



Appendix 8

Environmental Noise Assessment



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Environmental Noise Assessment

**Lot 9042 (301) Leatherback Blvd, Alkimos
Service Station Development**

Reference: 18084600-01A

Prepared for:

Caltex Australia Petroleum Pty Ltd
C/- Planning Solutions



Report: 18084600-01A

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Date:	Rev	Description	Prepared By	Verified
1-Nov-18	-	Draft Issued to Client	Matt Moyle	Terry George
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1 INTRODUCTION

A service station development is proposed at a portion of Lot 9042 (#301) Leatherback Blvd, Alkimos (refer *Figure 1-1*). Existing noise sensitive premises identified in this assessment are to the west, with other commercial premises being to the north. It is noted that the adjacent vacant block to the west (Lot 772) is classified “mixed use”, which has the potential for multi-storey residential and has been considered accordingly.

Noise sources considered were those associated with the plant yard mechanical plant, service station equipment and car park use. Noise from these items was assessed against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997* by way of noise modelling.



Figure 1-1 Site Locality (Nearmap image)

The service station is proposed to operate 24 hours a day, 7-days a week. Site drawings used in this assessment are included 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”.

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 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments for Intrusive Characteristics

Tonality	Modulation	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 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	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
Commercial	All hours	60	75	80
Industrial	All hours	65	80	90

The influencing factor was calculated for the nearest noise sensitive premises, refer *Figure 2-1*, being a recent aerial image of the subject area. As per the relevant local structure plan, the subject site itself is classified “commercial” within 100m of Marmion Avenue and the remainder being primarily residential (Refer *Appendix B*).

An influencing factor of 5-10 dB has been calculated for the nearby residential premises, based on a transport factor of 2-6 dB from Marmion Avenue (23,073 vpd, Site #51834 in 2018) and 2 dB from the commercial zoning – refer *Tables 2-3 and 2-4*.

Table 2-3 Influencing Factor Calculation – Turnstone St Residences

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Commercial Land	1.7 dB	1.4 dB	3.4 dB
Major Road	0 dB	2 dB	2 dB
Total			5 dB

Table 2-4 Influencing Factor Calculation – Lot 772 (Future) Mixed Use

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Commercial Land	3.0 dB	1.4 dB	4 dB
Major Road	6 dB	2 dB	6 dB (max)
Total			10 dB

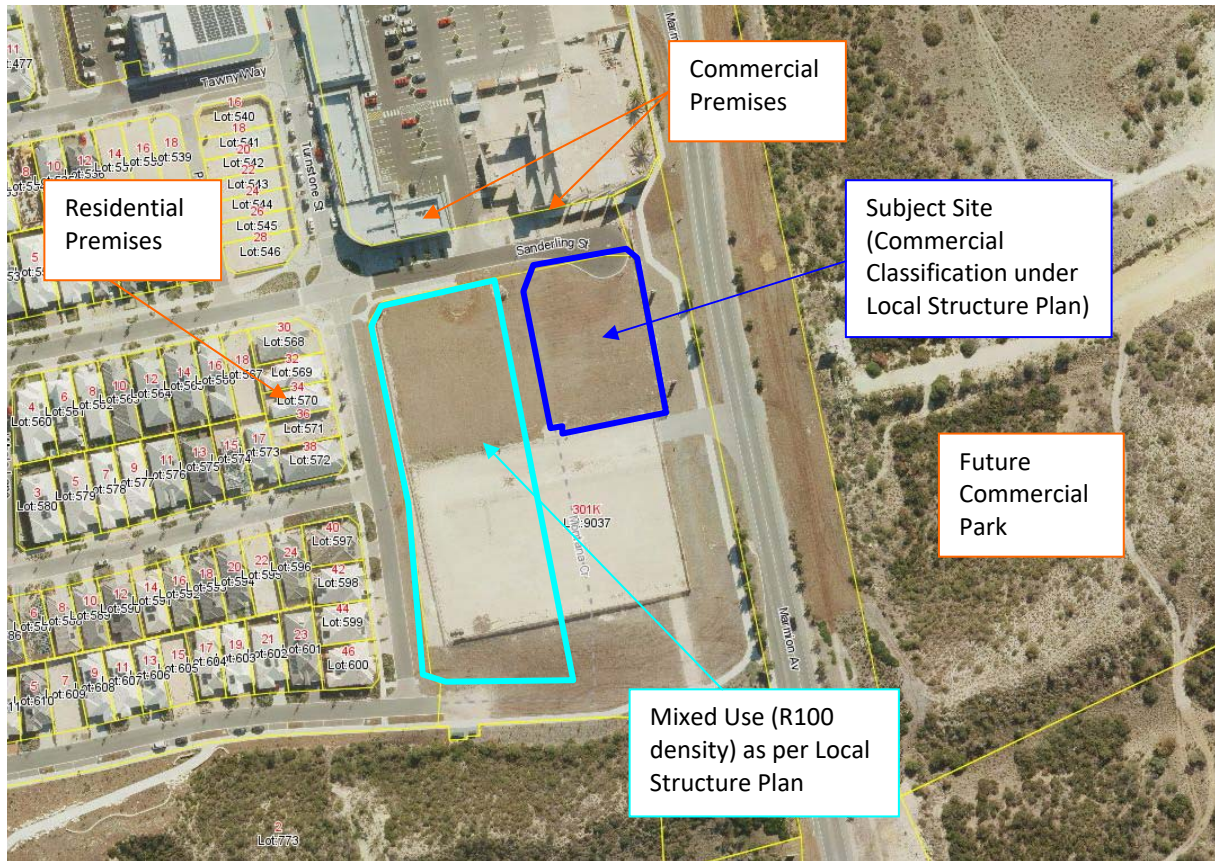


Figure 2-1 Locality of Subject Site and Nearby Receivers (IntraMaps)

Table 2-5 shows the relevant L_{A10} , L_{A1} and L_{Amax} assigned levels (including the influencing factors for residential premises). The L_{A10} assigned level is applicable to the mechanical plant and fuel bowser noise while the L_{Amax} is applicable to the audible alarm and car door closing noise. The L_{A1} is applicable to delivery vehicle noise (refrigerated deliveries).

Table 2-5 Assigned Noise Levels

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Turnstone St Residences	0700 to 1900 hours Monday to Saturday (Day)	50	60	70
	0900 to 1900 hours Sunday and public holidays (Sunday)	45	55	70
	1900 to 2200 hours all days (Evening)	45	55	60
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	40	50	60
Future Mixed Use R100 Residences	0700 to 1900 hours Monday to Saturday (Day)	55	65	75
	0900 to 1900 hours Sunday and public holidays (Sunday)	50	60	75
	1900 to 2200 hours all days (Evening)	50	60	65
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	45	55	65
Commercial	All hours	60	75	80

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 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 hours RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

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. Given the close proximity of existing buildings and fences, the noise emissions were assessed at a point 1 metre away from building facades and a -2 dB adjustment was made to the predicted noise levels to account for reflected noise.

For Service Station developments, the following comments are provided:

- Mechanical plant such as air-conditioning, exhaust fans and refrigeration plant are to comply with the most critical Night L_{A10} assigned noise level.

- The primary noise sources for the Service Station are the mechanical plant (Night L_{A10}), car door noise and the air and water beeper (Night L_{Amax}).

