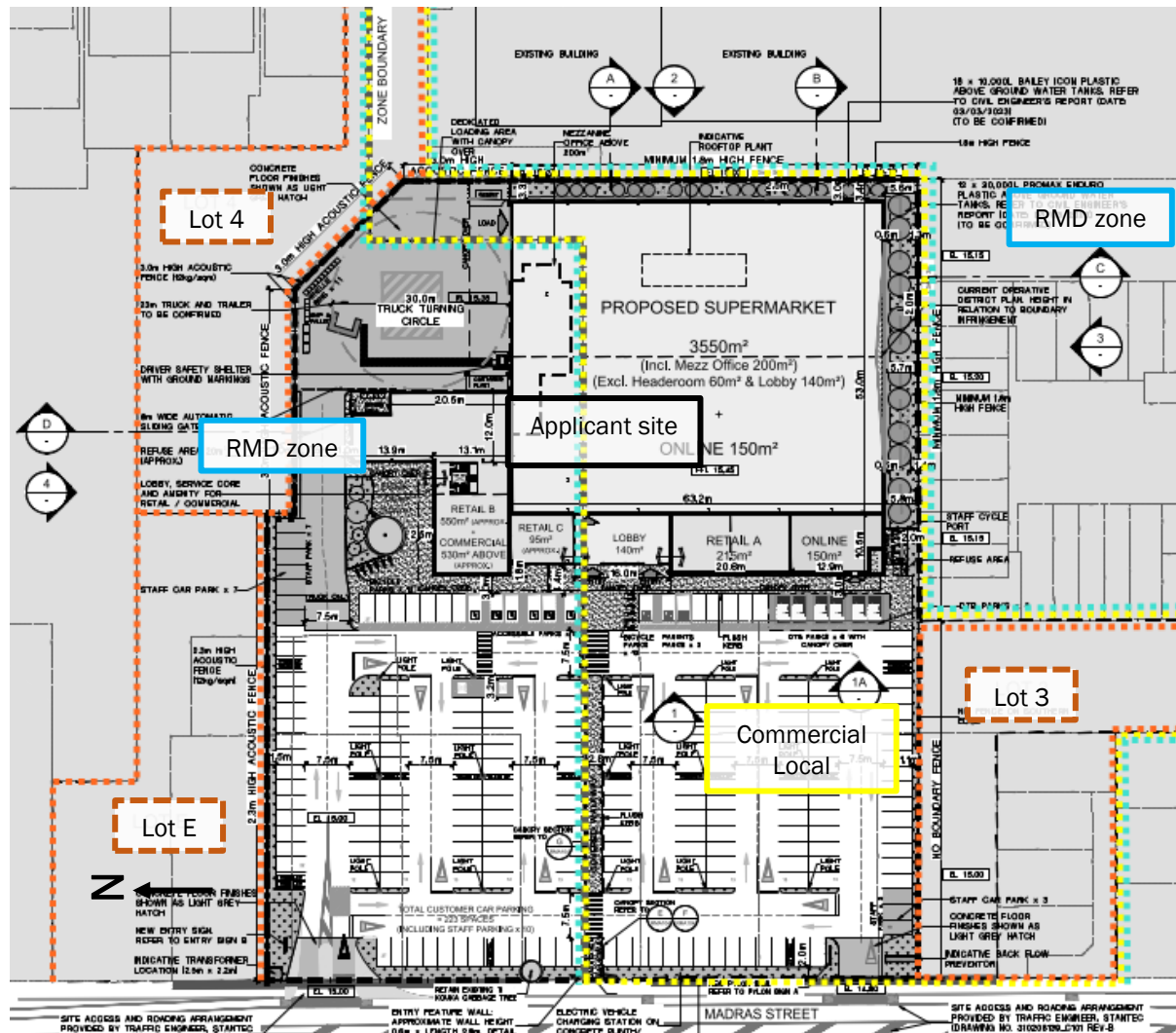


Figure 1.1 – Site and surrounding area

The purchase of the wider landholding by WWNZ included an agreement to sell back Lots 3 and 4 to the original landowner once the boundary adjustment subdivision has been completed and new titles issued. As such, lots 3 and 4 will not ultimately be owned by WWNZ (with the transfer of ownership anticipated to potentially occur whilst this application is being processed). Lot 4 is immediately to the north of the loading bay and Lot 3 is to the southwest adjacent to the customer carpark. The future owner of these Lots (as per a sale and purchase agreement) has provided an Affected Persons Approval (APA) and therefore effects cannot be considered.

