

ATTACHMENT 8

ENVIRONMENTAL ACOUSTIC ASSESSMNET





**PROPOSED CENTRE ZONE DEVELOPMENT
LOTS 154 and 155
CORNER ALEXANDER DRIVE & LANDSDALE ROAD
EAST LANDSDALE**

ENVIRONMENTAL ACOUSTIC ASSESSMENT

NOVEMBER 2021

OUR REFERENCE: 28605-3-21089



DOCUMENT CONTROL PAGE

ENVIRONMENTAL ACOUSTIC ASSESSMENT
CENTRE ZONE DEVELOPMENT
EAST LANDSDALE

Job No: 21089

Document Reference: 28605-3-21089

FOR

HINDLEY AND ASSOCIATES

DOCUMENT INFORMATION

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Date of Issue:	04 November 2021		

REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Revised plan (Carwash)	27/11/2021	TR	GW
2	Client Comment	02/12/2021	TR	N/A

DOCUMENT DISTRIBUTION

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1. INTRODUCTION

Herring Storer Acoustics were commissioned to undertake an acoustic assessment of noise emissions associated with the proposed centre zone development to be located at Lot 154 and 155, corner of Alexander Drive and Landsdale Road, East Landsdale.

This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. Noise sources considered as part of this assessment, as requested by council, include:

- Mechanical Services;
- Delivery vehicles;
- Carwash; and
- Voice associated with the drive thru's of the fast food tenancies.

Comment is also provided with regards to noise associated with waste collection.

For reference, the site plan for the proposed development is attached in Appendix A.

2. SUMMARY

As shown on Figure 3.1, the closest neighbouring residences to this development are to the west and north.

From the analysis undertaken, noise emissions from the proposed development has been assessed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, the following are recommended to be imposed as conditions:

- The mechanical services design needs to be confirmed during the design development phase. An acoustic study of the mechanical services be undertaken once the design has been finalised, to ensure compliance is achieved.
- Waste collections to be undertaken under in accordance with the requirements of Regulation 14A – “Waste collection and other works”.

3. CRITERIA

3.1 ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997

The allowable noise level for noise sensitive premises in the vicinity of the proposed Large Format Retail development is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 and 8 stipulate maximum allowable external noise levels or assigned noise levels that can be received at a premise from another premises. For residential premises, this noise level is determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. The base noise levels for residential premises are listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF

Note: L_{A10} is the noise level exceeded for 10% of the time.
 L_{A1} is the noise level exceeded for 1% of the time.
 L_{Amax} is the maximum noise level.
 IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

“impulsiveness” means a variation in the emission of a noise where the difference between L_{Apeak} and L_{Amax(Slow)} is more than 15 dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band;
- (b) is present for more at least 10% of the representative assessment period; and
- (c) is regular, cyclic and audible;

“tonality” means the presence in the noise emission of tonal characteristics where the difference between –

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as L_{Aeq,T} levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

For this development, the closest residential premises of concern are located to the north east, as shown on Figure 3.1 below. Each individual premises has been considered in our assessment, however, to simplify reporting, only the highest noise level for each scenario considered has been reported.



FIGURE 3.1 – AREA AROUND PROPOSED DEVELOPMENT

The influencing factor at the nearest residential locations have been determined as summarised in Table 3.3.

TABLE 3.3 – INFLUENCING FACTOR

Influencing Factor Parameter	Influencing Factor (dB)	
	Residences within 100m of Alexander Drive	Residences greater than 100m from Alexander Drive
Commercial land use with inner circle	+ 1	+ 1
Commercial land use within outer circle	0	0
Primary Road within 100m (Alexander Dr)	+6	0
Primary Road between 100 and 450m (Alexander Dr)	0	+2
TOTAL IF	+7	+3

Based on the above, the assigned noise levels are as listed in Tables 3.4 and 3.5.

TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL FOR RESIDENCES WITHIN 100M OF ALEXANDER DRIVE

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _A 10	L _A 1	L _A max
Noise sensitive premises: Highly sensitive area	0700 - 1900 hours Monday to Saturday	52	62	72
	0900 - 1900 hours Sunday and Public Holidays	47	57	72
	1900 - 2200 hours all days	47	57	62
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	42	52	62

Note: L_A10 is the noise level exceeded for 10% of the time.
 L_A1 is the noise level exceeded for 1% of the time.
 L_Amax is the maximum noise level.

**TABLE 3.5 - ASSIGNED OUTDOOR NOISE LEVEL
 FOR RESIDENCES TO NORTH AND WEST, BETWEEN 100 AND 450M OF ALEXANDER DRIVE**

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A 10}	L _{A 1}	L _{A max}
Noise sensitive premises: Highly sensitive area	0700 - 1900 hours Monday to Saturday	48	58	68
	0900 - 1900 hours Sunday and Public Holidays	43	53	68
	1900 - 2200 hours all days	43	53	58
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	38	48	58

Note: L_{A10} is the noise level exceeded for 10% of the time.
 L_{A1} is the noise level exceeded for 1% of the time.
 L_{Amax} is the maximum noise level.