Under regulation 3, nothing in the Noise Regulations applies to the following relevant noise emissions –

- (a) noise emissions from the propulsion and braking systems of motor vehicles operating on a road;
- (b) noise emissions from a safety warning device, other than a reversing alarm, fitted to a motor vehicle operating on a road;
- (c) noise emissions –
 - (i) from a safety warning device fitted to a building as a requirement of the Building Code as defined in the *Building Regulations 2012* regulation 3; orif every reasonable and practicable measure has been taken to reduce the effect of the noise emission consistent with providing an audible warning to people;

Since the development is open to the public, the service station, car park and associated like areas are considered to be a road and therefore vehicle noise (propulsion and braking) is not strictly assessed. Vehicle door closing noise is assessable in any parts of the car park, as this does not form part of the ‘propulsion or braking’ systems. Refrigeration units on delivery vehicles are considered assessable under the appropriate L_{A1} time period as they are short term and infrequent events.

Regulation 14A provides requirements for the collection of waste stating that this activity can also be exempt from having to comply with Regulation 7 prescribed standards provided it is undertaken between 7am and 7pm Mondays to Saturdays and undertaken in the quietest reasonable manner. It can be undertaken outside of these hours where the CEO has approved a Noise Management Plan for the activity.

3 METHODOLOGY

Computer modelling was undertaken, using the software *SoundPLAN 8.0* with the ISO 9613 algorithms (ISO 17354 compliant) 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	Day (0700-1900)	Night (1900-0700)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5m/s	Up to 5m/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 adapted from *Google Earth*, site photographs and proposed plans. Existing and future buildings have also been included as these can provide barrier attenuation when located between a source and receiver, much the same as a hill. Parapets are assumed to be atop the service station building and at 1-metre higher than the roof.

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 0.1 has been used for the carpark, road and service station areas, and 0.6 has been used for the remaining areas.

3.4 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*.

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	
Exhaust Fan Toilet (L _{A10})	-	61	67	61	64	60	52	46	67
Kitchen Exhaust Fan (L _{A10})	79	77	73	70	61	63	62	52	72
Air Conditioning Condenser – Actron SRD33C, 2 off (L _{A10})	-	72	70	67	65	62	56	50	70
Refrigeration Condensing Unit – Actrol ACPAC AP8.8M2 (L _{A10})	-	88	82	82	78	69	60	52	75
Pulford Silenced Compressor	73	72	75	71	67	63	59	51	73

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Fuel Bowser x 4	-	65	68	65	67	65	59	50	71
Air Service Alarm (L_{max})	-	-	-	-	-	91	96	92	99
Exhaust Fan Toilet (L_{A10})	-	61	67	61	64	60	52	46	67
Truck Mounted Refrigeration Unit	107	97	90	95	94	89	86	-	98
Car Door Closings (L_{max})	71	74	77	81	80	78	72	61	84

With regards to the noise sources in the table, the following are noted:

- Service station mechanical plant sound levels have been sourced from file data for previous similar projects;
- The drawings indicate a solid fence to the service station plant yard at 1.8m high with some ventilation panels. These have been included in the model accordingly.
- The service station mechanical plant will operate at all times, due to the 24-hour nature of the store.
- The truck mounted refrigeration unit is assumed 2.5m above ground level and above the truck cab.
- Three scenarios are considered as follows:
 1. Night L_{A10} Noise – All service station plant running including all bowzers simultaneously.
 2. Night L_{Amax} Noise – All plant from scenario 1 and with car door and air service beeper noise sources.
 3. Night L_{A1} Noise - All plant from scenario 1 and with refrigerated truck in loading bay.
- An image of the noise model overview for Scenario 2 is shown in *Figure 3-1*. Note that an indicative 3-storey building is shown in the worst case location on Lot 772. This scenario has been assessed separately (refer *Section 4.4*).

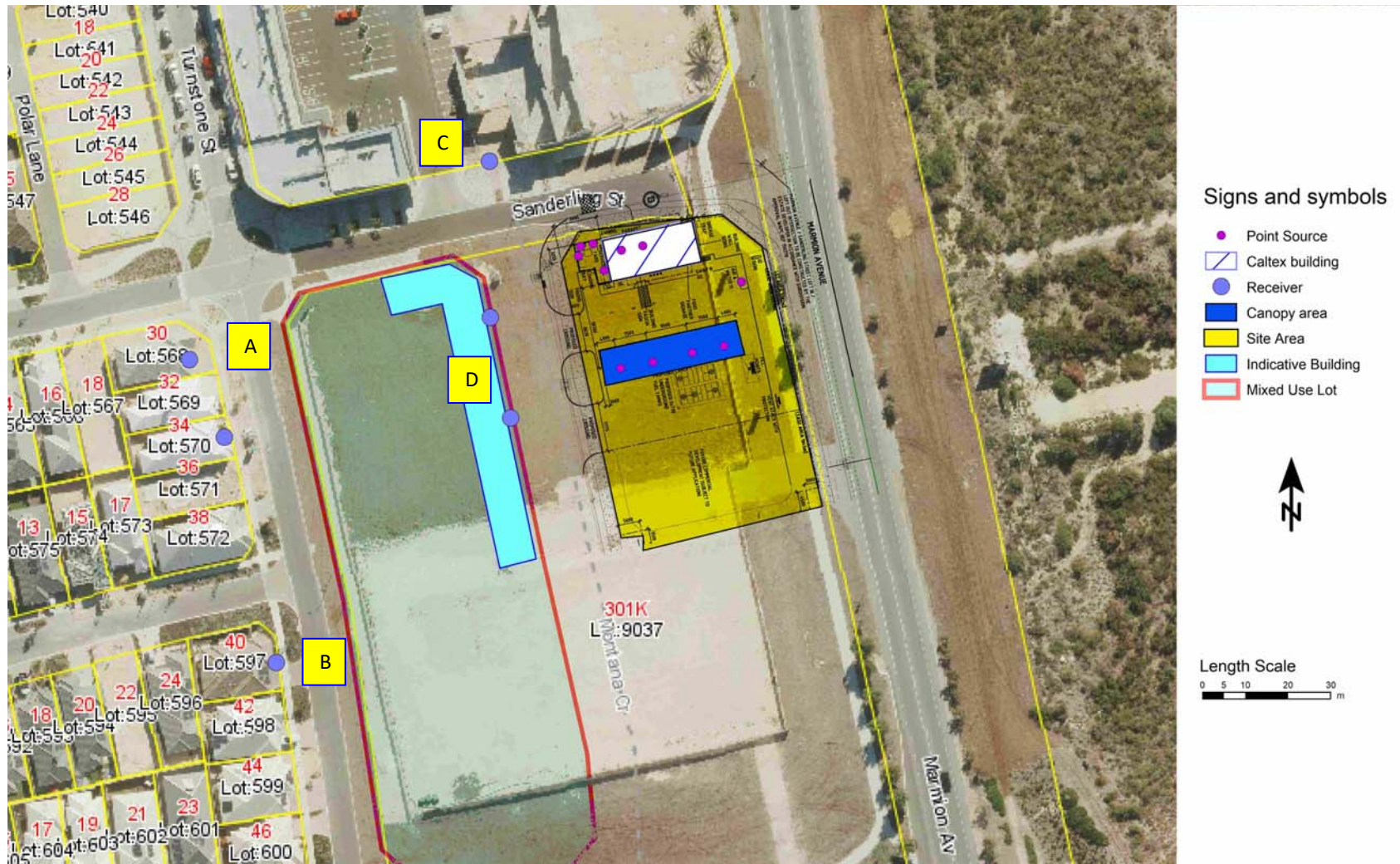


Figure 3-1 2D Image of Noise Model

4 RESULTS AND ASSESSMENT

The results of the noise modelling for the three scenarios are summarised in *Sections 4.1 to 4.3*. Note that the results are initially for the existing situation only, without adjacent Lot 772 developed as a mixed use building. Tabulated results are predicted for the receiver locations as identified in *Figure 3-1*.

