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Environmental Noise Assessment

**Auto Master's Workshop
Lot 9627 (#6) Hollosy Way, Ashby**

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Prepared for:
Endeavour Properties Pty Ltd

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Date:	Rev	Description	Prepared By	Verified
11-Mar-19	-	Issued to Client	Olivier Mallié	Terry George

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1 INTRODUCTION

It is understood land on Lot 9627 (#6) Hollosy Way in Ashby (refer *Figure 1-1*) will be developed into commercial premises, consisting of:

- Two new buildings A and B, including an automotive workshop, and
- Associated car parking (103 bays including 2 dedicated loading bays).

An Auto Master's workshop is proposed to be located within Tenancy T1 of Building A. The workshop will be open during the daytime only i.e. Monday to Saturday 7am-7pm.

This report presents the assessment of the noise emissions associated with the automotive workshop e.g. hand-tools, and associated AC plant, against the *Environmental Protection (Noise) Regulations 1997*. It is understood that an assessment of the larger complex, e.g. Buildings A and B mechanical plant and car parking areas, has been completed and therefore such noise sources are not considered here.

The project is located within Cell 1 of the East Wanneroo Structure Plan (refer *Appendix B*). Established residential premises are located to the south, along Hollosy Way, and are the closest noise sensitive receivers.

It is also noted that a service station is located on the adjacent lot, to the east. Therefore, noise emissions associated with the service station may already impact some of the residences along Cezanne Bend. As such, cumulative noise impacts at those receivers to the south were also considered in this assessment.



Figure 1-1 Project Locality (City of Wanneroo IntraMaps)

The development plans are shown in *Appendix A*.

Appendix C contains a description of some of the terminology used throughout this report.

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

“7. (1) Noise emitted from any premises or public place when received at other premises –

- (a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and
- (b) Must be free of –
 - i. tonality;
 - ii. impulsiveness; and
 - iii. modulation,
 when assessed under regulation 9”

A “...noise emission is taken to significantly contribute to a level of noise if the noise emission ... exceeds a value which is 5 dB below the assigned level...”

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

- (a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and
- (b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial	All hours	60	75	80

1. **highly sensitive area** means that area (if any) of noise sensitive premises comprising —
- (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
 - (b) any other part of the premises within 15 metres of that building or that part of the building.

The influencing factor, applicable at the closest noise sensitive premises has been calculated between 2 and 4 dB, as shown in *Table 2-3*, and based on the land uses shown in *Figure 2-1*. Pinjar Road was considered a secondary road based on 2015/16 traffic data from Main Roads WA at site 1411 (East of Wanneroo Road).

Table 2-3 Influencing Factor Calculation

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	0 %	0 dB
Commercial Land	30 %	7 %	1.9 dB
Transport Factor			0 to 2 dB
Total			2 to 4 dB

Table 2-4 shows the assigned noise levels including the influencing factor and transport factor at the receiving locations.

Table 2-4 Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises west of Bocklin Road: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	47	57	67
	0900 to 1900 hours Sunday and public holidays (Sunday)	42	52	67
	1900 to 2200 hours all days (Evening)	42	52	57
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	37	47	57
Noise sensitive premises east of Bocklin Road: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	49	59	69
	0900 to 1900 hours Sunday and public holidays (Sunday)	44	54	69
	1900 to 2200 hours all days (Evening)	44	54	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	39	49	59
Noise sensitive premises: any area	All hours	60	75	80
Commercial	All hours	60	75	80

1. **highly sensitive area** means that area (if any) of noise sensitive premises comprising —
- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
 - any other part of the premises within 15 metres of that building or that part of the building.

It must be noted the assigned noise levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces. Where this could not be achieved (e.g. due to the close proximity of existing buildings and fences), the noise emissions were assessed at a point within 1 metre from building facades, and a -2 dB adjustment was made to the predicted noise levels to account for reflected noise.



It is noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector or authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector or authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Water and Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector or authorised person*. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

Proposed Auto Master's - Lot 9627 (#6) Hollosy Way, Ashby
 Land Use Map for Influencing Factor Calculation

Figure 2-1



Signs and symbols

-  IF Circles
-  Commercial Uses



10-Mar-19

Length Scale 1:5000



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3 METHODOLOGY

Computer modelling has been used to predict noise levels at each nearby receiver.

The software used was *SoundPLAN 8.1* with the ISO 9613 (ISO 171534-3 improved method) algorithms selected. These algorithms have been selected as they include the influence of wind. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Night (1900-0700)	Day (0700-1900)
Temperature (°C)	15	20
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5 m/s	Up to 5 m/s
Wind Direction*	All	All

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.2 Topographical Data

Topographical data was based on that publicly available from *GoogleEarth* in the form of spot heights, noting the topography is relatively flat but gently sloping up in an eastward direction. This results in some differences in elevation between sources and some receivers.

3.3 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). In this instance, a value

of 0 has been used for the commercial lots and roads, 0.5 for the residential development and 1 elsewhere (e.g. public open space, parks).

3.4 Source Sound Levels

The most significant sources of noise associated with the development include the mechanical plant to be located on the roof, deliveries and car doors closing in the car park. The sound power levels used in the modelling are provided in *Table 3-2*. These are based on vendor data for the mechanical plant, and data already on file for the other sources.

Table 3-2 Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Reception AC (Daikin RXS35L)	61	66	63	58	57	52	44	35	61
Office AC (Daikin RXS50L)	62	67	64	59	58	53	45	36	62
Workshop Evap. Cooler Units (Braemar RPA 450)	-	82	77	76	74	76	72	62	81
Toilet Exhausts (Fantech TD-500/150SIL)	64	54	65	64	60	52	46	42	65
Workshop Open Roller Door Break Out Noise (each), dB L ₁₀	87	84	77	75	73	71	68	61	78
Electric Impact Wrench Roller Door Break Out Noise, dB L _{max}	103	102	99	100	91	89	85	-	100
Closing Car Door, L _{max}	71	74	77	81	80	78	72	61	84

With regards to the above, please note the following:

- All sources were modelled as point sources, with the exception of the workshop roller doors, which were modelled as area sources approximately 7.0 m wide and 3.0 m high.
- All mechanical plant is located on the roof, and was modelled 0.8-1.3 metres above roof level depending on the size of the unit. Exhaust cowls were modelled 0.5 metre above the roof.
- Car door closing was modelled 1 metre above local ground.

