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10 March 2017

Commercial-in-Confidence

AMP Capital Investors Limited
c/o- David Thomas
Ausmaid Pty Ltd,
Suite A Building 32,
Suakin Drive Mosman, NSW, 2088

Dear David,

Warehouse 1 - Precinct A (Lot 204) - Crossroads, Casula - Development Application acoustic review

1.0 Introduction

AMP Capital Investors Limited has commissioned AECOM Australia Pty Ltd (AECOM) to undertake an updated acoustic impact assessment of the approved Warehouse 1 (W1) development at Lot 204 (Precinct A) (the subject site) at the Crossroads, Casula to support a Section 96 Application to modify the current development consent.

The subject site has been approved by Liverpool City Council on 20 March 2014 (Development Application No. DA-594/2013) (DA approval) as modified by DA-594/2013/A on 23 September 2016.

Two previous acoustic impact assessments have considered the subject site. A development application (DA) assessment was prepared in May 2013, and a Masterplan was prepared in February 2013. These reports are identified in Table 1.

Table 1 Reference acoustic assessments

Acoustic assessment details	Report reference
"*Lot 104, Warehouse S1 and S2, Crossroads, Casula*", reference *60275825RP(Acoustics)-0002_A*, dated 6 February 2013 by AECOM	DA Assessment
"*The Crossroads, Casula - Masterplan*", reference *60275825 RP-0004_C*, dated 31 May 2013 by AECOM	Masterplan assessment

The Section 96 proposes to increase the floor area of the approved 19,725m^2 warehouse (W1) to 22,910m^2 and add a power generator. This letter outlines any changes which would result in acoustic impacts from the operation of the proposed warehouse facility W1 due to the increase in floor area and additional generator. All relevant receiver location designations, modelling assumptions and methodology are outlined in the assessments detailed in the reports identified in Table 1.

The mechanical plant, forklift and truck movement scenarios described in Section 1.4 of the AECOM report "*Lot 104, Warehouse S1 and S2, Crossroads, Casula*", reference *60275825RP(Acoustics)-0002_A*, dated 6 February 2013 have not been altered.

Parts of this letter are technical in content. A glossary of acoustic terminology and reference documents used in this report can be found in Appendix A.

2.0 Environmental noise limits

2.1 DA approval requirements

The DA approval does not prescribe specific noise limits for the site, but instead the site noise emissions are to be controlled by Condition 8 which states:

> ***B. Operational Matters***
>
> ***Compliance with other acts***
>
> *8. Use and occupation of the premises must be carried out at all times without nuisance and in particular so as not to breach the provisions of the Protection of the Environment of Operations Act 1997. The operation and use of any machinery, plant and//or equipment within, on or in connection with the operation and use of the premises to be carried out so as not cause:*
>
> - *Transmission of vibration to any place of different occupancy*

- *An offensive noise, as defined in the Protection of the Environment of Operations Act 1997*

The noise criteria in the DA assessment was derived in accordance with the Protection of the Environment of Operations Act 1997, and as such, the criteria in that assessment is appropriate for assessing any changes in noise impacts as part of this review.

In regards to vibration, no vibration intensive activities are proposed as part of the operations, and as such compliance with this requirement will be achieved.

Other acoustic requirements detailed in the DA approval are as follows.

B. Operational Matters

Acoustic measures

17. All drainage grates within parking and driveway areas are to be mechanically fastened in place through flexible rubber bushes.

18. Subject to traffic committee approval signage instructing truck drivers to exercise noise minimising vehicle operation is to be installed on Campbelltown road.

19. An external public address system can only be used between 7.00 am to 7.00 pm.

2.2 Acoustic review criteria

2.2.1 Operational noise criteria

Noise criteria were derived in the 2013 DA Assessment for Warehouse 1 and have been adopted for this review. The noise limits for the subject site are presented in Table 2.

Table 2 Warehouse 2 noise limits

Assessment period	Warehouse 1 noise limits, dB(A)									
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Amenity noise limits ($L_{Aeq\ period}$)										
Day	54	48	51	49	50	58	67	35	45	63
Evening	44	38	41	38	40	58	67	-[4]	47	63
Night	35	31	35	34	36	60	66	-[4]	-[4]	63
Intrusive noise limits ($L_{Aeq\ 15\ minute}$)										
Day	45	45	47	47	40	-[5]	-[5]	-[5]	-[5]	-[5]
Evening	45	45	46	46	39	-[5]	-[5]	-[5]	-[5]	-[5]
Night	39	39	40	39	34	-[5]	-[5]	-[5]	-[5]	-[5]

Notes:

1. Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays & Public Holidays.
2. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday & Public Holidays.
3. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays & Public Holidays.
4. The criteria only apply when the facility is in use.
5. Intrusive noise limit only apply to residential receivers.