4.1 Scenario 1 – Night L_{A10}

Table 4-1 provides the results for the night time L_{A10} scenario with all mechanical plant and fuel bowsers in use.

Table 4-1 Predicted Noise Levels, Scenario 1: Night, L_{A10} dB

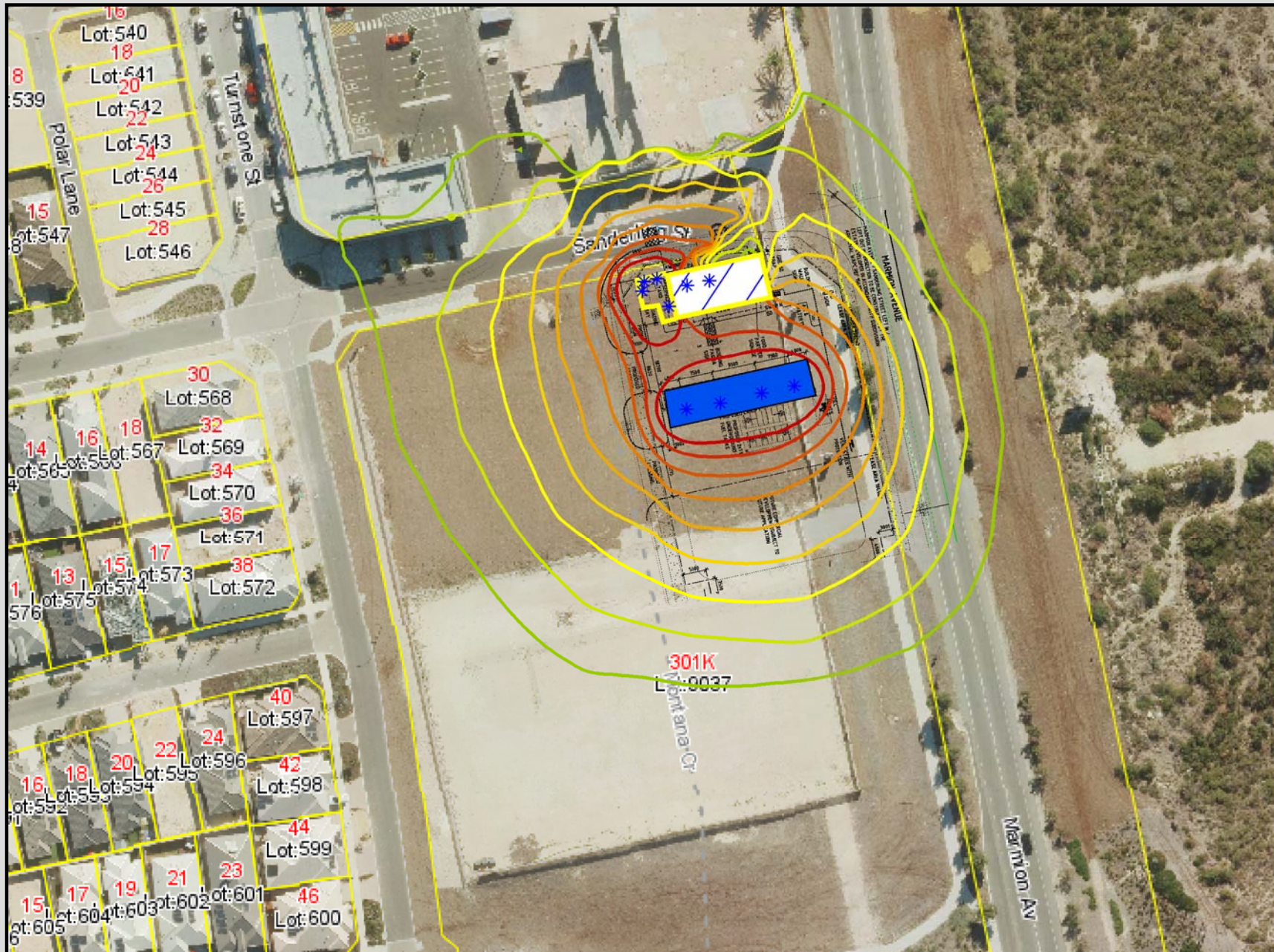
Location	Predicted Noise Level Worst-Case Downwind			Critical Assigned Level	Calculated Exceedence
	Mechanical Plant	Fuel Bowsers	Combined		
Residence A	26	24	28	40	<i>Complies</i>
Residence B	23	22	25	40	<i>Complies</i>
Commercial C	22	22	24	60	<i>Complies</i>

The most critical receiving premises is Residence group A (Across Turnstone Street) with a predicted level of 28 dB L_{A10} . Mechanical plant can be considered to contain tonal characteristics when in isolation however when other noise sources are present including background, any tonality is generally masked. Therefore, compliance with the assigned level is demonstrated at all receivers by a margin of at least 12 dB.

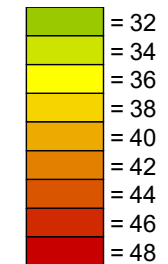
Compliance is readily achieved at the commercial boundary.

Figure 4-1 provides the noise contour plots for the Night L_{A10} Scenario. This plot demonstrates compliance of the most critical noise scenario.

Figure 4-1



**Predicted Noise level
L_{A10} dB**



Signs and symbols

- Point source
- Proposed building
- Parapet/Enclosure
- Canopy area

Lot 9042 (301) Leatherback Blvd, Alkimos - Commercial Development

L_{A10} Noise Level Contours - Scenario 1 - Ground Floor Predicted Noise Levels



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4.2 Scenario 2 – Night L_{Amax}

Table 4-2 provides the results for the night time L_{Amax} scenario.

Table 4-2 Predicted Noise Levels, Scenario 2: Night, L_{Amax} dB

Location	Predicted Noise Level Worst-Case Downwind			Critical Assigned Level	Calculated Exceedence
	Air-Beeper	Car Doors	Maximum*		
Residences A	44 + 5	31 + 10	49	60	Complies
Residences B	44 + 5	28 + 10	49	60	Complies
Commercial C	26 + 5	32 + 10	42	80	Complies

* "+ 5" in the table has been assumed for potential tonal penalty and "+ 10" for impulsive penalty and included in the maximum, noting that these noises are not cumulative.

For a given receiver the maximum noise source is generally the air service beeper. Where the maximum level is a car door, a +10 dB adjustment is applied for impulsiveness. Where the maximum level is the air beeper, a +5 dB adjustment is applied for tonality.

Noise levels comply at all nearest receivers, by a factor of at least 11 dB, with the highest level being at Residences A and B. The dominant noise source in this case is the air-beeper. It is recommended that this be selected as a non-beeping unit to further reduce the impact to amenity if complaints become an issue.

4.3 Scenario 3 – Night L_{A1} Loading Bay Refrigerated Deliveries

The plans indicate a designated loading bay on the west side of the store building in front of the service yard. Non-Refrigerated trucks are not considered an issue, although to minimise impacts, these should not be left to idle as part of good practice.

The critical assessable noise source is a refrigerated truck parked in this area for a short time whilst unloading stock. Given the intermittency of this activity and short duration (less than 10% of a RAP), the noise is assessed against the L_{A1} criteria. The worst case receiver is Residence A (Lot 568 to Lot 572 Turnstone Street) for this noise source, with a level of 43 dB(A) predicted. Noise from these units may be considered tonal and therefore the level for assessment purposes is 48 dB(A), which complies with the L_{A1} criteria at all times by at least 2 dB.