3.2 WASTE COLLECTION

It is noted that under the *Environmental Protection (Noise) Regulations 1997*, the noise received at a premise from the collection of waste does not need to comply with the Assigned Noise levels, provided it is carried out in accordance with Regulation 14A of the Regulations. In summary, waste collection carried out during the following times do not need to comply with the Assigned noise levels:

- 0700 hours and 1900 hours on any day that is not a Sunday or a public holiday;
- Or
- 0900 hours and 1900 hours on a Sunday or public holiday.

For information waste collection carried out during the above times is classified as **class 1 works**. **Class 2** works means specified works carried out otherwise than between the hours specified in the definition of class 1 works.

Note: Class 2 works, also do not need to comply with the assigned noise levels, provided certain requirements, including operating under an approved Noise Management Plan, are followed.

For information it is also noted that, under the Regulations, the above requirements applies to "specified works". Specified works, includes:

- (a) the collection of waste; or
- (b) the cleaning of a road or the drains for a road; or
- (c) the cleaning of public places, including footpaths, cycle paths, car parks and beaches; or
- (d) the maintenance of road verges and public open space (including the collection of rubbish and the planting, trimming, watering or removal of trees); or
- (e) the periodic collection of household items or other things placed on street verges by residents for the purpose of such a collection; or
- (f) activities associated with hazard or emergency management.

Waste *means* waste from domestic or commercial sources and includes:

- (a) putrescible waste; and
- (b) non putrescible waste; and
- (c) recyclable materials.

Thus, based on the above, noise emissions from waste collections do not need to be assessed and does not form part of the acoustical assessment.

4. MODELLING

Modelling of the noise propagation from the proposed development was carried out using an environmental noise modelling computer program, “SoundPlan”. Calculations were carried out using the EPA worst case weather conditions as stated in the Environmental Protection Authority’s “Draft Guideline on Environmental Noise for Prescribed Premises”.

4.1 MECHANICAL SERVICES

It is noted that mechanical services have not been selected at this stage of the development, thus, it is not possible to use actual equipment selections in our calculations. Hence, typical noise levels for air conditioners associated with tenancies of the size proposed has been utilized. The noise modelling is conservative, as it does not include any diversity in load, which would occur (particularly during the night period).

The calculations for the mechanical services were based upon the sound power levels listed in Tables 4.1.

**TABLE 4.1 – SOUND POWER LEVELS
 MECHANICAL SERVICES**

Item of Equipment	Sound Power Level, (dB(A))
Medical Centre	AC - 6 @ 72
Pharmacy	AC - 3 @ 72
Shops 1 – 10 (Each)	AC 2 @ 72
Restaurant	AC - 4 @ 72 Exhaust Fan 1 @ 75
Supermarket	AC - 1 @ 84 Exhaust 2 @ 72 Refrigeration 1 @ 88
Convenience Store	AC - 2 @ 71
Liquor Store	AC 4 @ 72
Shops 11 – 13 (Each)	AC 2 @ 72
Offices 1 – 4 (Each)	AC 4 @ 72
Takeaway 1 – 3 (Each)	AC - 1 @ 72 Exhaust 1 @ 72
Fast Foods 1 and 2 (each)	AC - 2 @ 79 Supply Fan 1 @ 75 Exhaust 1 @ 70 and 1 @ 80
Fast Food 3	AC - 1 @ 78 Supply Fan 1 @ 75 Exhaust 1 @ 70 and 1 @ 80

It is noted equipment selected during the design phase of the development will need to have noise emissions confirmed in relation to the above assumed noise levels.

With regards to noise emissions, the following are noted:

- 1 Noise associated with the mechanical services does not take into account any diversity of operation. Such diversity would occur during the evening and night periods (whilst cooler). Thus, this is a conservative assessment.
- 2 The location of the mechanical plant has been assumed to be on the roof of the tenancies, with screening to the plant.

4.2 DELIVERIES

The L_{A1} assigned noise level would be the pertinent prescribed noise level in this instance (for deliveries) as the duration of time that the noise of the deliveries is present is less than 10% of a representative time period. The noise associated with the delivery is the manoeuvring of the truck into place, upon which the truck is switched off – hence – even if the delivery takes some time (i.e. 30 – 60 minutes) the noise level associated with the truck is not present throughout the duration of the delivery.

The calculations for delivery trucks were based in the sound power levels listed in Tables 4.2. The large delivery truck being for the supermarket and liquor store; and the small delivery being for the other tenancies, such as the convenience store and fast food tenancies.

