Government of **Western Australia**
Development Assessment Panels

Metro South-West Joint Development Assessment Panel Agenda

Meeting Date and Time: 11 September 2019, 9:00am
Meeting Number: MSWJDAP/191
Meeting Venue: City of Rockingham Boardroom
Civic Boulevard
Rockingham

Attendance

DAP Members

Mr Tony Arias (Presiding Member)
Mr Brian Curtis (A/Deputy Presiding Member)
Mr Andrew Macliver (Specialist Member)
Cr Chris Elliot (Local Government Member, City of Rockingham)
Cr Deb Hamblin (Local Government Member, City of Rockingham)

Officers in attendance

Mr David Banovic (City of Rockingham)
Mr Greg Delahunty (City of Rockingham)
Mr Mike Ross (City of Rockingham)
Mr John Di Rosso (Western Australia Planning Commission)

Minute Secretary

Ms Nicole D'Alessandro (City of Rockingham)

Applicants and Submitters

Mr Nathan Stewart (Rowe Group)
Mr John Gastev
Mr Victor Miraudo (Miraudo Constructions)
Ms Manny Braude (Braude Architects)

Members of the Public / Media

Nil

1. Declaration of Opening

The Presiding Member declares the meeting open and acknowledges the traditional owners and pay respects to Elders past and present of the land on which the meeting is being held.

2. Apologies

Ms Lee O'Donohue (Deputy Presiding Member)

3. Members on Leave of Absence

Nil

4. Noting of Minutes

Signed minutes of previous meetings are available on the DAP website.

5. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

6. Disclosure of Interests

Nil

7. Deputations and Presentations

7.1 Mr Nathan Stewart (Rowe Group) presenting against the application at item 8.1. The presentation will speak on behalf of the landowner of Lot 71 (1441) Mandurah Road, Baldivis and provide additional reasons for refusal.

7.2 Mr John Gastev presenting against the application at item 8.1. The presentation will speak in support of the Officer Recommendation to refuse the application.

The City of Rockingham and Western Australian Planning Commission may be provided with the opportunity to respond to questions of the panel, as invited by the Presiding Member.

8. Form 1 – Responsible Authority Reports – DAP Applications

8.1a	Property Location:	Lots 2 and 13 (Nos. 1447 and 1457) Mandurah Road, Baldivis
	Development Description:	Lifestyle Village/Park Home
	Applicant:	Urbanista Town Planning
	Owner:	Miraudo Constructions Pty Ltd
	Responsible Authority:	City of Rockingham
	DAP File No:	DAP/18/01451

8.1b	Property Location:	Lots 2 and 13 Mandurah Road, Baldivis
	Development Description:	Lifestyle Village/Park Homes
	Applicant:	Urbanista Town Planning
	Owner:	Miraudo Constructions
	Responsible Authority:	Western Australian Planning Commission
	DAP File No:	DAP/18/01451

9. Form 2 – Responsible Authority Reports – Amending or cancelling DAP development approval

Nil

10. Appeals to the State Administrative Tribunal

Nil

11. General Business / Meeting Closure

In accordance with Section 7.3 of the DAP Standing Orders 2017 only the Presiding Member may publicly comment on the operations or determinations of a DAP and other DAP members should not be approached to make comment.

Government of **Western Australia**
Development Assessment Panels

Form 1 – Responsible Authority Report

(Regulation 12)

Property Location:	Lots 2 and 13 (Nos. 1447 and 1457) Mandurah Road, Baldivis
Development Description:	Lifestyle Village/Park Home
DAP Name:	Metro South-West JDAP
Applicant:	Urbanista Town Planning
Owner:	Miraudo Constructions Pty Ltd
Value of Development:	$6.5 million
LG Reference:	DD020.2018.00000172.001
Responsible Authority:	City of Rockingham
Authorising Officer:	Bob Jeans, Director Planning and Development Services
DAP File No:	DAP/18/01451
Report Due Date:	02 September 2019
Application Received Date:	22 June 2018
Application Process Days:	90 Days
Attachment(s):	**Attachment 1** Development Application Plans **Attachment 2** Development Application Submission **Attachment 3** Schedule of Submissions **Attachment 4** Correspondence regarding additional information **Attachment 5** Metro South-West Joint Development Assessment Panel Minutes dated 14 May 2019

Officer Recommendation:

That the Metro South-West Joint Development Assessment Panel (MSWJDAP) resolves to:

1. **Refuse** the DAP Application reference DAP/18/01451 and accompanying plans:

   - Site Plan, Drawing No SK1 Rev A, dated 16.03.2018;
   - Ground Floor Plan, Drawing No SK2 Rev 01.01, dated 16.03.2018;
   - Unit Floor Plan and Elevations, Drawing No SK3 Rev 01.01, dated 16.03.2018;
   - Club House Floor Plan and Elevations, Drawing No SK4 Rev 01.01, dated 16.03.2018;
   - Site Plan Tank Locations, Drawing No SK5, dated 16.03.2018;
   - Recreational Area Site Plan, Drawing No SK6, dated 16.03.2018;
   - Site Sections, Drawing No SK7, dated 16.03.2018;
   - Perspectives, Drawing No SK8, dated 16.03.2018;
   - Survey Plan, Drawing No SK9, dated 16.03.2018

in accordance with Clause 68 of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of 68(2)(b) of the deemed provisions of the City of Rockingham Town Planning Scheme No.2, subject to the following reason as follows:

Reason

1. The proposed development is for a land use which is prohibited ('X') under Town Planning Scheme No.2.

Details: outline of development application

Zoning	MRS:	Rural
	TPS:	Rural
Use Class:		Prohibited 'X' (Grouped Dwelling)
Strategy Policy:		N/A
Development Scheme:		City of Rockingham Town Planning Scheme No.2
Total Lot Size:		40,467m^2
Existing Land Use:		Single House

Development

A Development Assessment Panel (DAP) development application has been submitted seeking development approval for a Lifestyle Village on Lots 2 and 13 (Nos 1447 and 1457) Mandurah Road, Baldivis. The application consists of the following:

- Development of a 'Lifestyle Village' which includes the construction of 68 chalets, a feature 'screen' wall, private access roads, a communal clubhouse and associated open spaces;
- The proposed chalets are made up of 22 one bedroom chalets and 46 two bedroom chalets, with each chalet including a kitchen, dining and living area, one bathroom and laundry as well as an additional study room, store area and alfresco area;
- Each chalet will also be provided with a carport providing parking for one vehicle as well as 24 visitor parking bays, forward of the chalets; and
- The existing houses and associated structures are proposed to be retained.

The following reports accompanied the development application:

- Acoustsic Report;
- Planning Report;
- Transport Statement;
- Environmental Impact Assessment;
- Visual Landscape Evaluation;
- Bushfire Management Plan and Emergency Evacuation Plan; and
- Waste Management Plan.

The development proposal originally included five commercial tenancies adjacent to the visitor car bays. Amended plans were subsequently provided which removed reference to commercial tenancies from the application, however, reference to the commercial tenancies were not removed from the supplementary reports.

Background:

The subject land has a total land area of 4.0467ha.

The subject land is well vegetated with more than 50 mature Tuarts trees and two mature Jarrah trees. The topography of the site is steep with a fall of approximately 20m from east to west. There is an existing house and associated outbuildings on each lot.

The lots are located within the area known as the “Baldivis Rural Wedge” which has a distinctly rural amenity, characterised by small-scale rural and semi-rural land uses such as plant nurseries and hobby farming and rural residential development.

The Vernon Arms Tavern and White Lakes Brewery are located directly to the north of the subject land. To the east is the Lake Walyungup wetland which is highly visible from the adjoining roads.

The subject land is otherwise surrounded by rural-style residential land on one to two hectare lots.

History

The following outlines the history of the development proposal:

- In June 2018, the applicant submitted a DAP application DAP/18/01451 for the proposed development;
- The City immediately submitted a Regulation 11A 'Stop the Clock' form as the application was deficient in necessary information;
- In January 2019, the City submitted a Regulation 11A 'Recommence the Clock' form upon receipt of the requested information;
- The City advertised the proposal upon receipt of the requested information;
- In February 2019, the City became aware of the *Henville v City of Armadale,* State Administrative Tribunal decision and immediately informed the applicant of the implications that this decision may have for their application;
- In May 2019, the MSWJDAP resolved to defer the JDAP application DAP/18/01451 for a period of four (4) months to allow the applicant the opportunity to clarify its application in terms of:
    1. *"The actual use approval sought whether as a "Caravan Park" or a "Park Home Park";*
    2. *How in general the proposed habitation forms are not buildings and will satisfy the meaning of a park home including how the park homes will be brought to their sites as a vehicle as a means of transport so as to be capable of being drawn on a road on wheels; and*
    3. *Demonstration that the proposal will address the rural and planning context of the land."*
- In July 2019, the City was informed by the applicant that no additional information would be submitted in response to the information requested by the MSWJDAP and that the developer wants a decision to be made on the plans considered at the May 2019, MSWJDAP meeting.

Legislation and Policy:

The applicant has not taken this opportunity to clarify its proposal in terms of the land use, form of development or planning context of the land. The development has been assessed against the City’s Town Planning Scheme No. 2 (TPS2) and is considered to be a ‘Grouped Dwelling’ pursuant to TPS2, which is not capable of approval within the Rural zone. Consequently, it was not considered appropriate to undertake a detailed assessment against applicable Policy.

Legislation

The applicant has not taken advantage of the opportunity to clarify its proposal in terms of the land use, form of development or planning context of the land. The development has been assessed against the City's Town Planning Scheme No. 2 (TPS2) and is considered to be a 'Grouped Dwelling' pursuant to TPS2, which is not capable of approval within the Rural zone. Consequently, it was not considered appropriate to undertake a detailed assessment against applicable Policy.

City of Rockingham Town Planning Scheme No.2 (TPS2)

Clause 3.2 - Zoning Table

The subject land is zoned 'Rural' under TPS2.

The applicant has applied for a 'Lifestyle Village / Park Home Estate' which includes the construction of 68 chalets that "provide alternative accommodation for the aged" as well as a communal clubhouse. The 'Chalets / Park Homes' are also referred to as 'Grouped Dwellings' throughout the Planning Report.

In its submission, the applicant contends that the proposed development reasonably fits within the definition of a 'Caravan Park' land use under TPS2. This is said to be based upon a decision from the Minister for Planning, Lands and Heritage that in summary concluded that, *where no distinction is drawn between a 'Park Home' and a 'Caravan' under a Town Planning Scheme a 'Park Home' shall be treated as a 'Caravan'*.

It is noted that:

1. a 'Caravan Park' is an 'A' use within the Rural zone under TPS2 which means the land use is not permitted unless the Local Government has exercised its discretion following advertising; and

2. a 'Grouped Dwelling' is an "X" use within the Rural zone under TPS2 which means the land use is not permitted by TPS2.

Grouped Dwelling - an 'X' Use

TPS2, defines a 'dwelling' as meaning 'a building or portion of a building being used or intended, adapted or designed to be used for the purpose of human habitation *on a permanent basis* by:

(a) a single person;
(b) a single family; or
(c) no more than six persons who do not comprise a single family'.

See Schedule No 1, Part 2 Land Use Interpretations.

The R-Codes define a 'grouped dwelling' as '[a] dwelling that is one of a group of two or more dwellings on the same lot such that no dwelling is placed wholly or partly vertically above another, except where special conditions of landscape or topography dictate otherwise, and includes a dwelling on a survey strata with common property.'

It is considered that the proposal must be treated as a 'Grouped Dwelling' development as it includes 68 single-storey chalets over the two lots, in which case it is a prohibited 'X' use that is not capable of approval within the Rural zone.

Caravan Park

TPS2 defines a ‘caravan park’ as having ‘the same meaning as in the *Caravan Parks and Camping Grounds Act 1995*’ ***(CP Act)***. See Schedule No 1, Part 2 Land Use Interpretations.

Section 5 of the *CP Act* defines:

(1) a ‘caravan park’ as meaning ‘an area of land on which caravans, or caravans and camps, are situated for habitation;

(2) a ‘caravan’ as meaning ‘a vehicle that is fitted or designed for habitation, and unless the contrary intention appears, includes an annex’;

(3) a ‘camp’ means ‘any portable shed or hut, tent, tent fly, awning, blind or other portable thing used as or capable of being used for habitation and includes a vehicle of a prescribed type or in prescribed circumstances’; and

(4) a ‘vehicle’ means ‘a conveyance (other than a train, vessel or aircraft) capable of being propelled or drawn on wheels’.

It is considered that the proposal is not a ‘camp’ as it is neither portable nor a vehicle. Nor is it a ‘caravan’ as it is not a vehicle, being a conveyance capable of being propelled or drawn on wheels.

This reasoning was considered, albeit in a different context, in *HENVILLE*, where the State Administrative Tribunal (SAT) affirmed a decision by the City of Armadale to refuse an application for a park home park licence under the *CP Act*. Critical to the SAT’s reasoning was the interpretation of the word ‘vehicle’ as defined in the *CP Act* and accordingly, the interpretation of what constitutes a ‘Park Home’.

In *HENVILLE,* the SAT concludes that a 'Park Home' must meet three tests:

(1) It must be a means of transport to be a conveyance and therefore a vehicle as defined;

(2) It must be a vehicle of a class or description as provided for by the Regulations; and

(3) It must be fitted or designed for habitation.

The SAT also determined that for an object to be a 'vehicle' for the purposes of the *CP Act*, it must be a means of transport and not merely moveable or capable of movement.

There is no detailed evidence contained within the proposed Development Application that the ‘Chalets/Park Homes’ are vehicles capable of being a means of transport in that the ‘Chalets/Park Homes’ do not contain axles, chassis or wheels.

It is therefore concluded that the development does not contain any ‘Park Homes’ and consequently cannot be treated as a ‘Caravan Park’ land use pursuant to TPS2.

For the above reasons, the development application must be refused, as Council and the MSWJDAP has no discretion to approve 'X' land uses.

It could be contended that the proposal may be treated as a ‘Lifestyle / Retirement Village’, which is a 'Use Not Listed' under TPS2, however, this is not considered to be appropriate as the R-Codes specifically make provision for aged accommodation (i.e Aged or dependant

person's dwellings). Consequently, applications for aged accommodation that contain two or more dwellings are appropriate to be treated as 'Grouped Dwellings' pursuant to TPS2.

State Government Policies

N/A

Local Policies

As the application is for a land use that is not capable of approval an assessment against the City's Policy framework was not considered appropriate.

Consultation:

Public Consultation

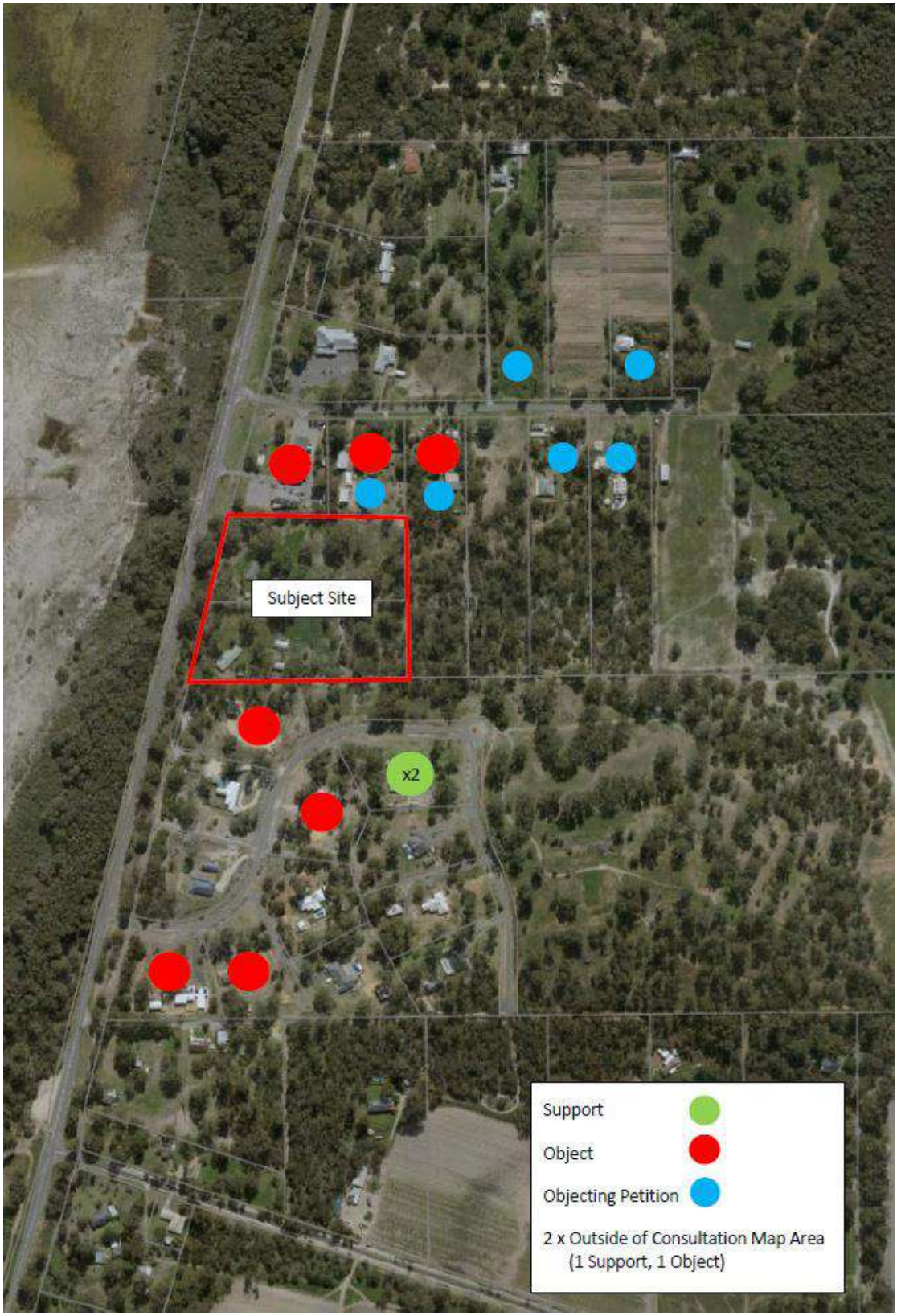
In accordance with Clause 64 of the deemed provisions of TPS2, the application was advertised for public comment over a period of 28 days, commencing on 23 January 2019 and concluding on 20 February 2019. The proposed intensity of residential land use warranted comment from nearby owners and occupiers prior to Council providing its recommendation to the MSWJDAP.

Note, advertising was undertaken prior to the City becoming aware of the decision in HENVILLE.

Advertising was carried out in the following manner:

- Landowners and occupiers within 500 metres of the site were notified in writing of the proposed development, as shown in Consultation Map below;
- A sign advertising the proposed development was erected on the front boundary, between the two sites;
- A notice appeared in the public notices section of the Sound Telegraph on the 23 January 2019 and the 30 January 2019; and
- Copies of technical documents and plans of the proposal were made available for public inspection at the City's Administration Offices and placed on the City's website.

No further advertising was undertaken subsequent to MSWJDAP resolution to defer the application.



1. Consultation Map

At the close of the public consultation period a total of 12 submissions were received, which included eight (8) objections, one (1) petition objecting to the proposal from landowners of six rural properties and three (3) letters of support.

A Schedule of Submissions is attached, however, given that the proposed land use cannot be approved, the City has not considered these submissions.

Consultation with other Agencies or Consultants

The following Government departments and service agencies were consulted:

- Department of Water and Environmental Regulations (DWER);
- Department of Health (DoH);
- Department of Fire and Emergency Services (DFES); and
- Department of Planning, Lands and Heritage (DPLH).

The submissions are contained within the attached Schedule of Submissions, however, given that the proposed land use cannot be approved, the City has not considered these submissions.

Officer Comments:

Nil

Council Recommendation:

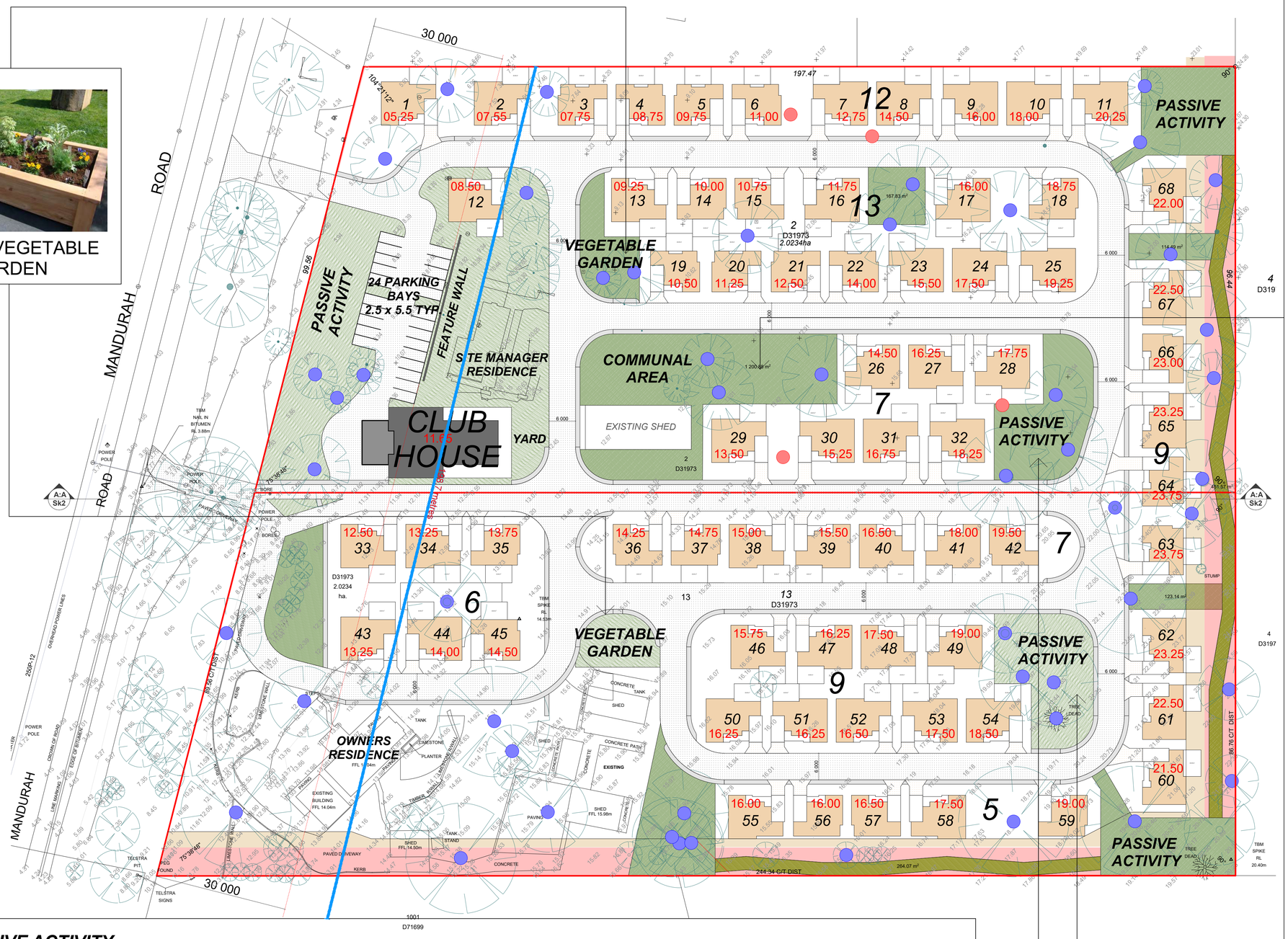
The application was referred to the 27th August 2019 Ordinary Council Meeting, where the officer's recommendation was adopted by the Council.

Conclusion:

The application proposes a 'Grouped Dwelling' development which cannot be approved within the Rural zone. Consequently, the application must be refused.