4.4 Future Lot 772 Development

Based on the Local Structure Plan classification of Mixed-use and the R100 density code, in future there may be a residential component at this location, such as a multi-storey unit development atop a commercial ground floor tenancy. While the current situations are shown to be compliant with all assigned levels, in future, the Local Structure Plan has indicated a potential for residential development at Lot 772 and therefore must be assessed as such.

The assessment, considers the most conservative outcome, being a multi storey unit located very close to the eastern boundary. *Table 4-3* summarises the noise levels to these potential receivers (all floor levels) based on the same scenarios as previously calculated and including relevant adjustments for intrusive characteristics as previously described.

Table 4-3 Predicted Noise Levels, Future Mixed Use Development Lot 772

Location	Predicted Noise Level Worst-Case Downwind*			Critical Assigned Level L _{A10} / L _{A1} / L _{Amax}	Calculated Exceedence
	L _{A10}	Loading L _{A1}	L _{Amax}		
Ground Floor (commercial)	34	59	59	60/75/85	Complies
First Floor	37	59	59	45/55/65	+4
Second Floor	40	59	59	45/55/65	+4
Third Floor	42	60	60	45/55/65	+5

*Includes all applicable intrusive adjustment penalties

As indicated in the table, the loading bay noise from a refrigerated truck will exceed the night assigned level in future, with the conservative assumption that the development will be multi storey close to the eastern boundary. Note that compliance is achieved for day and evening time periods, and therefore it is recommended that nothing further be implemented in the design at this stage. If required in future, the delivery schedules for refrigerated trucks only would need to be restricted to day and evening time periods.

5 RECOMMENDATIONS

The three most critical scenarios are predicted to comply with the assigned levels. Mechanical plant noise is dominant for the Night L_{A10} Scenario and compliance is readily achieved. The noise model assumes parapets around the top of the building, but in their absence, solid screening panels should be used to surround mechanical plant.

Intermittent refrigerated truck deliveries in the designated loading area are identified as a potential issue if Lot 772 is developed in the future for noise sensitive use. To ensure compliance at the appropriate time, the following adjustments to operations would be required:

- Refrigerated deliveries should preferably occur Monday to Saturday, 7am to 10pm, or Sunday 9am to 7pm;
- Deliveries outside of the above time would require the refrigeration unit to be turned off immediately to achieve compliance (at night).

With the above in place, the assessment has indicated that noise complies with assigned levels determined in accordance with the *Environmental Protection (Noise) Regulations 1997*.

Some best practice recommendations have been included below – to be implemented in the design and operation where practicable.

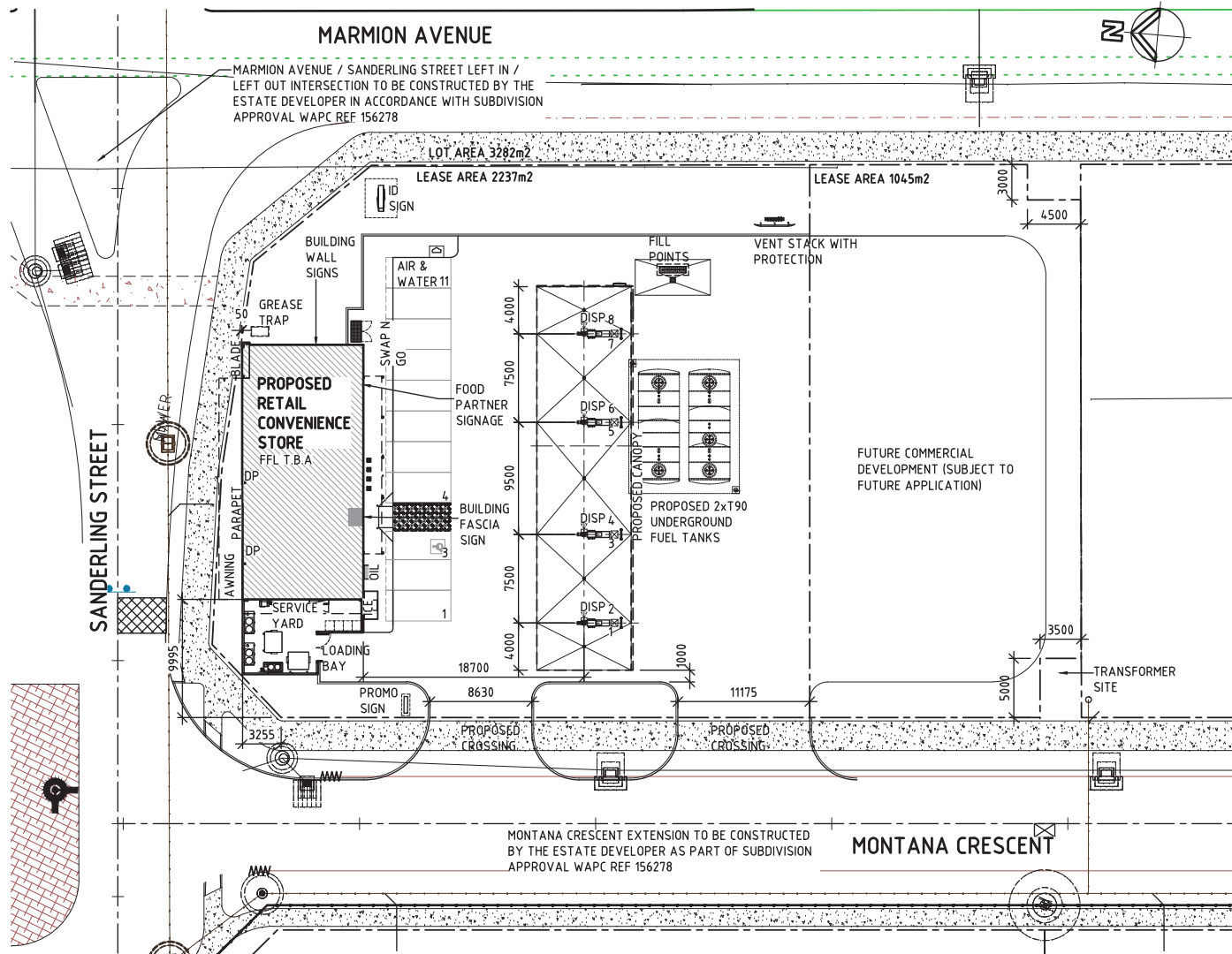
- Mechanical plant that will operate during the night (e.g. refrigeration condensers) to be selected having a low speed option;
- Mechanical plant to be maintained to ensure noise levels do not increase over time;
- Mechanical plant to be installed using anti-vibration isolation mounts;
- Mechanical plant to be in line with those assumed in the modelling – refer *Table 3-2*;
- Any external music or the like shall be low level and completely inaudible at residences;
- Access grates shall be firmly seated in position and fitted with rubber gaskets to avoid excess banging.

6 CONCLUSION

The potential noise impacts resulting from the proposed service station development at Lot 9042 (#301) Leatherback Blvd, Alkimos have been assessed in accordance with the *Environmental Protection (Noise) Regulations 1997*. Compliance with the assigned levels at all existing receivers is achievable at all times. If Lot 772 is developed in the future for noise sensitive use, there is a potential for a non-compliant outcome. This exceedence occurs for refrigerated truck deliveries to the store, but can be managed as described in *Section 5*.