4 RESULTS

The noise levels from the following scenarios were predicted at the closest receivers:

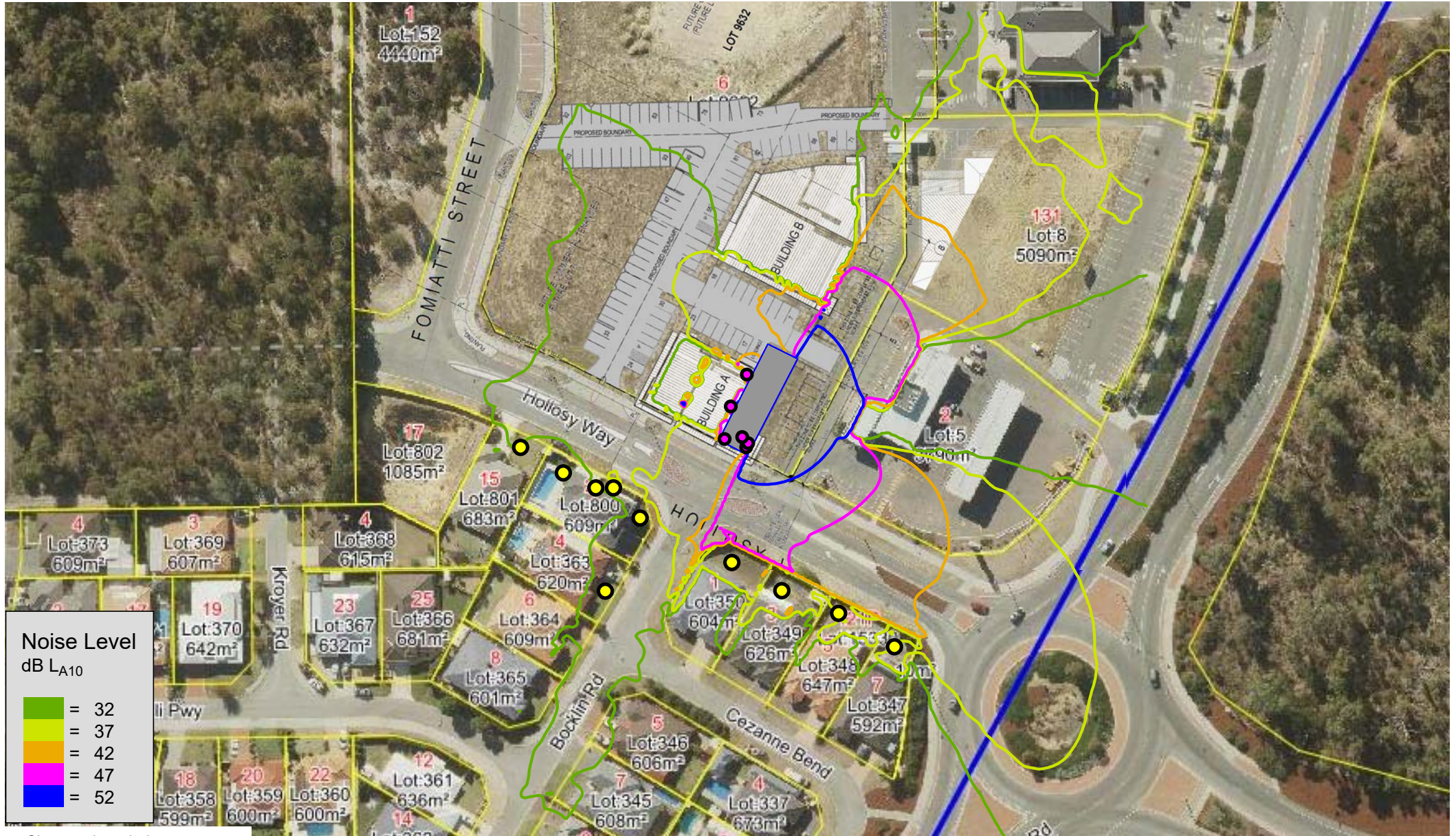
- Normal Operations (L_{10}) – this scenario represents typical Monday to Saturday daytime operations and includes general workshop noise and the mechanical plant. The roller doors are assumed to be fully open.
- Hand Tools Operations (L_{max}) – this scenario represents typical maximum noise levels from impact tools e.g. impact wrench. The roller doors are assumed to be fully open.
- Car door closing (L_{max}) – although not specifically noted on the plans, it was assumed the car bays closest to the workshop would be used mostly for vehicles associated with the workshop. This scenario represents noise associated with a car door closing within bays 1 to 6.

The results of the noise modelling for each scenario above are presented in *Table 4-1*.

Figures 4-1 to 4-3 also show the predicted noise levels as contours map at ground level as well as the location of each receiver.

Table 4-1 Predicted Noise Levels

Receiver	Floor	Normal Operations dB L_{A10}	Hand Tools Operations dB L_{Amax}	Car Doors dB L_{Amax}
#1 Cezanne Bd	GF	41	57	41
#2 Bocklin Rd (front)	GF	36	46	44
#2 Bocklin Rd	GF	35	43	39
#2 Bocklin Rd	FL 1	40	43	43
#2 Bocklin Rd	FL 1	28	36	29
#2 Bocklin Rd (back)	GF	34	37	31
#3 Cezanne Bd	GF	40	56	40
#4 Bocklin Rd	GF	33	45	42
#5 Cezanne Bd	GF	37	53	37
#7 Cezanne Bd	GF	37	51	37
#15 Hollosy Way	GF	32	39	20