NOTE:
REMOVE UNDERGROWTH TO
VERGE PLANT GROUND COVERS
& RETICULATE

RAISED VEGETABLE GARDEN



N

COMMUNAL AREA

SHADE PERGOLA & BBQ

OUTDOOR GYM

PASSIVE ACTIVITY

LOG SEATS

LOG SEATS

WATER FEATURE

SCULPTURE

SUNSET RETREAT

VERSION 6

REV			
A	SHOWN FINISHED FLOOR LEVELS		06.11.2018

TITLE	SITE PLAN		
SCALE	1:500	WORK 17-110	PLOT 06.11.2018
DATE	16.03.2018	FILE RET_022_zh.pln	PAPER A1
AUTHOR	eb	DRAWING	REV
DRAWN	zh	SK 1	A
COPYRIGHT	©2018		

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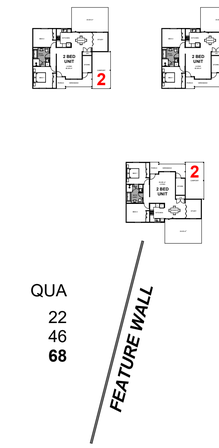
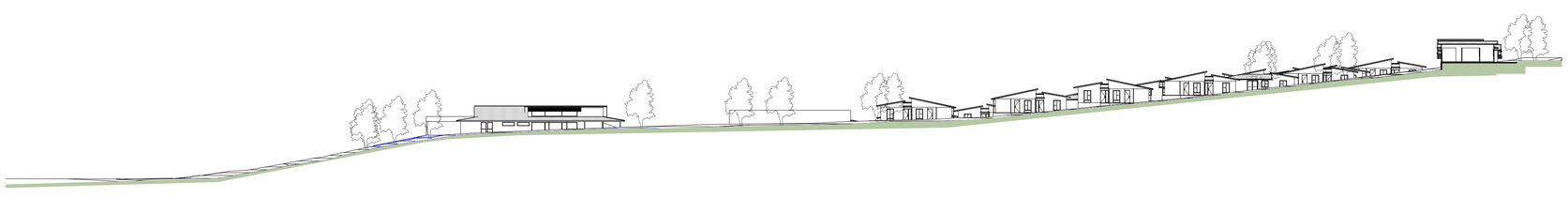
PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

UNITS	QUA
1 BED + STUDY	22
2 BED + STUDY	46
TOTAL UNITS	**68**



LAYOUT PLAN
1:500



SITE SECTION A:A
1:500 Sk1 & Sk2

SUNSET RETREAT

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PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

VERSION 6

TITLE	GROUND FLOOR PLAN		
SCALE	1:500	WORK	17-110
PLOT	19.10.2018		
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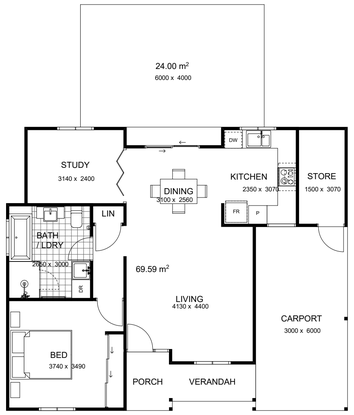
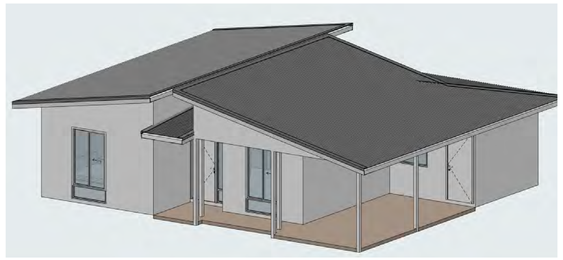
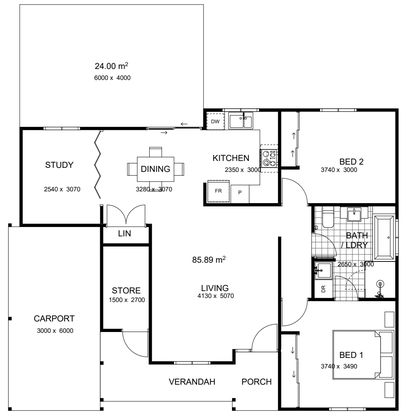




1 BED UNIT FLOOR PLAN
SCALE 1:100



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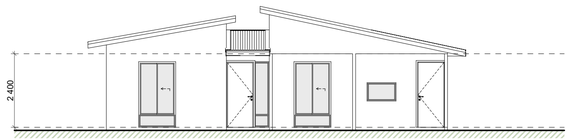
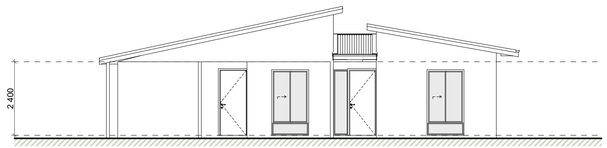


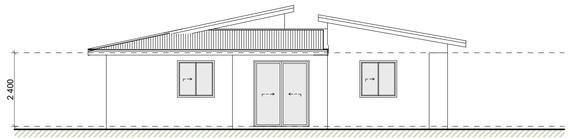
FRONT ELEVATION
SCALE 1:100



FRONT ELEVATION
SCALE 1:100

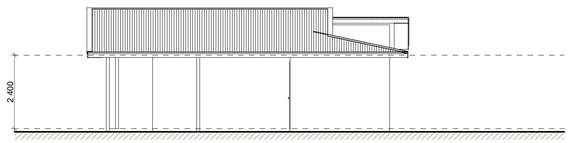
SIDE ELEVATION
SCALE 1:100

SIDE ELEVATION
SCALE 1:100



REAR ELEVATION
SCALE 1:100

REAR ELEVATION
SCALE 1:100



SIDE ELEVATION
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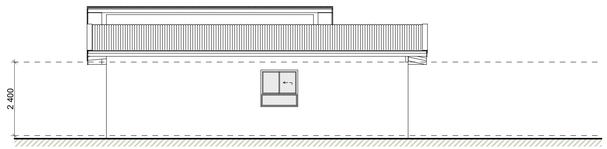

SIDE ELEVATION
SCALE 1:100

SUNSET RETREAT

VERSION 6

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PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

TITLE	UNITS FLOOR PLAN & ELEVATIONS		
SCALE	1:100	WORK	17-110
PLOT	19.10.2018		
DATE	16.03.2018	FILE	RET_022_zh.pln
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DRAWN	zh		
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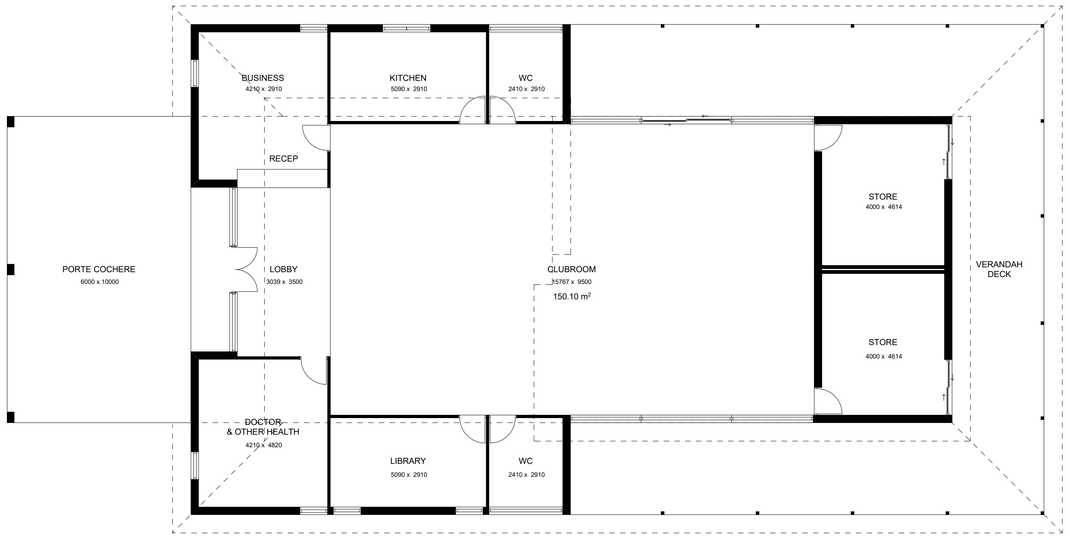
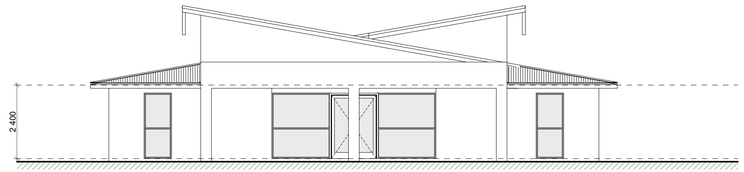
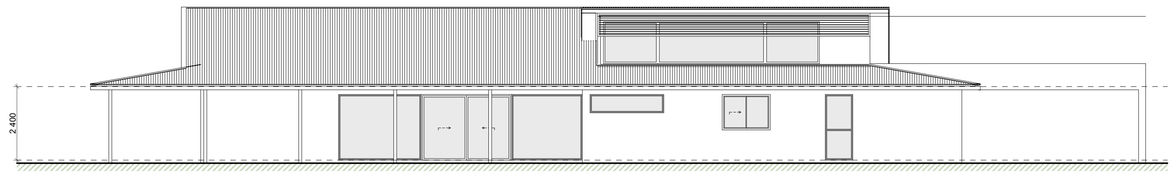


CLUB HOUSE FLOOR PLAN
SCALE 1:100

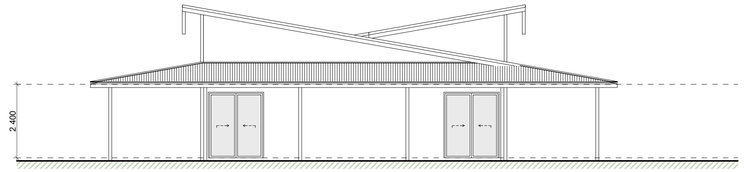
N



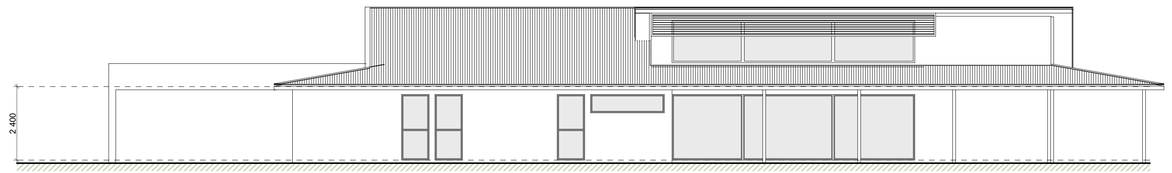
WEST ELEVATION
SCALE 1:100



NORTH ELEVATION
SCALE 1:100



EAST ELEVATION
SCALE 1:100



SOUTH ELEVATION
SCALE 1:100

SUNSET RETREAT

VERSION 6

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PROPOSED DEVELOPMENT
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For MIRAUDO CONSTRUCTION

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AUTHOR	eb
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E braudearchitects@iinet.net.au
ABN 87 064 182 547

NOTE:
BIOMAX
WASTEWATER RECYCLING
SYSTEM
TANK LOCATION

SUNSET RETREAT

BRAUDE
ARCHITECTS
PTY. LTD.
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ABN 87 064 182 547

PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

VERSION 6

TITLE	SITE PLAN TANK LOCATIONS
SCALE	1:500
WORK	17-110
PLOT	19.10.2018
DATE	16.03.2018
FILE	RET_022_zh.pln
PAPER	A1
AUTHOR	eb
DRAWING	SK 5
REV	
DRAWN	zh
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ABN 87 064 182 547

LOCATION	AREA
A	=168m²
B	=289m²
C	=1200m²
D	=539m²
E	=450m²
F	=452m²
G	=451m²
H	=595m²
I	=264m²
J	=432m²
K	=209m²
L	=396m²
M	=115m²
N	=123m²
O	=590m²
TOTAL:	6273m²

SUNSET RETREAT

VERSION 6

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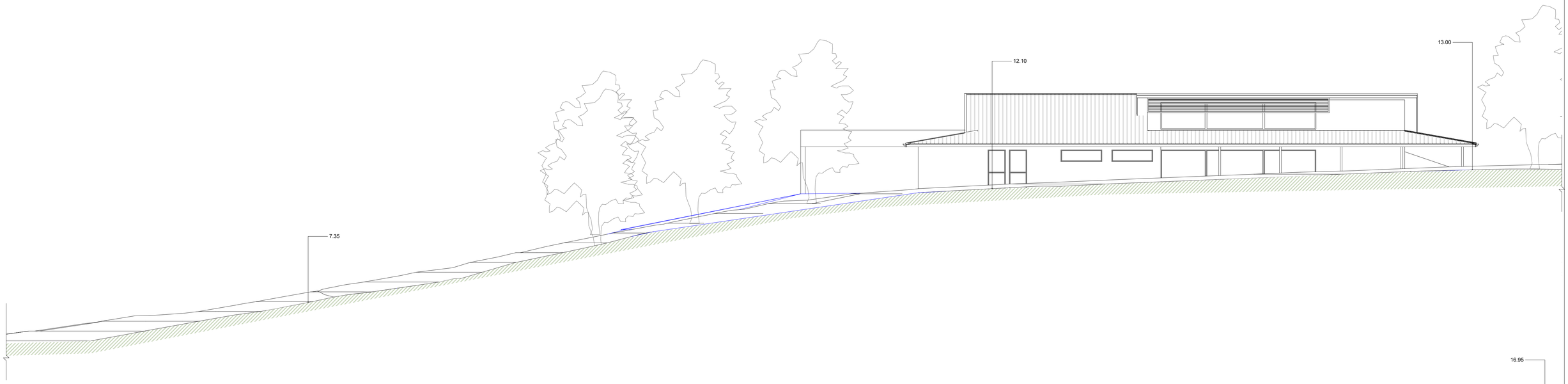
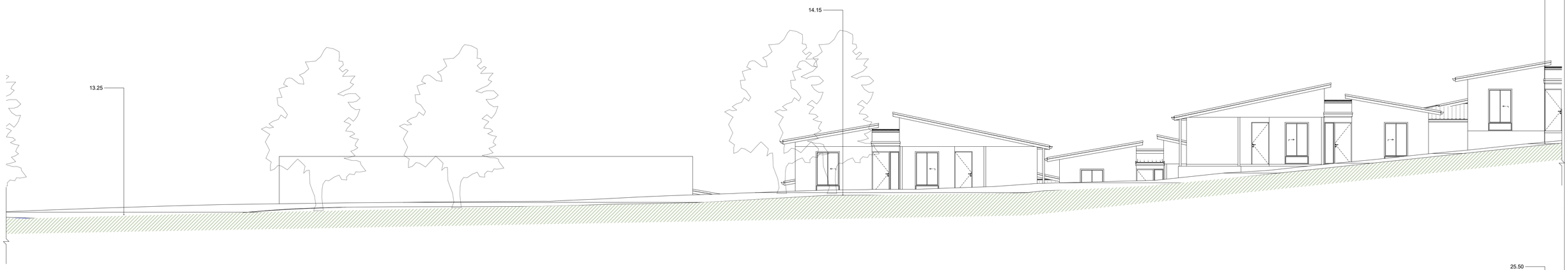
ABN 87 064 182 547

PROPOSED DEVELOPMENT
At Lots 13 & 2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

RECREATION AREA SITE PLAN

Scale	1:500
Work	17-110
Plot	19.10.2018
Date	16.03.2018
File	RET_022_zh.pln
Paper	A1
Author	eb
Drawn	zh
Drawing	SK 6





SITE SECTION A:A
1:100 Sk1 & Sk2

SUNSET RETREAT

VERSION 6

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M 04 0827 4556
E braudearchitects@iinet.net.au
ABN 87 064 182 547

PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

TITLE	SITE SECTION		
SCALE	1:500	WORK 17-110	PLOT 19.10.2018
DATE	16.03.2018	FILE RET_022_zh.pln	PAPER A1
AUTHOR	eb	DRAWING	REV
DRAWN	zh	SK 7	
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VIEW FROM SOUTH-WEST

VIEW FROM SOUTH-EAST

VIEW FROM NORTH-WEST

VIEW FROM EAST

VIEW FROM WEST

SUNSET RETREAT

VERSION 6

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E braudearchitects@iinet.net.au
ABN 87 064 382 547

PROPOSED DEVELOPMENT
At Lots 13 &2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

TITLE	PERSPECTIVES		
SCALE		WORK 17-110	PLOT 11.12.2018
DATE	16.03.2018	FILE RET_022_zh.pln	PAPER A1
AUTHOR	eb	DRAWING	REV
DRAWN	zh	SK 8	
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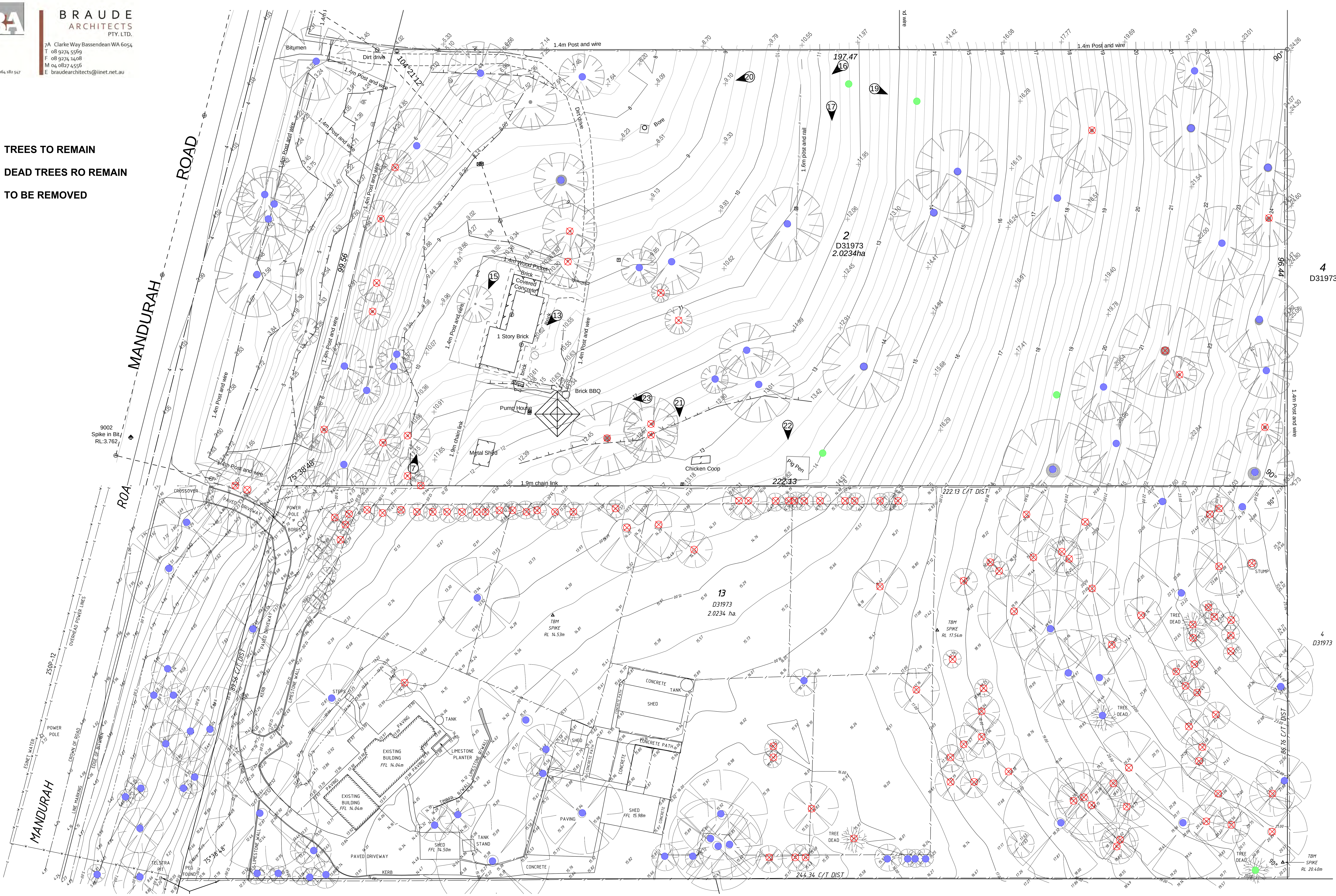
ABN 87 064 182 547

- TREES TO REMAIN
- DEAD TREES RO REMAIN
- TO BE REMOVED


MANDURAH ROAD
D31973
2.0234ha
13
D31973
2.0234 ha.
4
D31973
1 Story Brick
Brick BBQ
Pump House
Metal Shed
Chicken Coop
Pig Pen
Bore
1.4m Post and wire
1.6m post and rail
1.9m chain link
Dirt drive
Bitumen
9002
Spike in Bit
RL:3.762
197.47
222.13
99.56
96.44
104°21'12"
75°38'48"
222.13 C/T DIST
244.34 C/T DIST
89.56 C/T DIST
86.76 C/T DIST
EXISTING BUILDING
FFL 14.04m
CONCRETE TANK
SHED
CONCRETE PATH
LIMESTONE PLANTER
PAVED DRIVEWAY
KERB
TBM SPIKE RL 14.53m
TBM SPIKE RL 17.54m
TBM SPIKE RL 20.40m
TREE DEAD
STUMP
POWER POLE
TELSTRA PIT
OVERHEAD POWER LINES
CROSSOVER

N

SUNSET RETREAT

VERSION 6

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T 08 9274 5569
F 08 9274 1408
M 04 0827 4556
E braudearchitects@iinet.net.au
ABN 87 064 182 547

PROPOSED DEVELOPMENT
At Lots 13 & 2 Mandurah Rd BALDIVIS
For MIRAUDO CONSTRUCTION

TITLE	SURVEY PLAN				
SCALE	1:500	WORK	17-110	PLOT	19.10.2018
DATE	16.03.2018	FILE	RET_022_zh.pln	PAPER	A1
AUTHOR	eb	DRAWING	SK 9	REV	
DRAWN	zh				
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APPLICATION FOR DEVELOPMENT APPROVAL

OWNER DETAILS

Name : Miravdo Constructions & Antonietta + Vittorio Miravdo

ABN (if applicable) _____

Address : 87 Bateman Road

Mount Pleasant Postcode: 6153

Phone: Work: _____ Home: _____ Mobile: 0414 286 213

Fax: _____ Email: _____

Contact Person for correspondence: Vic Miravdo

Signature V. Miravdo Date 22/6/2018

Signature A. Miravdo Date 22/6/2018

The signature of the owner(s) is required on all applications. This application will not proceed without that signature. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 clause 62(2).

APPLICANT DETAILS (if different from owner)

Name: Urbanista Town Planning

Address: 231 Bulwer Street

Perth Postcode 6000

Phone: Work: 6444 9171 Home: _____ Mobile 0403 911 329

Fax: _____ Email: _____

Contact person for correspondence: Bianca Sandri

The information and plans provided with this application may be made available by the City of Rockingham for public viewing in connection with the application. Yes ☐ No ☐

Signature: _____ Date: 22/6/2018

PROPERTY DETAILS

Lot No. 2 + 13 House/ Street No. 1447 + 1457 Street Name Mandurah Road

Suburb Baldivis Nearest Street Intersection Outridge Road

Title Encumbrances (eg. Easements, Restrictive Covenants) NA

Certificate of Title Vol. No: 1447 – 1307 / 1457 – 2034 Folio 197 / 636 Diagram/Plan No: 31973 / 31973

PROPOSED DEVELOPMENT

Nature of development: Works ☐

Use ☐

Works and Use ☑

Is an exemption from development claimed for part of the development? Yes ☐ No ☑

If Yes, is the exemption for: Works ☐

Use ☐

Description of proposed works and/or land use: Proposed lifestyle village/ park home.

Description of exemption claimed (if relevant) _____

Nature of any existing buildings and/or land use: _____

Approximate cost of proposed development (exclusive of GST): $ 6.5 million

Estimated time of completion: 2 years

OFFICE USE ONLY

Acceptance Officer's Initials: _____ Date Received: _____

Application Reference No. _____

Parcel No. 29488 + 29587. File No. _____

Application Fee $_____ Date Sought _____ Date Received _____

Receipt No. _____ Planning Account No. 711 (Application Planning Fee)

Government of **Western Australia**
Development Assessment Panels

DAP FORM 1

Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005
Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 7, 10, 21

Application Details

To	*Name of local government and/or Western Australian Planning Commission* City of Rockingham	
Planning Scheme(s)	*Name of planning scheme(s) that applies to the prescribed land* Town Planning Scheme No. 2	
Land	*Lot number, street name, town/suburb* Lot 2 + 13 Mandurah Road, Baldivis	
Certificate of Title *(provide copy)*	*Volume Number* 1307 + 2034	*Folio* 197 + 636
	Location Number	*Plan / Diagram Number* 31973
Details of development application made to responsible authority	*Summary of Proposal* Proposed Lifestyle Village/Park home	
Development Use	*Residential / Commercial / Industrial / Rural / Mixed Use / Other* Commercial	
Estimated cost of development *(GST Exc)*	$ 6.5 million	

Part A - Acknowledgement by Applicant and Landowner

Mandatory Application	☐ I give notice that I understand that this is a mandatory Development Assessment Panel application *(regulation 5)*
Optional Application	☑ I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel *(regulation 6)*
Delegated Application	☐ I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination *(regulation 19)*

Applicant Details (to be completed and signed by applicant)

By completing this notice, I declare that all the information provided in this application is true and correct.
I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name	Bianca Sandri	
Company	Urbanista Town Planning	
Address	*Street number/PO Box number, street name, suburb, state, postcode* 231 Bulwer Street, Perth WA 6000	
Contact Details	*Email* bianca@urbanistaplanning.com.au	*Phone* 0403 911 329
Signature		*Date* 22/6/2018

Landowner Details (to be completed and signed if landowner is different from applicant) By completing this notice, I give consent to the making of this application by any authorised applicant on my behalf.		
Name	Miravdo Constructions + Vittorio + Antonietta Miravdo	
Address	*Street number/PO Box number, street name, suburb, state, postcode* 87 Bateman Road, Mount Pleasant 6153	
Contact Details	*Email*	*Phone* 0414 286 213
Signature	V. Miravdo	*Date* 22/6/2018

Part B - Acknowledgement by Local Government

Responsible Authority	☐ Local Government ☐ Western Australian Planning Commission ☐ Dual – Local Government and Western Australian Planning Commission ☐ Building Management and Works (Department of Finance) – *Public School Applications*	
Fees for applications *(DAP Regulations - Schedule 1)*	$ Amount that has been paid by the applicant $ Amount to be paid by local government *(delegated applications only - regulation 22)*	
Statutory Timeframe *(regulation 12)*	☐ 60 days (advertising not required) ☐ 90 days (advertising required or other scheme provision)	
LG Reference Number		
Name of planning officer *(Report Writer)*		
Position/Title		
Contact Details	*Email*	*Phone*
Planning Officer's Signature		*Date*

Please refer to the Development Assessment Panel's "Guidance Note: Lodging a DAP Application" for further information.

CITY OF ROCKINGHAM
RECORDED CORRESPONDENCE
RECEIVED
- 2 JUL 2018
RECORDS OFFICE
FILE | A/CARD
OFFICER | COPY

PRE LODGMENT CONSULTATION (Optional)

If you have had any pre-lodgment discussions with a City Planning Officer prior to the submission of this Development Application, please confirm the following:

Planning Officer: Neels Pretorius Date (if known) 29/9/2017

Matters Discussed Discussed the proposed land use in general.

Form of communication: Email ☑ Phone ☐ Meeting ☑ Letter ☐

Should you require further assistance, please call the City's Planning Services on 9527 0748.

URBANISTA

TOWN PLANNING

NO. 1447-1547 MANDURAH ROAD, BALDIVIS

PROPOSED LIFESTYLE VILLAGE/PARK HOME ESTATE

This report has been prepared by Urbanista Town Planning on behalf of Miraudo Constructions the owners of No. 1447-1457 (Lots 2 and 13) Mandurah Road, Baldivis.

Daniella Mrdja | Director

Urbanista Town Planning |
admin@urbanistaplanning.com.au |
231 Bulwer Street, Perth |

Document Revisions

Planning Report Revision 1 – No. 1447–1547 Mandurah Road Baldivis: Dated 22 June 2018
Planning Report Revision 2 – No. 1447–1547 Mandurah Road Baldivis: Dated 20 December 2018

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INTRODUCTION

Urbanista Town Planning have been engaged by the owners of the subject site at Lots 2 and 13, Nos. 1447 and 1457 Mandurah Road, Baldivis, to facilitate the development of a lifestyle village/park home estate. There are a number of documents, both statutory and strategic, that have been used to inform this proposal and ensure that the best outcome for all stakeholders is achieved.

The subject proposal is for the development of a 'lifestyle village/park home' which includes the construction of 67 chalets a communal clubhouse and a series of five commercial tenancies. The development also includes areas of passive and active open space.

it is considered that all relevant considerations have been addressed from both a statutory and strategic perspective and these are clearly detailed in the report below.

FIGURE 1 – SOUTH WEST FACING DEVELOPMENT PERSPECTIVE

THE SITE

The land that is the subject of this planning proposal is made up of two lots and is known as Nos. 1447 (Lot 2) and 1457 (Lot 13) Mandurah Road, Baldivis.