Appendix A

Site Plans



LEGEND

- NEW YELLOW PAINTED DIRECTIONAL ARROW.
- WHITE 'SYMBOL OF ACCESS' 900 HIGH ON BLUE RECT ANGLE 1200 SQ. TO COMPLY WITH AS1428.1
- 100mm WIDE YELLOW PAINTED CAR PARK LINE.
- SINGLE FLOOD LIGHT COMPLETE WITH FOOTING & CONNECTION TO EXTERNAL LIGHTING CIRCUIT.
- FUEL DISPENSER.
- SITE SETOUT POINT.
- EXTENT OF LANDSCAPING
- CONCRETE KERB

NOTES : CONSTRUCTION

- C.01 FOR BUILDING DIMENSIONS REFER TO FLOOR PLAN.
- C.02 ALL SIGNAGE SHOWN IS INTERNALLY ILLUMINATED UNO.
- C.03 CONFIRM EXACT SITE DIMENSIONS PRIOR TO COMMENCING CONSTRUCTION.
- C.04 MERGE ALL CURVED SECTIONS OF ROAD INTO STRAIGHT SECTIONS.
- C.05 KERB RAMPS SHOWN TO BE AT A MAXIMUM GRADIENT OF 1 IN 8 AND SHALL FULLY COMPLY WITH THE REQUIREMENTS OF A 'KERB RAMP' AS DEFINED IN AS1428.

PROJECT CONSULTANTS WA
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REV.	BY	DATE	DESCRIPTION OF CHANGE
B	JS	14.08.18	BUILDING REVISED, ROLL OVER KERB REMOVED
C	JS	12.09.18	BOUNDARY REVISED
D	JS	03.10.18	DEVELOPER SITE REVISED BUILDING PARAPET / POSTION REVISED

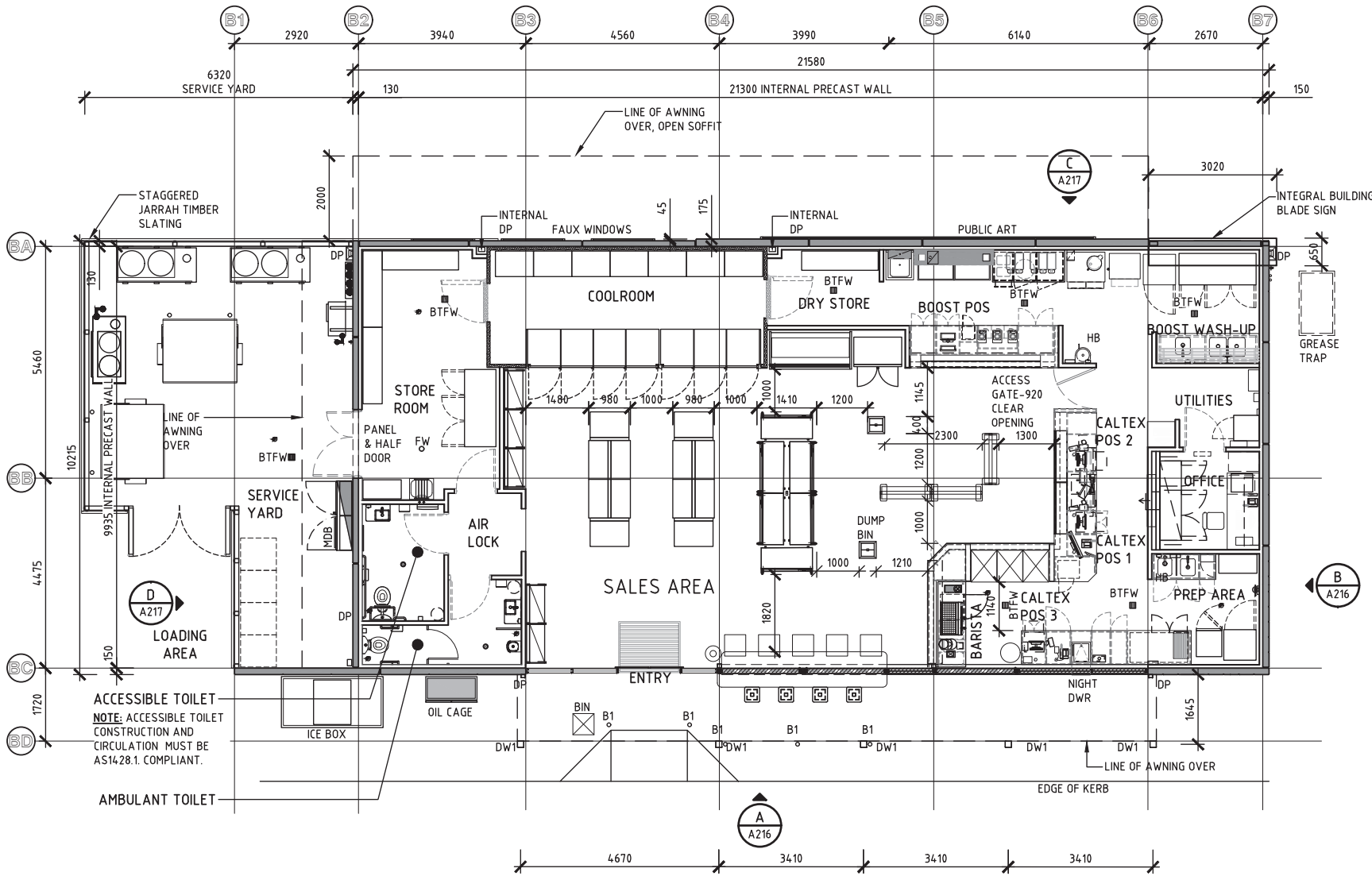
REVISION

PROJECT
ALKIMOS - WA
 MARMION AVENUE
 CNR SANDERLING STREET

TITLE
 SITE; PLAN
 PROPOSED

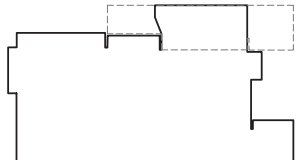
SCALE	DEVELOPMENT	
1:400	APPROVED	DATE
SIZE	DRAWING No.	REV.
A3	P1565-A100	D





- WALL LEGEND**
- CONCRETE PANEL WALLS PLUS 76mm METAL STUD FRAME AND 10mm GYPROCK LINING.
 - INTERNAL METAL STUD FRAMED WALL WITH 10mm GYPROCK LINING ON ALL EXPOSED SURFACES
 - COOLROOM & FREEZER PANNELLING, REFER TO REFRIGERATION DRAWINGS.
 - GLAZED SHOPFRONT

- LEGEND**
- B1 BOLLARD
 - BTFW BUCKET TRAP FLOOR WASTE
 - DW1 150x150mm ALUMINIUM NON-STRUCTURAL COLUMN WITH BOLLARD INSERT
 - DP DOWNPIPE



TOTAL SALES ROOM AREA : 136m²
 BUILDING G.F.A. : 220m²
 (EXCLUDES SERVICE & PLANT YARDS)
 BOOST JUICE AREA (DASHED): 29m²

PROJECT CONSULTANTS WA
 P T Y L T D
 ACN 602 924 336 ABN 40 415 457 574
 CONTACT No. 0430 466 223

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REV.	BY	DATE	DESCRIPTION OF CHANGE
C	JS	07.09.18	PARAPET WALL EXTENDED, AWNING STRAIGHTENED, TIMBER ADDED TO FENCE
D	JS	12.09.18	SERVICE YARD REDUCED
E	JS	03.10.18	PARAPET WALL REVISED BLADE ADDED