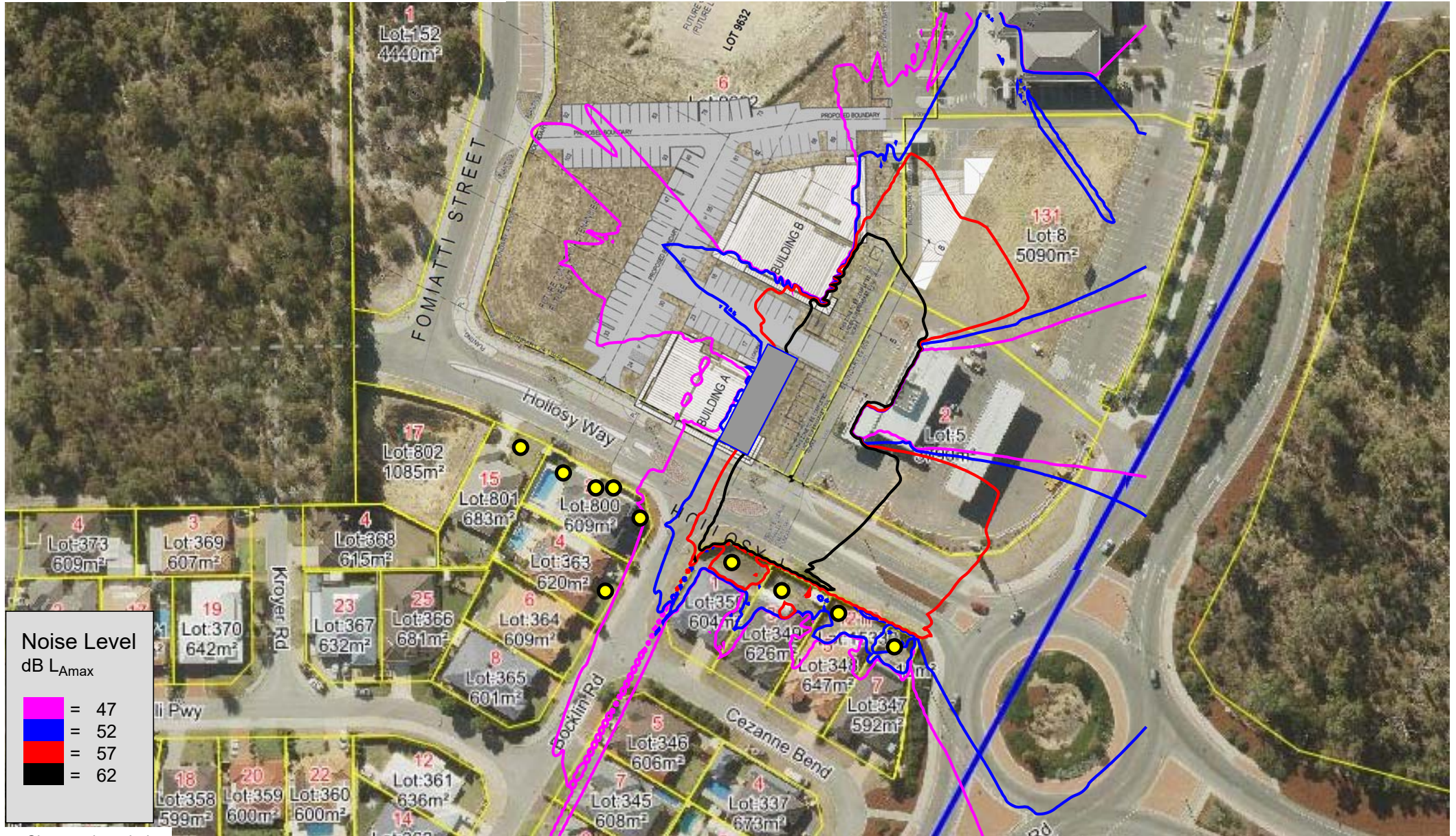
Signs and symbols

- Receiver
- Noise Source
- Proposed Workshop



Length Scale 1:1450



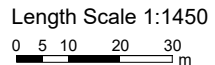


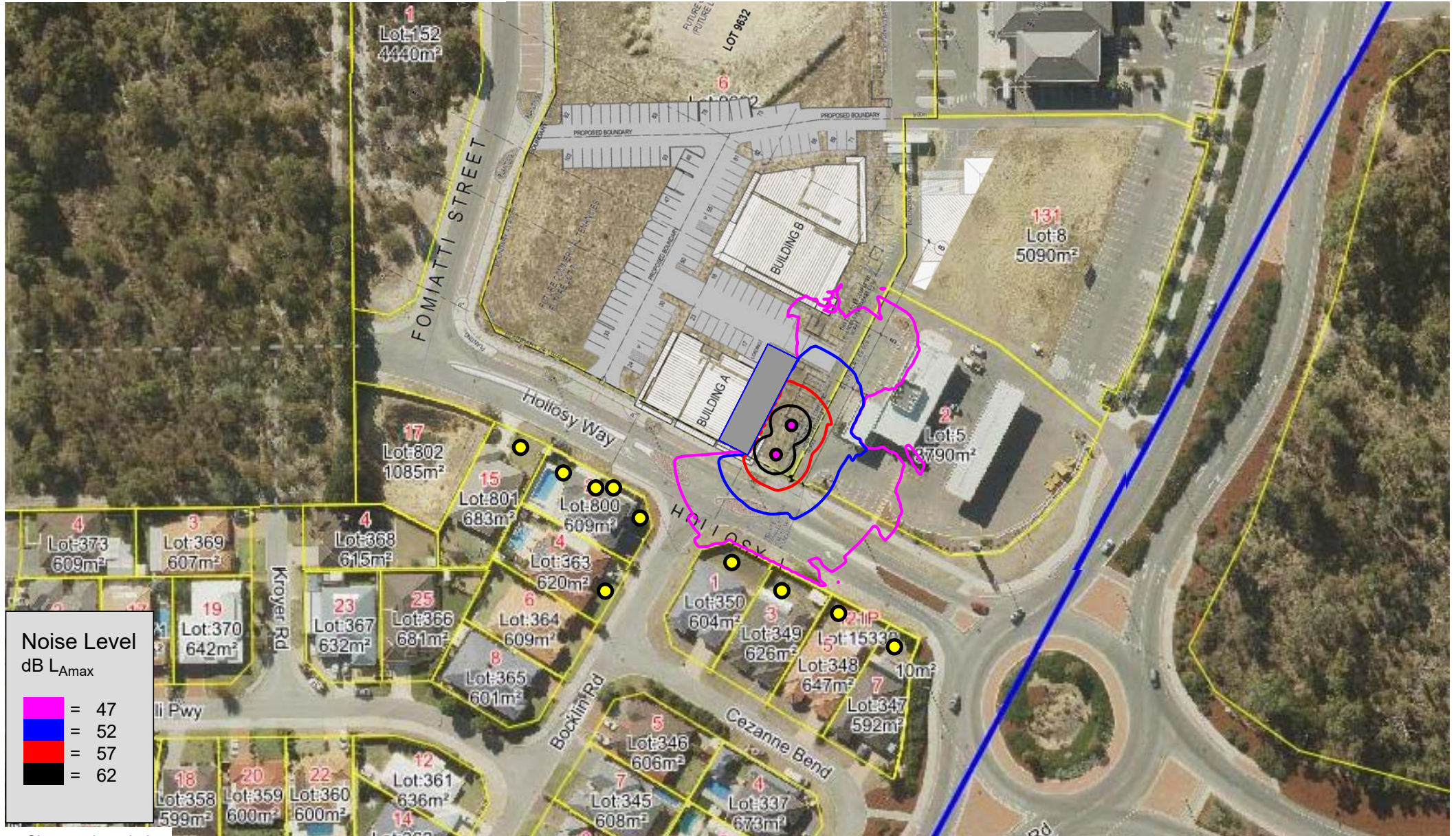
Noise Level
 dB L_{Amax}

█	= 47
█	= 52
█	= 57
█	= 62

Signs and symbols

- Receiver
- Noise Source
- Proposed Workshop





Noise Level dB L _{Amax}	
■	= 47
■	= 52
■	= 57
■	= 62

Signs and symbols

- Receiver
- Noise Source
- Proposed Workshop



Length Scale 1:1450



5 ASSESSMENT

5.1 Normal Operations (L₁₀)

This scenario represents daytime trading hours (Monday to Saturday) noise levels. The applicable assigned noise level is therefore the L_{A10} of 47 dB or 49 dB depending on the receiver.