TABLE 4.2 – GENERAL SOUND POWER LEVELS

Item of Equipment	Sound Power Level, (dB(A))
Large Delivery Truck (ie Supermarket / Liquor Store)	94
Small Delivery Truck (ie Bread)	85

4.1 VOICES ORDERING

Noise modelling was undertaken for voices within the drive thru's, including ordering speakers within Fast Food Outlets.

The noise emissions associated with voices and ordering speaker are listed in Table 4.3.

TABLE 4.3 – SUMMARY OF NOISE EMISSIONS FROM OPERATIONS

Item of Equipment	Sound Power Level, (dB(A))
Voice	73
Ordering Speaker	83

4.2 CARWASH

As requested, noise modelling was undertaken for the car wash and vacuum bays, assuming the following activities are taking place:

DAY, EVENING and SUNDAY / PUBLIC HOLIDAY DAY PERIOD

- 4 vacuum units in operations.
- 3 hand wash; and
- the Auto and Super carwashes in use.

NIGHT PERIOD

- 2 vacuum units in operations.
- 2 hand wash bay; and
- the auto carwash in use.

We understand that the carwash would be open 24 hours per day, 7 days per week. Given the possible usage, noise emissions from the car wash and vacuum bays need to comply with the assigned L_{A10} noise level.

From measurements undertaken at a similar facility, noise emissions associated with the vacuum units and wash down are listed in Table 4.5.

TABLE 4.5 – SUMMARY OF NOISE EMISSIONS FROM OPERATIONS

Item of Equipment	Sound Power Level, (dB(A))
Vacuum Unit	93
Hand Carwash (Pressure Hose)	91
Auto / Super carwash	89

Note: The above noise levels are without any noise mitigations.

5. PREDICTED NOISE EMISSIONS

Calculations were undertaken to all the residences noted on Figure 3.1. The resultant noise levels are listed in Table 5.1.

NOTE: Noise levels were calculated at all adjacent noise sensitive premises, however, for simplicity of reporting, only the highest noise levels have been included below.

TABLE 5.1 – CALCULATED NOISE LEVELS

Item	Residences (dB(A))		
	North	Future Residence to North	West
Mechanical services	35 L _{A10}	33 L _{A10}	32 L _{A10}
Deliveries	39 L _{A1}	34 L _{A1}	47 L _{A1}
Fast Food Voices			
Voice	18 L _{A10}	8 L _{A10}	18 L _{A10}
Speaker	28 L _{A10}	18 L _{A10}	27 L _{A10x}
Carwash			
Day	40 L _{A10}	33 L _{A10}	37 L _{A10}
Evenings/Sundays	40 L _{A10}	33 L _{A10}	37 L _{A10}
Night	35 L _{A10}	27 L _{A10}	32 L _{A10}

6. ASSESSMENT

The following provided the acoustic assessment for the noise sources requiring compliance, as listed in Table 5.1.

6.1 L_{A10} NOISE EMISSIONS

Noise emissions from the mechanical services would be steady state and would operate for the majority of time. Hence noise received from the mechanical services needs to comply with the assigned L_{A10} noise level. Additionally, noise emissions from the following noise source would also occur for more than 10% of the time and would be assessed under the assigned L_{A10} noise Level:

- Voices and ordering speakers; and
- Carwash.

Given the resultant noise level at the residences and likely background noise level in the area, we believe that noise emissions from the mechanical services are likely to be tonal, hence, a +5 dB(A) penalty has been applied to the calculated noise level associated with these noise sources. Table 6.1 lists the characteristics that should be included in the assessable noise level.

TABLE 6.1 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
MECHANICAL SERVICES

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Northern Residences	35	+5	-	-	40
Future Northern Residences	33	+5	-	-	38
Western Residences	32	+5	-	-	37

Table 6.2 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the mechanical services.

TABLE 6.2 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
MECHANICAL SERVICES

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Northern Residences	40	Day Period	53	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies
Future Northern Residences	38	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies
Western Residences	37	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies

Noise received from voice does not contain any annoying characteristics. Thus, the assessable noise levels are as listed in Table 5.1. Tables 6.2 and 6.3 show the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the gym classes.

**TABLE 6.2 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
 VOICES**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Northern Residences	18	Day Period	53	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies
Future Northern Residences	8	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies
Western Residences	18	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies

**TABLE 6.3 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
 ORDERING SPEAKERS**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Northern Residences	28	Day Period	53	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies
Future Northern Residences	18	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies
Western Residences	27	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
		Night	38	Complies

For the car wash, noise received at the neighbouring residences could be tonal. Thus, the +5 dB(A) penalty has been applied to the calculated noise level associated with the mechanical services. Tables 6.4 and 6.5 lists the characteristics that should be included in the assessable noise level.