Land immediately to the north of the supermarket carpark (Lot E) is owned by the Applicant and therefore APA is inherent in the common ownership.

The proposal includes acoustic fencing on the northern, eastern and part of the southern boundary of the supermarket site. In order to be acoustically effective, the fencing will need to meet the following minimum specifications:

- Surface mass – at least 12 kg/m²

- The fence must be continuous and maintained with no gaps or cracks. For timber fences, this will require palings to be well overlapped (25 mm minimum) or a “board and batten” system, and a sleeper rail connecting the base of the palings to the ground. We also recommend a paling thickness of at least 25 mm to help resist warping.
- Suitable fencing materials which are commonly used include 25 mm timber, 9 mm fibre cement, 19 mm plywood, masonry, and concrete, or a combination of the above.

We have visited the site and we observed an existing 2.0 metre fence to the boundary of 101 Purchas Street and a 1.8 metre fence to 93-95 Packe Street. These fences are relatively new and are likely to be acoustically effective. In order to ensure the fence meets the requirements outline above, any gaps will however, need to be repaired. The overall site plan is shown in figure 1.2 below. The figure also shows the layout of the supermarket, including the location of the carpark and loading area.

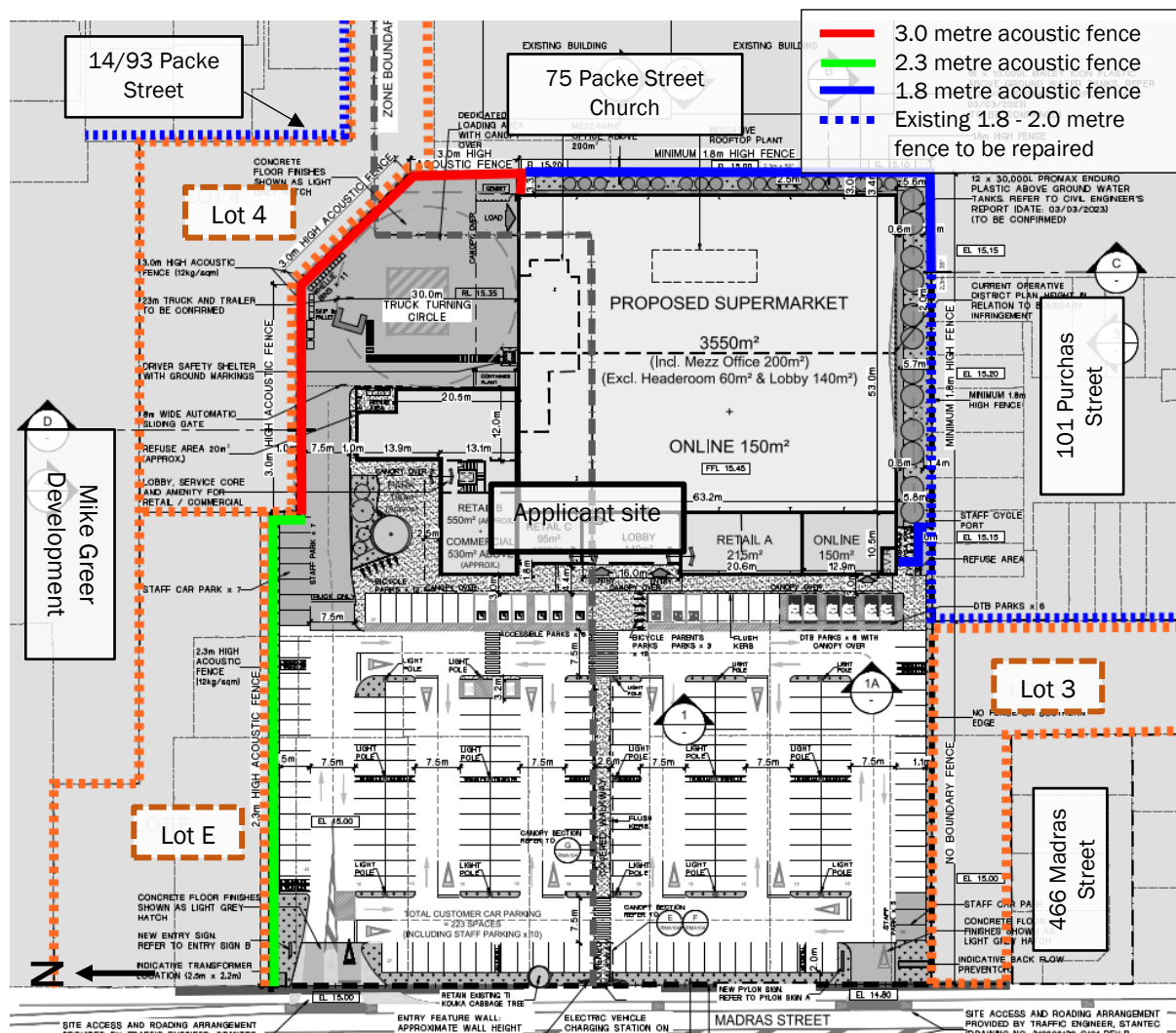


Figure 1.2 – Site and fencing plan

2.0 ACOUSTIC CRITERIA

The Resource Management Act 1991 requires consideration of the significance of any adverse effects associated with the proposal. Guidance as to the significance of any adverse noise effects may be obtained from several sources.

2.1 Christchurch District Plan

As described in section 1.0, part of the site is zoned commercial (CL) and remainder of the site and the majority of the remaining land is zoned residential (RMD) except the site at 1 – 4 / 466 Madras Street to the south west zoned CL as designated in the Christchurch District Plan (DP).

The noise limits for sound received in the relevant zones are outlined in 6.1.5.2.1 a. *Zone noise limits outside the Central City* are as follows:

a. *All residential zones (other than in the Accommodation and Community Facilities Overlay)*