During the daytime, and given that the workshop is part of a larger commercial complex, it is considered that no annoying characteristics are present in the noise emissions at the surrounding receivers. *Table 5-1* presents the assessment of the predicted noise levels against the daytime L_{A10} assigned noise level.

Table 5-1 Assessment of Normal Operations Noise Levels, dB L_{A10}

Receiver	Floor	Assigned Noise Level ¹	Predicted Noise Level ²	Adjusted Noise Level	Calculated Exceedance
#1 Cezanne Bd	GF	49	41	41	Complies
#2 Bocklin Rd (front)	GF	47	36	36	Complies
#2 Bocklin Rd	GF	47	35	35	Complies
#2 Bocklin Rd	FL 1	47	40	40	Complies
#2 Bocklin Rd	FL 1	47	28	28	Complies
#2 Bocklin Rd (back)	GF	47	34	34	Complies
#3 Cezanne Bd	GF	49	40	40	Complies
#4 Bocklin Rd	GF	47	33	33	Complies
#5 Cezanne Bd	GF	49	37	37	Complies
#7 Cezanne Bd	GF	49	37	37	Complies
#15 Hollosy Way	GF	47	32	32	Complies

Notes:

1. The assigned noise level is as defined in *Table 2-4*.
2. From *Table 4-1*.

Based on the above, it can be seen that noise from the workshop achieves compliance with the Regulations. It is also noted that the predicted noise levels are more than 5 dB below the assigned noise level at all receivers. Therefore, the noise emissions from the workshop are considered to “*not significantly contribute*” within the meaning of regulation 7(1)(a).

5.2 Hand Tools Operations (L_{max})

Impact wrench or 'rattle guns' are commonly used in service centres for various tasks and these generate short duration impact type of noise regardless of how these tools are powered (e.g. pneumatic or battery powered). Due to their nature, impulsive characteristics are considered to be present, especially where receivers are located relatively close to the source e.g. #1 and #3 Cezanne Bend.

The highest predicted noise levels are 56 dB L_{Amax} and 58 dB L_{Amax} at receivers at #1 and #3 Cezanne Bend respectively. This results in assessable levels of 66 dB L_{Amax} and 68 dB L_{Amax} including the adjustment for impulsiveness (refer *Table 2-1*). These levels comply with the assigned noise level of 69 dB L_{Amax} . It is noted that regulation 7(1)(a) is not considered to apply in this case, since it is highly unlikely for two or more L_{max} events to occur simultaneously. In other words, L_{Amax} noise events would not sum cumulatively and 'significantly contribute to' the overall noise levels.

5.3 Car Doors Closing (L_{max})

The noise emissions from car doors closing in either bays 1 to 6 i.e. closest to the workshop, are considered to be associated with the workshop. Due to the nature of the source, impulsive characteristics may be present, even during the daytime, and therefore an adjustment of +10 dB (refer *Table 2-1*) was made to the predicted noise levels.

The highest predicted noise level from a car door closing is 44 dB L_{Amax} at #2 Bocklin Rd (front). As such, the assessable level is 54 dB L_{Amax} , which complies with the Regulations. It is noted that regulation 7(1)(a) is not considered to apply in this case, since it is highly unlikely for two or more L_{max} events to occur simultaneously. In other words, L_{Amax} noise events would not sum cumulatively and 'significantly contribute to' the overall noise levels.

6 RECOMMENDATIONS

The noise emissions from the proposed Auto Master's workshop to be located within tenancy T1 of Building A at Lot 9627 (#6) Hollosy Way, Ashby, and car doors closing in bays 1-6, were predicted and assessed based on noise modelling.

The assessment undertaken concludes that the noise emissions associated with the workshop can comply with the *Environmental Protection (Noise) Regulations 1997*.

Nonetheless, the following should also be implemented to minimise noise impacts to neighbouring residences:

- Any air compressor is to be located the furthest away from any roller doors e.g. north-east or north-west corners of the shop floor.
- Workshop building to incorporate acoustic absorption to the underside of the roof e.g. Bradford Anticon 60 or similar between roof sheeting and purlins.