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content then correction factors are to be applied, in accordance with the INP.

2.2.2 Sleep disturbance criteria

The sleep disturbance criteria applicable for the subject site are presented in Table 3 and are from the DA Assessment.

Table 3 Sleep disturbance criteria, dB(A)

Receiver	Sleep Disturbance Criteria $L_{A1\ (1\ minute)}$ dB(A)	
	Screening Level	Awakening Reaction
R1	56	60 – 65
R2	56	60 – 65
R3	57	60 – 65
R4	56	60 – 65
R5	51	60 – 65

3.0 Operational noise assessment

3.1 Modelling methodology and assumptions

The acoustic review assessment has been undertaken with the same modelling and assessment assumptions as those in the 2013 DA assessment except for the following updates:

1. The noise model has been updated to reflect the proposed warehouse design drawings by Nettleton Tribe architects, dated 3 March 2017, included in Appendix B.
2. There is an increase of 10 vehicles in peak time vehicle generation from the site due to the increase in floor area as predicted in the traffic report prepared by Colston, Budd, Rogers & Kafes Pty Ltd, reference 10249/2 dated February 2017.
3. A 500 kVA generator is proposed to be located on the south western boundary of the site.

4.0 Noise assessment

The 2013 DA assessment considered all required assessment periods. This Section 96 acoustic review has only considered the worst case night time operations, as this is the most stringent scenario.

A traffic report was prepared by Colston, Budd, Rogers & Kafes Pty Ltd, reference 10249/2 dated February 2017. The traffic report stated that the proposed increase of floor area will result in an additional 10 cars during peak times.

The noise emission calculations of the proposed Generator are based on the noise output of a CAT DE400SE0, 500 kVA generator operating at 100% capacity.

It is also assumed that the mechanical plant requirements, truck and forklift movements will not be altered due to the increase in floor area and have therefore the scenarios have not been altered from the DA assessment.

4.1 Operational noise impacts

The operations outlined in the 2013 DA assessment with the increase in vehicle movements have been modelled as per the proposed warehouse facility plans, and presented in Table 4.

Table 4 Amenity assessment - Night period worst meteorological conditions

Receiver	Intrusive Criterion	Amenity Criterion	Night time – 3 m/s source to receiver wind		
			DA Assessment (2013)	Section 96 assessment (2017)	Difference from Section 96 Assessment
R1	39	35	30	30	0
R2	39	31	26	26	0
R3	40	35	23	23	0
R4	39	34	28	28	0
R5	34	36	22	22	0
R6	-[1]	60	45	45	0
R7	-[1]	60	54	54	0
R8[1]	-[1]	N/A	18	18	0
R9[1]	-[1]	N/A	31	31	0
R10	-[1]	63	29	29	0

Notes:

1. This has not been assessed during the night period as the school and the golf course and driving range would not typically be used during the hours of 10 pm to 7 am

2. Intrusive noise limit only apply to residential receivers.

It can be seen from Table 4 that no changes in the environmental noise emissions are likely at the receiver locations, given that the noise emission from the site is dominated by the truck and forklift movements.

4.2 Sleep disturbance

The night-time sleep disturbance assessment has been undertaken against the most stringent meteorological condition to determine if there are any changes in noise impacts due to the proposed changes. The modelling assumptions are as per the 2013 DA assessment.

Table 5 presents a summary of the changes in the predicted impacts from those presented in the 2013 DA assessment and the Section 96 assessment. The assessment indicates compliance at all assessment locations.

Table 5 $L_{A1\ (1\ minute)}$ Noise contribution at residential receiver locations during night time operational conditions

Receiver	Criterion		Predicted $L_{A1\ (1\ minute)}$ with worst case meteorological conditions		
	Screening Level	Awakening Reaction	DA Assessment (2013)	Section 96 Assessment (2017)	Difference from Section 96 Assessment
R1	56	65	48	48	0
R2	56	65	47	47	0
R3	57	65	47	47	0
R4	56	65	51	51	0
R5	51	65	43	43	0

4.3 Key review findings

The key findings of this acoustic review are presented in Table 6.

Table 6 Key acoustic review findings

Assessment	Key differences from DA assessment
Operational noise assessment	- No change in noise impact at all receptor locations due to increase in traffic volumes and the generator. - Compliance achieved at all receivers.
Sleep disturbance assessment	- No differences from the DA assessment.
Operational road traffic noise assessment	- No changes in overall truck numbers are proposed, and as such there are no differences from those presented in the DA assessments.