Daytime	(0700 to 2200 hours)	50 dB L_{Aeq}	
Night-time	(2200 to 0700 hours)	40 dB L_{Aeq}	65 dB L_{Amax}

b. *All commercial zones*

Daytime	(0700 to 2200 hours)	55 dB L_{Aeq}	
Night-time	(2200 to 0700 hours)	45 dB L_{Aeq}	70 dB L_{Amax}

The Christchurch District Plan states that the noise shall be measured in accordance with NZS 6801:2008 *Acoustics – Measurement of Environmental Sound* and be assessed in accordance with NZS 6802:2008 *Acoustics – Environmental Noise* except that provisions in NZS 6802:2008 referring to Special Audible Characteristics shall not be applied. NZS 6802:2008 does not provide an assessment period but recommends a 15-minute measurement interval for fluctuating continuous sound.

2.2 New Zealand Standard NZS 6802:2008

NZS 6802:2008 *Acoustics – Environmental noise* outlines a guideline daytime limit of 55 dB L_{Aeq} (15 min) and night-time noise limits of 45 dB L_{Aeq} (15 min) / 75 dB L_{AFmax} for “the reasonable protection of health and amenity associated with the use of land for residential purposes”.

For mixed-use areas NZS 6802:2008 offers a guideline daytime and night-time limit of 60 dB L_{Aeq} for non-residential receivers.

The Standard also describes how a -5 dB adjustment may be applied to sound received for less than 30% of the daytime period. Where the level of sound reduces significantly for large periods of time but does not stop completely, an energy average can be calculated across the whole daytime period, with a reduction of up to 5 dB permitted. No such adjustment is permitted for the night-time period.

2.3 World Health Organisation

*Guidelines for Community Noise*¹, a document produced by the World Health Organisation (WHO) based on extensive international research recommends a guideline limit of 55 dB L_{Aeq} to ensure few people are

¹ Edited by Berglund, B et al. *Guidelines for community noise*. World Health Organization 1999.

seriously annoyed in residential situations. A guideline limit of 50 dB L_{Aeq} is recommended to prevent moderate annoyance.

Guideline night-time limits of 45 dB L_{Aeq} / 60 dB L_{AFmax} are recommended to allow occupants to sleep with windows open and meet internal limits of 30 dB L_{Aeq} / 45 dB L_{AFmax} within bedrooms to avoid sleep disturbance.