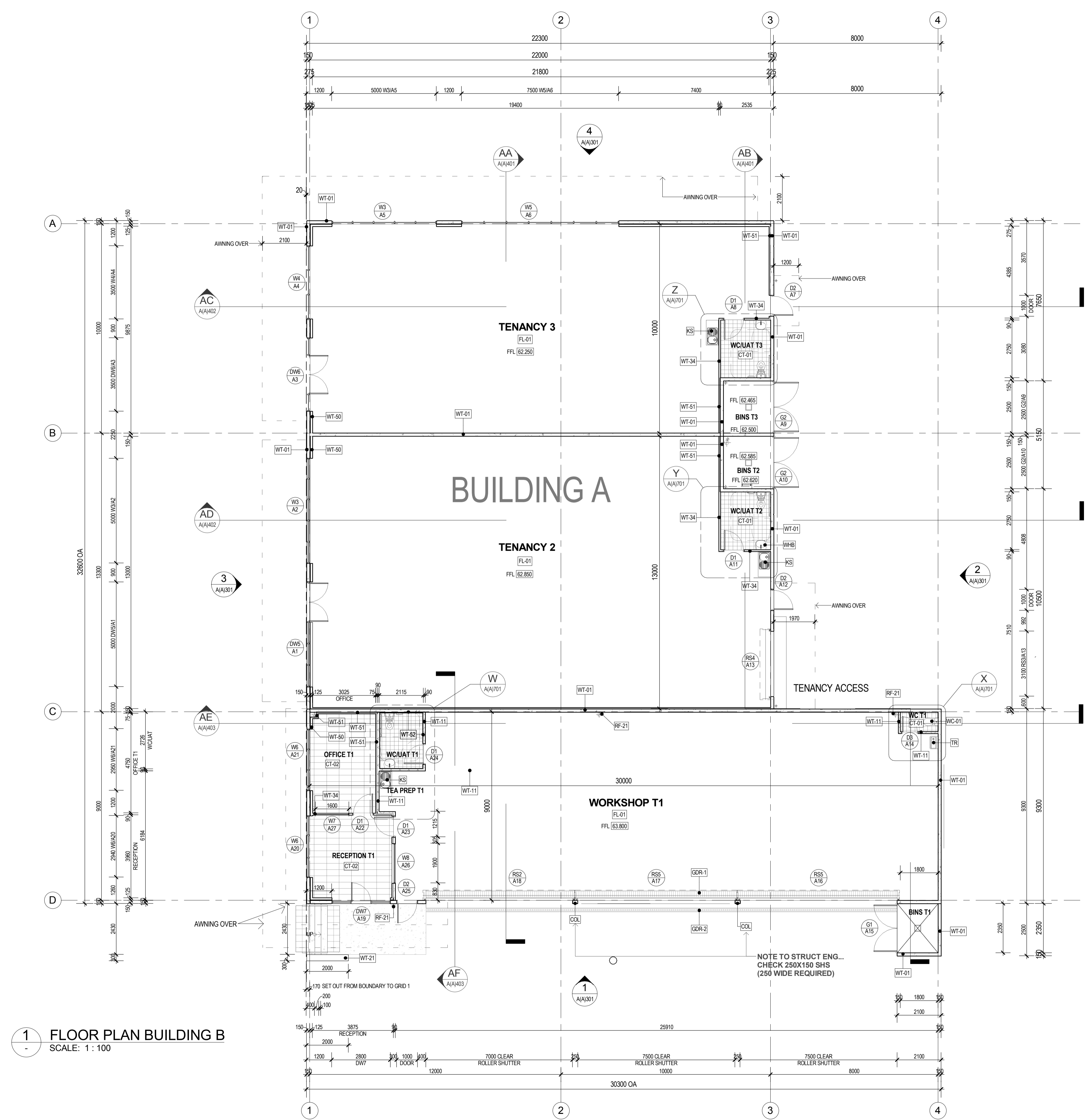
Appendix A

Development Plans

- GENERAL NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES.
 2. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
 3. LARGE SCALE DRAWINGS SHALL TAKE PRECEDENCE OVER SMALLER SCALE DRAWINGS.
 4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
 5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL CONSULTANT DRAWINGS AND THE SPECIFICATION.

KEYNOTE LEGEND	
CODE	DESCRIPTION (SPECIFICATION SECTION)
COL	COLUMN (STRUCT. ENG. DWGS)
CT-01	FLOOR TILE (INT. FINISHES SCHED.)
CT-02	FLOOR TILE (AUTOMASTERS STANDARD)(INT. FINISHES SCHED.)
GDR-1	GRATED DRAIN (HYDR. CONSULT. DWGS)
GDR-2	GRATED DRAIN (CIVIL CONSULT. DWGS)
KS	KITCHEN SINK AND TAPWARE (HYDR. CONSULT. DWGS)
RF-21	RAIN WATER DOWNPIPE (HYD)
TR	WASH TROUGH (HYDR. CONSULT. DWGS)
WC-01	TOILET SUITE (HYDR. CONSULT. DWGS)
WHB	WALL MOUNTED WASH HAND BASIN (HYDR. CONSULT. DWGS)

WALL TYPE SCHEDULE	
CODE	DESCRIPTION
WT-01	150mm THICK PRECAST CONCRETE PANEL TO STR. ENG. DETAIL
WT-02	200mm THICK PRECAST CONCRETE PANEL TO STR. ENG. DETAIL
WT-11	
WT-21	350mm THICK MASS LIMESTONE RETAINING WALL TO STR. ENG DETAIL
WT-22	NATURAL LIMESTONE RETAINING WALL (CIVIL ENG. DWGS)
WT-34	1 x 13mm SOUNDSHIELD P8 (TO BOTH SIDES) ON 64mm STEEL STUDS WITH POLYESTER INSULATION
WT-35	1 X 9mm VILLABOARD + 64mm STEEL STUD + 1 X 9mm VILLABOARD. POLYESTER INSULATION
WT-40	1 x 9mm COMPRESSED FIBRE CEMENT SHEET (ONE SIDE ONLY) ON 92mm STEEL STUDS ON IN-SITU CONCRETE BASE
WT-41	COLORBOND XX CLADDING ON STEEL TOP HATS AND/OR STUDS (SET OFF SUBSTRATE TO ACCOMMODATE DOWNPIPE)
WT-42	COLORBOND XX CLADDING ON 50x35 TOP HATS FIXED DIRECTLY TO CONCRETE SUBSTRATE
WT-50	1 X 13mm PLASTERBOARD ON 92mm STEEL STUD SET 20mm OFF SUBSTRATE WITH R2.0 WALL BATT INSULATION (BRADFORD GOLD OR EQUAL APPROVED)
WT-51	1 X 13mm PLASTERBOARD ON CLIP-MOUNTED 28mm FURRING CHANNEL WITH 30mm KOOL THERM K12 INSULATION (OR EQUAL APPROVED)
WT-52	1 X 13mm WP PLASTERBOARD ON CLIP-MOUNTED 15mm FURRING CHANNEL



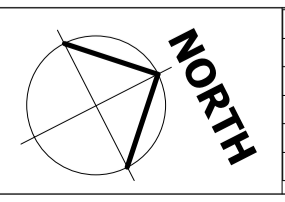
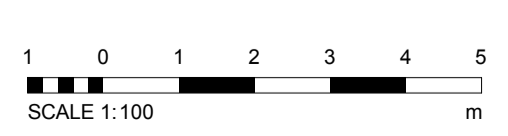
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SCALE: 1 : 100

NOTE TO STRUCT ENG...
CHECK 250X150 SHS
(250 WIDE REQUIRED)

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D	15-01-2019	RC	ISSUED FOR APPROVAL
C	12-12-2018	RC	TENANCY 1 REVISIONS
B	21-11-2018	RC	CONSULTANT COORDINATION
A	19-11-2018	RC	APPROVAL

Project Name
ASHBY COMMERCIAL TENANCIES, Lot 9627 Hollosy Way, ASHBY WA 6065 for Endeavour Properties Pty Ltd