**TABLE 6.4 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
 CAR WASH (EVENING / SUNDAY / PUBLIC HOLIDAY PERIOD)**

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Northern Residences	40	+5	-	-	45
Future Northern Residences	33	+5	-	-	38
Western Residences	37	+5	-	-	42

**TABLE 6.5 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
 CAR WASH (NIGHT PERIOD)**

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Northern Residences	35	+5	-	-	40
Future Northern Residences	27	+5	-	-	32
Western Residences	32	+5	-	-	37

Table 6.6 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the Car Wash.

**TABLE 6.6 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
 CAR WASH**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
North Residences	45	Day Period	53	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
	40	Night	42	Complies
Future Northern Residences	33	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
	28	Night	38	Complies
Western Residences	37	Day Period	48	Complies
		Sunday Day Period	43	Complies
		Evenings	43	Complies
	32	Night	38	Complies

6.2 L_{A1} NOISE EMISSIONS

Noise emissions from the following noise sources would be present for less than 10% of a representative time period, hence noise received from this noise source needs to comply with the assigned L_{A1} noise level:

- Deliveries.

Based on the definitions of tonality, noise emissions from these sources, being an L_{A1} and being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable to the noise associated with delivery trucks. Hence, Table 6.7 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the above noise sources.

**TABLE 6.7 – ASSESSMENT OF L_{A1} NOISE LEVEL EMISSIONS
 DELIVERIES**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
North Residences	39	Day Period	63	Complies
		Sunday Day Period	57	Complies
		Evenings	57	Complies
		Night	53	Complies
West Residences	34	Day Period	58	Complies
		Sunday Day Period	53	Complies
		Evenings	53	Complies
		Night	48	Complies
South Residences / Child Care	47	Day Period	58	Complies
		Sunday Day Period	53	Complies
		Evenings	53	Complies
		Night	48	Complies

7. CONCLUSION

From the above assessments, the noise received at the neighbouring residences complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, the following are recommended to be imposed as conditions:

- The mechanical services design needs to be confirmed during design development phase. An acoustic study of the mechanical services be undertaken once the design has been finalised, to ensure compliance is achieved.
- Waste collections to be undertaken under in accordance with the requirements of Regulation 14A – “Waste collection and other works”.

APPENDIX A

SITE PLAN



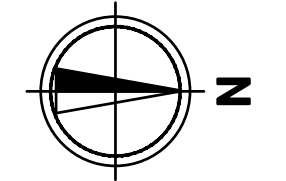
LEGEND

- BUILDING FOOTPRINT GFA
- ANCILLARY STRUCTURE/USE AREA
- BITUMEN SEALED PAVEMENT, REFER TOP CIVIL DETAILS
- BLACK CONCRETE HARDSTAND, REFER TO CIVIL
- SELECTED PAVED FOOTPATH
- SOFT LANDSCAPED AREA
- COLORLED PAVING ROLL-OVER HARDSTAND
- EXISTING LEVELS/ OVERLAY
- NEW 350mm WIDE LIMESTONE BLOCK RETAINING WALL SHOWN INDICATIVELY, REFER TO CIVIL DRAWINGS FOR MORE INFORMATION.
- NEW 200mm WIDE SEMI MOUNTABLE CONCRETE KERBS, TIE INTO EXISTING ROAD KERB AS REQUIRED, REFER TO CIVIL DRAWINGS FOR MORE INFORMATION.
- NEW RAMPS WITH TACTILE STRIPS, CONSTRUCTION TO BE IN ACCORDANCE WITH AS1428.1, REFER TO CIVIL DRAWINGS FOR DETAILS

LANDSCAPING NOTE

ALL LANDSCAPING IS TO BE DESIGNED AND INSTALLED IN ACCORDANCE WITH BUSINESS MANAGEMENT PLAN AS REQUIRED. PLEASE REFER TO LANDSCAPING PLAN BY OTHERS FOR MORE INFORMATION.

LOT 154	TOTAL SITE AREA	20,266m ²
	SOFT LANDSCAPING	2,130m ²
	LANDSCAPING COVERAGE	10.5%
LOT 155	TOTAL SITE AREA	12,266m ²
	SOFT LANDSCAPING	1,85m ²
	LANDSCAPING COVERAGE	15.0%



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DEVELOPMENT APPLICATION

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A1 SHEET

PROPOSED SITE PLAN
SCALE 1:400

PROPOSED CENTRE ZONE DEVELOPMENT
LOT 154 & 155 Cnr. ALEXANDER DRIVE & LANDSDALE ROAD, EAST LANDSDALE
for LANDSDALE UNIT TRUST & ALEXANDER UNIT TRUST

Date 24.08.20
Design SJH
Drawn JJR
Checked SJH
Scale 1:400
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