The total land area of the two lots is 40,467sqm with a total frontage of 189.12m to Mandurah Road to the west. Each lot is currently occupied by a residential dwelling and various outbuildings and sheds.

Within a 1km radius of the subject site and amongst several residential lots with a rural and special rural zoning, is the Vernon Arms Taverns, which is directly to the north of the site, the Free Reformed Church of Baldivis, a National Lifestyle Village and the Mother Theresa Catholic College.

FIGURE 2: AERIAL PHOTO OF SITE (SOURCE: NEARMAP)

THE PROPOSAL

The subject proposal is for the development of a 'lifestyle village/park home estate' which includes the construction of 67 chalets a communal clubhouse and a series of five commercial tenancies. The development also includes areas of passive and active open space.

The proposed 67 chalets are made up of 22 one bedroom chalets and 45 two bedroom chalets. Each of the chalets include a kitchen, dining and living area, one bathroom and laundry as well as an additional study. The chalets also include a single open carport and an outdoor alfresco area of the main living areas. A floor plan of the two chalet types are shown below.

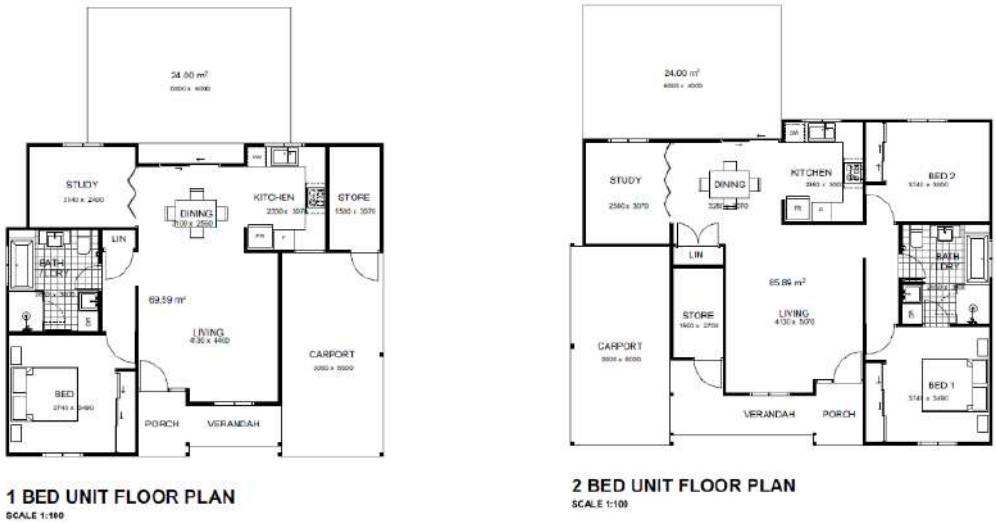


FIGURE 3: CHALET FLOOR PLANS

The proposed clubhouse is located at the entrance of the site and is made up of a communal clubroom/common area with an area of 150sqm as well as a kitchen area, library and medical consulting room and an office area with reception.

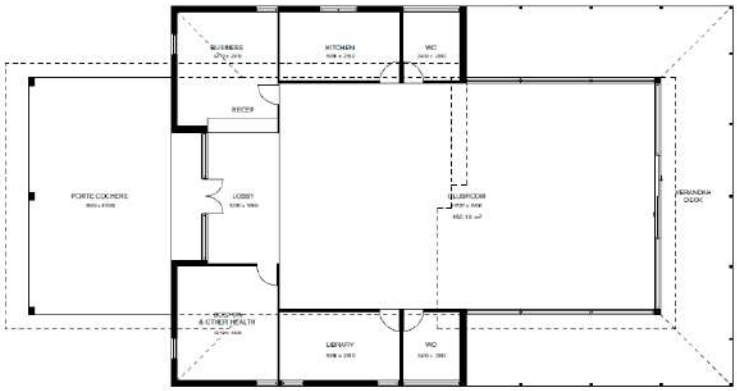


FIGURE 4: CLUBHOUSE FLOOR PLANS

In addition to the above, the proposal also includes five small commercial tenancies that will service the chalets as well as the local community. The proposed commercial tenancies have a height of two storeys with a ground and upper floor area of 73sqm each. The ground floor will contain with the business operating area and the upper floor will contain a storage area associated with the business.

The land uses of the commercial tenancies include the following:

- Convenience store;
- Take-away food;
- Medical consulting room;
- Pharmacy; and
- Hairdressing and beauty.

The commercial tenancies are adjacent to 21 car bays, which are in addition to the one car bay associated with each chalet.

The proposal also includes a number of outdoor communal areas that can be used for passive and active recreation. There is a large area located towards the centre of the site that will be used as a communal vegetable garden for the residents of the chalets. Within the active open space area, amenities such as barbeques, outdoor gyms and a small playground will be provided and within the passive open space area, it will include calming water features and seating and picnic areas.

STATUTORY PLANNING FRAMEWORK

Metropolitan Region Scheme

The subject site is zoned Rural under the Metropolitan Regional Scheme. In accordance with the WAPC's Rural Planning Guidelines, the rural zone is highly flexible and can cater for a wide range of land uses including intensive and extensive agriculture, primary production, biodiversity conservation and tourism.

Given the proposal falls under a tourism land use, it is considered that the proposed land use is consistent with the Rural zone of the Metropolitan Region Scheme.

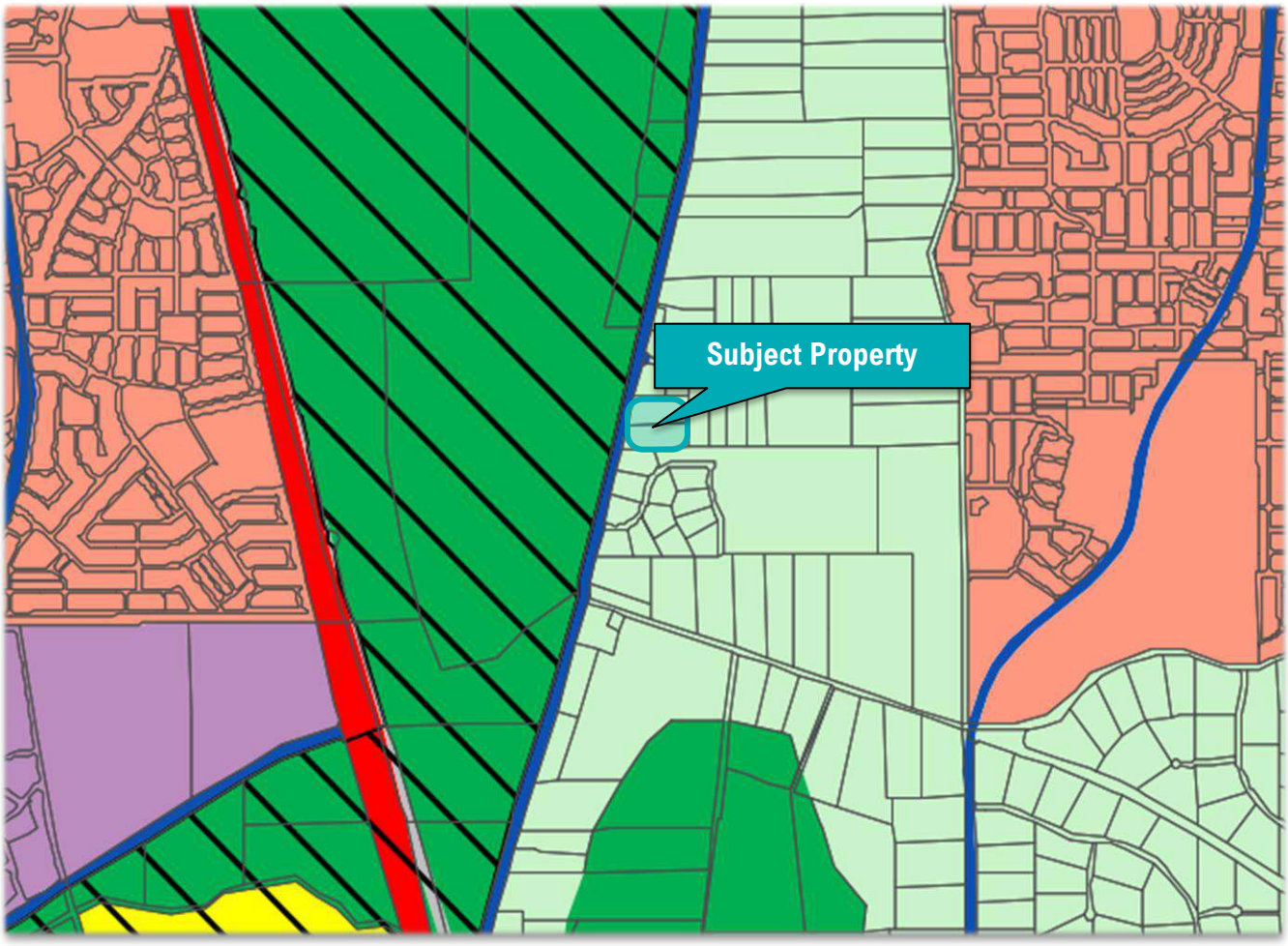


FIGURE 5: MRS ZONING MAP (SOURCE: WAPC)

State Planning Policy 2.5: Rural Planning

State Planning Policy 2.5 has been developed to protect and preserve Western Australia's rural land assets and to ensure broad compatibility between land uses.

Western Australia is a large and diverse State with regional variations of climate, economic activity, cultural values, demographic characteristics and environmental conditions. The WAPC's decisions will be guided by the need to provide economic opportunities for rural communities and to protect the State's primary production and natural resource assets. WAPC policy is to:

(a) continue to promote rural zones in schemes as flexible zones that cater for a wide range of land uses that may support primary production, regional facilities, environmental protection and cultural pursuits;

(b) support small rural communities by providing for rural enterprise zones which combine light industry and housing, provided they are carefully planned; in general proximity to urban areas; serviced; and have design features that address buffers and amenity;

(c) support small scale tourism opportunities, such as bed and breakfast, holiday house, chalet, art gallery, micro-brewery and land uses associated with primary production, within the rural zone; and

(d) recognise the differing needs of the various regions, and consider regional variations where they meet the stated objectives of this policy and are supported in strategies and schemes.

Whilst this development proposal is identified on land for Rural purposes by both the Scheme and Strategy, the intended uses are for caravan park and lifestyle development uses which are compatible uses with rural or agricultural pursuits. This development proposal has addressed the topography, environmental, servicing, landscaping and fire constraints associated with the future extension of lifestyle uses beyond the residential uses that currently exist on this site. This development proposal is consistent with the intent and purpose of this policy and the intended use will have limited to no impact on the surrounding rural lands within this locality

City of Rockingham Town Planning Scheme No. 2

Objectives of the Zone

To maintain consistency with the Metropolitan Region Scheme, the subject site is also zone 'Rural' in accordance with the City's Town Planning Scheme No. 2 (TPS2). In accordance with clause 4.11.1 of the City's TPS2, the objective of the Rural zone is as follows:

> *"The objective of the Rural Zone is to preserve land for farming and foster semi-rural development which is sympathetic to the particular characteristics of the area in which it is located, having due regard to the objectives and principles outlined in the Rural Land Strategy and supported by any other Plan or Policy that the Local Government may adopt from time to time as a guide to future development within the Zone"*

Given the proposal is consistent with the WAPC's Rural Planning Guidelines, it is considered that the proposal also meets the objectives of the City's TPS2. Notwithstanding, further information relating to the City's Rural Land Strategy is discussed below.

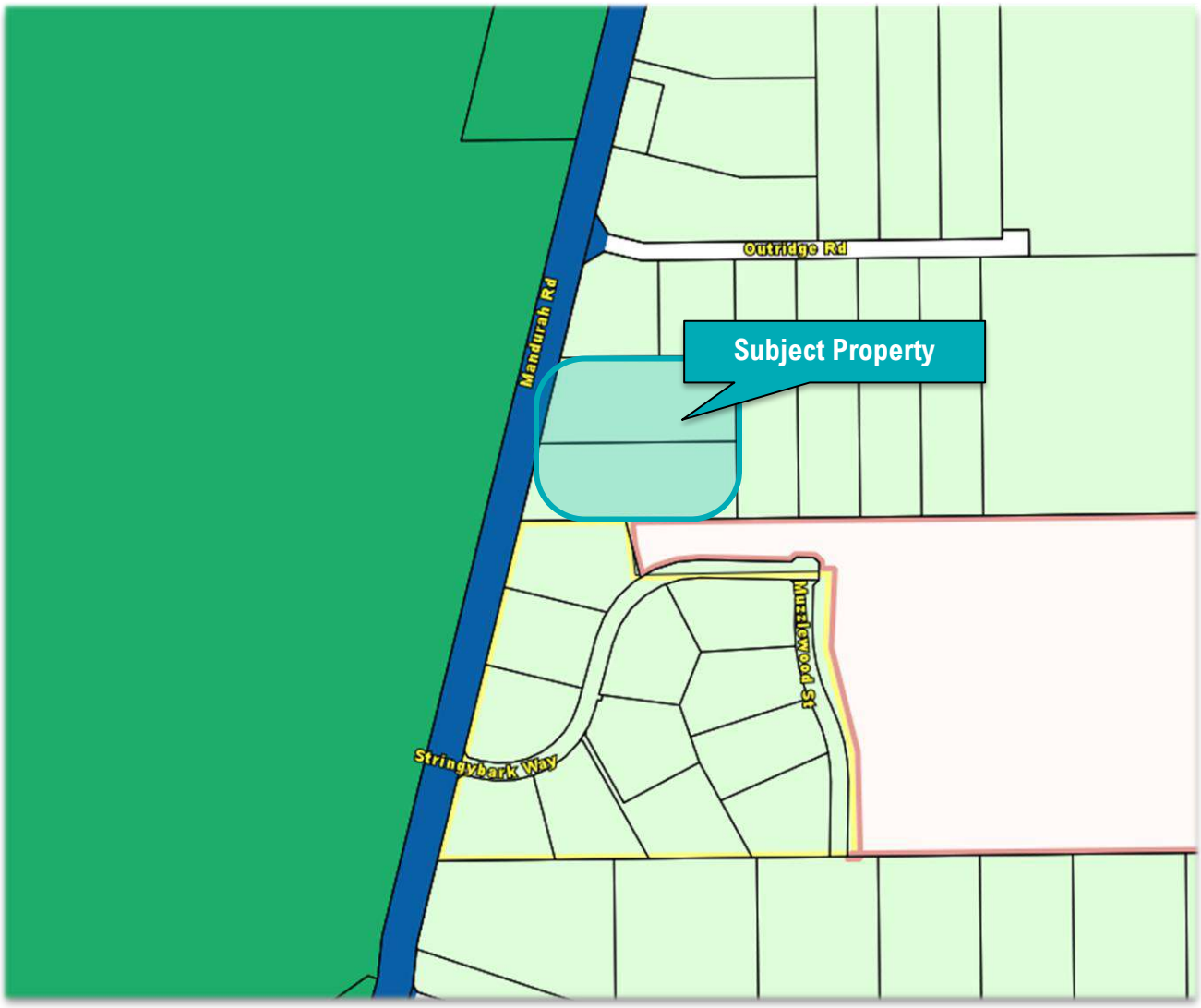


FIGURE 6: TOWN PLANNING SCHEME NO. 2 ZONING MAP (SOURCE: CITY OF ROCKINGHAM)

Land Use Permissibility

The City's TPS2 does not list a Lifestyle Village or a Park Home as a land use. In light of this, consideration of clause 3.2.4 of TPS 2 should be applied. Clause 3.2.4 states:

"If the use of the land for a particular purpose is not specifically mentioned in the zoning table and cannot reasonably be determined as falling within the interpretation of one of the use classes, the Local Government may:

a) determine that the use is consistent with the objectives and purpose of the particular zone and is therefore permitted;

b) determine that the proposed use may be consistent with the objectives and purposes of the particular zone and thereafter follow the advertising procedures of Clause 64 of the deemed provisions in considering an application for development approval; or

c) determine that the use is not consistent with the objectives and purposes of the particular zone and is therefore not permitted."

In assessing a proposal, consideration must be given as to whether a proposed development/use reasonably fits within an existing definition, whilst having regard to the fact that not all uses are listed, nor do all uses reasonably fit within an existing definition. In regard to this matter, in 1997 the Minister for Planning upheld an appeal against the decision to refuse planning approval of parks homes being situated on a caravan park on the basis that *"local laws relating to the control of caravan parks and camping grounds in various local government districts have not all been amended to include the term "Park Home" as distinct from the definition of Caravan .Where no such distinctions are drawn the general it is general practice to agree that park homes comply with the definition of caravan.*

On this basis it is considered that the proposed use reasonably fits within the definition of a "Caravan Park".

A "Caravan Park" is defined within TPS 2 as follows:

Caravan Park – has the same meaning as in the Caravan Parks and Camping Grounds Act 1995.

The TPS 2 definition refers to the *Caravan Parks and Camping Grounds Act 1995* which states:

"caravan park means an area of land on which caravans, or caravans and camps, are situated for habitation"

However, in accordance with the Caravan Parks and Camping Grounds Regulations 1997 (the regulations), a 'Caravan Park' is not restricted to the parking of caravans only, but also to the park home accommodation as proposed. As such the Park homes could fall under the definition of caravan park under the regulations thereby complying with the definition of caravan park under TPS 2.

With the Rural Zone a Caravan Park is an 'A' use which means that Council may at its discretion permit the use.

Setbacks

In accordance with the Rural Land Strategy, the site is located within Precinct 4A of Planning Unit No. 4. Planning Unit No. 4 is located to the east of Mandurah Road and to the west of the committed lands and future urban areas of Planning Unit No. 1. As before, the subject site is located in a Rural Zone. The following setback requirements apply as per the City of Rockingham Local Planning Policy 3.1.1 Rural Land Strategy:

- 40m to Mandurah Road;
- 10m to other lot boundaries; and
- 30m to roads created through subdivision (not applicable).

The following approximate setbacks are proposed for the development at 1447–1457 Mandurah Road, Baldivis:

- 4.8m to Mandurah Road — excluding grouped dwelling 1, the setback from Mandurah Road is 20.8m (lifestyle village grouped dwellings No. 1, 2, 12, 33, 34, 43 are within the 40m setback area);
- 3.4m to north lot boundary;
- 8.4m to south lot boundary; and
- 11.2m to east lot boundary.

The City of Rockingham Local Planning Policy 3.1.1 Rural Land Strategy outlines following objective for precinct 4:

> *The primary objective for this Planning Unit is to encourage special rural/special residential development which recognises and enhances the landscape and natural resource attributes of the unit and provides a natural viewshed to Mandurah Road and a rural context to proposed urban development to the east.*

Additionally, the City of Rockingham identifies the following objective for the Rural Zone within TPS 2.

> *The objective of the Rural Zone is to preserve land for farming and foster semi-rural development which is sympathetic to the particular characteristics of the area in which it is located, having due regard to the objectives and principles outlined in the Rural Land Strategy and supported by any other Plan or Policy that the Local Government may adopt from time to time as a guide to future development within the Zone*

The setback variations are supportable for the following reasons:

- The lesser setbacks satisfy the objectives of precinct 4 of the City of Rockingham Local Planning Policy 3.1.1, and of the Rural Zone within the City's TPS 2.
- The lesser setbacks do not impact on any views of significance.
- The setback variations maintain opportunities for passive surveillance, visual privacy for cone-of-vision areas behind setback lines and limits the visual impact of fences and lot boundary walls.

- The lesser setback will not set an undesirable precedent for lesser setbacks as it exists in a streetscape that does not contain features of heritage, streetscape or cultural significance.
- The lesser setback is not anticipated to result in a perception of adverse building bulk when viewed from the adjoining properties. The proposed grouped dwellings are single storey.
- The lesser setback does not contribute adversely to a loss of direct sun, light generally or ventilation to major openings.
- The lesser setback does not result in any new merit-based decision relating to visual privacy or visual intrusion.
- The reduced setbacks maintain sufficient area for trees and landscaping, as detailed in the attached landscaping plan.
- The proposed development minimises visual intrusion and overshadowing into adjoining lots.
- Several other lifestyle villages and comparable developments have been approved. Examples exist at 831 Mandurah Road and on Sixty Eight Road. These are both by National Lifestyle Villages. These National Lifestyle Villages developments provide very limited areas of landscaping outside of those setback areas, unlike this subject development.
- The reduced setbacks enable a reduced number of internal roads and hardscaping, by having the rear of dwellings address the lot boundaries, as opposed to road areas.
- The reduced setbacks, attributable to the rear of dwellings facing lot boundaries, enables the provision of a tighter “aged community lifestyle” development which is more walkable and attributable to creating a sense of community.
- The development proposes the retention of existing buildings and structures which are already within the setback areas and previously approved by the local government authority. A reduced setback is consistent with the established setback of this lot.

This justification for setback variations have demonstrated that the development satisfies the objectives and intent of the City’s TPS 2 and Local Planning Policies. In this instance this variation is supportable, and in exercising its discretion, the support of the City of Rockingham on this variation would therefore be welcomed.

City of Rockingham Rural Land Strategy

The City of Rockingham Rural Land Strategy provides the basis for land use planning in the rural area of the municipality. In particular is provides Council with a framework for the assessment of proposals to rezone, subdivide, manage and develop rural land in the City.

In accordance with the Rural Land Strategy, the site is located within Precinct 4A of Planning Unit No. 4. Planning Unit No. 4 is located to the east of Mandurah Road and to the west of the committed lands and future urban areas of Planning Unit No. 1. This area provides a transition between the coastal urban corridor to the west and the inland urban corridor to the east.

Planning Unit No. 4 is dominated by a series of wetlands, swamps and other low-lying areas, with the most significant wetlands being the Stakehill Swamp, which is located approximately 1km south of the subject site and the Anstey Swamp which is located approximately 4km south of the subject site.

The primary objective for this Planning Unit is to encourage special rural/special residential development which recognises and enhances the landscape and natural resource attributes of the unit and provides a natural viewshed to Mandurah Road and a rural context to proposed urban development to the east.

Precinct 4A represents the northern section of the Planning Unit where it serves as an interface between the future urban land located generally east of the ridgeline and the lake system parallel with Mandurah Road.

It is considered that the overall objectives of the City's Rural Land Strategy have been satisfied within the development of this proposed land use as the subject planning unit encourages special residential development within the area.

Planning Bulletin 49: Caravan Parks

The WAPC's Planning Bulletin 49 Caravan Parks (February 2001) provides guidance for local governments in considering the development of caravan parks. Key objectives for the development of caravan parks are:

- to provide short-term accommodation for tourists in locations which complement existing tourist and recreation facilities;
- to provide long-term accommodation for permanent residents in locations with access to services normally available to conventional residential development;
- to encourage development of caravan parks in a manner which is compatible with existing land uses, and which does not have a detrimental impact on the environment or the amenity of the locality.

The bulletin outlines that when considering locations for caravan park development, short stay sites should have good access to key tourist and cultural areas along with places of heritage and landscape significance. In addition, the bulletin also provides that long term parks that principally cater for permanent residents, should ideally be developed near areas with access to shops, schools, and public transport and community facilities.

The bulletin also includes that it should not be assumed that occupants of long term parks have access to cars and as such, a bus route linking with essential commercial, social and community services is considered essential to the site if beyond walking distances to these facilities. In addition, the facilities must also have the capacity to service the needs of the caravan park residents. Bulletin 49 –states that:

'caravan parks which are principally designed for permanent residents should be assessed in the same way as conventional residential development. They should be located in areas with access to employment, shops, schools, public transport, and community and recreation facilities.'

The subject site includes five commercial tenancies which intend to serve the day-to-day needs of the residents. However, the site is located within close proximity to several local and district shopping centres including the Warnbro Centre, Port Kennedy Centre and the Baldivis Shopping Centre.

The policy also acknowledges that development of caravan parks must take into consideration site or locational selection matters including mix of tourist and permanent accommodation, visual impact and amenity, topography, drainage, soils and vegetation, utility services, pedestrian and vehicular access and environment, setting and land capability.

Planning Bulletin 83: Planning for Tourism

The purpose of Planning Bulletin 83 is to set out the policy position of the Western Australian Planning Commission (WAPC) to guide decision making by the WAPC and local government for subdivision, development and scheme amendment proposals for tourism purposes.

The Bulletin sets out criteria for identifying tourist sites through the strategic planning framework, identifying the strategic value of existing sites and their importance to tourism development. The Local Planning Strategy detailed in section 5.2 above, clearly outlines the importance of the park through identifying it as a major tourist node.

Section 9 of the Bulletin relates to caravan parks and advises that these are specifically dealt with under Planning Bulletin 49.

Caravan Parks and Camping Grounds Regulations 1997 (W.A.)

The Caravan and Camping Regulations are relevant to the proposed redevelopment. Schedule 7 of the Regulations set out the key requirements in relation to the design, layout and function of the park. It requires all development to be in accordance the Caravan Parks and Camping Ground Regulations and sets out the key design standards as follows:

- internal roads, requiring entrance and two-way roads to be at least six metres wide and one-way roads to be at least four metres wide;
- setbacks, requiring a minimum of one metre between caravans, and between caravans and roads;
- parking, including a requirement for each site to have parking for at least one vehicle;
- internal open space, requiring at least 10 per cent of the total area of the caravan park to be open space;
- permitted buildings in caravan parks, including a manager's house, shop, restaurant and ablution facilities;
- fire-fighting equipment; and
- supply of an electricity, water and telephone service, including a requirement for each long-term site to have separate electricity meters, its own tap and telephone connections.

These requirements have been adopted for the proposed development. The key requirements of Schedule 7 that are relevant to this proposal have been summarised into a table for compliance. This is shown in Attachment 5.

The proposed redevelopment complies with all relevant provisions of the regulations that apply to this planning application.

PLANNING CONSIDERATIONS

Land Uses

The subject application is for the development of a lifestyle village/park home. Within this overarching land use lies five commercial tenancies, which are considered to serve the day-to-day needs of the residents.

In accordance with the City's TPS2 the definition of 'incidental use' is as follows:

"Incidental Use: means a premises which is ancillary and subordinate to the predominate use".

Given this above definition it is considered that the five commercial tenancies are incidental uses and therefore are not required to be assessed in accordance with the Zoning Table of the City's TPS2.

Car Parking

In accordance with the Caravan Parks and Camping Grounds Regulations, 1 car bay per 20 sites is required to be provided, with a minimum of 4 bays. The proposed lifestyle village/park home will have 67 chalets and therefore only requires 3.35 bays. Notwithstanding this, each chalet will be provided with parking for one vehicle as outlined in the plans located in Attachment 4. In addition to the one car bay per chalet, the proposal also includes 21 car bays located adjacent to the shops and club house and within the Mandurah Road street setback area.