Drawing Name
BUILDING A - FLOOR PLAN

Project Number
06177A

Drawing No.
A(A)201

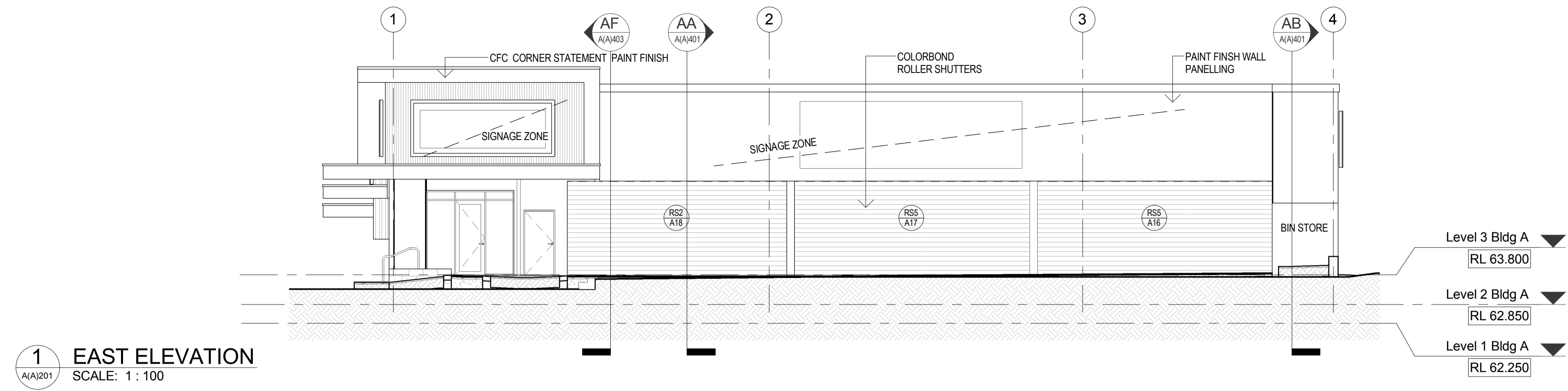
Rev.
E

PRELIMINARY ONLY

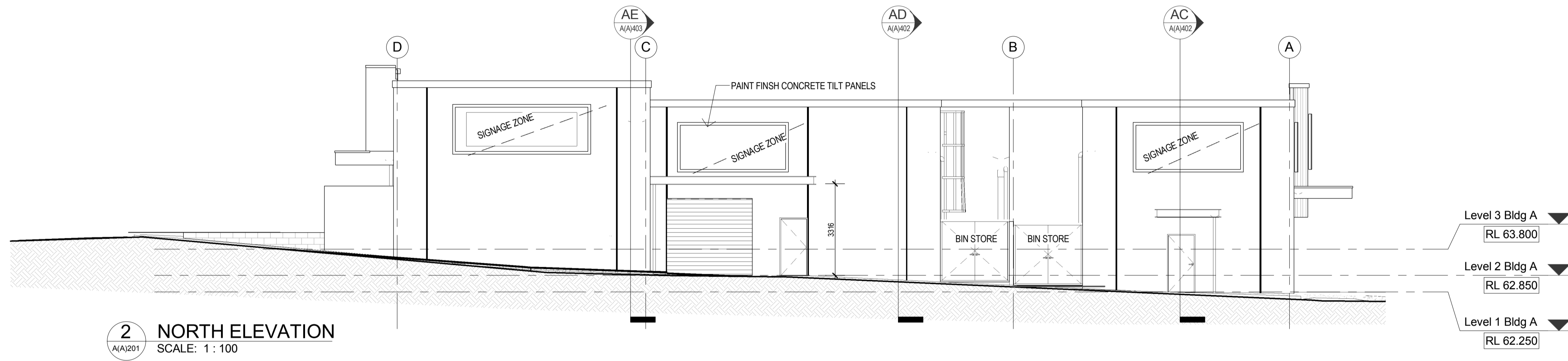
Reduction **25mm on A1** | Scale **1 : 100** | Date **Nov. 2018** | Drawn **OP/DG/RC** | Checked **FI**

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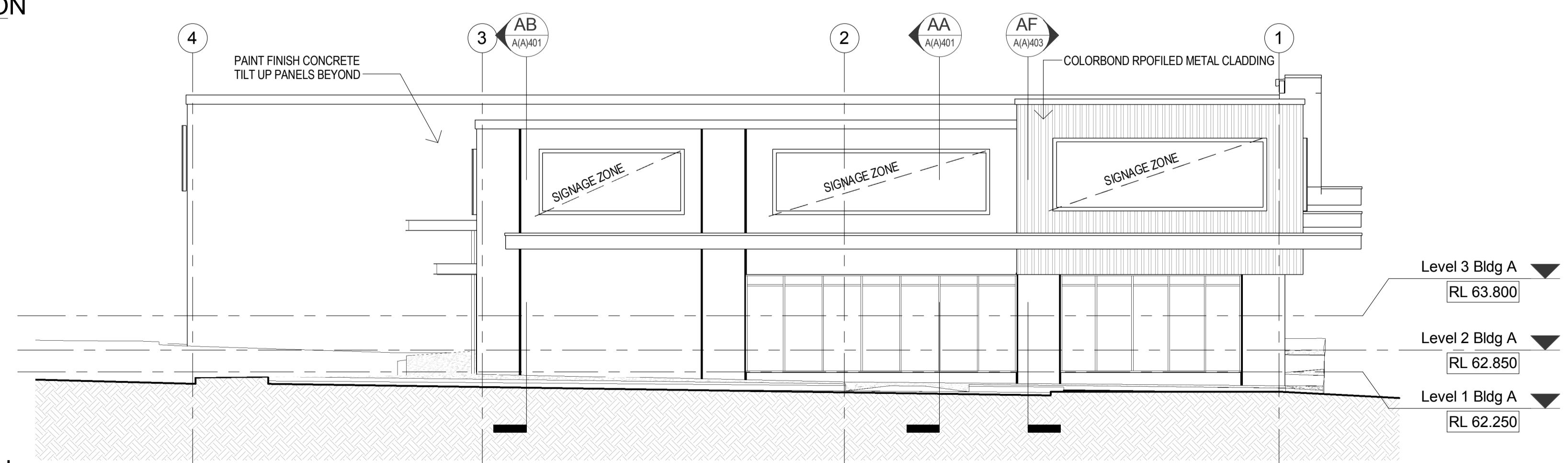
1 EAST ELEVATION
 SCALE: 1 : 100