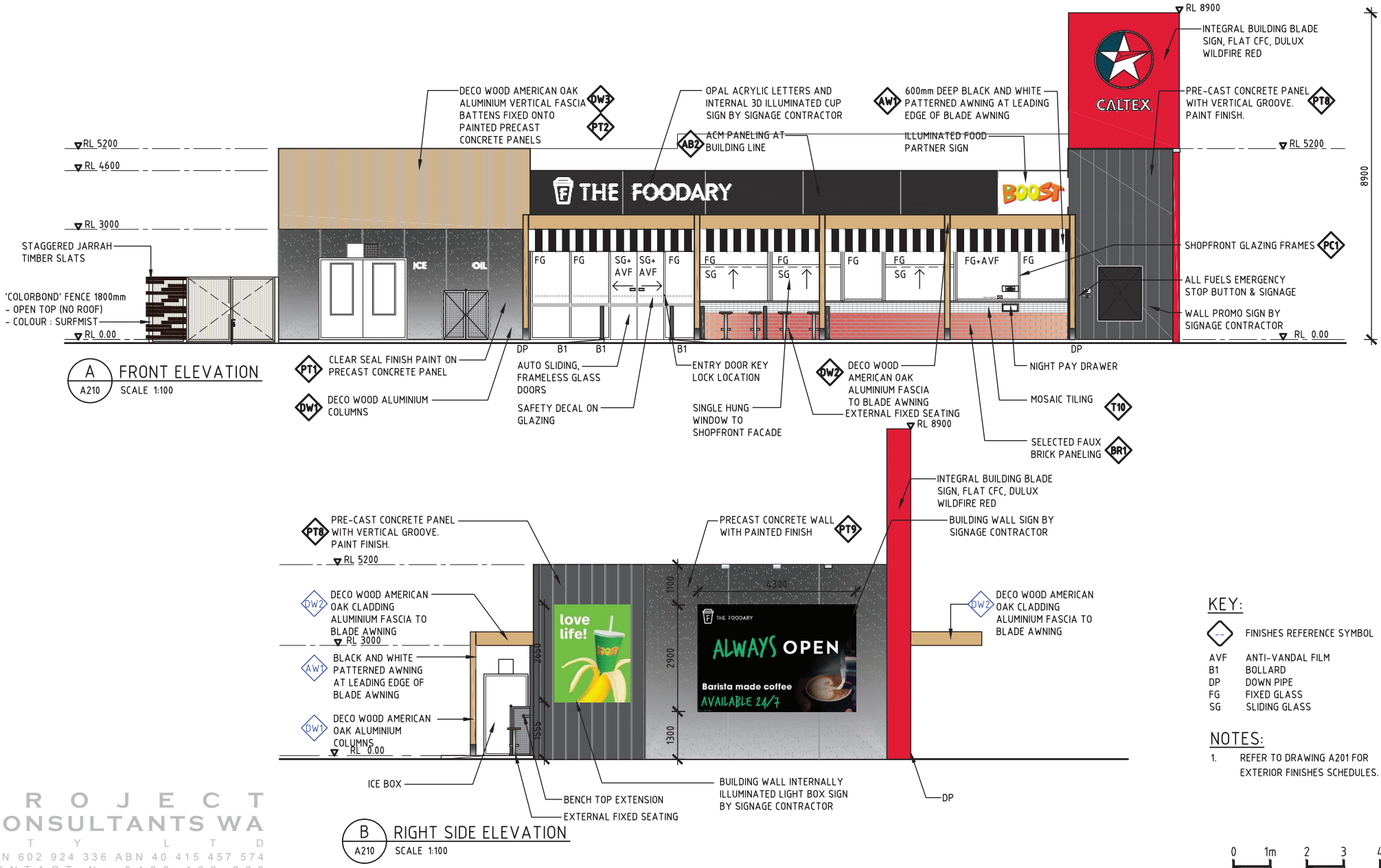
REVISION

PROJECT
ALKIMOS - WA
 MARMION AVENUE
 CNR SANDERLING STREET

TITLE
 SHOP; FLOOR PLAN
 PROPOSED

SCALE	DEVELOPMENT	
1:100	APPROVED	DATE 16.09.15
SIZE A3	DRAWING No. P1565-A210	REV. E





A FRONT ELEVATION
A210 SCALE 1:100

B RIGHT SIDE ELEVATION
A210 SCALE 1:100

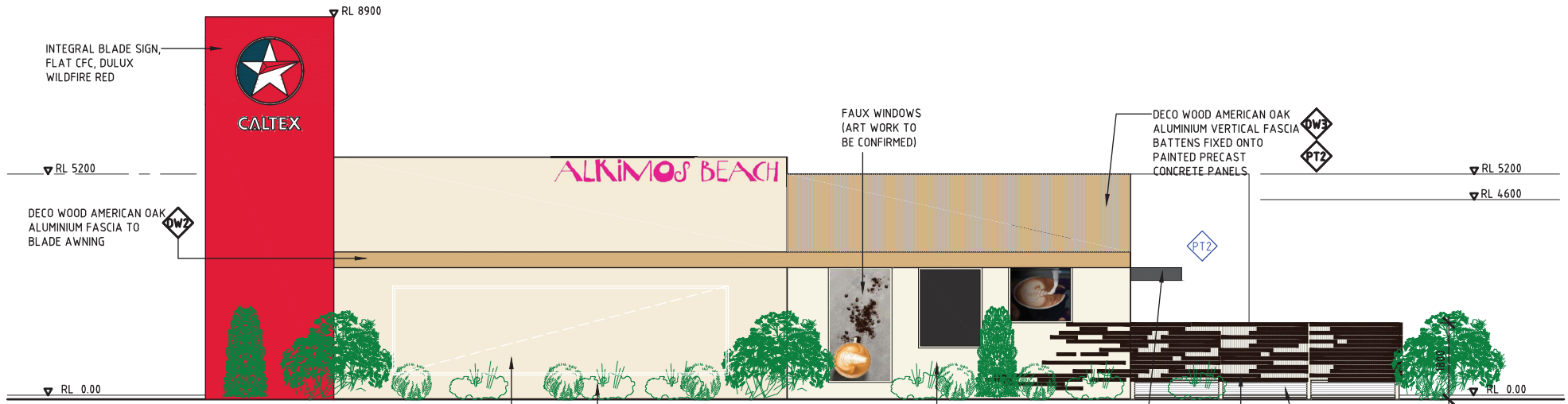
- KEY:**
- FINISHES REFERENCE SYMBOL
 - AVF ANTI-VANDAL FILM
 - B1 BOLLARD
 - DP DOWN PIPE
 - FG FIXED GLASS
 - SG SLIDING GLASS

- NOTES:**
- REFER TO DRAWING A201 FOR EXTERIOR FINISHES SCHEDULES.