5.0 Recommendations

The recommendations outlined in Section 1.5 – Discussion of the 2013 DA assessment are to be adopted as part of the warehouse operations. No additional recommendations are required as a result of this review except for the additional acoustic measures outlined in the 2013 DA approval presented in Section 2.1.

6.0 Conclusion

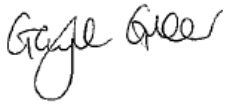
AMP Capital Investors Limited has commissioned AECOM Australia Pty Ltd (AECOM) to undertake an updated acoustic impact assessment for the proposed Warehouse 1 development at Lot 204 (Precinct A) at the Crossroads, Casula to support a Section 96 Application to modify the development consent.

The subject site has been approved by Liverpool City Council on 20 March 2014 (Development Application No. DA-594/2013) (DA approval).

AECOM has undertaken a review of noise impacts with consideration of the warehouse design drawings by Nettleton Tribe architects, dated 3 March 2017, and the proposed operations, against the requirements outlined in the Approval.

The noise assessment of the Section 96 application indicates that there will be no change in noise impact at the receptors from the DA assessment, and AECOM notes that the proposed design will meet the current noise and vibration requirements of the modified DA approval.

Yours sincerely



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Appendix A

Acoustic Terminology

The following is a brief description of acoustic terminology that may have been used in this letter.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A). It should be noted that where dB(Z) is presented in this report, it notes an un-weighted spectrum.
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:
	0dB(A) Threshold of human hearing
	30dB(A) A quiet country park
	40dB(A) Whisper in a library
	50dB(A) Open office space
	70dB(A) Inside a car on a freeway
	80dB(A) Outboard motor
	90dB(A) Heavy truck pass-by
	100dB(A) Jackhammer/Subway train
	110 dB(A) Rock Concert
	115dB(A) Limit of sound permitted in industry
	120dB(A) 747 take off at 250 metres
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
L_{max}	The maximum sound pressure level measured over the measurement period

L_{min}	The minimum sound pressure level measured over the measurement period
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10}.
L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90}.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L_{90} sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The L_{eq} sound pressure level is used to quantify traffic noise.
Day	The period from Monday to Saturday 7 am – 10 pm and Sundays and Public Holidays 8 am – 10 pm.
Night	The period from Monday to Saturday 10 pm – 7 am and Sundays and Public Holidays 10 pm – 8 am.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*, the EPA's NSW Industrial Noise Policy,and the EPA's Road Noise Policy.

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Appendix B – Proposed Warehouse 1 drawings

FUTURE DEVELOPMENT
PRECINCT "B"

B E E C H

R O A D

TRUCK EXIT

SLIDING GATE

5M SETBACK LINE

TRUCK ENTRY

1.8M HIGH PALISADE FENCE

A 30

CAR ENTRY/ EXIT

SLIDING GATE

CAR PARK 137 CARS

COMPACTORS

RECYCLING ZONE 605.0 sqm

BULLET

RECYCLING BINS

SLIDING GATE

6M FIRE TRAIL

GENERATOR

HARDSTAND

6M FIRE TRAIL

15M AWNING

3M AWNING

ARMCO RAILING

REC.

OUTLINE OF LEVEL 1 OFFICE SHOWN DASHED

LOBBY
45 SQM
RL 42.300 ± 0.5

RAMP DOWN TO BASEMENT CAR PARK BELOW

3 x ON-GRADE DOCKS 8MX 6M (WxH)

14 x RECESSED DOCKS 3M x 4M (WxH)

6M x 4M(H) ROLLER SHUTTER DOOR

6M x 4M(H) ROLLER SHUTTER DOOR

DOCK OFFICE
250 SQM

WORKSHOP
1000 SQM

WAREHOUSE 2

(approved development
& under construction)

PROPOSED
WAREHOUSE
(including workshop)

20,125m²

RL 42.510 ± 0.5

6M FIRE TRAIL

6M FIRE TRAIL

10M SETBACK LINE

B 30

B 30

A 30

Y1 Y2 Y3 Y4 Y5 Y6

3500 8500 8500 8500 4500

XA XB XC XD XE XF XG XH XJ

5800 8400 8400 8400 8400 885 11275 7225 7300

A A1 B C D E2 E1 E

30535 30720 31295 31295 1845 1410

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

10735 11100 11100 11100 11100 11100 11100 11100 11100 11100 11100 10860 10860 10860 10860