2 NORTH ELEVATION
 SCALE: 1 : 100



3 SOUTH ELEVATION
 SCALE: 1 : 100



4 WEST ELEVATION
 SCALE: 1 : 100

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Rev.	Date	Issued By	Revision Description
E	15-01-2019	RC	CONSULTANT COORDINATION
D	21-11-2018	RC	CONSULTANT COORDINATION
C	27-08-2018		ISSUED TO CONSULTANTS
B	16-08-2018		REVISED PRELIM ISSUE
A	08-12-2017		PRELIMINARY ISSUE

Project Name
ASHBY COMMERCIAL TENANCIES, Lot 9627 Hollosy Way, ASHBY WA 6065 for Endeavour Properties Pty Ltd

Drawing Name
BUILDING A - ELEVATIONS

Project Number
06177A

Drawing No.
A(A)301

Rev.
E

Reduction
 25mm on A1

Scale
 1 : 100

Date
 Nov. 2018

Drawn
 OP/DG/RC

Checked
 FI

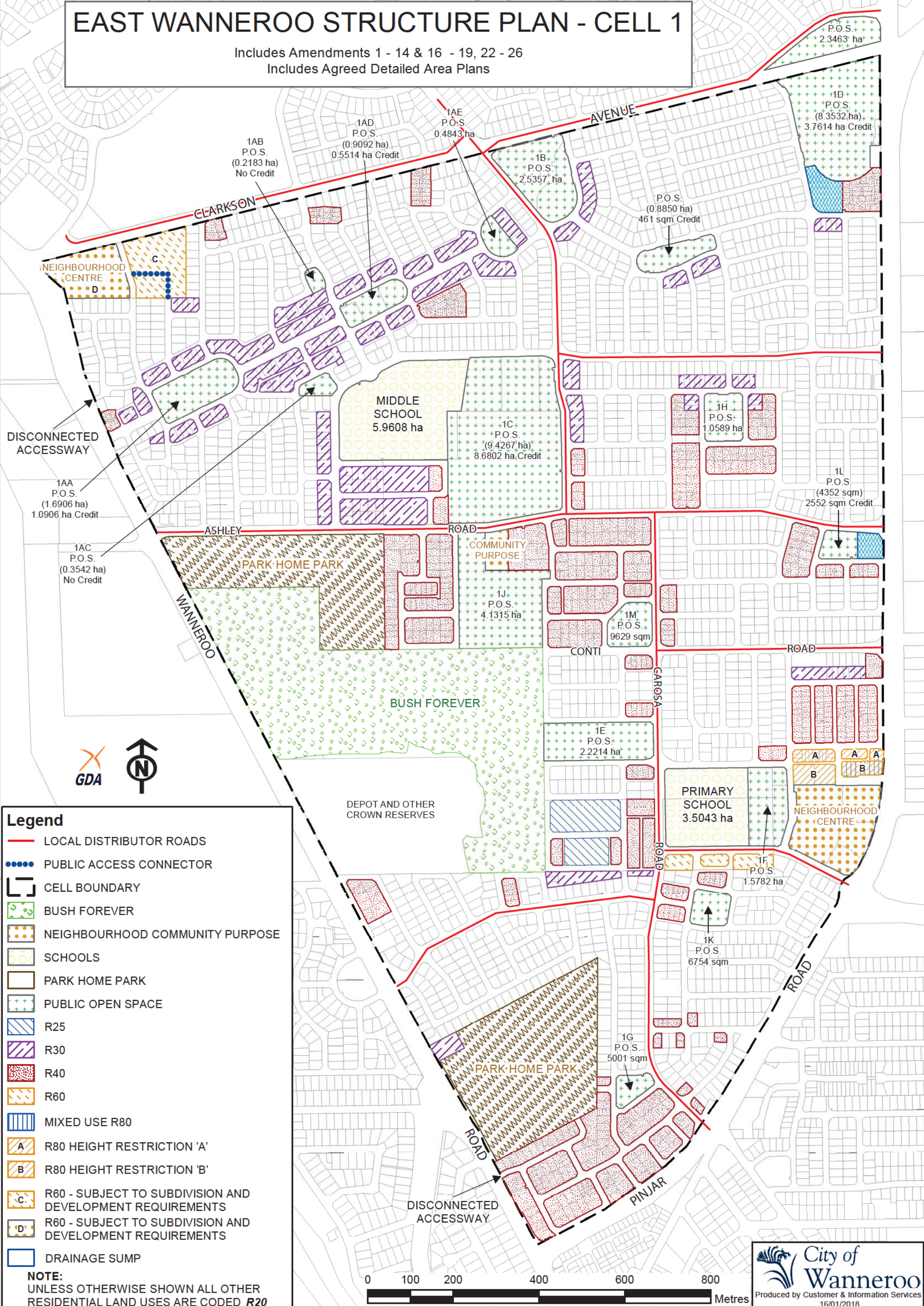
PRELIMINARY ONLY

Appendix B

East Wanneroo Structure Plan

EAST WANNEROO STRUCTURE PLAN - CELL 1

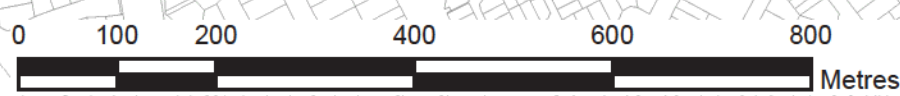
Includes Amendments 1 - 14 & 16 - 19, 22 - 26
Includes Agreed Detailed Area Plans



Legend

- LOCAL DISTRIBUTOR ROADS
- PUBLIC ACCESS CONNECTOR
- CELL BOUNDARY
- BUSH FOREVER
- NEIGHBOURHOOD COMMUNITY PURPOSE
- SCHOOLS
- PARK HOME PARK
- PUBLIC OPEN SPACE
- R25
- R30
- R40
- R60
- MIXED USE R80
- R80 HEIGHT RESTRICTION 'A'
- R80 HEIGHT RESTRICTION 'B'
- R60 - SUBJECT TO SUBDIVISION AND DEVELOPMENT REQUIREMENTS
- R60 - SUBJECT TO SUBDIVISION AND DEVELOPMENT REQUIREMENTS
- DRAINAGE SUMP

NOTE:
UNLESS OTHERWISE SHOWN ALL OTHER RESIDENTIAL LAND USES ARE CODED **R20**



Appendix C

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}

This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}

This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

L_{APeak}

This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

L_{Amax}

An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}

An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}

An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "intrusive" noise level.