These guideline noise levels are measured at the façade of dwellings and other noise sensitive locations and the L_{Aeq} limits apply for 16 hours in the daytime, and 8 hours for the night-time.

The WHO also recommends a 24-hour noise limit of 70 dB L_{Aeq} for “industrial, commercial, shopping and traffic areas.”

2.4 AS/NZS 2107:2016

New Zealand Standard AS/NZS 2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors* provides recommended internal noise levels for residential in suburban settings of 30 – 40 dB L_{Aeq} for living areas, and 35 to 45 dB L_{Aeq} for living areas in inner city areas or near major roads.

When windows are cracked open for ventilation in a typical dwelling, a noise reduction of 17 dB can be expected as noise travels from outside to inside. Therefore, where noise of up to 57 dB L_{Aeq} is received on the façade of a dwelling living area, internal noise levels are likely to not exceed 40 dB L_{Aeq} even with windows cracked open for ventilation. With windows closed, an external level of greater than 62 dB L_{Aeq} would typically be required, before internal levels exceeded 40 dB L_{Aeq} .

2.5 Existing noise environment

Rewa Satory of AES visited the proposed site location on the 12th of July 2024 (a Friday in the school holidays) to observe the ambient environment between 0700 and 0800 hours, to give an indication of the background noise levels of the surrounding area at a time relevant to the operation of the supermarket with particular regard to the use of the loading bay. This time was selected to try to capture the low background noise levels when traffic movements on Madras Street were expected to be low. Noise measurements were undertaken in general accordance with NZS 6801:2008 *Acoustics – Measurement of Environmental Sound*.

Noise was measured at the property boundaries on the west side of Madras Street, opposite the entrance/exits of the supermarket. Traffic travelled primary in the northbound traffic lane and was periodic in time with the traffic lights to the south. An average of 3.8 vehicles passed every minute with periods of up to 2 minutes with no vehicles passing. Vehicles were primarily light, with only 2 % heavy vehicles observed. Noise levels of 64 and 66 dB L_{Aeq} were measured opposite the entrance/exits, indicating the properties on Madras Street experience high noise levels due to traffic during the daytime. We note that noise from traffic on Madras Street is expected to increase steadily throughout the day peaking between 1700 and 1800 hours when noise may be in the order of 5 dB higher.

Further to the east on the site the ambient environment was still dominated by noise from vehicles on Madras Street although birds, and nearby construction activities were also audible. The level measured at the eastern edge of the proposed carpark was between 45 – 48 dB L_{Aeq} with slightly lower levels of 43 – 47 dB L_{Aeq} measured in the vicinity of the proposed loading bay. Noise during peak traffic between 1700 and 1800 hours would be in the order of 5 dB above these levels.

Overall, the noise in the area is what would be expected in the typical residential area - with higher noise received at residential properties in proximity to Madras Street and over much of the site during the afternoon peak between 1600 and 1800 hours.

2.6 Discussion regarding appropriate noise levels

For sites in the RMD we note that the applicable District Plan noise limits are 5 dB more stringent than the upper guideline limits outlined in national and international guidance discussed above for the protection of residential amenity. However, the District Plan daytime limit is consistent with the lower guideline limit outlined in the WHO guidance.

Based on the above we consider that where noise from the proposed activity complies with the residential District Plan limit of 50 dB $L_{Aeq} (15min)$ when received within any residentially zoned site, noise effects will be minimal. Noise levels of up to 55 dB L_{Aeq} are also likely to be acceptable at sites that receive elevated noise from traffic on Madras Street.

During the night-time period, compliance with the District Plan noise limits for residential zones of 40 dB L_{Aeq} / 65 dB L_{AFmax} and 45 dB L_{Aeq} / 70 dB L_{AFmax} for commercially zoned properties will also ensure that noise effects are minimal.

3.0 NOISE GENERATED BY THE ACTIVITY

We have assessed noise from the types of activities that are likely to be associated with this development. Key noise sources are expected to be as follows:

- Noise associated with the back of house operations. This includes service and goods vehicles using the loading bay for deliveries and rubbish collection, forklifts to unload and move pallets.
- Noise associated with the carpark and click and collect bays, including customers and delivery vehicles travelling on the site and using the carpark (engine noise, exhaust noise, road/tyre noise and the like).
- Mechanical plant noise associated with the various activities including outdoor condensers and extract systems.
- Although the tenants for the small-scale tenancies have not yet been confirmed there may potentially be breakout noise from music and people (i.e. cafés, gym).