PROJECT CONSULTANTS WA
P T Y L T D
ACN 602 924 336 ABN 40 415 457 574
CONTACT No. 0430 466 223



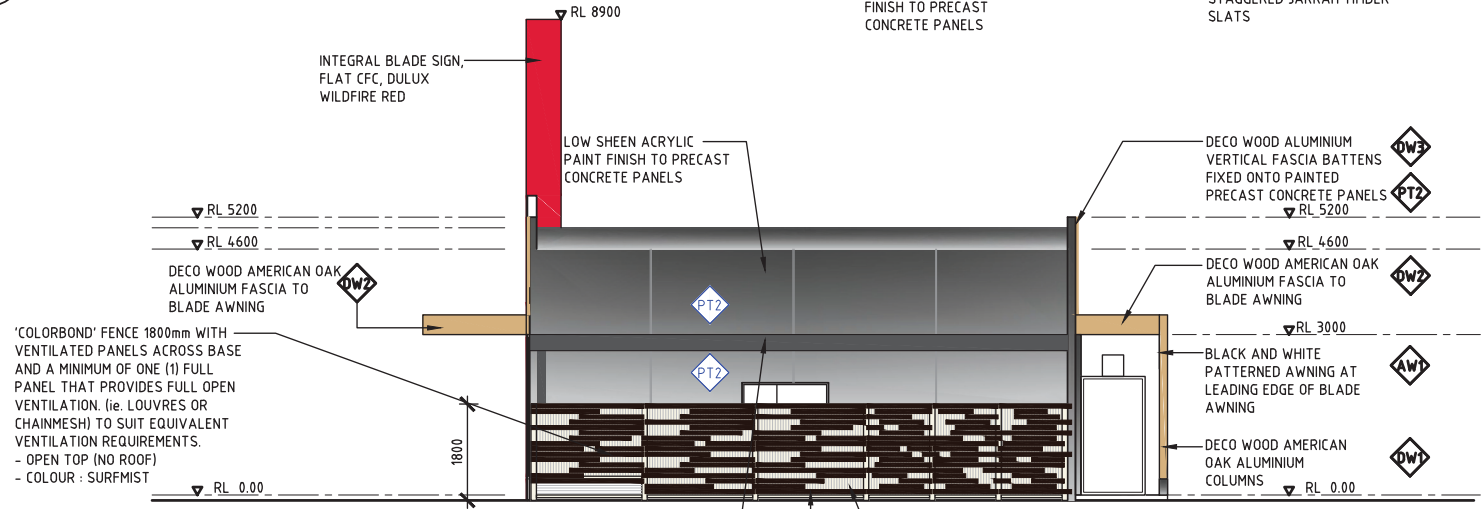
 CALTEX Caltex Australia Petroleum Pty Ltd <small>COPYRIGHT THIS DRAWING & DESIGN MUST NOT BE COPIED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF CALTEX AUSTRALIA PETROLEUM PTY LTD.</small>	REV.	BY	DATE	DESCRIPTION OF CHANGE	PROJECT	TITLE	SCALE	DEVELOPMENT	
	C	JS	14.08.18	JARRAH TIMBER ADDED TO FENCE	ALKIMOS - WA MARMION AVENUE CNR SANDERLING STREET	SHOP : ELEVATIONS PROPOSED SHEET 1	1:100	APPROVED	DATE
	D	JS	12.09.18	SERVICE YARD REDUCED			DRAWING No.	REV.	
E	JS	03.10.18	PARAPET WALL REVISED BLADE SIGN ADDED	SIZE			P1565-A216	E	
REVISION									



C REAR ELEVATION
A210 SCALE 1:100

FUTURE ARTWORK (TO BE CONFIRMED)
DULUX CHALK USA TEXTURED PAINT FINISH TO EXTENDED PARAPET
DULUX CAFE LATTE LOW SHEEN ACRYLIC PAINT FINISH TO PRECAST CONCRETE PANELS

FAUX WINDOWS (ART WORK TO BE CONFIRMED)
DECO WOOD AMERICAN OAK ALUMINIUM VERTICAL FASCIA BATTENS FIXED ONTO PAINTED PRECAST CONCRETE PANELS
PAINTED CFC FASCIA ON SERVICE YARD AWNING
STAGGERED JARRAH TIMBER SLATS
'COLORBOND' FENCE 1800mm WITH VENTILATED PANELS ACROSS BASE AND A MINIMUM OF ONE (1) FULL PANEL THAT PROVIDES FULL OPEN VENTILATION. (ie. LOUVRES OR CHAINMESH) TO SUIT EQUIVALENT VENTILATION REQUIREMENTS.
- OPEN TOP (NO ROOF)
- COLOUR : SURFMIST



D LEFT SIDE ELEVATION
A210 SCALE 1:100

'COLORBOND' FENCE 1800mm WITH VENTILATED PANELS ACROSS BASE AND A MINIMUM OF ONE (1) FULL PANEL THAT PROVIDES FULL OPEN VENTILATION. (ie. LOUVRES OR CHAINMESH) TO SUIT EQUIVALENT VENTILATION REQUIREMENTS.
- OPEN TOP (NO ROOF)
- COLOUR : SURFMIST

LOW SHEEN ACRYLIC PAINT FINISH TO PRECAST CONCRETE PANELS
PAINTED CFC FASCIA ON SERVICE YARD AWNING
'COLORBOND' SOLID BARRIER FENCE 1800mm
- OPEN TOP (NO ROOF)
- ACCESS GATES
- COLOUR : SURFMIST
STAGGERED JARRAH TIMBER SLATS

DECO WOOD ALUMINIUM VERTICAL FASCIA BATTENS FIXED ONTO PAINTED PRECAST CONCRETE PANELS
DECO WOOD AMERICAN OAK ALUMINIUM FASCIA TO BLADE AWNING
BLACK AND WHITE PATTERNED AWNING AT LEADING EDGE OF BLADE AWNING
DECO WOOD AMERICAN OAK ALUMINIUM COLUMNS

- KEY:**
- FINISHES REFERENCE SYMBOL
 - DOWN PIPE
- NOTES:**
- REFER TO DRAWING A201 FOR EXTERIOR FINISHES SCHEDULES.



PROJECT CONSULTANTS WA
P T Y L T D
ACN 602 924 336 ABN 40 415 457 574
CONTACT No 0430 466 223

REV.	BY	DATE	DESCRIPTION OF CHANGE
C	JS	07.09.18	PARAPET EXTENDED, WINDOWS INCREASED JARRAH TIMBER SLATS ADDED TO FENCE
D	JS	12.09.18	SERVICE YARD REDUCED LANDSCAPING ADDED
E	JS	03.10.18	PARAPET WALL REVISED BLADE SIGN ADDED