Site Access

The subject development provides two forms of access from Mandurah Road. These access points are located approximately 100m apart and provides direct access to the club house and commercial shops. The road is proposed to be fully sealed and will provide two-way access around the facility.

Bushfire Management

A bushfire management investigation was undertaken to inform the preparation of the plan and ensure that the design took into account the matters relevant to fire management as applicable under state policy. It is noted that

the site is considered to be within a bushfire prone area and is a vulnerable land use given it is for short stay accommodation.

A Fire Consultant (Bushfire Prone Planning) was engaged to provide preliminary advice with respect to the design for improvements to the park. This included consideration of setbacks from fire risks, consideration of evacuation planning, water supplies, movement systems, compliance with the caravan and camping regulations and other typical fire management objectives. The plan was then formulated to taking into account this preliminary information and advice.

The plan has therefore been appropriately informed by technical bushfire management information in accordance with policy. A bushfire management plan has subsequently been prepared to support the proposal as required under relevant policy. This is included at Attachment 6.

CONCLUSION

This report demonstrates that the proposed redevelopment is consistent with the relevant local planning framework and Caravan and Camping Regulations.

The proposal provides 67 chalets in a lifestyle village setting, which provides alternative accommodation for the aged. The proposed introduces a number of new passive and active recreation areas to provide for a greater experience and support a more diverse demographic.

The proposal is well informed by the attached Bushfire Management Plan that demonstrates that the proposal is compliant with the relevant Regulations and Guidelines.

It is considered that the proposed redevelopment will assist in boosting resident and visitor numbers to the area and in turn increasing investment into the existing businesses and providing opportunities for new ones. It will create employment and be a major drawcard for the area. The new chalets provide residential options that can be utilised all year round again helping to establish a more sustainable economy.

Based on the above, support for this redevelopment is respectfully requested.

WESTERN AUSTRALIA

REGISTER NUMBER	
2/D31973	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
4	26/8/2015

VOLUME 1307 FOLIO 197

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 2 ON DIAGRAM 31973

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

MIRAUDO CONSTRUCTIONS PTY LTD OF 87 BATEMAN ROAD, MOUNT PLEASANT
(T N100814) REGISTERED 24/8/2015

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1307-197 (2/D31973)
PREVIOUS TITLE:	1302-807
PROPERTY STREET ADDRESS:	1447 MANDURAH RD, BALDIVIS.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ROCKINGHAM

WESTERN AUSTRALIA

REGISTER NUMBER	
13/D31973	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
2	9/5/2008

VOLUME 2034 FOLIO 636

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 13 ON DIAGRAM 31973

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ANTONIETTA MIRAUDO
VITTORIO MIRAUDO
BOTH OF 1457 MANDURAH ROAD, BALDIVIS
AS JOINT TENANTS

(T K583052) REGISTERED 1/5/2008

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

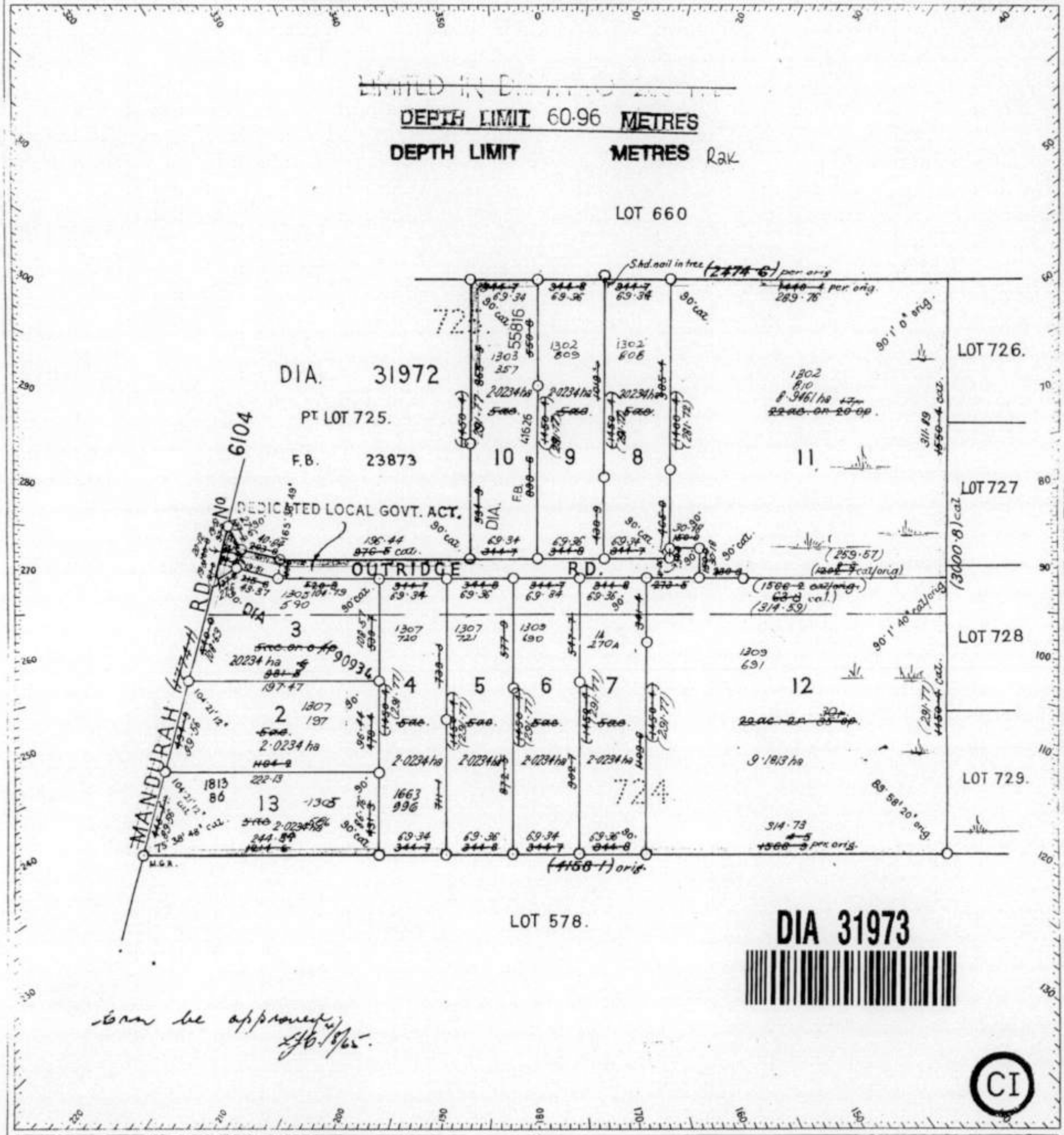
----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	2034-636 (13/D31973)
PREVIOUS TITLE:	1813-86
PROPERTY STREET ADDRESS:	1457 MANDURAH RD, BALDIVIS.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ROCKINGHAM

Town or District.	Number of Lot or Location.	Field Book.	Scale	Certificate in which Land is Vested.	Area
PEEL ESTATE	Lots 724 & Pt. Lot 725.	23873	1:4752 ~~6. Chains to one inch.~~	Vol. ~~1126~~. Fol. ~~990~~.. 1272 ~ 642	~~A. R. P. 94. 3. 7 - Green 2. 2. 23 - Brown 97 1 30 - Total~~



can be approved

CERTIFICATE

I hereby certify that this survey was performed by me personally (or under my own personal supervision, inspection and field check) in strict accordance with the Licensed Surveyors (Guidance of Surveyors) Regulations, 1961.

Date 17-6-65

Licensed Surveyor.

Approved by Town Planning Board

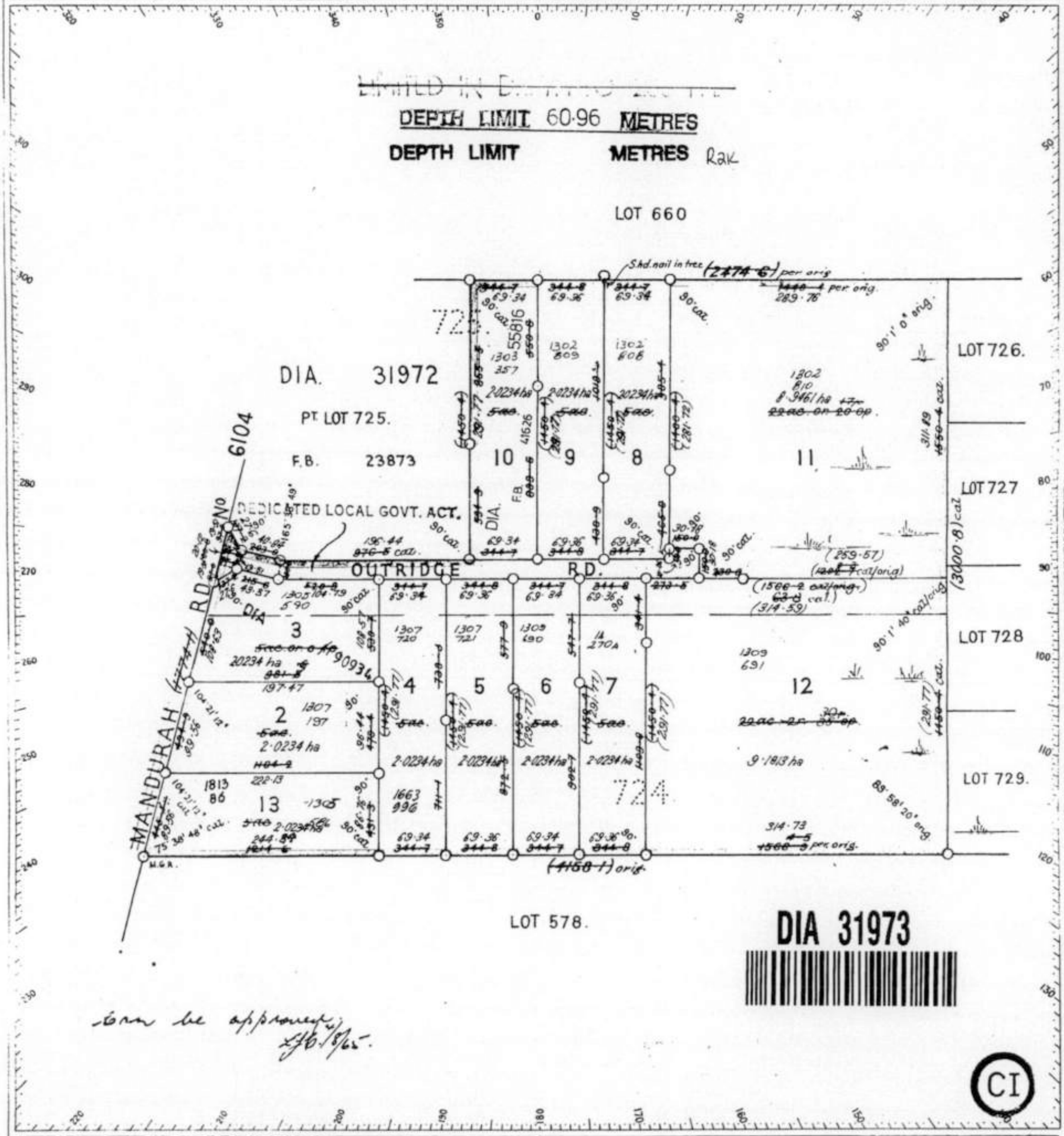
Chairman

Date

Approved	On	Registered	Diagram No.
Inspector of Plans and Surveys. Examined. Date 26-8-65	Plan Diagram Index Plan ~~8353~~ PEEL 10000 2.4		31973

DKT. DIA 22177

Town or District.	Number of Lot or Location.	Field Book.	Scale	Certificate in which Land is Vested.	Area
PEEL ESTATE	Lots 724 & Pt. Lot 725.	23873	1:4752 ~~6. Chains to one inch~~	Vol. ~~1126~~ 1272 Fol. ~~990~~ 642	~~A. R. P. 94. 3. 7 - Green 2. 2. 23 - Brown 97 1 30 - Total~~



can be approved

CERTIFICATE

I hereby certify that this survey was performed by me personally (or under my own personal supervision, inspection and field check) in strict accordance with the Licensed Surveyors (Guidance of Surveyors) Regulations, 1961.

Date 17-6-65 W. A. Morison
Licensed Surveyor.

Approved by Town Planning Board

Chairman

Date

Approved	On	Registered	Diagram No.
Inspector of Plans and Surveys	Plan		31973
Examined Date 26-8-65	Diagram		
	Index Plan 8353 PEEL 10000 24		

A. L. LAMONT CAL. BK.4
DKT DIA 22177

CARAVAN AND CAMPING REGULATIONS CHECKLIST

The provisions included below are from a design and layout perspective as required for the development application and any specific design or building requirements will be dealt with through the relevant process.

CLAUSE	PROVISION	COMMENTS	COMPLIANCE
DIVISION 2 – DISTANCES BETWEEN CARAVANS, CAMPS, BUILDINGS, ETC			
8 (3)	There is to be at least 1m between any caravan, camp, annexe or other structure or building and any facility road.	The proposed chalets are setback at a minimum distance of 3m from the facility road.	Yes.
8 (4)	There is to be at least 6m between a caravan, camp, annexe or other structure or building on a facility and any land reserved or set aside by the Government of the State for a road.	The proposed chalets are setback at a minimum distance of 23.6m from the Mandurah Road boundary.	Yes.
8 (5)	There is to be at least 1m between the boundary of a facility and a caravan, camp, annexe or other structure or building on the facility.	The proposed chalets are setback at a minimum distance of 3.4m to the north, 11.2m to the east and 8.3m to the south.	Yes.
DIVISION 3 – BUILDINGS, FENCES AND HARD STANDS			
12 (1)	A storage shed on a site is not to exceed 6sqm in area and, unless forming part of a carport, 2.1m in height.	The storage areas available to each of the chalets range from 4sqm to 4.6sqm.	Yes.
13 (1)	Every long stay site is to have either or both of the following: (a) a hard stand for a vehicle other than a caravan; (b) such additional amount of space as is approved on the side of the facility road next to the site for at least one such vehicle to park.	Each of the proposed chalets include a space for one car bay that is located directly adjacent to each chalet.	Yes.
14 (1)	A fence on a site is: (a) not to be higher than 1.2m; and (b) to be built of lightweight material or mesh.	No fencing is proposed to be constructed within the site.	Yes.
DIVISION 4 – ROADS AND PARKING			
15 (1)	A facility entrance road is to be at least 6m wide.	The entrance road to the facility is 4.1m.	No. Further amendments required.
15 (3)	A facility road which is a two-way road is to be at least 6m wide.	The facility road has a width of 4m.	No. Further amendments required.
17 (3)	A car park on a facility is to have at least one parking space per 20 caravan sites on the facility, and not less than 4 parking spaces in any event.	The proposal includes one car bay per chalet as well as 21 additional car bays which are located adjacent to the commercial tenancies at the entrance to the facility.	Yes.

CLAUSE	PROVISION	COMMENTS	COMPLIANCE
DIVISION 5 – RECREATIONAL AREAS			
18 (1)	At least 1/10 of the total area of a facility is to be recreational area.	The proposal includes 2,162.9sqm of recreational area, which equates to a total of 5.34% of the site.	No. Further amendments required.
18 (3)	At least 2/3 of the recreational area of a facility is to be in the one area.		No. Further amendments required.
18 (4)	In a facility there is to be: (a) recreational facilities for children, which are protected from the weather and enclosed as approved; and (b) a building for communal or recreational activities, as is approved.	The proposal includes a communal 'clubhouse' which will be uses for recreational activities. The proposal also included an area for active recreation which includes a children's playground, gymnasium equipment as well as barbeques and seating.	Yes.
DIVISION 6 – ABLUTION AND TOILET FACILITIES			
Each chalet includes a bathroom and toilet for the use of the residents.			
DIVISION 7 – LAUNDRY FACILITIES			
Each chalet includes a laundry for the use of the residents.			
DIVISION 8 – WASHING UP FACILITIES			
Each chalet includes a kitchen for the use of the residents.			

Miraudo Construction Pty Ltd
C/o- Braude Architects

1447-1457 Mandurah Road, BALDIVIS

Acoustic Assessment Report for DA

06 DEC 2018

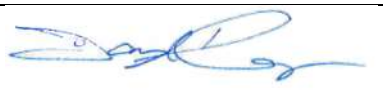
Sealhurst Pty Ltd
PO Box 862 | CANNING BRIDGE | APPLECROSS | WA 6153
ABN: 86 161 563 551
ACN: 161 563 551

Braude Architects Pty Ltd

1447-1457 Mandurah Rd, BALDIVIS WA

Acoustics - Report for Development Application

DEC 2018

QA INFORMATION	
Project No	SEA-2018-036
Project Name	1447-1457 Mandurah Rd, BALDIVIS WA
Client	Miraudo Construction Pty Ltd
Report Title	Acoustics - Report for Development Application
Filename	SEA-2018-036 RPT001 [DA]
Revision	0
Reason For Issue	Development Application Submission
Authored By	David Kudla
Authorised By	
Issue Date	06 DEC 2018

PROJECT PARTNERS

Discipline	Entity	
Client	Miraudo Construction Pty Ltd	
Architectural Design	Braude Architects Pty Ltd	
Structural Design	TBC	
Mechanical Design	TBC	
Electrical Design	TBC	
Hydraulic Design	TBC	

Report Author Contact Details:

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Director
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51 Knight Road, GNANGARA, WA 6077
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REPORT ABSTRACT

Sealhurst were commissioned by Braude Architects, on behalf of their client (the Principal) Miraudo Constructions Pty Ltd, to conduct a range of preliminary acoustic assessments regarding the forthcoming Sunset Retreat Lifestyle Resort development, addressed at 1447 & 1457 Mandurah Road, BALDIVIS, in Western Australia.

The project is at concept design stage, approaching Development Application (DA) submission, and in liaison with the City of Rockingham, the following assessments were sought:

- Vehicle noise from accessing the site for residential reasons;
- Motor noises from any air conditioning units, exhaust systems, refrigeration plant etc;
- Activities on the site producing any noise ..[…].. and compliance (eg clubhouse events, outdoor gym etc) with noise emissions criteria;
- Compliance with State Planning Policy 5.4 – Road Traffic Noise

Assessments are effectively three-fold :

The project composition as a collection of 68 x individual 1and 2-bedroom short-term rental accommodation units, precludes assessment under National Construction Code (NCC) VOL I Section F5 Sound Transmission & Insulation, (applicable to Class 2, Class 3 or Class 9c (Aged Care) dwellings); Or NCC VOL II Section 3.8.6 (Class 1 Dwellings), on the basis there are no shared separating wall or floor/ceiling constructions between individual units, as would be required to be rated under NCC requirements.

In lieu, to provide appropriate acoustic assessment, internal noise levels within each noise-sensitive short-term accommodation unit have been assessed based upon detailed spectral noise survey data, recorded over 5 consecutive days at a location representative of the nearest short-term rental accommodation units (No.s 1 and 33) to the existing Mandurah Road.

In terms of noise emissions (from AC units, exhaust systems refrigeration plant and the like, all prospective/identified Noise Emission sources in the concept scheme are given advisory compliance notes and limiting Sound Power Level (dB(A) values, to ensure compliance with the Assigned Noise Level limits under WA Environmental Protection (Noise) Regulations 1997 (Incl. Amendments).

Finally, under a separate initiative, Council have requested a compliance assessment under State Planning Policy 5.4, relating to Road Traffic noise, on the basis that this section of Mandurah Road is an extension of Mandjoogoordap Drive, and interconnecting road between Kwinana Freeway, and Mandurah Road - all of which form Primary Roads, under the [DRAFT] State Planning Policy Implementation Guidelines, September 2017.

To provide a preliminary response to this assessment requirement, Noise Exposure Forecast screening assessment and consequential noise treatments under *SPP5.4 Implementation Guidelines'* "Quiet House Specification C" have been applied where applicable, to demonstrate compliance with outdoor, and indoor Noise criteria. Note, prediction modelling in this project assumes no significant changes to the existing road layout within a 300m radius of the project site, from Mandurah Road Northern and Southern extents as view from the nearest short stay accommodation unit(s).

The cumulative requirements of each assessment are summarised and presented within our report with integrated recommendations for building envelope, roof and glazing requirements, to comply fully with the requirements of *AS2107 :2016 Acoustics: Recommended internal design sound levels and reverberation times for building interiors*; Indoor Noise criteria under *State Planning Policy 5.4 Road and Rail Noise*; And, compliance advice for noise emissions to meet *WA Environmental Protection (Noise) Regulations 1997 (Incl. Amendments)*.

EXECUTIVE SUMMARY

Sealhurst were appointed by Braude Architects, on behalf of their client, Miraudo Construction Pty Ltd to conduct a range of preliminary acoustic assessments regarding the forthcoming Sunset Retreat Lifestyle Resort development, addressed at 1447 & 1457 Mandurah Road, BALDIVIS, in Western Australia.

The existing site addresses (1447 and 1457 Mandurah Road) are semi-rural bush land lots, immediately south of the Vernon Arms Tavern and some 3.5km south west of Baldivis town centre. The site(s) are to be developed into a new "lifestyle resort", with provision of x68 individual short-stay units, a combination of 1x and 2x bedroom + study arrangements, outdoor leisure areas and club house containing BBQ area. The land currently contains several rural residential-style buildings, which drawings indicate will remain on the development as the owners' residence and will be a accompanied by a new site managers residence.

This Schematic Design report presents our review of the concept design documentation as available at 06 DEC 2018. A summary of our report findings is presented below:

ARCHITECTURAL REQUIREMENTS

BUILDING FACADE - NOISE INGRESS & BUILDING ENVELOPE CONSTRUCTION

Australian Standard *AS2107:2016* establishes internal room acoustic design criteria for assessment of anticipated internal noise levels in short-stay accommodation units. For the purposes of Schematic Design, the internal design standard for *"Hotels and motels in suburbs or near minor roads"* has been adopted for the accommodation, in lieu of any specific Sunset Retreat design standard preferences, as-yet to be determined. 30 – 35 dB(A) presents a low background noise level within each aged care unit, and will provide restful conditions in each unit.

Compliance with *AS2107:2016* internal design sound levels is considered by way of 2 noise contributions; external noise ingress, and noise from building services. Analysis has been undertaken during daytime noise conditions between 58 – 60dB(A), to meet AS2107:2016 internal design sound levels, based upon real-world noise level data, recorded on site during a 5-day survey period, 30 NOV – 05 DEC 2018.

In this circumstance, glazing rated at a minimum performance of Rw 32dB is required to achieve internal design sound levels of <35dB(A) in bedrooms and occupied spaces, with awning-type windows which were assessed during day and night time conditions. Rw 32B may be readily achieved using 6mm float single glazing in standard framing, and where operable awning windows are proposed, must be fitted with effective compressible gasket seals to all jambs.

Note, primary building construction methodology is not yet determined, as is appropriate for this stage of design - our assessment considered for alternative (typical) construction methodology(s), appropriate for this type of development. Pending selection of primary construction methodology (TBC during detailed design) we recommend a wall build-up be adopted which carries an Rw rating of Rw 55dB or above.

Lower (quieter) internal levels can be obtained at the client's discretion, typically through the specification of higher acoustic (Rw) performance wall/roof/glazing and acoustically treated ventilation openings.

BUILDING SERVICES - INTERNAL NOISE

MECHANICAL SERVICES

Internal mechanical services systems noise in this project is expected to be limited to internal apartment Air Conditioning (AC) FCUs only. Proposed AC systems' models and corresponding external condenser unit (CU) locations have yet to be selected. Based upon our experience with typical residential AC FCU units, we anticipate the internally generated noise levels from internal FCUs will be within the acceptable criteria under

AS2107:2016 using readily available standard units. To ensure this occurs, an example specification would be to select FCUs with sound pressure level ratings of <41dB(A) at 1m from the unit.

NB – the internal fan coil unit (FCU) is as distinct from the external condenser unit (CU) component of the split system –We recommend all similar CU(s) be mounted on appropriate, load rated anti-vibration mounts to avoid hum/noise disturbance into building structure from CU operations;

Specific advice re: Sound Power Level (SWL) limits are provided to ensure all AC CU system(s) are able to comply with noise emission requirements, under *WA Environmental Protection (Noise) Regulations 1997* limits.

BUILDING SERVICES & PENETRATIONS

As the principle standard for the design and construction of buildings in Australia, Section 3.8.6 of VOL II of the NCC sets out specific minimum acoustic performance criteria for shared separating construction(s) (i.e. party walls) between, and for noise control from integral building services serving adjacent Class 1 dwelling space.

However, in this project, all of the short-stay accommodation units are effectively individual dwellings, with no shared (i.e. party wall) separating constructions or shared building services. In lieu of any statutory requirements under the National Construction Code, Section 5 sets out a series of recommendations taken from the NCC, which can be applied to this project for the benefit of end-user acoustic amenity.

ENVIRONMENTAL NOISE EMISSIONS COMPLIANCE

The *WA Environmental Protection (Noise) Regulations 1997 (inc. amendments)* stands as the applicable statutory legislation covering all noise emissions from the new development. The Assigned Noise Level (ANL) limits have been determined based upon an Influencing Factor of +2, and applied at the nearest noise-sensitive receiver location, (NSR/s) identified as a residential building directly south of the proposed site resulting in ANL limits of:

- 47 dB L_{A10} during daytime periods, 0700 – 1900;
- 42 dB L_{A10} during evening periods, 1900 – 2200; And,
- 37 dB L_{A10} during night-time periods, 2200 – 0700;

The calculated ANL limits are applicable to all noise emissions – identified herein as AC CUs located on individual unit lots, clubhouse functions, outdoor gymnasium provision , and prospective wastewater treatment plant – TBC during detailed design.

STATE PLANNING POLICY 5.4

City of Rockingham, as approving Council, have requested a compliance assessment under State Planning Policy 5.4, relating to Road Traffic noise, on the basis that this section of Mandurah Road forms a listed Primary Road, under the [DRAFT] State Planning Policy Implementation Guidelines, September 2017.

To address the request, we have carried out the preliminary screening and Noise Exposure Forecast (NEF) calculation processes, and integrated the Policy requirements with a practical view of on-site noise levels, and a long-term approach to satisfying internal noise criteria in a 20-year planning horizon, as per *the Policy*.

Outdoor noise criteria for compliance is established under *the Policy* as:

- <55dB(A) during the daytime, defined as 06AM – 10PM; And
- <50dB(A) during night time hours;

The Noise Exposure Forecast (NEF) assessment predicts a daytime NEF Level of 64dB(A) at the most exposed façades of short-stay accommodation Unit No.s 1 and 33 (W façade(s)), inclusive of +2.5dB façade correction. The 20-year Forecast (NEF) level is based upon AAWT ~25,000 vehicle movements and inclusive of a 5% HGV traffic composition, which is approx.. 4 times the existing road traffic volume and flow rate.