Noise modelling has been undertaken based on the following daytime scenario.

3.1 Loading Bay

The loading bay and access is located on the northern side of the supermarket as shown in figures 1.1 and 1.2. Delivery vehicles will access the loading bay via the northern entrance to the carpark and exit the same way.

We understand from correspondence with Woolworths that there may be up to 10 – 15 truck deliveries per day. Three of these will be 23-meter-long truck and trailers from Woolworths distribution centres, and the remainder will be direct deliveries from suppliers. The largest trucks may be up to 3.0 metres at the highest point. Refrigeration units (for trucks that require them) will be located just below the highest point of the truck, on top of the cab.

Truck deliveries will occur during the daytime period only and generally fall between 0700 and 1600 hours. Woolworths has advised that whilst trucks may leave their engines running for quick drop offs, trucks that require a longer period to unload goods (more than 5 minutes) will turn off their engines during unloading. Refrigeration units will also be turned off when unloading to avoid triggering the defrost / condensation cycle of the truck. We have based our analysis on the assumption that these managerial measures are adopted.

As noted above the amount of time taken for deliveries will vary. Some longer deliveries may take up to around 30 minutes, but on the other hand, shorter deliveries may take less than 5 minutes. For the purposes of this assessment this means that for the majority of the day there will be minimal heavy vehicle activity in the loading bay, with noise mostly only expected from the movement of pallets, forklifts and general unpacking activity.

Based on past measurements and our experience with similar operations, we have assumed that the loudest delivery vehicle to arrive at the site will have a sound power of 110 dB L_{WA} when moving, and 100 dB L_{WA} when idling. We have assumed a sound power of 98 dB L_{WA} for a refrigeration unit located on top of the cab as the truck drives through the site.

Goods will be unloaded manually and with forklifts. We have been advised by Woolworths that they are moving towards a new fleet of electric forklifts for this development. In our experience the noise produced by the motors of electric forklifts will be negligible compared to the other expected noise sources in the loading bay area. We recommend that a condition is adopted to ensure the forklifts are electric, and that non-tonal reversing alarms are fitted to the forklifts.

Due to the intermittent nature of the activity a duration adjustment has been applied as allowed for in NZS 6802:2008. Based on 10 – 15 deliveries per day, noise is expected to be present less than 30% of the daytime period and/or the energy average over the daytime period is expected to be low. Therefore, a duration / averaging adjustment of -5 dB has been applied.

3.2 Activity in carpark

As shown above there are entry/exit accessways from Madras Street, at the northern end of the site and at the southern end. There are 225 customer carparks (including 6 click and collect spaces, 6 accessible spaces, 3 parents parks and 6 staff parks).

The predominant noise associated with the carpark will be from vehicle movements. Calculations of vehicle movements in the carpark have been based on the method described in *Parking Area Noise, 6th Edition* produced by the Bavarian State Agency for Environment (2007), implemented into SoundPlan. We have used separate driving lanes, assuming each vehicle movement generates a sound power of 85 dB L_{WA} when travelling at 10 km/hr. A single movement has been assumed to be a car entering the carpark, stopping in a parking space at random, and exiting the carpark.

Based on the draft Integrated Traffic Assessment we have based our modelling on the expected peak hour where 500 vehicles enter and exit the carpark to use all spaces including the click and collect activity, this is expected to be 20 – 25% of the daily traffic of approximately 2650 vehicles. During this peak hour 288 vehicles are expected to use the southern entrance and 213 are expected to use the northern entrance. Based on data from a similar sized supermarket traffic volumes in the carpark are expected to gradually increase throughout the day, peaking between 1700 – 1800 hours before rapidly tapering off towards closing time. As the noise from the carpark is expected to vary considerably throughout the day, we have used the energy average method and included a -4 dB duration / averaging adjustment.