REVISION

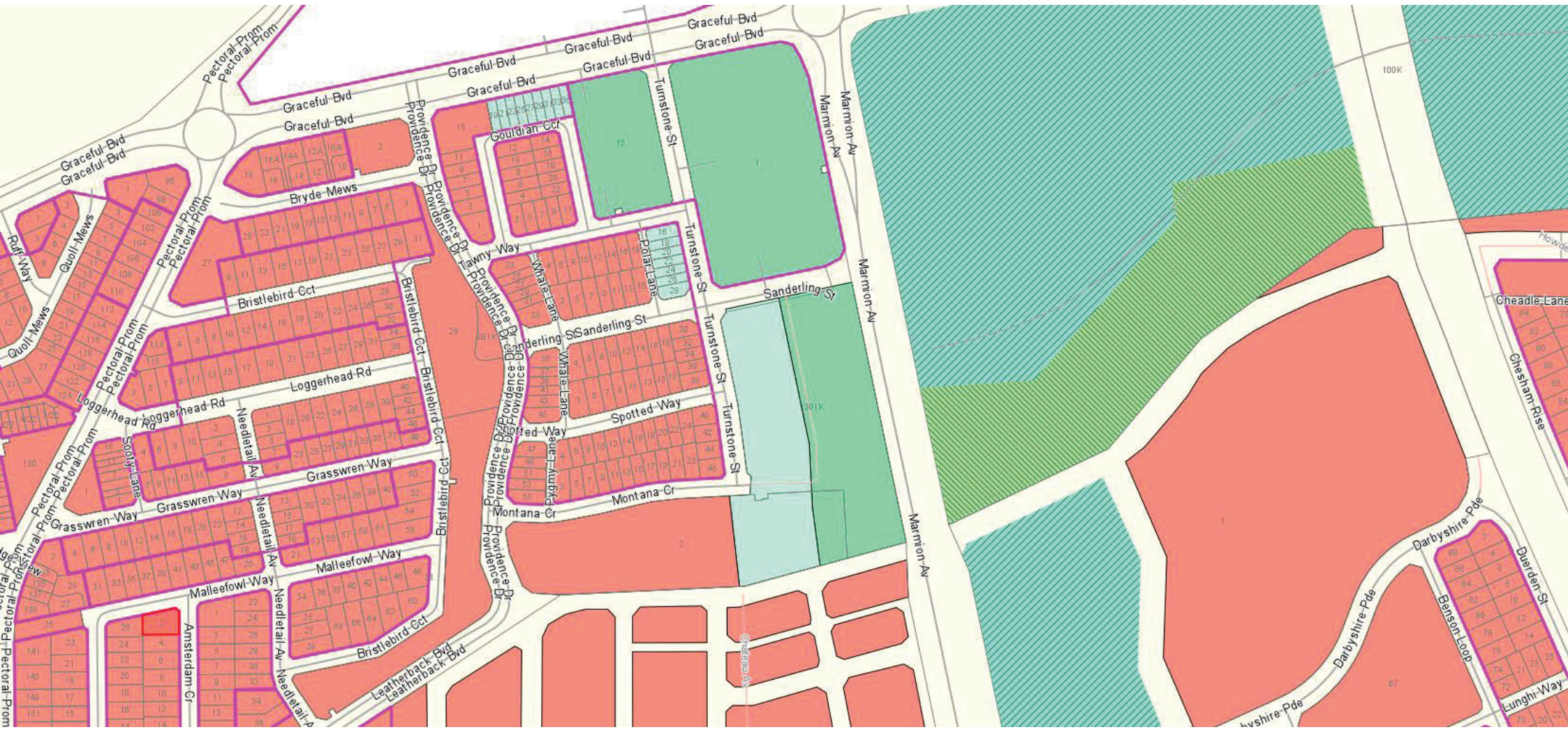
PROJECT
ALKIMOS - WA
MARMION AVENUE
CNR SANDERLING STREET

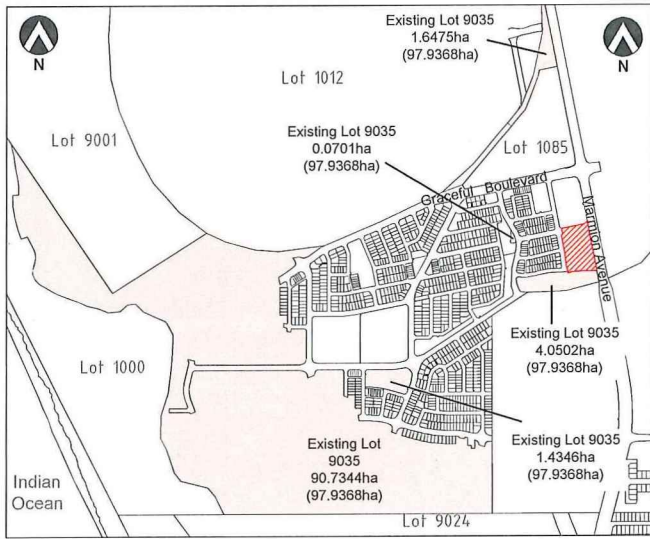
TITLE
SHOP : ELEVATIONS
PROPOSED
SHEET 2

SCALE	DEVELOPMENT	
1:100	APPROVED	DATE
SIZE	DRAWING No.	REV.
A3	P1565-A217	E

Appendix B

Zoning Map





LOCATION PLAN

LOCATION PLAN - EXISTING LOTS
 [Red hatched box] SUBJECT LOTS - PROPOSED SUBDIVISION
 [Orange outline box] APPLICATION AREA - EXISTING LOT 9035

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
21-Aug-2018	156278

LEGEND
 [Red hatched box] SUBJECT LOTS - PROPOSED SUBDIVISION
 [Orange outline box] APPLICATION AREA - EXISTING LOT 9035
 [Dashed line] PROPOSED LOT BOUNDARY
 [Solid line] EXISTING LOT BOUNDARIES
 [Dotted line] EXISTING CONTOURS
 1012 EXISTING LOT NUMBERS

PROPOSED LAND USE/DEVELOPMENT

Zone	Lot Size	No. of Lots
Commercial	2000m ² - 2999m ²	2
Commercial	2000m ² - 2999m ²	1
Mixed Use	3000m ² - 3999m ²	2
Other	Over 25ha	1
TOTAL		6

Existing Lots	1
Proposed Lots	5
Balance of Title	1
TOTAL	6



CADASTRAL INFORMATION
 SOURCE: COSSILL WEBLEY
 YTMWDD: 170717
 DWG REF: 4016 Cod 170717
 PROJECTION: PC694

AERIAL PHOTOGRAPHY
 SOURCE: YTMWDD:

PROPOSED MIXED USE & COMMERCIAL SITES - SUBDIVISION PLAN
Lot 9035 Graceful Boulevard, Alkimos
 City of Wanneroo

G LOT 768 MODIFIED	180730	HH	RD
F POS AREA INCLUDED	180528	HH	RD
E COMMERCIAL AREA EDIT	180214	HH	RD
D TRUNC. ADDED TO LOT 771	180212	SB	RD
C LOTS 768-770 ADJUSTED	171219	HH	RD
REV DESCRIPTION	YTMWDD	DRAWN	APPRD

REF NO. **DLL ALK** DRAW NO. **RD1 339** REV. **G**

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 time weighting as specified in AS1259.1-1990. 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 time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.

L_{APeak}

This is the maximum reading in decibels using the A frequency weighting and P time weighting AS1259.1-1990.

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 $L_{A\ peak}$ and $L_{A\ Max\ slow}$ 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.

Peak Component Particle Velocity (PCPV)

The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and in one of the three orthogonal directions (x, y or z) measured as a peak response. Peak velocity is normally used for the assessment of structural damage from vibration.

Peak Particle Velocity (PPV)

The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and is the vector sum of the PCPV for the x, y and z directions measured as a peak response. Peak velocity is normally used for the assessment of structural damage from vibration.

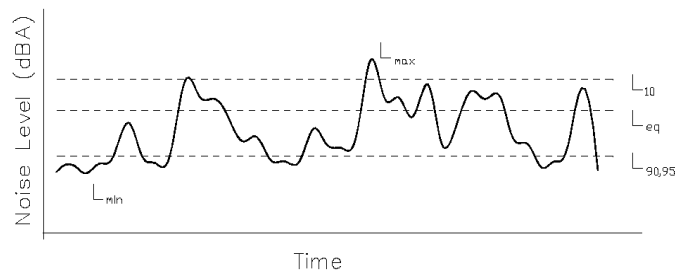
RMS Component Particle Velocity (PCPV)

The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and in one of the three orthogonal directions (x, y or z) measured as a root mean square (rms) response. RMS velocity is normally used for the assessment of human annoyance from vibration.

Peak Particle Velocity (PPV)

The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and is the vector sum of the PCPV for the x, y and z directions measured as a root mean square (rms) response. RMS velocity is normally used for the assessment of human annoyance from vibration.

Chart of Noise Level Descriptors



Typical Noise Levels