Area Schedule

precinct A	
landtake area	34,835 sqm
Building 1 - GFA	
Warehouse (includes workshop 1,000sqm)	20,125 sqm
Dock Office	250 sqm
Office (level 1)	2,490 sqm
Lobby	45 sqm
Basement car park	1,495 sqm
Total	24,405 sqm
fsr	0.70:1
heavy duty area	4,600 sqm
light duty area (excl fire trail)	4,077 sqm
car parking required:	135
Cars Provided	176

FOR DA

Client

AMP CAPITAL

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Project

PROPOSED WAREHOUSE - 260 BEECH ROAD

CROSSROADS LOGISTICS CENTRE
260 BEECH ROAD, CASULA NSW 2170

Issue	Description	Date
A	ISSUE FOR DA	02.03.17

PROPOSED GROUND PLAN

1:500 @A1

March 2017

10388_DA-011

0 5 10 25 50m

nettleton tribe partnership pty ltd ABN 58 161 683 122
117 willoughby road crows nest nsw 2065
t 02 9431 6431 f 02 9439 7474
e sydney@nettletontribe.com.au w nettletontribe.com.au

Wed, 02, 2017 - 10:46am C:\Users\aekuan\Desktop\10388 DEVTOP\10388_DA-011.dwg

FUTURE DEVELOPMENT
PRECINCT "B"

B E E C H

R O A D

A
30

5M SETBACK LINE

Y1 Y2 Y3 Y4 Y5 Y6
3500 8500 8500 8500 8500 4500

ROOF LINE ABOVE
SHOWN DASHED

OFFICE
2490 SQM
RL 46.110 ± 0.5

VOID

COVERED
REC.

15M AWNING

3M AWNING

ROOF TO DOCK
OFFICE BELOW

XA 5800
XB 8400
XC 8400
XD 8400
XE 8400
XF 680
A 11280
A1
XG 7280
XH 3450
XJ 7300

B

WAREHOUSE 2

(approved development
& under construction)

WAREHOUSE
VOID

30720

C

31290

D

B
30

B
30

31290

E2

E1

1850

1410

E

10M SETBACK LINE

A
30

10730 11100 11100 11100 11100 11100 11100 11100 11100 11100 11100 11100 10860 10860 10860 10860

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

FOR DA

Client

AMP CAPITAL

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Project

PROPOSED WAREHOUSE - 260 BEECH ROAD

CROSSROADS LOGISTICS CENTRE
260 BEECH ROAD, CASULA NSW 2170

Issue	Description	Date
A	ISSUE FOR DA	03.03.17

PROPOSED LEVEL 1 PLAN
1:500 @A1
March 2017
10388_DA-012

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nettleton tribe partnership pty ltd ABN 58 161 683 122
117 willoughby road crows nest nsw 2065
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e sydney@nettletontribe.com.au w nettletontribe.com.au

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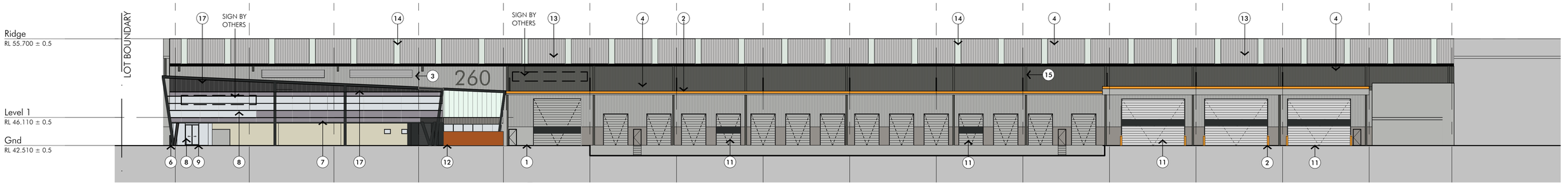
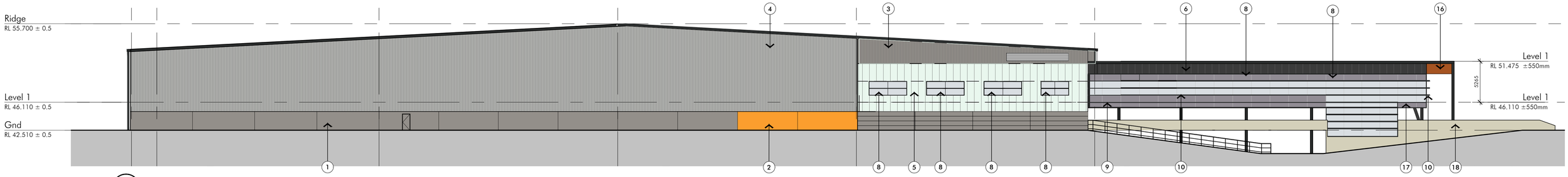
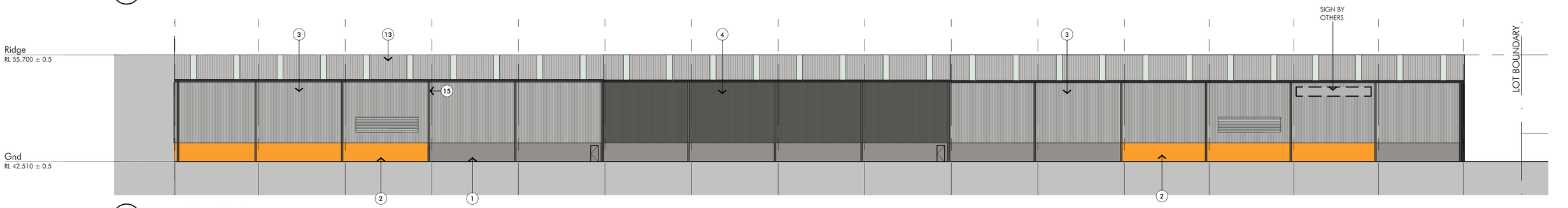