L_{Aeq}

The equivalent steady state A-weighted sound level (“equal energy”) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the “average” noise level.

L_{A90}

An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

One-Third-Octave Band

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level

Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

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 $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

- (a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
- (b) is present for at least 10% of the representative.

Impulsive Noise

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A \text{ peak}}$ and $L_{A \text{ Max slow}}$ is more than 15 dB when determined for a single representative event;

Major Road

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10} (\% \text{ Type A}_{100} + \% \text{ Type A}_{450}) + \frac{1}{20} (\% \text{ Type B}_{100} + \% \text{ Type B}_{450})$$

where:

% Type A₁₀₀ = the percentage of industrial land within
a 100m radius of the premises receiving the noise

% Type A₄₅₀ = the percentage of industrial land within
a 450m radius of the premises receiving the noise

% Type B₁₀₀ = the percentage of commercial land within
a 100m radius of the premises receiving the noise

% Type B₄₅₀ = the percentage of commercial land within
a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

Representative Assessment Period

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise

Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

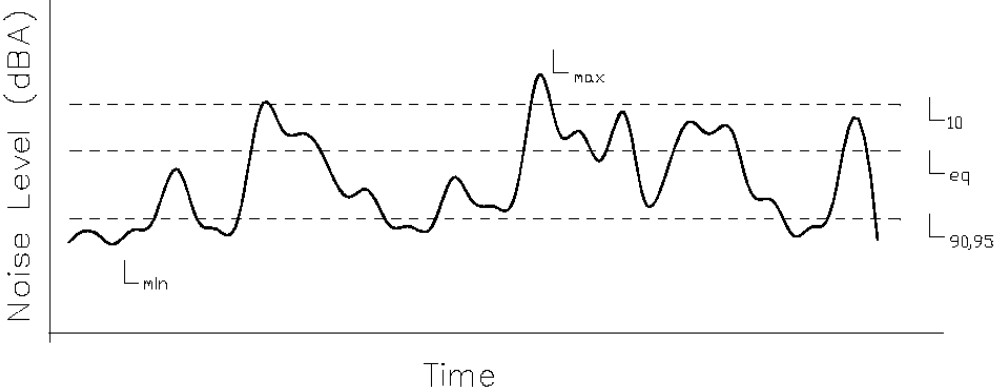
Ambient Noise

Means the level of noise from all sources, including background noise from near and far and the source of interest.

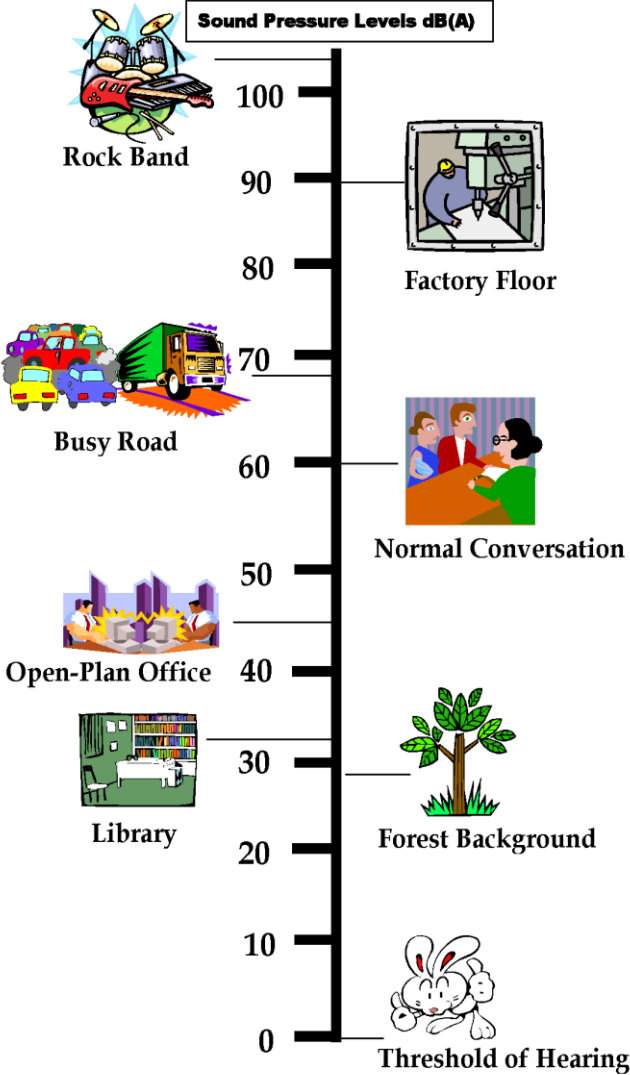
Specific Noise

Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

Chart of Noise Level Descriptors



Typical Noise Levels



- GENERAL NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES.
 2. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
 3. LARGE SCALE DRAWINGS SHALL TAKE PRECEDENCE OVER SMALLER SCALE DRAWINGS.
 4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
 5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL CONSULTANT DRAWINGS AND THE SPECIFICATION.
 6. HYDRAULIC SERVICES ARE SHOWN INDICATIVELY ONLY. REFER TO HYDRAULIC CONSULTANT'S DRAWINGS.
 7. MECHANICAL SERVICES EQUIPMENT SHOWN INDICATIVELY ONLY. REFER MECHANICAL ENGINEER'S DRAWINGS.
 8. STRUCTURAL MEMBERS ARE SHOWN INDICATIVELY ONLY. REFER TO STRUCTURAL ENGINEER'S DRAWINGS. REPORT ANY DISCREPANCIES TO ARCHITECT.
 9. DIMENSIONS OF OPENINGS DO NOT INCLUDE STRUCTURAL TOLERANCES.



1 BUILDING A SOUTH EAST
SCALE:



2 BUILDING A SOUTH WEST
SCALE:



3 BUILDING A NORTH WEST
SCALE:



4 BUILDING A NORTH EAST
SCALE:

Rev.	Date	Issued By	Revision Description
A	21-11-2018	RC	CONSULTANT COORDINATION
B	12-12-2018	RC	TENANCY 1 REVISIONS
C	15-01-2019	RC	CONSULTANT COORDINATION
0	01-02-2019	RC	ISSUED FOR TENDER

Project Name
**ASHBY COMMERCIAL TENANCIES, Lot 6
Hollosy Way, ASHBY WA 6065 for Endeavour
Properties Pty Ltd**

Drawing Name
BUILDING A - PERSPECTIVES

Project Number
06177A

Drawing No.
A(A)001

Rev.
0