3.3 Small scale retail activity

As noted above, the exact tenants for the three small scale retail tenancies have not been confirmed. However, we understand that these will not be licenced premises and that with the exception of a potential gym all other tenancies will operate within the supermarket opening hours, there is otherwise currently no intent to restrict the nature of activity. In our experience small scale retail tenancies such as a takeaway would produce a minimal level of noise. However, tenants such as cafés, restaurants, and gyms may produce noise via breakout from people and music. We have assumed a worst-case internal reverberant level within these tenancies of 80 dB L_{Aeq} , operating continuously throughout the day. This level of noise is representative of a high level of internal capacity and with respect to noise emissions is expected to represent a 'worst-case' tenant such as a gym or high noise café. Higher noise activities would require a lobby and exterior windows to be closed to manage their noise emissions to remain in line with our assumptions.

3.4 Mechanical plant

We understand that external mechanical plant for the development is yet to be confirmed at this stage. However, it is likely to include air handling units, chiller compressors and outdoor condenser units.

It is reasonable to expect that these systems can be designed, installed and operated using standard good practice to emit acceptable levels of noise at all times.

We recommend that a Condition of Consent is drafted requiring all mechanical plant systems (except for emergency backup generators) to be designed to achieve 40 dB L_{Aeq} at nearby sites containing residential activity, at all times. This will ensure that the mechanical plant noise emissions do not meaningfully contribute to the cumulative daytime noise levels, and that compliance with the night-time noise limits can be realistically achieved.

A combination of the following mitigation measures may need to be considered in order to achieve these noise levels:

- Placement of external mechanical plant as far from noise sensitive receivers as practical
- Use of solid screens or enclosures to interrupt line of sight of noise emitting equipment to nearby noise sensitive receivers
- Selection of low noise generating units
- Oversizing units and running on lower operating modes
- Inclusion of vibration isolating mounts
- Attenuators on extract fan discharges

3.5 Expected daytime noise levels

SoundPlan computational noise modelling based on ISO 9613 *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation* has been used to calculate the propagation of noise from the site, accounting for screening from buildings and site fencing, worst-case downwind conditions, and sound power levels for each of the noise sources described above.

The fencing is as depicted in figure 1.2 above – a 3.0 metre fence is adopted to the loading bay, a 2.3 metre fence to the remainder of the northern boundary and a 1.8 metre fence to the eastern boundary extending to meet the existing 2.0 metre fence to the property at 101 Purchas Street, that will be upgraded to be acoustically effective.

Based on the above the expected worst-case noise levels at currently developed properties are as shown in table 3.1 below, with noise rating levels that exceed the daytime zone limit of 50 dB L_{Aeq} for the RMD zone and 55 dB L_{Aeq} in the CL zone highlighted in yellow.

Table 3.1 – Noise rating levels due to supermarket activity at nearest properties

Direction	Zone	Location	Measurement Point	Expected noise level (dB L_{Aeq})
North	RMD	Lot E	Boundary	47
	RMD	Lot 4 (APA)	Boundary	48
	RMD	Mike Greer homes	Boundary	46
			1F	48
Northeast	RMD	14/93 Packe Street	Boundary	50
East	RMD	75 Packe Street (Church)	Boundary	48
			1F offices	41
South	RMD	101 Purchas Street	Boundary	45
			1F	50
	CL	466 Madras Street	Boundary	53
			1F	53
	CL	Lot 3 - 472 Madras Street (APA)	Boundary	56
West	RMD	459 - 477 Madras Street	Boundary	46 – 49
		479 Madras Street	Boundary	51
		483 Madras Street	Boundary	51
		489 Madras Street	Boundary	49

Therefore, noise is generally expected to comply with the District Plan daytime limits at all adjoining properties, for the current configuration of receivers on neighbouring sites. The exception is across the road at 479 and 483 Madras Street and at 472 Madras Street where the expected noise level exceeds the District Plan limit by 1 dB. However, the owner of 472 Madras Street has provided Affected Persons Approval (APA) and therefore effects cannot be considered. At the properties at 479 and 483 Madras Street we expect this noise to have minimal adverse effect, as noise from traffic on Madras Street is of a similar character and is expected to exceed this level by some margin during the daytime, even during the lowest traffic hour between 0700 and 0800 hours.

3.6 Conclusions regarding daytime noise levels and effects

During the daytime compliance is expected at properties to the south and east. Across the road to the west a 1 dB exceedance of the 50 dB L_{Aeq} noise limit is expected at 479 and 483 Madras Street. However, we expect effects to be minimal due to the small exceedance and the high traffic noise levels already experienced at these properties.