EXECUTIVE SUMMARY

Note, NEF forecast assessment is considered to be greater (i.e. predict a higher) level of road traffic noise than might be expected using the *Policy*'s 2.5% traffic growth rate per year, over the 20-year planning horizon. Using the *Policy* growth rate, the forecast traffic growth is to an equivalent AAWT volume of 10,440 vehicle movements per day, OR a 64% increase in road traffic.

Comparison of the Forecast (NEF) Level of 64dB(A) with the current "free-field" measured site noise conditions of 60dB(A) (when inclusive of +2.5dB façade correction), the result shows a predicted increase in road transportation noise level of 2dB(A) over 20-years.

In all cases, the predicted outdoor noise level exceeds the outdoor Noise Criteria hence indoor Noise Criteria has been addressed in order to demonstrate compliance with *the Policy*, as

- <40dB(A) during the daytime hours in Living and work areas, defined as "habitable rooms"
- <35dB(A) during night time hours in Bedrooms;

A Site-Specific Noise Management Plan has been authored, in conjunction with the real world measured noise data, and an interpolation of the predicted traffic growth on Mandurah Road over a 20 year planning horizon. A summary of the noise mitigation treatment requirements are presented in the table below:

Unit	Receiver Height AGL (m)	(NEF) Level 20-Yr Planning Horizon	Daytime Outdoor Criteria <55dB(A)	Predicted Internal Noise Level <40dB(A)[1][2]	Mitigation Treatment(s)
Unit 1 W Facade	1.4m (Gnd)	64dB(A)	EXCEEDS – See Internal Noise Criteria	34.4dB(A)	Glazing acoustically- rated at Min Rw32dB Equivalent to fixed (i.e. non-operable 6mm single glazed in conjunction with Quiet House C Roof Specification and minimum Rw 55dB-rated building envelope wall construction;
Unit 33 W Facade	1.4m (Gnd)	64dB(A)	EXCEEDS – See Internal Noise Criteria	34.4dB(A)	Glazing acoustically- rated at Min Rw32dB Equivalent to fixed (i.e. non-operable 6mm single glazed in conjunction with Quiet House C Roof Specification and minimum Rw 55dB-rated building envelope wall construction;

We recommend the Site Specific Noise Management Plan recommendations be installed in their entirety, and be considered as a minimum provision.

It is anticipated these design requirements and implications will be coordinated through the design and construction phase(s) to the various responsible trades by the Managing Contractor, to ensure compliance on site in the finished installation.

CONSTRUCTION NOISE & VIBRATION

Finally, in anticipation of potential demolition and forward works on the site, Sealhurst have provided summary notes in Section 6.3 and Appendix G regarding management of noise and vibration during construction phase, to serve as preliminary guidance in terms of noise emissions during these phases. Control strategies and potential mitigation are presented for project reference and as a basis for any construction noise and vibration management plan which Council may request as the project design matures to construction phase.

[1] Internal noise levels calculated in accordance with ISO 12354:3, to 0.1dB(A), based upon typical internal finishes, with carpeted floor finish;

[2] Daytime Internal Noise Criteria applicable to Living Areas is <40dB(A); Night time Internal Noise criteria applicable to Bedroom spaces <35dB(A);

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1 INTRODUCTION

1.1 General Appreciation

Sealhurst were appointed by Braude Architects, on behalf of their client Miraudo Construction Pty Ltd to conduct a range of preliminary acoustic assessments regarding the forthcoming Lifestyle Resort development, addressed at 1447 & 1457 Mandurah Road, BALDIVIS, in Western Australia.

The existing site addresses (1447 and 1457 Mandurah Road) are semi-rural bush land lots, immediately south of the Vernon Arms Tavern and some 3.5km south west of Baldivis town centre. The site(s) are to be developed into a new "lifestyle resort", with provision of x68 individual short-stay units, a combination of 1x and 2x bedroom + study arrangements, outdoor leisure areas and club house containing BBQ area.

The land currently contains several rural residential-style buildings, which drawings indicate will remain on the development as the owners residence and will be a accompanied by a new site managers residence.

1.1.1 Current Status and Requested Acoustic Assessment(s)

The Sunset Retreat project is at concept design stage, approaching Development Application (DA) submission, and in liaison with the City of Rockingham, the following assessments were sought:

- Vehicle noise from accessing the site for residential reasons;
- Motor noises from any air conditioning units, exhaust systems, refrigeration plant etc;
- Activities on the site producing any noise ..[…].. and compliance (eg clubhouse events, outdoor gym etc) with noise emissions criteria;
- Compliance with State Planning Policy 5.4 – Road Traffic Noise

Assessments are effectively three-fold :

(i) The project composition as a collection of 68 x individual 1and 2-bedroom short-term rental accommodation units, precludes assessment under National Construction Code (NCC) VOL I Section F5 Sound Transmission & Insulation, (applicable to Class 2, Class 3 or Class 9c (Aged Care) dwellings); Or NCC VOL II Section 3.8.6 (Class 1 Dwellings), on the basis there are no shared separating wall or floor/ceiling constructions between individual units, as would be required to be rated under NCC requirements.

In lieu, to provide appropriate acoustic assessment, internal noise levels within each noise-sensitive short-term accommodation unit have been assessed based upon detailed spectral noise survey data, recorded over 5 consecutive days at a location representative of the nearest short-term rental accommodation units (No.s 1 and 33) to the existing Mandurah Road.

(ii) In terms of noise emissions (from AC units, exhaust systems refrigeration plant and the like, all prospective/identified Noise Emission sources in the concept scheme are given advisory compliance notes and limiting Sound Power Level (dB(A) values, to ensure compliance with the Assigned Noise Level limits under WA Environmental Protection (Noise) Regulations 1997 (Incl. Amendments).

(iii) Finally, under a separate initiative, Council have requested a compliance assessment under State Planning Policy 5.4, relating to Road Traffic noise, on the basis that this section of Mandurah Road is an extension of Mandjoogoordap Drive, and interconnecting road between Kwinana Freeway, and Mandurah Road - all of which form Primary Roads, under the [DRAFT] State Planning Policy Implementation Guidelines, September 2017.

To provide a preliminary response to this assessment requirement, Noise Exposure Forecast screening assessment and consequential noise treatments under *SPP5.4 Implementation Guidelines'* "Quiet House Specification C" have been applied where applicable, to demonstrate compliance with outdoor, and indoor Noise criteria.

NB - prediction modelling in this project assumes no significant changes to the existing road layout within a 300m radius of the project site, from Mandurah Road Northern and Southern extents as view from the nearest short stay accommodation unit(s).

1.1.2 Assessment Criteria

Each requested assessment is directly referenced to an underlying Australian Standard – the cumulative requirements contained thereunder is taken from a national framework of acoustic design criteria, intended to guide and facilitate noise sensitive developments to meet the neds of the building, end-users, Principal client and the surrounding environment.

- Environmental Noise Intrusion – all areas of the development will be designed to achieve internal sound levels as set out under *AS2107:2016 Acoustics: Recommended design sound levels and reverberation times for building interiors;*
- Environmental Noise Emissions – all noise emissions sources identified within the current project documentation must be demonstrated to comply with the *WA Environmental Protection (Noise) Regulations 1997 (Incl. Amendments);*
- Road traffic noise intrusion - areas deemed to be most exposed to the nearby Mandurah Road carriageway edge have been assessed under *State Planning Policy 5.4 Road and Rail Noise*, in terms of meeting the referenced Outdoor and Indoor Noise criteria;

Each assessment communicates how the proposed development has been acoustically assessed and designed for the purpose of minimising the effects of noise intrusion and/or noise emissions, sufficient to meet each applicable element of referenced design criteria.

1.1.3 Report Aims

The primary aim of this report is to presents a summary of the requested assessments, (in lieu of a specific reference Policy document/design code under City of Rockingham prescription), and present the outcomes in terms of design compliance status, or compliance advice to achieve the cumulative acoustic design and noise control criteria contained thereunder.

Our report will achieve this by presenting a technical assessment of each applicable element of the project via detailed site appraisal and current project design information. The format of the report is set out in individual sections which present each criterion, and current design compliance status (or compliance advice) for each relevant building element (e.g. building envelope, noise emissions etc).

It is intended that our report will comprise one part of the integrated DA submission of cross-disciplinary documentation, pursuant to an application for Development Application, such that the project is able to progress through the approvals phase(s) to achieve detailed design, Building Permit approval, and ultimately to Construction Phase.

1.2 Project Inputs

1.2.1 Schedule of Architectural Drawings

The assessment has been carried out based upon milestone design architectural drawings supplied by Braude Architects Pty Ltd. A schedule of these reference drawings is presented in Appendix A.1. Details are current at the date of this report (06 DEC 2018).

1.2.2 Integration of Building Services Design Elements

The completed building assessment must necessarily consider Structural, Mechanical, Electrical and Hydraulic elements as a single integrated design, able to achieve the cumulative acoustic requirements.

Where drawn documentation/design information is not yet available, each building design element is identified against the applicable criterion requirement, and compliance (or guidance advice) is presented.

2 PROJECT CONTEXT

2.1 Development Definition

2.1.1 Sunset Retreat - Proposed Development Site

The proposed development site contains 2 existing rural residential properties situated between existing residential and commercial properties directly east of Mandurah Road, BALDIVIS. The proposed site is indicated as an approximate sized 180m x 240m (approx. 10 acres) semi-rural block made up of adjacent properties running general east-west between Outridge Road, and Sixty Eight Road, running east-west some 500m south of the site.

The Said Retreat development will provide a total of 68 ground floor (22x 1-bedroom and 46x 2-bedroom) short-stay accommodation units, with individual parking bays, accessed from a shared access driveway off Mandurah Road which connects all areas of the site. In terms of construction methodology, the preferred built-form is yet to be confirmed by the principal client, however from experience we might anticipate a construction of brick or lightweight frame and appropriate cladding – TBC during detailed design.

The development site locale is (approximately) 45km south of Perth CBD, and 3.5km south west of the town centre of the suburb of Baldivis – Mandurah Rd runs north-south from its northern extent (Rockingham Rd junction) to Stakehill Rd with 1447-1457 Mandurah Road situated just south-east of Lake Walyungup. The site is ~3km south-west of Stockland Shopping Centre, which provides local amenities.

This section of Mandurah Road carries >6000 vehicle movements per annual average weekday (AAWT) and is defined under State Planning Policy 5.4 as a Primary State Road; This section of carriageway is also classified as a "Secondary Road" under *Environmental Protection (Noise) Regulations 1997 (Incl. Amendments)*, which implies road traffic (noise) as both a planning Policy and design consideration.

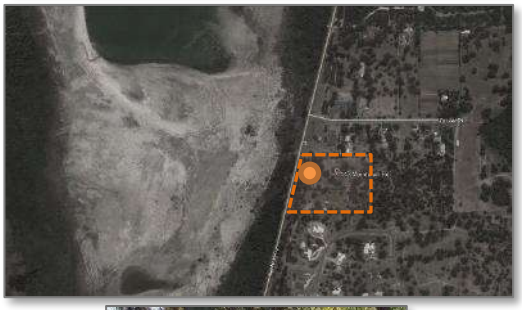
Section 3 presents details of our site assessment and objective noise data used for building envelope design.

A representation of the proposed development design and current site condition is shown in the images (right) in its immediate surroundings, and further afield its geographical context to State capital, Perth CBD.

3 EVALUATION OF LOCAL ENVIRONMENT

3.1 Existing Local Noise Climate

3.1.1 Summary of Relevant Noise Sources



A detailed noise survey and monitoring station was established on site between 30 NOV – 05 DEC 2018 in order to establish objective baseline conditions for the existing acoustic climate, and to provide objective data upon which to justify acoustic design of the built-form materials. Cascading images (right), locate the site and demonstrate our reference noise survey location, (shown orange circle) used to collect baseline noise data to inform the Planning Policy assessment, and to design noise-sensitive accommodation units for internal noise.

The noise monitoring location is approximately 25m from Mandurah Road carriageway edge, which carries an annual average weekday traffic (AAWT) flow of >6,960 vehicles flowing north south from the Rockingham Road. Road traffic noise is relatively consistent in terms of noise level, when assessed over consecutive 5-minute periods. Daytime hours were typically punctuated by individual vehicle pass-bys, HGV/truck movements, motorcycle and "hoon"-type vehicle acceleration pass-by noises.

Weekday and weekend road traffic noise onset steadily occurs between 4-5AM which implies that road traffic noise levels apply during daytime and night time periods. This is a feature of the area and is reflected in our design for bedroom envelope glazed specification. Results, summary objective values and analysis from the noise survey data is presented in Section 3.3.2.

The rural location implied birdsong and flora/fauna noise, tree rustle and associated movement noise attributable to wind gusts. Noise from the nearby Tavern was not discernible at the monitoring location.

Despite the immediate proximity of the site to Mandurah Road, the acoustic climate is fairly benign (i.e. low noise) and does not present any onerous acoustic requirements to the proposed design. Calculations are undertaken in Section 4 to demonstrate the existing noise climate can be adequately controlled by incorporating acoustic design principles and use of standard (minimum-rated) glazing units within the building envelope construction to each short-term accommodation unit.

Accompanied by careful selection of mechanical building services plant equipment for heating and cooling (TBC during detailed design), the project can be successfully integrated to engage with the local environmental noise sources whilst providing the required amenity from (and contribution to) local external noise.

3.2 Existing Environmental Noise Assessment

3.2.1 Designing for Noise Ingress

To deliver a building design able to respond to an existing or future-defined acoustic environment, reliable sound level data is crucial information, particularly in relation to noise-sensitive building uses, whereby noise ingress is a design parameter. Reliable sound data allows informed decisions to be made regarding building facade materials which will influence both project cost, and ultimately the internal acoustics of the finished space as a result of external noise climate in which the finished development will inhabit.

In order to make acoustically-compliant and cost-effective design decisions to satisfy internal noise level criteria, the building façade, (specifically building envelope materials selections), must consider and ensure appropriate acoustic ratings for walls, glazing units and ventilation openings within the primary building envelope construction. These decisions allow the building to successfully engage with the identified local environmental noise sources whilst retaining the required internal noise amenity in residential apartment areas.

Survey data can also provide useful project information in terms of noise emissions from the development (noise egress), for example plant room ventilation grilles and exhaust fan outlets to atmosphere, which serve the building.

3.2.2 Measurement Equipment Details

Attended and logged measurements were recorded using a Norsonic Nor140 Type 1 Sound Level Meter. The meter complies with all relevant specification standards for Type 1 integrating sound measurement equipment and was within a valid laboratory-calibration period at the time of survey. The meter also satisfies all relevant and applicable Australian Standards for acoustic measurement devices, including Schedule 4 clauses contained within the *Environmental Protection (Noise) Regulations 1997 (inc. amendments).*

The meter was field-calibrated before and after the measurement series, which consisted of continuous data logging with synchronised measurements stored in 5 minute intervals. All measurements were taken in accordance with the relevant guidance in *AS1055.1-1997: Acoustics – Description and Measurement of Environmental Noise, Part 1: General Procedures*.

Details of the measurement equipment are presented below:

Equipment Type/Model	Serial No.	Calibration Cert. No.	Last Calibration Date
Norsonic Nor140	1406036	2810J3578	2018-09-21
Norsonic Nor 1251	34172	647J3578	2018-09-21

Calibration certificates of this equipment are included in Appendix E of this report.

3.3 Design Sound Level Data

3.3.1 External Noise – Summary Average Design Sound Level Data

The table below presents continuous measurements taken over the course of the survey period as energetic or statistically-averaged single figure values (as appropriate) across day, evening and night time periods respectively, to generate reference levels for assessment of building facade and surrounding environment. Equivalent (L_{Aeq}), Maximum (L_{Amax}), Minimum (L_{Amin}) and relevant statistical noise indices L_{A1}, L_{A10} and L_{A90} sound level data is presented to offer an overview of the local acoustic environment.

A summary of this broadband design sound level data is presented below.

Measurement Location	Period	$L_{Aeq,T}$ (dB)	L_{A1} (dB)	L_{A10} (dB)	L_{A90} (dB)	L_{AFmax} (dB)
1457 Mandurah Road, 25m east from carriageway along west fence line of the site block, approximately 3.5m above street level.	Day time (0700-1900 hrs)	63.2	68.5	63.8	44.5	111.3
	Evening Time (1900-2200 hrs)	55.6	65.6	59.4	40.0	86.6
	Night time (2200-0700 hrs)	54.1	60.5	49.6	34.2	85.4

3.3.2 Comment on Survey Data

Measurements were recorded at a location near the southern end of Mandurah Road north of where it intersects Stakehill Road, on the existing property near the west fence line 3.5m above street level. Recorded levels are typically fairly low, at ~60dB(A) during day time periods;

Annotated 24-hour plots of noise level over the survey period are included in Appendix D.1 which identify ambient and general background noise levels, incidental "peak" occurrences from incidental noise sources such as passing cars, motorcycles, bird song and passing HGV/truck movements.

On the basis of this environment we have used a daytime noise spectrum summing to 60 dB(A) to assess the 1447-1457 Mandurah Road frontage units. Similarly, a night time noise spectrum summing to 48 dB(A) was used to determine internal noise levels to assess bedrooms, in accordance with *AS2107:2016*, based upon the upper range of representative levels observed after 22:00.

24-hour data was also used as real-world guidance during our assessment to State Planning Policy 5.4, on the basis that the Policy Noise Exposure Forecast (NEF) table defines predicted 20-year planning horizon noise levels for road traffic volumes "up to 25,000" vehicles per day, which is significantly above (over 4 times) the recorded number of vehicles at the existing site.

An interpolation exercise has therefore been carried out between real world measured data over 5 consecutive days, and the NEF forecast data to allow a fair and reasonable approach to design of noise-sensitive building envelope(s).

4 ACOUSTIC DESIGN FOR EXTERNAL NOISE

4.1 Applicable Criteria

4.1.1 AS 2107:2016 Acoustics - Design Sound Levels [...] for Building Interiors

AS 2107:2016 presents the applicable Australian Standard for sound in building interiors, and defines internal noise levels which are deemed acceptable and suitable for a range of spaces within completed buildings.

Design compliance is derived by comparison of predicted internal sound levels against the applicable *AS 2107:2016* criteria, which is provide in a range. An allowance is made for building services noise within the predicted compliance ratings for contributions from both external noise ingress AND with building services systems operating.

An extract from *AS 2107:2016* is presented below for criteria applicable to typical hotel-type accommodation spaces, which has been adopted for the design of the Sunset Retreat lifestyle resort. A range of typical spaces are outlined, with "sleeping areas" identified as the most sensitive:

4.1.2 *AS 2107:2016* Design Criteria for Short-Stay Resort Accommodation

Item	Type of Occupancy/Activity	Design sound level, $L_{Aeq,t}$ range, dB(A)	Design reverberation time (T) range, s
7	**RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)**		
	Hotels and motels –		
	Bars and lounges	< 50	0.6 to 1.0
	Conference areas –		
	Without sound reinforcement –		
	Up to 50 persons	35 to 40	Curve 1*
	From 50 to 250 persons	30 to 35	Curve 1*
	With sound reinforcement	35 to 45	Curve 1*
	Dining rooms	40 to 45	See Note 1
	Enclosed carparks	<65	–
	Foyers and recreation areas	45 to 50	See Note 1
	Kitchen, laundry and maintenance areas	<55	–
	Sleeping areas (night time) –		
	Hotels and motels in inner city areas or entertainment districts, or near major roads	35 to 40	–
	Hotels and motels in suburbs or near minor roads	30 – 35	–
	Washroom and toilets	45 to 55	–

Particular note is raised re: *AS 2107:2016* regards bedrooms, which states that sleeping areas must be assessed (i.e. internal noise levels calculated) using noise data measured (or predicted) during the night time hours of 2200-0700.

4.1.3 Internal Design Sound Level Standard Adopted for Schematic Design

For the purposes of Schematic Design, the internal design standard for *"Hotels and motels in suburbs or near minor roads"* has been adopted for all short-term accommodation units. 30 – 35 dB(A) presents a low background noise level within each accommodation unit, and will provide restful conditions in each unit.

At low background noise levels, activity noise in adjacent space(s) can become more perceptible, hence a balance for background noise, services noise, perceived privacy and quiet is to be sought in the acoustic design provision, in order to provide optimum accommodation conditions.

Secondary implications are therefore to mechanical and hydraulic building services noise, TBC during detailed design, whereby equipment location and service duct routing must be considered as well as basic operational noise levels to ensure that services noise is designed to be as low as practicable within the project budgetary and design constraints;

4.1.4 Seeking Alternative Acoustic Design Standards

Clause 5.2 of *AS 2107:2000*, applicable to residential buildings states:

> *"The design sound levels given in the Residential Criteria Table are not necessarily appropriate in all circumstances. In particular, lower noise levels may be appropriate in quiet environments or where expectations of quality are high. For example, lower design sound levels than those given as "Satisfactory" may be preferred for luxury hotels and apartments."*

The design advice and recommendations presented in our design will be calculated to meet the minimum acceptable criteria as the basis for demonstrating design compliance. It should be noted that achieving higher levels of external sound attenuation can be achieved, though may incur additional costs WITHOUT an in-depth analysis of the overall design and how to optimise the prevailing circumstances, including building services.

Sealhurst's approach is to offer a balance of the most cost-effective solutions to attain the minimum required outcomes within the known constraints, whilst delivering an acoustical design able to retain its integrity in the finished project. Advice is provided on possible optimisations, and risks associated with material substitutions. The final selection of materials will therefore be an informed choice by the Principal client, based upon a cost-versus-performance assessment of the preferred building construction methodology and resultant facade materials, to be confirmed during design development.

4.2 Compliance Calculation Methodology

The building facade performance may be calculated to respond to the particular noise sources which impinge upon the new building. This is achieved by matching appropriate sound resisting components to measured noise level data (including spectral content), hence the building facade constructions can be assessed against internal noise level design targets, and then optimised where capacity is identified, to achieve the best cost outcome whilst preserving internal noise amenity.

4.2.1 Elemental Sound Reduction Index (R) Data

Sound reduction index data for individual building elements is available from a number of sources, most commonly from laboratory-measured data or technical product information direct from manufacturers and from reputable technical literature. Field-measured data can also be used.

Data is given in the form of a sound reduction index value "R_i" (dB) for each octave band centre frequency over the range 125Hz-4kHz, along with a weighted single-figure rating value R_w (dB). Sealhurst maintain a large volume of sound reduction index data for common and specialist building elements, construction types and finishes to allow the calculation and facade optimisation process.

It should be noted that all sound reduction index data quoted as R_w is referenced to standard test panel sizes, which are typically of a minimum of $10m^2$ for wall constructions, and $2.4m^2$ for glazing panels. Building façade elements with increasingly larger surface areas may suffer from a decrease in sound transmission loss performance, specifically at low frequency due to wave-based phenomena, and therefore a higher specification may apply to achieve internal design sound levels.

4.2.2 Composite Sound Reduction Index

Design assessment is by means of a composite sound reduction index (SRI) calculation, which examines the building envelope at specific noise-sensitive points, for example a noise-receiving bedroom, and calculates sound transmission through the building envelope, bounded at the limits of the subject internal space.

The Sound Reduction Index (R_w) performance characteristics of each individual façade element (and any known penetrations) are summed together in octave bands (63Hz-4kHz), and mathematically weighted according to their relative 'elemental' façade area. The resultant figure is the composite sound reduction index (R_w) performance of the building façade and is typically dictated by the 'weakest' element of the construction, which in many cases can be glazing, ventilation louvers or other building penetrations.

Once the composite performance is calculated, representative noise spectra obtained during our site noise survey is applied to the composite building facade performance to optimise the building facade materials, identifying the minimum and/or best cost-versus-performance parameters to apply to the building in terms of the specification of the building facade's glazed elements. A more complete description of the calculation and reference standards are included in Appendix B.1 of this report.

4.2.3 Sound Reduction Index Data of Proposed Building Façade Elements

From the current (*Ref Appendix A.1*) design documentation and discussion with the project architect, we understand the typical building envelope construction format to multi-residential space(s) is not yet determined. This is appropriate for this stage of design – in lieu, from experience of this type of development design, we anticipate a structural construction build-up of double or single masonry, 140mm blockwork, or lightweight frame and appropriate cladding material build-up – TBC during detailed design.

Roof construction is expected to be profile steel sheeting over timber roof trusses, with appropriate thermal, waterproofing and insulation detailing, also TBC during detailed design.

Notwithstanding structural walls and roof construction, glazed elements in any building are an essential part of façade design, however glazing pane and frame combinations are less acoustically-robust than cavity masonry and/or appropriately clad and insulated lightweight framed construction. Logically, the (acoustic) performance of the overall facade design and consequent internal noise amenity is therefore dependent upon the selection of appropriate glazing, frame and installation detailing.

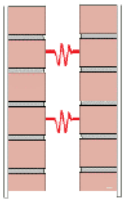
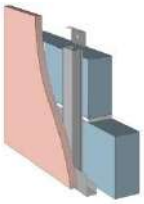
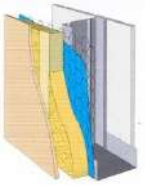
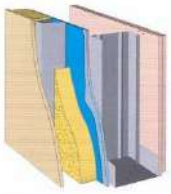
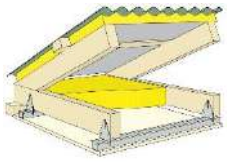
Critical to the performance of any building envelope is the specification of acoustic (Rw) performance of the glazing panes/framing system, and the integration of the glazing framing systems within surrounding building envelope structure. In this project, the inter-element specification, and subsequent installation on site will be key to achieving the required resistance to the ingress of external noise to meet the prescribed internal sound level design criteria.

4.3 Predicted Internal Noise Levels – Residential Spaces

4.3.1 Assessment of Recommended Building Envelope Specification

Given the current project status, 3 types of building envelope and roof construction build up were assessed against existing measured noise level data to determine appropriately-rated wall material and glazing elements, to achieve internal design sound levels.