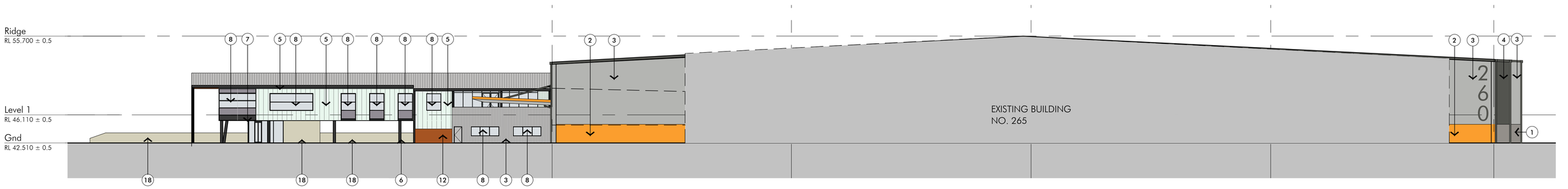
01 - NORTH WEST ELEVATION
1:250



02 - NORTH EAST ELEVATION
1:250



03 - SOUTH EAST ELEVATION
1:250



04 - SOUTH WEST ELEVATION
1:250

1. PRECAST CONCRETE 'MOLE GREY'
2. PRECAST CONCRETE 'ORANGE'
3. COLORBOND TRIMDECK WALL SHEETING 'SHALE GREY'
4. COLORBOND TRIMDECK WALL SHEETING 'WOODLAND GREY'
5. DANPALON 'CLEAR'
6. PAINTED WALL/ COLUMN 'CHARCOAL'
7. OFFICE WINDOW SPANDREL PANEL 'DARK GREY'
8. OFFICE WINDOW GLAZING 'LIGHT GREY VISION PANEL'
9. ALUMINIUM WINDOW FRAMES 'DARK GREY' POWDERCOAT
10. ALUMINIUM SUNSHADES 'DARK GREY' POWDERCOAT
11. ROLLER SHUTTER DOOR 'SHALE GREY' POWDERCOATED
12. TIMBER EFFECT PANELING
13. PROFILE ROOF SHEETING 'ZINCALUM'
14. PROFILED 'CLEARLITE' ROOF SHEETING
15. DOWNPIPES & GUTTERS 'WOODLAND GREY' POWDERCOAT
16. TIMBER EFFECT SCREENING
17. COMPOSITE CLADDING DARK GREY
18. PAINTED CONCRETE WALL BEIGE

FOR DA

Mar 03, 2017 - 12:25pm H:\10388 Elsternwick\2 Auto\CAD\10388_DA-020.dwg

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Project
HUME MOTORWAY
CAMPBELLTOWN ROAD

PROPOSED WAREHOUSE - 260 BEECH ROAD
CROSSROADS LOGISTICS CENTRE
260 BEECH ROAD, CASULA NSW 2170

Issue	Description	Date
A	ISSUE FOR DA	03.03.17

Title: ELEVATIONS
Scale: 1:250 @A1
Date: March 2017
Number: 10388_DA-20

0 1 2
5 10m

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