3.7 Night-time noise

During the night-time period (2200 – 0700 hours) the only noise sources expected from the supermarket will be customer and staff vehicles departing the site, bakery staff arriving in the early morning, as well as mechanical plant, which is described in section 3.4 above.

Based on a traffic information from other similar sized Woolworths supermarkets, indicates that there may be in the order of 100 vehicles entering and exiting the site in the one-hour period from 2100 to 2200 hours. Typically, the number of people entering the supermarket will decrease the closer it gets to closing time. We expect it is reasonable to assume that after 2200 hours, there will be less than 50 vehicles departing the site in any one-hour period (including departure of staff vehicles).

Based on this scenario, the noise level received at the boundary of the upper level of the nearest unit at 101 Purchas Street and at the boundary of properties directly opposite the entrance/exits at 483 and 467 Madras Street may be in the order of 38 dB L_{Aeq} and therefore comply with the District Plan L_{Aeq} night-time noise limit. We also expect noise from door slams and engine starts to comply with District Plan night-time limit of 65 dB L_{AFmax} at all nearby properties.

At Lots 3, 472 Madras Street, in the CL zone noise may be up to 47 dB L_{Aeq} which exceeds the night-time limit by 2 dB; however, the owner of this Lot has provided APA and therefore effects cannot be considered.

There is also the possibility that a future gym tenant may be open between 2200 and 0700 hours in the night-time period. Where any music within the facility is limited to a background level without a significant bass beat and all external windows/doors remain closed, we expect the night-time noise limits would be complied with and in conjunction with vehicle movements as described above noise effects would be minimal. However, some other styles of gym operation could potentially exceed the night-time limits. A condition requiring either a letter of compliance or a noise management plan be provided to the council if a tenancy is to open to customers/clients between 2200 and 0700 hours would provide assurance that the night-time noise limits were complied with.

Overall, during the night-time noise is therefore expected to comply with the District Plan limits at all nearby sites with the exception of a 2 dB exceedance at the boundary of Lot 3 which results in Restricted Discretionary status with respect to noise; however, as stated above APA consent has been provided and therefore the effects cannot be considered.

4.0 CONSTRUCTION NOISE

Noise generated by site preparation and construction activities associated with the establishment of the supermarket has the potential to adversely affect nearby properties, especially if carried out during the early morning or evening hours.

The Christchurch City Plan specifically excludes construction activities from the noise standards for all zones, Rule 6.1.6.1.1 P2 refers to New Zealand Standard NZS 6803:1999 *Acoustics – Construction Noise* for construction noise rules.

We therefore recommend that the applicant adopts best practice procedures to reduce the likelihood of annoyance, nuisance and adverse health effects to people in the vicinity of construction work, and that these activities are planned and managed in accordance with NZ 6803:1999 *Acoustics – Construction Noise*, and that construction is undertaken to ensure noise does not exceed the sound levels specified in Tables 2 and 3 of the Standard.

In order to ensure noise emissions are reduced during the construction phase, an advice note could be adopted ensuring that the site fencing is installed before other works on site begin.

5.0 CONCLUSION

Based on a review of the District Plan limits and other relevant guidance we consider that where daytime noise from the proposed activity complies with the District Plan limit of 50 dB L_{Aeq} when received within any residentially zoned site, noise effects will be minimal. Higher noise levels may also be acceptable in some scenarios, based on the existing ambient environment, and other guidance.

During the night-time period, compliance with the District Plan noise limits for residential zones of 40 dB L_{Aeq} / 65 dB L_{AFmax} and 45 dB L_{Aeq} / 70 dB L_{AFmax} for commercially zoned properties will also ensure that noise effects are minimal.

During the daytime compliance with the District Plan limits is expected at properties to the north and east. Across the road to the west a 1 dB exceedance of the 50 dB L_{Aeq} daytime noise limit is expected at 479 and 483 Madras. However, we expect effects to be minimal due to the small exceedance and the high traffic noise received at these properties. To the south at Lot 3 a 1 dB exceedance of the Commercial Local daytime limit is expected; however, as this property has provided Affected Persons Approval (APA) the effects cannot be considered.

During the night-time noise is expected to comply with the District Plan limits at all nearby sites with the exception of a possible 2 dB exceedance at Lot 3. However, as stated above APA has been provided and the effects cannot be considered.