The table below summarises our estimated sound transmission ratings for anticipated construction methodologies for short term accommodation units:

Element	Anticipated Construction Detail	Schematic	Estimated Rating Rw, dB	Plus Glazing
EXTERNAL WALL	**250mm CAVITY MASONRY WALL** 90/70/90 Cavity masonry, assume standard ties and no insulation		**Rw 60dB**	Affects Overall Rw
EXTERNAL WALL	**140mm BLOCKWORK, Dry-lining to internal face** 140mm dense, core filled Blockwork, (or 110mm masonry), drylined to internal room side with 13mm FR Plasterboard on stand-off wall clip frame, cavity insulation 75mm Glasswool insulation batts;		**Rw55dB**	Affects Overall Rw
EXTERNAL WALL	**LIGHTWEIGHT CLAD WALL 1** 6mm FC Sheet on top hats w/25mm insulation; 76mm steel stud to 1 x 10mm Gyproc internal wall lining		**Rw41dB**	Affects Overall Rw
EXTERNAL WALL	**LIGHTWEIGHT CLAD WALL 2** 6mm FC Sheet on top hats w/25mm insulation; 76mm steel stud to 2 x 13mm FR P/Board internal wall lining, with 75mm Glasswool insulation batts		**Rw51dB**	Affects Overall Rw
ROOF	**Profile Steel Sheet Roof** Timber Truss Structure, Thermal (75mm Anticon) and acoustic (75mm Glasswool Ceiling Batts) insulation, 1x13mm P/Board suspended ceiling on Rondo channel system;		**Rw45dB**	n/a

4.4 Building Façade Design Development Process

4.4.1 Sound Reduction Index Data of Proposed Building Façade Elements

Once the preferred construction methodology is determined, (e.g. lightweight steel or timber frame and cladding, masonry, blockwork etc) the acoustic (Rw) performance(s) of envelope walls may be assessed. Appropriately engineered blockwork, lightweight infill, masonry or masonry veneer walls can each offer significant (up to Rw60dB) performance against external sound, therefore a number of structural and non-structural infill wall options are available, to be integrated with areas of roofing and glazed façade, which will form the composite building envelope.

Glazed elements in any building are an essential part of façade design, however glazing pane and frame combinations are typically less acoustically robust than typical surrounding building façade wall construction, with typical performances around 30-35dB, and specialist glazing and frames required to achieve >Rw 37dB . A table of typical glazing and it associated acoustic (Rw) rating(s) is presented below in Section 4.4.2 for direct reference.

Logically therefore, the (acoustic) performance of the overall facade design and consequent internal noise amenity is therefore dependent upon the selection of appropriate glazing, frame and installation detailing. In this project the specification of glazing acoustic performance and subsequent integration detailing between building façade walls and glazing frame and sub-frame elements will be critical in achieving the required resistance to the ingress of external noise to meet *AS 2107:2016* internal sound level design criteria, during periods of resort occupancy.

4.4.2 Typical Glazing Acoustic (Rw) Performance versus Glazing Selections

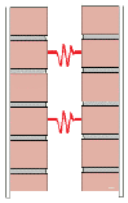
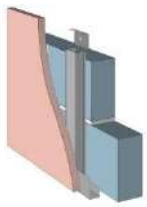
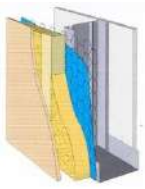
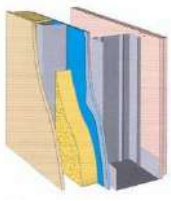
There are obvious cost implications for the choice of glazing option, plus additional considerations regards coordinating an appropriate (acoustic) selection with energy/ESD and architectural preferences. The table below presents sound reduction index (Rw) data for potential façade glazing construction elements, which may be included in the building design to control noise ingress:

Glazed Element	Sound Reduction Index (R_i)						
	R_w (dB)	Octave Band Centre Frequency (Hz)					
		125	250	500	1000	2000	4000
Standard Glazing							
6mm standard float glass	**30**	20	24	31	35	29	36
10mm standard float glass	**34**	26	27	34	35	36	44
Laminate Glazing							
6.38mm laminate glazing	**32**	20	24	31	35	33	38
8.38mm laminate glazing	**34**	23	27	32	34	35	43
10.38mm laminate glazing*	**36**	26	27	33	36	38	46
Specialist Acoustic Laminate Glazing							
6.5mm VLAM Hush acoustic laminate	**36**	23	27	32	37	39	39
8.5mm VLAM Hush acoustic laminate	**37**	24	30	34	39	40	42
Double Glazed Unit (DGU)							
10/12/6.38mm lam.	**37**	27	29	34	41	37	47

4.5 Predicted Internal Acoustic Amenity

4.5.1 Calculated Results

Our analysis is presented below in the following table details minimum R_w ratings and glazing format to achieve the prescribed internal design sound level criterion, from existing external noise sources:

Primary Construction	Internal Area	Min. Rw (dB) | Resultant Internal Level (dB(A)) | Glazing Format			
Accommodation Unit Space		LAeq (dB(A))	Predicted Internal Level	Minimum Recommended Glazing Rw rating	Equivalent Type
90/70/90 Cavity Masonry (Rw 59dB)					
	Unit 1 Bedroom 1 – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.4dB(A)**	Rw 32dB	6mm Float
	Unit 33 Bedrooms – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.1dB(A)**	Rw 32dB	6mm Float
Blockwork w/internal stud frame cladding and insulation lining (Rw 55dB)					
	Unit 1 Bedroom 1 – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.8dB(A)**	Rw 32dB	6mm Float
	Unit 33 Bedrooms – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.5 dB(A)**	Rw 32dB	6mm Float
Lightweight Cladding 1 (Rw 45dB)					
	Unit 1 Bedroom 1 – 25m from Mandurah Road carriageway edge	<35dB(A)	**39.0dB(A)**	Rw 32dB	6mm Float
	Unit 33 Bedrooms – 25m from Mandurah Road carriageway edge	<35dB(A)	**38.7dB(A)**	Rw 32dB	6mm Float
Lightweight Cladding 2 (Rw 51dB)					
	Unit 33 Bedrooms – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.7 dB(A)**	Rw 32dB	6mm Float
	Unit 33 Bedrooms – 25m from Mandurah Road carriageway edge	<35dB(A)	**34.3 dB(A)**	Rw 32dB	6mm Float

NB: Predicted internal levels are based upon soft floor coverings in bedrooms throughout; Use of hard floor coverings increases predicted reverberation time and consequently increase predicted internal noise levels by up to 2-3 dB(A).

4.5.2 Comment on Results

Analysis has been undertaken during daytime and during night time noise conditions to meet AS2107:2016 internal design sound levels, based upon real-world noise level data, recorded on site during a 5-day survey period, 30 NOV – 05 DEC 2018.

Our noise level analysis demonstrates that the general conditions are between 58 – 60dB(A) during day time hours, which represents fairly benign acoustic conditions (i.e. do not present onerous conditions) for noise-sensitive design. In this circumstance, glazing rated at a minimum performance of Rw 30dB is required to achieve internal design sound levels of <35dB(A) in bedrooms and occupied spaces, with awning-type windows which were assessed during day and night time conditions. The rated glazing is due to the occurrence of incidental vehicle noise activity after 10 PM.

Rw 30B may be readily achieved using 6mm float single glazing in standard framing, and where operable awning windows are proposed, must be fitted with effective compressible gasket seals to all jambs.

Note, Lightweight Cladding option 1 analysis demonstrated an exceedance in internal noise levels, which was not due to the glazing element, rather the wall construction build-up in this case is insufficient. We recommend one of the alternative wall build-ups be adopted, or an alternative type of construction be used, which carries an Rw rating of Rw 55dB or above. Primary construction methodology TBC during detailed design

For units with sliding door sets to private balconies, these must be fitted with 6.38mm laminate (Rw 33dB) OR 10mm float (Rw 34dB) glazed units due to the larger glazed opening (relative to the façade area), and the presence of operable seals to the door mechanism(s). In this instance, all operable jambs, head track and threshold must be fitted in robust frames, and incorporate effective, compressible gasket seals to provide an airtight fit when closed.

Lower (quieter) internal levels can be obtained at the client's discretion, typically through the specification of higher acoustic (Rw) performance glazing and acoustically treated ventilation openings.

4.5.3 Comment on Built-form to Clubhouse and Shared Amenities Buildings

Regards the clubhouse (and any shared Amenities buildings), the specification for the short-stay accommodation units represents the "highest" specification for noise sensitive areas of the development. It follows that as less sensitive areas such as the clubhouse, administrative offices, and any function spaces (TBC during detailed design), require less stringent internal noise criterion, which implies the base specification for accommodation units will suffice.

However, the Principal client is advised that event types and operational intent will determine the effectiveness and any requirements for sound rating of building envelope materials. For the purposes of DA design, where noise level limits of 75 dBA are not anticipated to be exceeded in clubhouse activities - that is fairly lively bar atmosphere, with patron dining/drinks and potential background music - there will be no impact upon nearby off-site property;

Where the Principal foresees any high noise level events, or anticipates commercial/higher of the venue, additional details will be required to fully assess. TBC during detailed design.

4.6 Building Envelope Design Considerations

4.6.1 Notes on Glazing Installation

The determination of laboratory data (R_w) for standard glazing elements includes the performance of the frame. For a large group of glazing elements, particularly domestic glazing and non-specialist applications with R_w ratings below 37dB, the sound transmission of the window frame can be considered as equal to that of the glazing panel, (assuming adequate seals) except in the case of sliding window arrangements, which exhibit significantly lower R_w performance ratings due to poor sealing around the sliding mechanism at the frame perimeter.

In order to maintain the predicted acoustic amenity, all operable windows must be fitted with good quality seals to minimize transmission of noise through the facade. Very small air gaps can be severely detrimental to the aggregate window/façade performance, resulting in non-compliant internal noise levels.

Special attention must be taken during installation of the alternative sliding door set recommended in this report to ensure they are well fitted with a robust rubber gasket type closing mechanism to avoid introducing acoustically weak transmission paths for noise to enter through the façade. External door sets and frames must be supplemented with compressible neoprene seals at both jambs, and a continuous double brush seal at the threshold and head to minimise transmission of noise into living and bedroom areas.

At the junction between the window sub-frame and glazing frame proper, **ALL** void space must be fully sealed, or the full extent of the sound transmission performance will not be realised. This can typically occur during installation of glazing sub frame installation into the structural masonry opening(s), where synthetic packers are used for levelling of the window system.

ALL voids around the packers, that is, between building envelope construction and window frame must be hand packed/stuffed tight with fibreglass insulation off cuts and fully sealed with a dense mastic bead, of minimum depth 10mm

The images right show a typical installation with packers at the head track, between sub frame and opening; And at the threshold, between frame and floor slab, as generic examples of voids to be explicitly sealed – **Note, expanding foam must not be used as an acoustic treatment under any circumstances.**

4.6.2 Flanking Transmission

Certain types of construction such as architectural cladding systems, cavity block work and particular lightweight framing constructions are susceptible to the excess ingress of noise through poor junction detailing and voids between sound attenuating elements, known as flanking transmission paths.

The preferred building methodology for this project is yet to be determined, however the desing will afford adequate resistance to the passage of sound when fully sealed and properly detailed during construction.

In order to ensure that this performance is not compromised at junctions with building penetrations, and at junctions with external cladding elements, the following measures must be taken:

- Junction detailing at window frames are stuffed with glass wool insulation off cuts and sealed with a dense mastic bead of minimum depth 10mm;
- ALL voids between building penetrations and wall systems must be packed/stuffed glass wool insulation off cuts and sealed with a dense mastic bead of minimum depth 10mm;
- Where external wall elements meet perpendicular internal and party walls, all voids/gaps must be packed/stuffed glass wool insulation off cuts and sealed with a dense mastic bead of minimum depth 10mm;
- Any structural movement joints are to be fully sealed with a flexible sealant.

4.6.3 Notes for Glazing Schedule and Drawings

Sealhurst recommend the project architect annotate building plans with the following notes regarding glazed elements installation notes to allow the builder to follow the necessary detailing.

Installing Contractor to Ensure:

1. Chosen glazing/frame combination can achieve minimum acoustic R_w rating(s);
2. All operable windows to be fitted with good quality seals, with no air gaps;
3. All glazed door sets be fitted with compressible neoprene seals at both jambs, and a continuous double brush seal at the threshold and head; and
4. All voids between cavity masonry and glazing sub-frame must be packed with dense fibreglass insulation and fully sealed with dense mastic.

Failure to correctly install and seal glazed elements, in particular glazed sliding door sets is likely to weaken the building façade design sound resistance such that it cannot achieve the specified performance, and as a result *AS2107:2000* internal design sound levels may not be met in the completed building.

4.6.4 Ventilation Openings

In some instances, ventilation grilles exhausting air to atmosphere create paths for external noise to enter the building which can negate the engineered glazing/façade wall performance if not appropriately considered during design. Ventilation openings should be located away from sensitive spaces where practicable.

Where ventilation openings enter bedrooms or living spaces, internal ductwork linings, acoustically absorptive baffles or attenuating louvre grilles may be used to ensure the building faced retains its design resistance to noise ingress.

4.7 Roof Construction

4.7.1 Noise from Falling Rain

The roof and ceiling construction(s) are yet to be confirmed. A common issue with lightweight profile steel roof sheeting systems over framing is the acoustic response to excitation from falling rain. Droplets of water impacting upon the sheet cause it to vibrate in a manner analogous to a drum membrane. Unconstrained membranic excitation of the roof sheeting can cause high levels of intrusive noise in top floor accommodation unit units during downpours, causing nuisance/annoyance and a reduction in acoustic amenity and perceived quality.

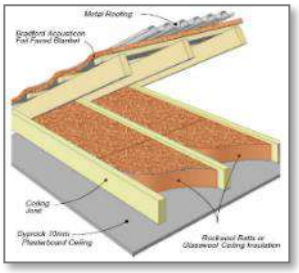
Generally speaking, rain noise is excluded from any standard classifications for environmental noise and its transitory nature and difficulty in field testing implies no fixed criteria to be achieved. However, levels as high as

70 to 80 dB L_{Aeq} can be generated during downpours - to give some context, 80dB(A) is as high as roadside noise levels, measured from the Kwinana Freeway.

4.7.2 Mitigation of Rain Noise

Where lightweight roof sheeting is installed, the issue of rain noise can be mitigated at nominal additional cost by the appropriate consideration during design of the installation of acoustic and thermal insulation layers usually already present, between critically connected roof elements.

An acoustically absorptive quilt should be installed to be laid in the ceiling void (potentially required where shared Mechanical and Hydraulic services are located, see minimum recommended services treatments detailed in Section 5.4.2) to absorb reverberant noise within roof cavities. This insulation quilt is anticipated to be coordinated into the roof construction already, providing a quietening function assisting in rain noise mitigation.



The roof sheeting and steel I-beams must be installed such to incorporate any thermal and acoustic insulation to underside of roof sheet. It is assumed that a combination of insulation in the roof space will be installed to provide the required energy efficiency/thermal rating, typically around R5.0. It should be noted that **thermal** R values do not consider sound insulation performance, however a denser insulating blanket should have a positive effect on the roof construction's ability to resist the passage of sound.

As an additional measure, resilient hangers can be used to suspend the plasterboard ceiling layer for maximum rain noise attenuation in the detail shown.

Pending final roof construction specification, appropriate detailing notes should be incorporated into the architectural Tender drawing set to ensure inclusion in both the documentation set and the pricing for Tender.

4.8 Additional Notes on Predicted Internal Noise Amenity

4.8.1 Installation Detailing

It is important to note that at the time of completion, internal noise levels measured within the completed building spaces will be a combination of external noise sources, building services operation noise and noise from adjacent units. Internal ambient conditions will ultimately depend on the quality of workmanship during construction phase and adherence to the advice and specific detailing requirements at window frame, between window frame and facade concrete walls, and at junctions between external wall elements as set out in this report.

4.8.2 Design Review, Inspection and QA

Effective site inspections and QA/checking procedures on site during construction phase are critical in ensuring the design acoustic performances are not compromised by omissions, incomplete detailing, poorly sealed junctions and interstitial spaces in construction elements or other voids gaps introduced due to site tolerances and the like.

Sealhurst recommend early site inspections be carried out during construction phase to coincide with acoustically critical installations of separating walls, floor/ceiling construction installations, glazing and window frame installations and roof construction sealing to establish and advise site staff of the standard of detailing to seek in regular day-to-day QA checks.

5 INTERNAL SOUND TRANSMISSION & INSULATION

5.1 Class 1 Residential Dwellings

5.1.1 Section 3.8.6 NCC VOL II

Section 3.8.6 of VOL II of the NCC sets out specific minimum acoustic performance criteria for shared separating construction(s) (i.e. party walls) between, and for noise control from integral building services serving adjacent Class 1 dwelling space, in order to achieve compliance with National Construction Code.

As the principle standard for the design and construction of buildings in Australia, the *National Construction Code* (*NCC*, formerly the *BCA*) defines aspects of performance applicable to each type of classification of building, depending upon its use.

However, in this project, all of the short-stay accommodation units are effectively individual dwellings, with no shared (i.e. party wall) separating constructions or shared building services. In lieu of any statutory requirements under the National Construction Code, we have set out a series of recommendations from the NCC, which can be applied to this project for the benefit of end-user acoustic amenity.

5.2 Recommendations from NCC VOL II, Section 3.8.6

The Principal is advised these are recommendations only, and do not represent acoustic design requirements. Recommendations as follows:

5.2.1 Entry Door Sets

All entry door sets to shortstay accommodation units should be capable of achieving R_w30dB or greater. This performance can typically be achieved through use of a solid core door, minimum thickness 40mm or greater, hung in a well-fitted door frame and incorporating effective compressible seals at both jambs and at the head of the frame. Brush seals can also be used at the threshold, providing the obstruction to airflow does not circumvent any relief air mechanism, which may be required as part of any mechanical ventilation strategy.

Sealhurst recommend the installation of soft close mechanisms and neoprene pads where apartment entry doors meet door frames to minimise the introduction of intrusive structure-borne noise from the closing or slamming of entry doors being propagated throughout the building.

5.2.2 Notes Regarding Soft Close Mechanisms to Kitchen Fixed Furniture

Sealhurst recommend all fixed furniture components such as kitchen tops, cupboards and drawers be fitted using isolating rubber grommet type fixings where structural connection with the wall is apparent, to further isolate transmission of impact sound from worktops into the surrounding structure. All closing cupboards and drawers should be fitted with soft-close mechanisms.

NB – isolating rubber grommet type fixings and soft close mechanisms are recommended in all kitchen joinery applications across the development. Benefits include reduced structural noise transmission from cupboard door slams, resulting in an improved sense of privacy, coupled with an increase in the subjective perception of quality within apartment units.

Floor standing whitegoods such as refrigerators and dishwashers should also incorporate an isolation treatment. Fitting rubber castor cups underneath the feet of these items will reduce the direct transmission of noise and vibration into the floor.

5.2.3 Building Services Penetrations

R_w/R_w+C_{tr} values describe direct airborne sound transmission performance through a particular partition type when tested in laboratory conditions and under strictly controlled circumstances. A fully sealed, field-installed partition without penetrations may be expected to meet an equivalent field performance of separation. However, once separating walls are penetrated, the penetrations can severely undermine the design performances, and hence must be treated.

NCC Section F5 Clause FP5.6 of states:

> *"The required sound insulation of a floor or a wall must not be compromised by the incorporation or penetration of a pipe or other service element"*

Where building services penetrate acoustically-rated separating walls, each penetration should be subject to a "pack-and-seal" detail. All void space between the penetration aperture and building service must be packed with a mineral wool or glassfibre insulation batt off-cut, and sealed with a dense mastic bead of minimum depth 10mm, in all cases. This standard acoustic detail should be documented as part of the Construction Drawings documentation set. Site QA during construction phase can then be referenced to the Standard Detail to ensure weaknesses that would negate the design performance of the separating wall are not introduced on site.

5.2.4 Perimeter Perpendicular Junctions to Building Envelope Wall

All perpendicular party wall junctions to building envelope (external) walls wall must be sealed air tight with sufficient mass equivalent to abutting separating wall construction to avoid introduction of flanking sound transmission paths which would otherwise negate the airborne sound insulation performance of the installed party wall.

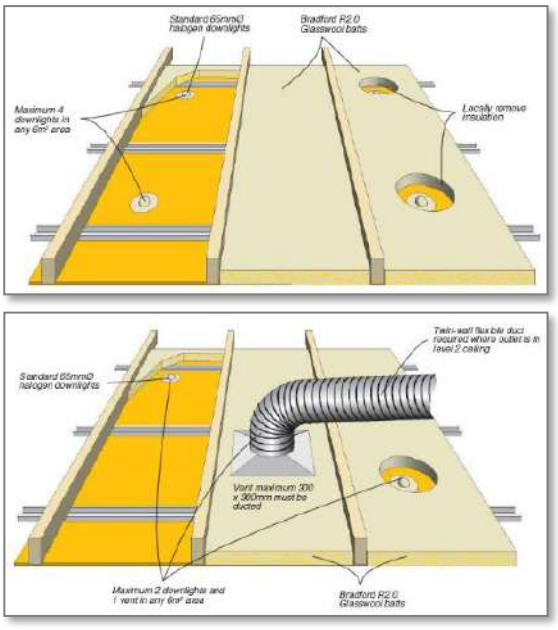
Detailing junction to ALL minimum rated wall junctions with building envelope/facade wall, for example where window sub-frame meets building aperture, MUST be considered during detailed design to ensure adequate seal and control of flanking sound transmission. See Section 0 of this report for pertinent details.

5.2.5 Installation of Downlights and Services in Acoustically Rated Bulkhead Floor/Ceilings

Where plasterboard ceilings are used over wet areas there are typically mechanical exhaust systems, hydraulic pipework and lighting installed above which must be treated appropriately to retain the acoustic performance of the ceiling layer for noise from the apartment unit above, and from resisting sound from the exhaust system and hydraulic pipework systems.

The installation diagrams are an extract from the CSR Redbook and show ideal construction arrangements whereby insulation is cut away around down lights, to a maximum number of 4 lights per 6m^2 of plasterboard ceiling area to avoid reducing the effectiveness of the plasterboard layer as an acoustic barrier.

For toilet exhaust fan (TEF) terminals, grilles are shown as having a maximum dimension of 300mm x 300mm.



5.3 Construction *"Deemed-to-Satisfy"* for Separating Wall Elements

5.3.1 Recommendations for Construction to comply with NCC Minimum Performance

Acknowledging the below are not requirements, the following construction advice represents good practice to achieve best practical noise amenity, without additional cost:

Section F5 of the referenced *NCC* states:

> *"Where masonry walls require wall ties, but are also required to be of* ***discontinuous construction****, the wall ties must be of resilient type".*

Regarding masonry and concrete slabs, *NCC Specification F5.2, Clause 2(a) Masonry* and *Clause 2(b) Concrete Slabs* states:

> *"(a)* ***Masonry*** *– Units are to be laid with all joints filled solid, including those between the masonry and any adjoining construction*
>
> *b)* ***Concrete slabs*** *– Joints between concrete slabs or panels and any adjoining construction must be filled solid"*

Regarding sheeting materials, *NCC Specification F5.2, Clause 2(c) Sheeting materials* states:

> *"(c)* ***Sheeting materials*** *–*
>
> *(i) if one layer is* ***required*** *on both sides of a wall, it must be fastened to the studs with joints staggered on opposite sides; and*
>
> *(ii) if two layers are* ***required****, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and*
>
> *(iii) joints between sheets or between sheets and any adjoining construction must be taped and filled solid. "*

Regarding timber or steel-framed construction, *NCC Specification F5.2, Clause 2(d) Timber or steel-framed construction* states:

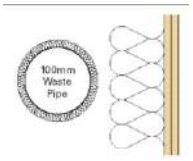
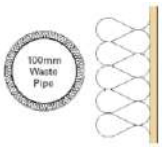
> *"(d)* ***Timber or steel-framed construction*** *– Perimeter framing members must be securely fixed to the adjoining structure and-*
>
> *(i) bedded in resilient compound*
> *(ii) the joints must be caulked so that there are no voids between the framing.*

5.4 Minimum Recommendations for Building Services Ducts

Hydraulic and mechanical services layouts will often show the intention for reticulated pipe and ductwork to be arranged behind concealed layers and routed to vertical services ducts throughout the building. From an acoustic perspective the concealing element should be specified to meet the performances/treatments prescribed in *the NCC* clauses, to provide a minimum standard for services noise:

The following table(s) present minimum rated services concealment constructions to meet the minimum standard:

5.4.1 Services Concealed in Vertical Ducts

Application	Specification	Schematic	Est. Rating (R_w+C_{tr})	NCC Compliant
Concealment of shared services riser/duct wall, or services to/from an adjacent apartment which are routed next to an adjoining apartment's **HABITABLE AREAS** (living rooms, bedrooms, etc)	Pipe lagged with Soundlag 4525C or equivalent performing pipe lagging material, mounted on anti-vibration pipe clips behind 2 x 13mm plasterboard sheet, with cavity insulation		43dB	COMPLIES
Concealment of shared services, or services to/from an adjacent apartment which are routed next to an adjoining apartment's **HABITABLE AREAS** (living rooms, bedrooms, etc)	Alternative masonry solution - Pipe lagged with Soundlag 4525C or equivalent performing pipe lagging material, mounted on anti-vibration pipe clips behind 1 x 90mm brickwork leaf with render/plaster set over		40dB	COMPLIES
Concealment of shared services riser/duct wall, or services to/from an adjacent apartment which are routed next to an adjoining apartment's **NON-HABITABLE AREAS** (wet areas etc)	Pipe lagged with Soundlag 4525C or equivalent performing pipe lagging material, mounted on anti-vibration pipe clips behind 1 x 13mm plasterboard sheet, with cavity insulation		28dB	COMPLIES

5.4.2 Services Concealed in Horizontal Ducts

Application	Specification	Schematic	Est. Rating (Rw+Ctr)	NCC Compliant
Concealment of shared services, or services to/from an adjacent apartment which are routed over an adjoining apartment's **HABITABLE AREAS** (living rooms, bedrooms etc) *Typically over habitable area ceiling spaces*	Pipe lagged with Soundlag 4525C or equivalent performing pipe lagging material, mounted on anti-vibration pipe clips behind 2 x 10mm plasterboard sheet, with cavity insulation		43dB	COMPLIES
Concealment of shared services, or services to/from an adjacent apartment which are routed over an adjoining apartment's **NON-HABITABLE AREAS** (bathrooms, laundry, WC etc) *Typically over wet area ceiling spaces*	Pipe lagged with Soundlag 4525C or equivalent performing pipe lagging material, mounted on anti-vibration pipe clips behind 10mm plasterboard sheet, with cavity insulation		28dB	COMPLIES

5.5 Ancillary Construction Requirements for Concealed Services Duct Walls

5.5.1 Recommendations for Construction to comply with NCC Minimum Performance

The *NCC* makes provision of additional criteria specific to the placement and function of mechanical building services, to preserve noise amenity for occupants. Acknowledging the below are not requirements, the following construction advice represents good practice to achieve best practical noise amenity, without additional cost:

> ***2. Construction deemed to satisfy***
>
> *(e) Services*
>
> *(i) Services must not be chased into concrete or masonry elements*
>
> *(ii) A door or access panel required to have a certain Rw+Ctr that provides access to a duct, pipe or other service must –*
>
> > *(A) not open into any* ***habitable*** *room (other than a kitchen); and*
> > *(B) be firmly fixed such that the rebate or frame is overlapped by the access panel by not less than 10mm, be fitted with a sealing gasket along all edges and be constructed of-*
> >
> > > (aa) *wood, particleboard or block board >33mm thick*
> > > (bb) *compressed fibre reinforced cement sheeting >9mm thick*
> > > (cc) *Other suitable material with mass per unit area >24.4 kgm-2*
>
> *(iii) A water supply pipe must –*
>
> > *(A) Only be installed in the cavity of a discontinuous construction; and*
> > (B) *In the case of a pipe that serves only one sole-occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit, and have a clearance of at least 10mm to the other leaf*
>
> *(iv) Electrical outlets must be offset from each other –*
>
> > *(A) In masonry walling, not less than 100mm; and*
> > *(B) In timber or steel framed walling, not less than 300mm*

5.6 Hydraulic Building Services Noise Control

5.6.1 Hydraulic Services Treatments

For the purposes of this report, "hydraulic services" refers to all piping installations relating to sewerage, storm water, hot and cold water supply and gas; "hydraulic services noise treatments" refers to "hydraulic services" which are reticulated in services ducts adjacent to individual short-stay units.

5.6.2 Use of Pipe Wrapping

All hydraulic pipe work (inclusive of down pipes, storm water pipes, hot and cold water supply pipes, drainage and foul waste pipes) reticulated within services ducts/risers/concealed ceiling voids adjacent to apartments should be wrapped in a suitable loaded vinyl or mineral wool pipe wrapping.

5.6.3 Penetrations into Services Ducts/Riser Walls

All penetrations into services duct risers, plant room walls or any other acoustically rated wall to allow pipe reticulation must be acoustically sealed so as not to introduce degradation to the rated wall acoustic performance. Minimum sealing detail requirements are to pack any gap/void around pipe/duct with fibreglass insulation batt off cuts and then seal with a 10mm dense mastic bead.

Where larger gaps are present, gaps can be filled with 2 x 13mm plasterboard sections cut to fit, and then packed with fibreglass insulation off-cuts and sealed a with a 10mm dense mastic bead.

NB - Expanding foam MUST NOT be used to seal gaps/voids in acoustically rated riser/duct walls, as this can be severely detrimental to the separation performance (R_w) of the wall.

5.6.4 Anti Vibration Pipe Clips

All pipes should be secured in cavities, voids or service risers using resilient pipe clip connections which incorporate an isolating rubber or neoprene collar, to avoid introducing pipe-borne noise into the surrounding structural elements.

5.6.5 Sound Isolation of Pumps

All pipe runs connected to hydraulic circulation pumps or similar plant equipment should be connected via flexible couplings to avoid the introduction of structure borne noise through rigid connections.

5.7 Mechanical Building Services Noise Control

5.7.1 Residential AC System FCUs

Mechanical services systems generating internal noise in this project is limited to internal apartment Air Conditioning (AC) FCUs only. At this stage of design, proposed AC system' models and specifications are yet to be selected. Based upon our experience with typical residential units, we anticipate the internally generated noise levels from internal FCUs will be within the acceptable criteria under *AS2107:2016*.

NB – the internal FCU is as distinct from the external condenser unit (CU) component of the split system - specific advice re: sound power level limits are specified to ensure all resort accommodation AC system(s) are able to meet environmental noise emissions *Regulations* limits.

In the event split system air conditioning is provided, external Condenser Units (CUs) would be anticipated to be located in close proximity to each accommodation dwelling; The CUs must also be mounted on appropriate, load rated anti-vibration mounts, to avoid hum/noise disturbance into adjacent units;

In addition to internal noise levels, the external Condenser Unit connected to the internal FCU unit must also comply with *Environmental Protection (Noise) Regulations 1997* limits at the nearest noise sensitive receiver - see Section 6.

5.7.2 Toilet and General Exhaust Fans

Noise from the operation of the bin store exhaust system, inclusive of fan, ducting, duct routing, and discharge point(s) must be designed so as not to impact the internal noise amenity of residents.

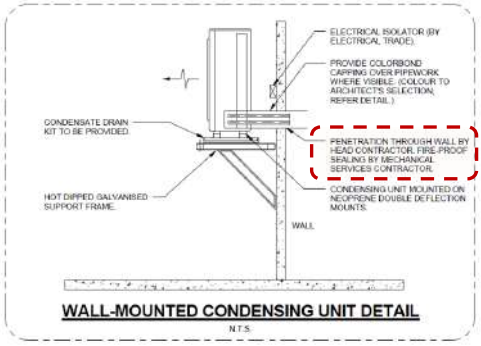
In addition to internal noise levels, any GEF fans must also comply with *Environmental Protection (Noise) Regulations 1997* limits at the nearest noise sensitive receiver - *see Section* 6.

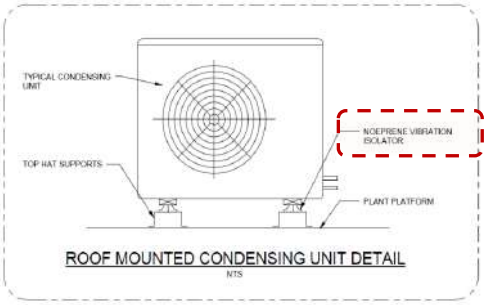
5.7.3 Anti Vibration Mountings

For the avoidance of doubt, where any CUs, or building plant generally is mounted on ground or on framed stand(s), all building plant generally are to be mounted on anti-vibration mounts, or isolation hangers, or using neoprene double deflection footing mountings, as per schematic detail (right).

Where CU units are anticipated to be fixed directly to a floor slab or underside of the concrete slab above or mounted in steel frame trusses, FCUs must be installed to include a neoprene or rubber anti vibration mounts on hanging mechanism to avoid direct transmission of fan operating motion into the structure.

It is essential these or equivalent anti vibration mounting system(s) such as those nominated by the manufacurer of the ACC units, are installed and checked on site during the construction phase. Failure to install anti vibration or isolation mountings will introduce structural vibration into the roof frame and sheeting and any connected structural elements. Loose laid waffle pad is typically not sufficient.





6 NOISE EMISSIONS TO ENVIRONMENT

6.1 Applicable Criteria

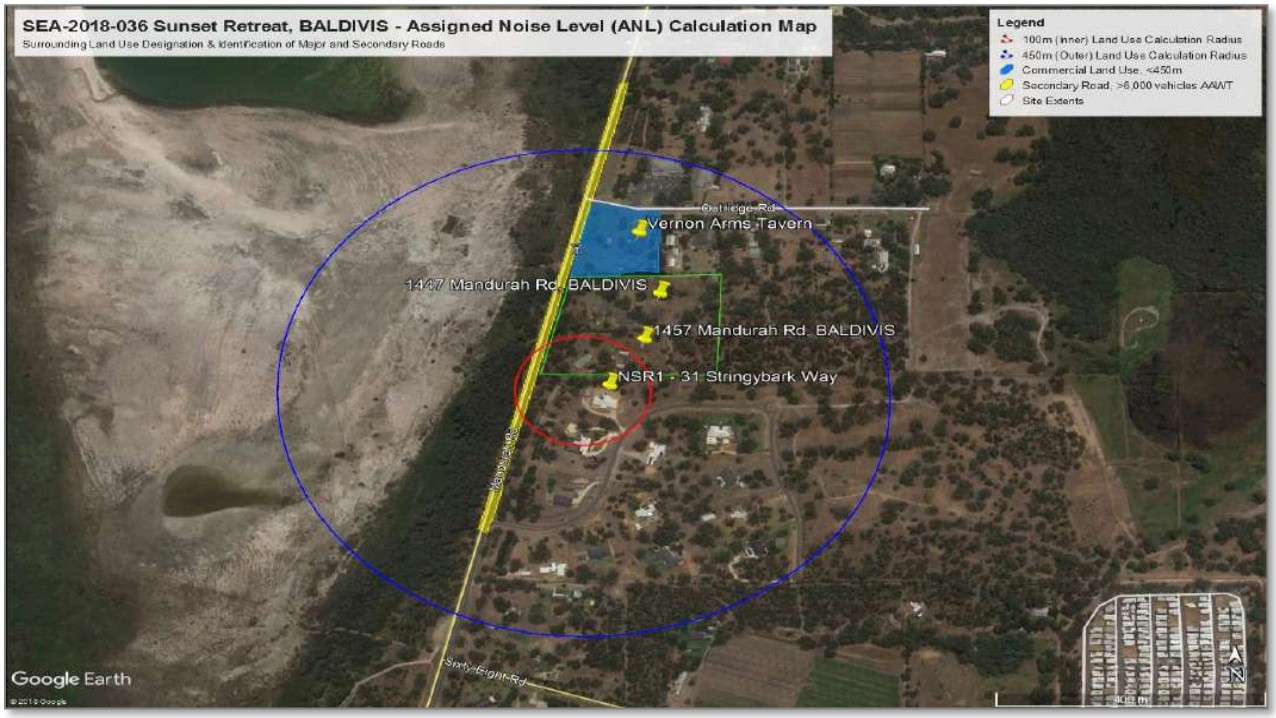
6.1.1 Environmental Protection (Noise) Regulations (1997)

The *Environmental Protection (Noise) Regulations 1997 (as amended)* is the applicable legislation governing all sources of noise which are introduced when the new building is constructed, and **applicable at the nearest noise-sensitive receiver (NSR)**.

The *Regulations* prescribe a specific methodology from which to calculate the ANL, which is based upon an appraisal of the percentage Commercial and Industrial land surrounding the nearest noise sensitive receiver (NSR), and the volume and composition of road traffic in the vicinity of 450m (outer) and 100m (inner) boundary areas surrounding the designated NSR.

6.1.2 Identification of Nearest Noise-Sensitive Receiver (NSR)

When calculating an Assigned Noise Level (ANL) limit, one must consider the nearest existing noise-sensitive receiver(s), NSR(s), as prescribed under *Schedule 1 Part C, Environmental Protection (Noise) Regulations 1997*), as the defining receiving location for noise emissions from a new development. The nearest NSR has been determined to be established residential boundaries at 31 Stringybark Way, to the immediate south. Aerial image below shows 100m and 450m calculation radii surrounding NSR 1, at 31 Stringybark Way:



6.1.3 Separation Distance to NSRs

A separation distance of approximately 25m exists between the adjacent site boundaries to adjacent established residential property at 31 Stringybark Way. This distance will be used for preliminary noise propagation calculations, until more and better particulars relating to services plant and locations are established on the site plan. At this stage more refined calculation for noise emissions can be undertaken – TBC during Detailed design.

6.1.4 Determination of Land Use

The land use determinations surrounding the proposed development site and NSR(s) is semi-rural/bush land parcels on the outskirts of BALDIVIS, with "Commercial Land Use" in the form of the Vernon Arms Tavern, immediately north of Lot 1457. The Tavern represents 0.1% land use area in the "Outer circle" (450m radii) only. No "Industrial Land Use" were identified. Where residential-only land uses are determined, the land use remains neutral in the calculation of the Assigned Noise Level.

In terms of road transport infrastructure with in the radii, Mandurah Road north of Sixty-Eight Road carries >6,000 vehicles AAWT and therefore designated a "Secondary" road, located <100m of the Inner calculation radii; Calculated Noise Emission Limits

Based upon the prescribed calculation methodology, an Influencing Factor (IF) has been calculated as +2. The Table below presents the resultant Assigned Noise Level limits, applicable at the nearest NSR:

Part of Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15m of a building directly associated with a noise sensitive use	0700 to 1900 hours Monday to Saturday	47	57	67
	0900 to 1900 hours Sundays and public holidays	42	52	67
	1900 to 2200 hours all days	42	52	57
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	37	47	57
Noise sensitive premises at locations further than 15m of a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and Utility premises	All hours	65	80	90

Appendix D presents the calculation methodology and assumptions used in our assessment.

6.1.5 Noise Source Character

In addition to the ANL limits, particular noise sources can attract additional punitive dB levies based upon the noise source characteristics. *Regulation 7* prescribes that the noise character must be "free" of annoying characteristics - specifically:

(i) tonality (e.g. whining, droning)
(ii) modulation (e.g. cyclical change in character, such as a siren)
(iii) impulsiveness (e.g. banging, thumping)

Penalties apply up to a maximum of +15dB, for tonality (+5dB), modulation (+5dB) and impulsiveness (+10dB), where the noise source is NOT music.

6.2 Identified Noise Emission Sources

6.2.1 A/C Condenser Units

Individual short-stay accommodation units are anticipated to be air-conditioned using individual split system(s) internal FCUs connected to external Condenser Units, located on each individual short-stay accommodation unit blocks. All externally located equipment locations and selections must be able to comply with the Assigned Noise Level (ANL) limits applicable under the *WA Environmental Protection (Noise) Regulations 1997* as determined in this report.

At this stage of design, preliminary selections for CU units have not yet been determined and the use of external CUs is assumed only at this stage. We are familiar with the typical range of manufacturer residential CUs and their application in this type of development. We recommend specification of external mechanical Condenser Units to have a maximum manufacturer-rated Sound Power Level (SWL) of 62 dB(A).

NB - For clarity on Sound Power Level (SWL) versus Sound Pressure Level (SPL,xm) at a given distance (e.g. 3m), please see Appendix H to ensure correct selections are sought for procurement. Where there is any doubt, please refer proposed selections to Sealhurst for review.

Residential CU units are typically broadband and steady-state in nature, hence tonality, modulation and impulsive penalties are not anticipated. Sealhurst recommend the final selections for procurement be reviewed prior to installation, in terms of octave band sound levels, to determine and any additional noise emissions sources not yet identified, be assessed to ensure the building is able to comply with the limits at all times.

6.2.2 Wastewater Recycling System

We understand there to be a current initiative for wastewater treatment plant on-site, as a sustainable development initiative. Details of the plant and its operation are not yet determined, as is appropriate for this early stage of design. Assessment of the wastewater recycling system was also excluded from the current scope.

We recommend that the system, location and operational noise characteristics be assessed in more detail as more and better particulars become known during detailed design. TBC during detailed design.

6.2.3 Clubhouse Event Noise

In order to determine a practical assessment of clubhouse Event Noise emissions, liaison with the Principal client and resort management is recommended, in terms of establishing a basis of anticipated events, i.e. and therefore anticipated or prospective noise emission profiles. Practical examples of prospective clubhouse uses would be:

- Communal or Community Events, such as crafting, art or food and drink fairs, and the like;
- Whether the venue is available for Commercial hire, as part of the Principal client's business model;
- Standard "on-site patrons only" expected use - i.e. provision of live music/entertainment;
- Any other anticipated use;

The above list is not exhaustive and demonstrates a range of uses and noise emission profiles. Specification for clubhouse/function room enclosing walls is anticipated to be equivalent to residential unit construction at this stage, to be further determined during design development, as more and better particulars become available. Specifically, through liaison with the Principal client, and the determination of intended event types for these spaces become known.

For the purposes of DA design, where noise level limits of 75 dBA are not anticipated to be exceeded in clubhouse activities - that is fairly lively bar atmosphere, with patron dining/drinks and potential background music - there will be no anticipated noise impact upon nearby off-site property;

Where the Principal foresees any high noise level events, or anticipates commercial/higher of the venue, additional details will be required to fully assess. TBC during detailed design.

6.2.4 Outdoor Gymnasium

The "Outdoor Gymnasium" is shown on concept DA drawings as passive resistance based exercises can only, and is not anticipated to generate any audible noise emissions beyond the immediate vicinity of the equipment itself. Where any up specification of the gym equipment may be proposed, or potential for outdoor fitness group classes, this may warrant review during detailed design, however the set, setting and target clientele for the Sunset Retreat would suggest high noise emissions to be very unlikely.

Details and specification TBC during detailed design.

6.3 Noise & Vibration during Construction Stage

The project will necessarily undertake a schedule of demolition and forward works to prepare the site for the new construction. This phase of works will inherently cause a period of potentially intrusive noise and vibration to the adjacent (retained) commercial building, and to offsite commercial neighbours.

Strictly speaking, all environmental noise emissions must demonstrate compliance with *Regulation 7* of the *WA Environmental Protection (Noise) Regulations 1997 (inc amendments)* which sets out the prescribed standard for calculating Assigned Noise Level limits for noise emissions, when received at the nearest noise sensitive neighbour.

6.3.1 Extract from Sub-Regulation 13, Clause (6)

In practice, and especially with particular temporary noise sources such as construction works, limits applicable under the *Regulations* can present an impractical target - for such purposes, the legislation affords alternative guidance under *Regulation 13* whereby a noise management plan is to be established to manage and control noise Extract from Regulation 13 Clause (6)

Construction noise and vibration to surrounding residents is usually a condition of Building Permit approvals, and is satisfied by the creation of a suitable noise management plan to outline appropriate mitigation and administrative conditions to control construction noise, to the satisfaction of the approving local Council.

Clause (6) of Regulation 13 sets out the requirements for a Noise Management Plan, which are as follows:

> *....(6) A noise management plan prepared under sub regulation (3) (c) or (4) is to include, but is not limited to -*
>
> *(a) details of, and reasons for, construction work on the construction site that is likely to be carried out other than between 0700 hours and 1900 hours on any day which is not a Sunday or public holiday;*
> *(b) details of, and the duration of, activities on the construction site likely to result in noise emissions that fail to comply with the standard prescribed under regulation 7;*
> *(c) predictions of noise emissions on the construction site;*
> *(d) details of measures to be implemented to control noise (including vibration) emissions;*
> *(e) procedures to be adopted for monitoring noise (including vibration) emissions;*
> *(f) complaint response procedures to be adopted.*

6.3.2 AS 2436:2010 Guidelines

In lieu of Council request or requirement for a detailed construction noise and vibration management plan, to assist the developer and/or Main Contractor, Section 4.6 of *AS 2436:2010 Guide to noise and vibration control on construction, demolition and maintenance sites* is reproduced in Appendix G.1. Contained therein are generic practical approaches to be employed during construction which will allow compliance with the Standard.

The application of the principles in Section 4.6 of *AS 2436:2010* coupled with a public information service such as flyers to local residents and businesses setting out the extent and duration of potential works is often sufficient to limit potential complaint.

6.3.3 Noise & Vibration Management Plan

Noise management plans engage the Contractor and affected nearby residents in an agreed plan which sets out a responsible and practical route to controlling or preparing for construction noise. A noise management plan can be extremely effective in maintaining good relations with neighbouring properties during potentially disruptive construction phases.

To address the issue of noise and vibration during construction phase, Sealhurst recommend a detailed noise management plan be established in accordance with *Regulation 13*, *Clause (6)* and in conjunction with the Contractor's demolition, forward works and construction schedules, to demonstrate that as much as practicable, a responsible and practical approach has been considered by the D&C team in terms of noise management.

In the event that Council require a more detailed noise management plan during construction phase, Sealhurst are able to prepare detailed noise and vibration management plan documentation for the planning, control and mitigation of noise and vibration during the Forward Works phase of the project.

A noise management plan (NMP) and vibration management plan (VMP) can be established in accordance with *Regulation 13*, *Clause (6)* and in conjunction with the Contractor's forward works and construction schedules, to demonstrate that as much as practicable, a responsible and practical approach will be considered by the D&C team in terms of noise and vibration management.

7 SPP 5.4 ROAD TRANSPORTATION NOISE ASSESSMENT

7.1 Policy Application

7.1.1 Overview of *State Planning Policy 5.4 Road and Rail Noise*

The Policy was originally established in May 2005 in Draft form, as a State-Level instrument intended to encourage traditionally opposing land uses (i.e. transportation and noise-sensitive) under controlled conditions, such that otherwise-useful development land was not unduly restricted due to the presence of road/rail infrastructure, and associated transportation noise levels; And, that residential land use "encroachment" toward road/rail corridors did not inhibit the essential operations of Primary and Secondary road and rail corridors, critical to delivery of State-wide goods and services.

In both cases, *the Policy* application is provision for road, (rail) and residential development designs which are able to consider both current (baseline) transportation noise conditions, and critically, a future-predicted noise condition at a projected 15-20 year planning horizon, and hence apply a design today, which will withstand and respond to transportation noise "growth" tomorrow.

7.1.2 Current (Draft) Policy Application and Provisions – September 2017

Since its inception, *The Policy* has undergone two substantial revisions, most recently in September 2017, whereby the criteria for *Policy* compliance, design impacts, and requirements placed upon road/rail infrastructure operators and prospective residential developers were simplified to fixed **outdoor** noise exposure forecast limits, **indoor** noise amenity limits, and a 20-year planning horizon;

The general purpose of *the Policy* is therefore explicitly twofold:

- *"to minimise the adverse impact of road (and rail) noise on noise-sensitive land use and/or development within the specified trigger distance(s) of major transport corridors";*
- *"The Policy also seeks to protect the functionality of the State's transport corridors by protecting them from encroaching incompatible development";*

Under *the Policy's* general purpose outline, the State-level objectives of *the Policy* are to:

a) Protect the community from unreasonable levels of transport noise;
b) Protect major transport corridors from incompatible urban encroachment;
c) Ensure that noise impacts are addressed as early as possible in the planning process; And,
d) Encourage best practice noise mitigation design and construction standards for noise-sensitive land use and/or development and/or major road (or railway) proposals;

7.1.3 Policy Application to 1447-1457 Mandurah Road, BALDIVIS

City of Rockingham, as approving Council, have requested a compliance assessment under State Planning Policy 5.4, relating to Road Traffic noise, on the basis that this section of Mandurah Road forms a listed Primary Road, under the [DRAFT] State Planning Policy Implementation Guidelines, September 2017.

To address the request, we have carried out the preliminary screening and Noise Exposure Forecast (NEF) calculation processes, and integrated the Policy requirements with a practical view of on-site noise levels, and a long-term approach to satisfying internal noise criteria in a 20-year planning horizon, as per *the Policy*.

7.1.4 Transport Corridor Classification & Trigger Distances

The Policy is applied to this project "*where there is proposed noise-sensitive land use within the Policy's trigger distance of a transport corridor as specified in Table 1.* The table (right) is a direct extract of Table 1 from *the Policy*, and lists Transport corridor classifications and corresponding trigger distances:

Transport corridor classification	Trigger distance	Distance measured from
Primary Roads		
State Roads (freeways/highways/primary distributors) Primary Regional Roads (red roads under region schemes) Freight roads (Perth and Peel regions) Regional freight roads	300 metres	Road carriageway edge
Secondary Roads		
Other Regional Roads (blue roads under region schemes) District Distributor A	200 metres	Road carriageway edge
Passenger railways		
	60 metres	Centreline of the closest track
Freight railways		
	300 metres	Centreline of the closest track

"Noise-sensitive use" is generally determined by land use(s) or development *as zoned by a local planning scheme or structure plan that is occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short-stay accommodation), caravan-park, camping ground, educational establishment, child care premises, hospital, nursing home, corrective institution or place of worship.*

The 68x short-stay accommodation dwellings proposed to be constructed at Sunset Retreat lifestyle resort, constitutes noise-sensitive use in this context.

7.1.5 Policy Noise Criteria

The table below is a direct extract of Table 2 from *the Policy* – the specific criteria applicable to the development at 1447-1457 Mandurah Road are highlighted orange as shown below.

The **Outdoor** Noise Criteria set out above apply to road noise emissions, as received at 1m from the most exposed, *habitable*[3] façade of the proposed building, at all residential floors. The most exposed *habitable* façade of a building is that which has the greatest exposure to the noise-source.

Where the outdoor noise criteria cannot be practicably met, an alternative **Indoor** Noise Criteria (shown red) is provided which must be demonstrated via means of a Noise Management Plan, which is set out in the format required by SPP5.4 Implementation Guidelines, Appendix

Proposals	New/upgrade	Noise Criteria[1] Outdoor Day (LAeq(Day) dB) (6 am–10 pm)	Outdoor Night (LAeq(Night) dB) (10 pm–6 am)	Indoor (LAeq(Day) or LAeq(Night) dB)	Where outdoor criteria must be met
Noise sensitive land use and/or development	New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor	55	50	40 (living and work areas) 35 (bedrooms) Refer to Note 2	Outdoor all floors
Roads	New	55	50	NA	Outdoor first two floors (more if practicable)
	Upgrade	60[3]	55[3]	NA	
Railways	New	55	50	NA	
	Upgrade	60[3]	55[3]	NA	

[3] NB - *habitable room* has the same meaning as defined in the National Construction Code - For a residential dwelling, this is any room other than a garage, storage area, bathroom, laundry, toilet or pantry.

7.2 Assessment Process

7.2.1 Noise Exposure Forecast Level

Where it is determined that a development is within the specified trigger distance of an identified Transport Corridor, a preliminary Noise Exposure Forecast (NEF) screening assessment is carried out to determine the likely noise impacts upon the noise-sensitive land use or development. See Appendix E.2 for NEF reference table;

Depending upon the outcome of the noise exposure forecast assessment, the forecast noise level will identify if:

- No further (noise control) measure is required;
- Noise-sensitive land use/development is acceptable, subject to mitigation measures;
- Noise-sensitive land use/development is not recommended; Or,
- Noise-sensitive land use/development is strongly discouraged;

Results of the screening assessment determine a Noise Exposure Forecast (NEF) noise level of 64dB(A), based upon a distance of 25m from Mandurah Road south-bound carriageway edge to the nearest (most-exposed) short-stay accommodation units, No.s 1 and 33. This classifies the site as Exposure Category C, 63-66dB(A), under which *the Policy* stipulates:

> *"Noise-sensitive land use and/or development is acceptable, subject to mitigation measures in accordance with an approved Noise Management Plan; Or, Quiet House C Specification"*

7.2.2 Noise Level Contour Map

Where it is determined that forecast noise impacts are likely, then a Noise Level Contour Map can be used to inform planning proposals on the likely impacts of transport noise upon the subject site. The map illustrates the likely noise levels and associated noise exposure categories and can be prepared using the noise level information contained within the Noise Exposure Forecast Table or prepared using site-specific noise level information provided by a suitably qualified acoustic consultant/engineer.

In this specific project application, given the NEF categorisation of the site, location, real-world measured noise level data on site (See Appendix **Error! Reference source not found.**), and our anticipation that all areas of the site will exceed the outdoor noise level criteria, the Noise Level Contour Map exercise has been omitted, and indoor Noise Criteria assessment has been undertaken as part of the Noise Management Plan.

7.2.3 Site-Specific Noise Management Plan

Preparation of a site-specific Noise Management Plan (NMP) is required to determine actual noise levels across the subject site and demonstrate that the proposal, can adequately mitigate the NEF forecast noise impacts through use of noise attenuation measures.

The Noise Exposure Forecast level of 64dB(A) exceeds the outdoor Noise Criteria of 55 dB(A) by 9dB(A), hence the project requires a site-specific Noise Management Plan to assess the current, future 20-yr planning horizon noise levels, and consequential noise mitigation treatments.

All façade ingress calculations are carried out in accordance with the relevant parts of British and European Standard *BS EN 12354:2000 Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements Part 3: Airborne sound insulation against outdoor sound*, which is the most prevalent calculation methodology in the absence of an equivalent Australian Standard.

Calculation Principles for this assessment are included in Appendix B.1.

8 NOISE MANAGEMENT PLAN

Appendix 6 of the *State Planning Policy 5.4 Road and Rail Noise Implementation Guidelines* document provides an overview and guide for the preparation, content and/or assessment of Noise Management Plans, suitable for submission to approving Council, and as a means to provide consistent level of assessment across a range of project and development types.

The following section headings represent the guideline Noise Management Plan format, with references to areas of this report to avoid unnecessary repetition.

8.1 Executive Summary

8.1.1 Scope of Work

Scope of works is summarised in the Report Abstract, at the front of this report.

8.1.2 Assessment Criteria

Assessment Criteria is taken directly from *the Policy* outdoor and indoor criteria:

- *Policy* Criteria requires **outdoor** noise levels to be <55dB(A) during daytime hours; And <50dB(A) during night time hours;
- Where this cannot be practically met, alternative **indoor** noise criteria under *the Policy* requires the demonstration of <40dB(A) within Living Areas, assessed during daytime hours; And of <35dB(A) within Bedrooms, assessed during night time hours;

8.1.3 Compliance Statement

Noise Exposure Forecast (NEF) Level of 64dB(A) categorises the most exposed façade(s) of the development site (Units 1 and 33, W façade(s)) as Category "C", which is acceptable, subject to mitigation measures in accordance with an approved Noise Management Plan; Or, "Quiet House C Specification". See Appendix E.3 for reference to Quiet House Specifications under *the Policy.*

In order to provide an efficient assessment, the most exposed façade's are taken to be representative of the entire development, that is, all units are treated as per the recommendation/requirements as set out in this report, then internal noise criteria will be adequately provisioned.

Under this scenario, **Outdoor Noise Criteria** is not practicable, hence the alternative **Indoor Noise Criteria** has been adopted to demonstrate compliance with *the Policy*. This has been achieved by the specification of appropriately-rated external wall construction of min. Rw 55dB construction, with glazing at Rw 32dB, deemed equivalent to 6mm float glass in frames with rubber gasket seals to all operable jambs, roof build up construction to Quiet House Category "C", including sealed eaves, and treated vents and air inlets.

The above recommendations form part of a Site Specific Noise Management Plan, of which all elements are compulsory.

8.1.4 Tabular Summary of Recommended Noise Mitigation Measures

The following summary table presents the minimum recommended noise mitigation measures required to achieve **Indoor Noise Criteria**:

Unit	Receiver Height AGL (m)	(NEF) Level 20-Yr Planning Horizon	Daytime Outdoor Criteria <55dB(A)	Predicted Internal Noise Level <40dB(A)[4][5]	Mitigation Treatment(s)
Unit 1 W Facade	1.4m (Gnd)	64dB(A)	EXCEEDS – See Internal Noise Criteria	34.4dB(A)	Glazing acoustically- rated at Min Rw32dB Equivalent to fixed (i.e. non-operable 6mm single glazed in conjunction with Quiet House C Roof Specification and minimum Rw 55dB-rated building envelope wall construction;
Unit 33 W Facade	1.4m (Gnd)	64dB(A)	EXCEEDS – See Internal Noise Criteria	34.4dB(A)	Glazing acoustically- rated at Min Rw32dB Equivalent to fixed (i.e. non-operable 6mm single glazed in conjunction with Quiet House C Roof Specification and minimum Rw 55dB-rated building envelope wall construction;

8.1.5 External Wall Construction

The mitigation set out in the table above is based upon an external building fabric construction rated at minimum Rw 55dB or greater to all facades at *facing* or *siding* line-of-sight to Mandurah Road. Primary construction methodology is yet to be determined. Our preliminary recommendation at this stage (in lieu of further design information) is to adopt one of the assessed construction build-ups set out in Section 4.3.

TBC during detailed design.

In addition, Quiet House Specification for A, B and C categories requires:

- *"Any penetrations in a part of the building envelope must be acoustically treated so as not to degrade the performance of the building elements affected. Most penetrations in external walls such as pipes, cables or ducts can be sealed through caulking gaps with non-hardening mastic or suitable mortar"*

It is anticipated these design requirements and implications will be coordinated through the design and construction phase(s) to the various responsible trades by the Managing Contractor, to ensure compliance on site in the finished installation.

8.1.6 Fixed Versus Operable Windows

In the summary table above, the terms "fixed (i.e. non-operable) windows" implies no anticipated degradation in the acoustic performance of the glazing due to the operable mechanism and seals. In the event operable windows are required for ventilation, this non-acoustic requirement places the onus on the following practical elements, which must be achieved on site:

i. All operable portions of the window have effective and compressible rubber gasket seals fitted;
ii. Seals must fully engage to provide an airtight seal in the closed position;

[4] Internal noise levels calculated in accordance with ISO 12354:3, to 0.1dB(A), based upon typical internal finishes, with carpeted floor finish;

[5] Daytime Internal Noise Criteria applicable to Living Areas is <40dB(A); Night time Internal Noise criteria applicable to Bedroom spaces <35dB(A);

iii. All gaps between window sub frame and structural opening are hand-packed/stuffed tight with fibrous insulation offcuts, and sealed in place with a dense mastic bead;

Detailing recommendations are included in Section 8.3 in terms of best-practice installation advice.

8.1.7 Sliding Doors to Barry Street Façade

We understand the preliminary concept design shows intent for traditional sliding door set arrangements in some areas. Under Quiet House specification, the following are compliance requirements:

i. Window and external door sound reduction values provided are based on the provision of suitable acoustic seals to prevent sound leakage. To comply with the specified ratings, all external glass windows and doors specified under requirements A, B and C must have the following:
   - Operable windows and external doors must have a seal to restrict air infiltration fitted to each edge and doors must have a drop seal to provide an airtight seal when closed
   - Within doors or fixed framing, glazing must be set and sealed using an airtight arrangement of non-hardening sealant, soft rubber (elastomer) gasket and/or glazing tape, or be verified by manufacturer or approved person that the construction system as to be installed achieves the relevant Rw+Ctr value;
   - In this context, a seal is foam or silicon based rubber compressible strip, fibrous seal with vinyl fin interleaf or the like. **Brush / pile type seals without this seal included are not allowed.**
   - Glazing referenced can be monolithic, laminated or toughened safety glass

We therefore recommend the traditional sliding door set be changed to an offset rail single sliding door with mechanical closing mechanism and full gasket seals to all jambs, as a best-practical means to achieve indoor Noise Criteria.

8.1.8 Roof Treatment – Quiet House C

In First Floor Bedrooms, roof treatment in Quiet House C is to be comprised of a build-up sufficient to meet Rw+Ctr 40dB, to be detailed as follows:

- Metal Sheet Roof;
- Sarking layer;
- Min. 10mm (recommended 13mm FR) plasterboard as suspended ceiling;
- Min. 50mm thickness (recommended 100mm thickness) fibrous insulation, @ min. density 20kgm^{-3};
- Eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the transport corridor where practicable;

8.2 Site Specific Noise Management Plan

8.2.1 1447 – 1457 Mandurah Road, RIVERVALE

The cumulative treatments identified in Section 8.1 to glazing/glazed apertures, facades, roof construction build-up, vents and otherwise building penetrations represent the Site Specific Noise Management Plan and are required to achieve the internal Noise Criteria, based upon the 20-year planning horizon road traffic noise levels required by *the Policy.*

The acoustic performance requirements set out herein are authored in such a way as to allow the development to progress to detailed design with sufficient information to furnish the design with the required treatments. As the development is at DA approvals phase, the performance requirements are expected to form part of the Detailed Design and ultimately Building Permit and Occupancy certificates.

8.2.2 Recommendation for Notification on Title

State Planning Policy 5.4 Appendix 7 recommends a Notification on Title be included to advise prospective purchasers of the potential noise impacts from major transport corridors. In this instance, the individual dwellings are short-stay accommodation units, and we understand ownership will be retained by the Principal client. As such we do not anticipate a requirement for Notification on Title, unless instructed to do so by Council.

The Principal client is hereby advised that any changes to end-ownership, anticipated use, sale, and classification of the x68 dwellings may impact the requirement (or omission) for a Notification on Title – TBC during detailed design.

8.3 Other Recommendations

8.3.1 Implementation of Site Specific Noise Management Plan

We recommend the Site Specific Noise Management Plan recommendations be installed in their entirety, and be considered as a minimum provision.

It is anticipated these design requirements and implications will be coordinated through the design and construction phase(s) to the various responsible trades by the Managing Contractor, to ensure compliance on site in the finished installation.

8.4 Building Envelope Design Considerations for Road Traffic Noise

8.4.1 Notes on Glazing Specification and Installation

The Principal client is referred to Section 4.6 in terms of appropriate construction detailing requirements to ensure Internal Noise Criteria is achieved in the finished building.

8.5 Introduction

The following Section presents remainder details of the development in terms of the relevant recommended Noise Management Plan report inclusions, as set out in Appendix 6 of *the Policy*:

8.5.1 General Appreciation

Sealhurst were commissioned by Braude Architects, on behalf of their client (the Principal) Miraudo Constructions Pty Ltd, to undertake an assessment of the implications of Mandurah Road traffic noise upon the proposed 68x short-stay accommodation and lifestyle resort development, Sunset Retreat, addressed at 1447 – 1457 Mandurah Road, BALDIVIS.

The site is currently undergoing formal Development Application approval, with specific acoustic assessment required to understand, comply and discharge *SPP5.4 Policy* requirements, which have been raised as a Condition of approval for the development.

8.6 Project Description

8.6.1 Proposed Noise Sensitive Development Site, Sunset Retreat, 1447 – 1457 Mandurah Road, BALDIVIS

The proposed development project is to construct 4 x individual "townhouse" style residential dwellings, located on an existing vacant Lot on the corner of Gladstone Road and Barry Street. The nearest short-stay accommodation unit is located 25m distance from Manager Road carriageway edge, which places the site within a specified "trigger distance" of proximity to a Primary State Transport Corridor. Under *State Planning Policy 5.4 Road and Rail Noise* (henceforth, "*the Policy*") requirements, an assessment of the impact of road transportation noise has been carried out.

8.6.2 Background History and Relevant Previous Studies

Not applicable

8.6.3 Noise Issues Addressed

Scope of works is summarised in the Report Abstract, at the front of this report. The essential scope of assessment is comprised:

i. Undertake Noise Exposure Forecast assessment, from Table 2 of *the Policy*;
ii. Determine the current road transport noise conditions on site, to verify "baseline" conditions;
iii. Determine a future-predicted transport noise condition based upon estimated road traffic growth in a 20-year planning horizon;
iv. In both cases, determine where the development site is able to meet *Policy* **outdoor** noise level criteria;
v. Where compliance with these conditions are demonstrated, no further action is required;
vi. Or, where compliance with **outdoor** conditions are impractical, a Noise Management Plan is to be generated, demonstrating an acoustic design provision suitable to achieve **internal** noise level criteria, using appropriate acoustic engineering means, potentially including:
    a. Specification of building screening using barrier walls;
    b. Specification of appropriately acoustically-rated façade materials – notably, wall types, ventilation openings and glazed elements;

8.7 Site Specific Details

8.7.1 Site Orientation Re: State Transport Corridors

1447 – 1457 Mandurah Road site is located parallel to Mandurah Road, and is currently a semi-rural block of residential use land on the outskirts of the established suburb of BALDIVIS, WA.

The Lot is proposed to be developed to provide 68x short-stay accommodation dwellings as part of the Sunset Retreat Lifestyl eResort (noise-sensitive) development, which will be situated within *the Policy*'s specified trigger distance of 300m of this section of Mandurah Road.

This area is identified as having a "*Primary Road*" infrastructure identified under Schedule 1 of *the Policy* as a primary freight road - Appendix E.1 of this report presents the network map in its entirety – an extract of the Schedule 1 mapping is shown in the cascaded images (right), with subsequent aerial imagery locating the site in its proposed context, and a proposed development site map, shown below.

8.7.2 Noise Receiver Levels & Locations

There is a physical separation distance of 25m from Mandurah Road carriageway edge to the most exposed facades (Units 1 and 33), with nominal features or screening buildings in between, hence the site is subject to road traffic noise, at a Noise Exposure Forecast (NEF) Level of 64dB(A) at the most exposed habitable façade location, indicated in the lower images (right). The NEF level is based upon the Noise Exposure Forecast table (See Appendix E.2) and the published Main Roads Traffic Digest values of 6,690 Annual Average Weekday Traffic (AAWT) volume, inclusive of 5% Heavy Goods Vehicles.

This location was used as a reference noise reception point for a 5-day noise monitoring survey, to ascertain and serve as a reference point, the current baseline road transport noise conditions at the site. Free-field measured noise levels were applied a +2.5dB façade correction at the baseline location – the resulting averaged noise levels were found to be 60dB L_{Aeq}, during daytime hours (6AM – 10PM) which are lower than the Noise Exposure Forecast (NEF) level, due to lower traffic growth at 2.5% per year over the 20-year planning horizon, and typical speed limit of 70km/hr are taken into account.

Note, prediction modelling in this project assumes no significant changes to the existing road layout within a 300m radius of the project site, from Mandurah Road Northern and Southern extents as view from the nearest short stay accommodation unit(s).

8.7.3 Additional Site Information

5-day noise monitoring was conducted at the site, with 24-hour results presented in Appendix C. Typical daytime noise levels ranged between 55-60dB(A) with occasional periods of incidental activity up to 65dB(A);

8.7.4 Measurement and Prediction Locations

Measured and predicted noise level locations were taken to be equivalent for direct comparison of measured versus predicted noise levels. See site images adjacent right, noise measurement location is at 1.6m above local ground level, with direct line of sight to Mandurah Road.

8.7.5 Maps

See Section 8.7.1 re: Cascaded aerial imagery showing site orientation and extents. See Appendix E.1 re: referenced Schedule 1 Primary Freight Road Routes in the Metropolitan Perth area;

8.8 Noise Criteria

8.8.1 Forecast (NEF) Level and Outdoor Noise Criteria

Outdoor noise criteria for compliance is established under *the Policy* as:

- <55dB(A) during the daytime, defined as 06AM – 10PM; And
- <50dB(A) during night time hours;

The Noise Exposure Forecast (NEF) assessment predicts a daytime NEF Level of 64dB(A) at the most exposed façades of short-stay accommodation Unit No.s 1 and 33 (W façade(s)), inclusive of +2.5dB façade correction. The 20-year Forecast (NEF) level is based upon AAWT ~25,000 vehicle movements and inclusive of a 5% HGV traffic composition, which is approx.. 4 times the existing road traffic volume and flow rate.

Note, NEF forecast assessment is considered to be greater (i.e. predict a higher) level of road traffic noise than might be expected using the *Policy*'s 2.5% traffic growth rate per year, over the 20-year planning horizon. Using the *Policy* growth rate, the forecast traffic growth is to an equivalent AAWT volume of 10,440 vehicle movements per day, OR a 64% increase in road traffic.

Comparison of the Forecast (NEF) Level of 64dB(A) with the current "free-field" measured site noise conditions of 60dB(A) (when inclusive of +2.5dB façade correction), the result shows a predicted increase in road transportation noise level of 2dB(A) over 20-years.

This growth factor has been verified using the logarithmic correction formula set out in Appendix 4 of *the Policy* Implementation Guidelines document – Change (dB) = 10 x Log (Future AAWT/Current AAWT), which predicts 2.14dB(A), or 2dB(A) rounded to the nearest single figure.

In all cases, the predicted outdoor noise level exceeds the outdoor Noise Criteria hence indoor Noise Criteria has been addressed in order to demonstrate compliance with *the Policy*, see below:

8.8.2 Indoor Noise Criteria

Indoor noise criteria for compliance is established under *the Policy* as:

- <40dB(A) during the daytime hours in Living and work areas, defined as *"habitable rooms"*
- <35dB(A) during night time hours in Bedrooms;

A. SCHEDULES OF INFORMATION

A.1 Architectural Drawings

The following Architectural design drawings have been provided by Braude Architects Pty Ltd and have been used for our assessment – acoustic design compliance and advice is based upon the information contained within these drawings:

DWG. REF	TITLE	DATE	REV	ISSUE STATUS
SK-1	SITE PLAN	06/11/2018	A	-
SK-2	GROUND FLOOR PLAN	06/11/2018	-	-
SK-3	UNITS FLOOR PLAN & ELEVATIONS	06/11/2018	-	-
SK-4	CLUB HOUSE FLOOR PLAN & ELEVATIONS	06/11/2018	-	-
SK-5	SITE PLAN TANK LOCATIONS	06/11/2018	-	-
SK-6	RECREATION AREA SITE PLAN	06/11/2018	-	-
SK-7	SITE SECTION	06/11/2018	-	-
SK-9	SURVEY PLAN	06/11/2018	-	-

B. BUILDING FACADE CALCULATION METHODOLOGY

B.1 Calculation Principles

Noise data obtained during the documented survey period and presented herein will provide the basis against which predicted internal noise levels can be calculated and compared against the referenced Australian Standard *AS2107:2016* criteria to assess internal noise amenity and compliance. The process of this evaluation assesses the composite acoustic performance of each façade element (e.g. glazing/frame, building envelope, ventilation opening etc) is calculated and the measured external sound field is said to impinge upon it as direct sound. As all measured noise levels were recorded under 'free-field' conditions, a correction of 2.5dB is applied to linear spectral noise levels when calculating façade performance to account for the façade incidence effect.

From the layouts and elevation drawings, the building envelope materials are not yet determined. Typically, there are three material element(s) capable of transmitting sound into the internal space – roof, wall construction and a range of framed and sliding glazing elements. Airborne sound transmission through the building structural element is less critical than sound transmission through glazed panels, therefore various acoustic performances of glazing types and thicknesses will be assessed and adjusted in design calculation to effect the most cost-effective design solution, whilst ensuring design compliance is demonstrated.

Corresponding internal noise levels are then predicted using these detailed sound transmission loss calculations through the calculated composite façade performance, with resultant internal levels corrected for radiating (exposed) façade area and internal energy 'losses' associated with transmitted sound undergoing absorption from (proposed) internal room finishes. This assessment is generally conservative to allow for unforeseen variation in eventual performance.

Each façade is also assessed for flanking transmission paths. This includes, but is not limited to, transmission through junctions between structural elements, aperture seals, and transmission through inter-connected elements such as mechanical systems.

In order that an acoustically-robust façade design is achieved, building façade assessment calculations are undertaken using 'worst case' (i.e. highest measured) external noise levels, unless otherwise noted. Calculations are carried out on the most sensitive internal spaces – generally those with the largest glazed area and a low internal absorptive area. This methodology provides an efficient review ensuring all spaces meet or exceed the required standard.

All façade ingress calculations are carried out in accordance with the relevant parts of British and European Standard *BS EN 12354:2000 Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements Part 3: Airborne sound insulation against outdoor sound*, which is the most prevalent calculation methodology in the absence of an equivalent Australian Standard.

C. NOISE MONITORING DATA

C.1 Design Sound Level Data Logs

As described in Section 3.2, unattended (noise logging) sound measurements were recorded using a Norsonic Nor140 Type 1 Sound Level Meter, at the site on Mandurah Road, along the western site boundary, 25m from carriageway edge, to capture representative sound levels incident as part of everyday activity, to be used to validate the proposed building façade acoustic specification performance.

Detailed noise data was recorded over consecutive 5min periods logged data periods throughout each day, evening and night time periods, starting on 30th November 2018 for a total duration of 6 consecutive days, to provide a representative noise baseline for assessment of external noise ingress. The following graphical representation plots external LAeq, LApeak, LAMAX and LA90 noise levels, providing an overview of the existing noise environment at the proposed new building facade.

Notable peaks are identified, annotated as shown, attributable to:

1	Passing motorcycles;
2	V8/"sports" exhausts on private vehicles;
3	Public services e.g. trucks/refuse/street cleaning vehicles;
4	Public transport services, HGVs
5	Periods of rainfall
6	Helicopter/aircraft flyover noise events;
7	Police/emergency services sirens;
8	Construction-type noise;
9	Dogs barking, passing pedestrians;
10	Birdsong

Consecutive logged data periods were recorded over the course of the representative measurement period, to provide a representative noise climate for assessment of external noise ingress. The following graphical representation plots external L_{Aeq}, L_{AMAX} and L_{AMIN} noise levels, providing an overview of the existing noise environment at the proposed development site.

L_{Aeq} (dB) noise levels are used for assessment of internal design criteria, shown green, representing the equivalent sound energy recorded in each successive period – the L_{Aeq} is a measure of general activity noise level recorded at the building façade location throughout the day.

L_{AMAX} (dB) noise levels report the loudest sound recorded during each consecutive 5-minute period. The L_{AMAX} trace is shown red, and peaks are attributable to sound pressure from the passing of incidental loud motorcycles/vehicles, refuse trucks, occasional pedestrian activity and the like.

L_{A90}dB) noise levels represent the residual background noise, referred as the 90th percentile, or, the level of noise exceeded for >90% of the period. The LA90 gives a good understanding of the consistency and level of background noise, in the absence of all other sources – the greater the difference between LAeq and LA90, the more incidental noise events occurred during a specific period; Where LAeq is close to LA90, few or no incidental noise events occur, (e.g. overnight) and the noise level is largely driven by environmental factors (e.g. wind) only.

Measurements were recorded at a location near the southern end of Mandurah Road where it intersects Stakehill Road, along the west fence line of front boundary line, some 3.5m above street level. The data is considered representative of all short-stay accommodation unit facades.

Spectral data pertaining to design sound levels for building interiors have not been adjusted for distance propagation, outside of corrections present in the noise ingress calculation methodology (see Appendix B.1)

30 NOV 18

A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90

Sound Pressure Level, Lp, dB

110
100
90
80
70
60
50
40
30

LA,MAX, 5min (dB)
LAeq, 5min (dB)
LA90, 5min (dB)
LA,Peak 5min (dB)

Set up of monitoring equipment

NBF0030 - 12:00 30 NOV 18 - Passing motorcyle elevating LAeq and causing peak event

NBF0073 - 15:35 30 NOV 18 - Incidental hoon activity from passing vehicle with sports exhaust elevating LAeq

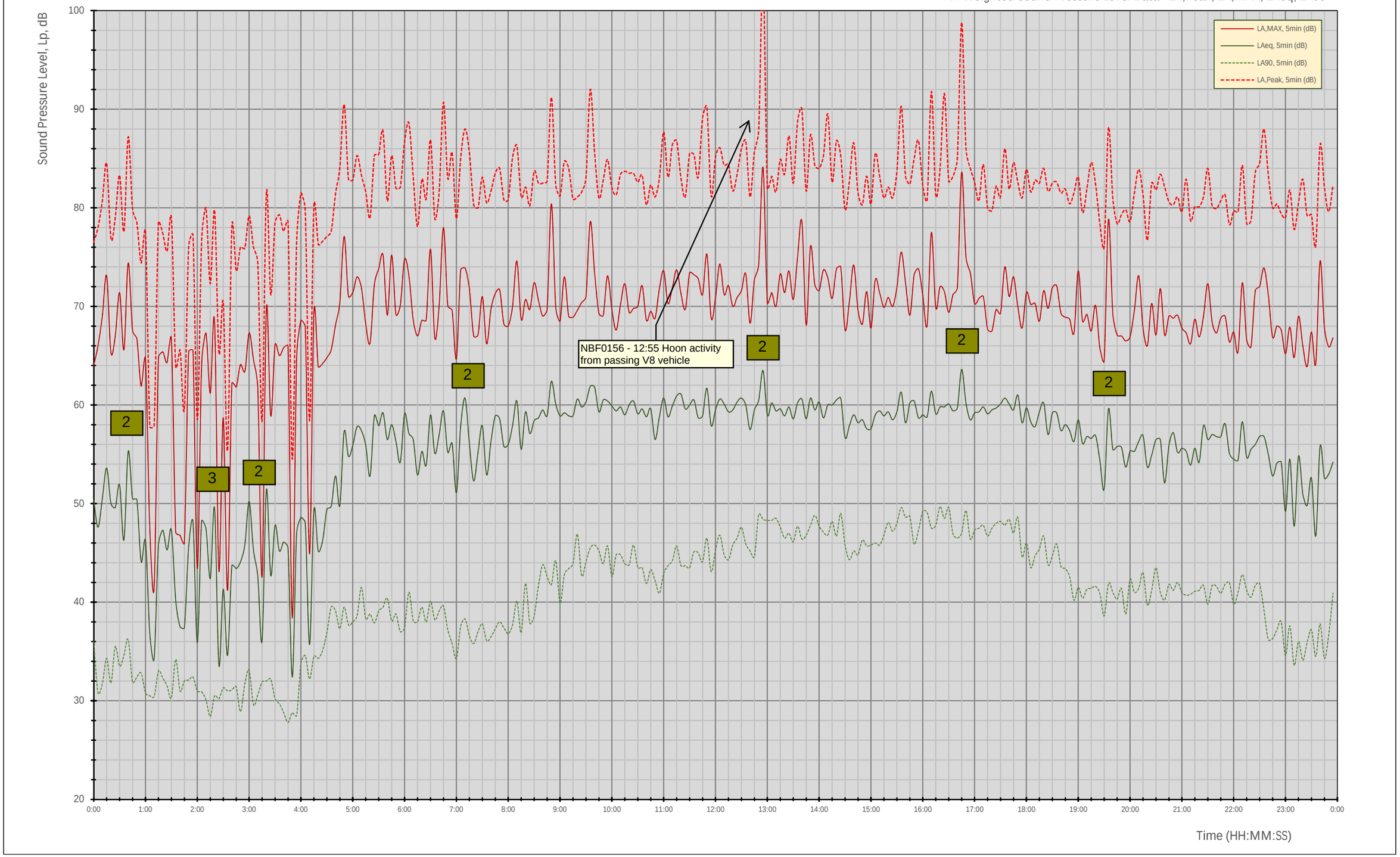
NBF0090 - 17:00 30 NOV 18 - Aircraft flyover noise event accompanied by bird song generating incidental elevated LAeq

1

0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00

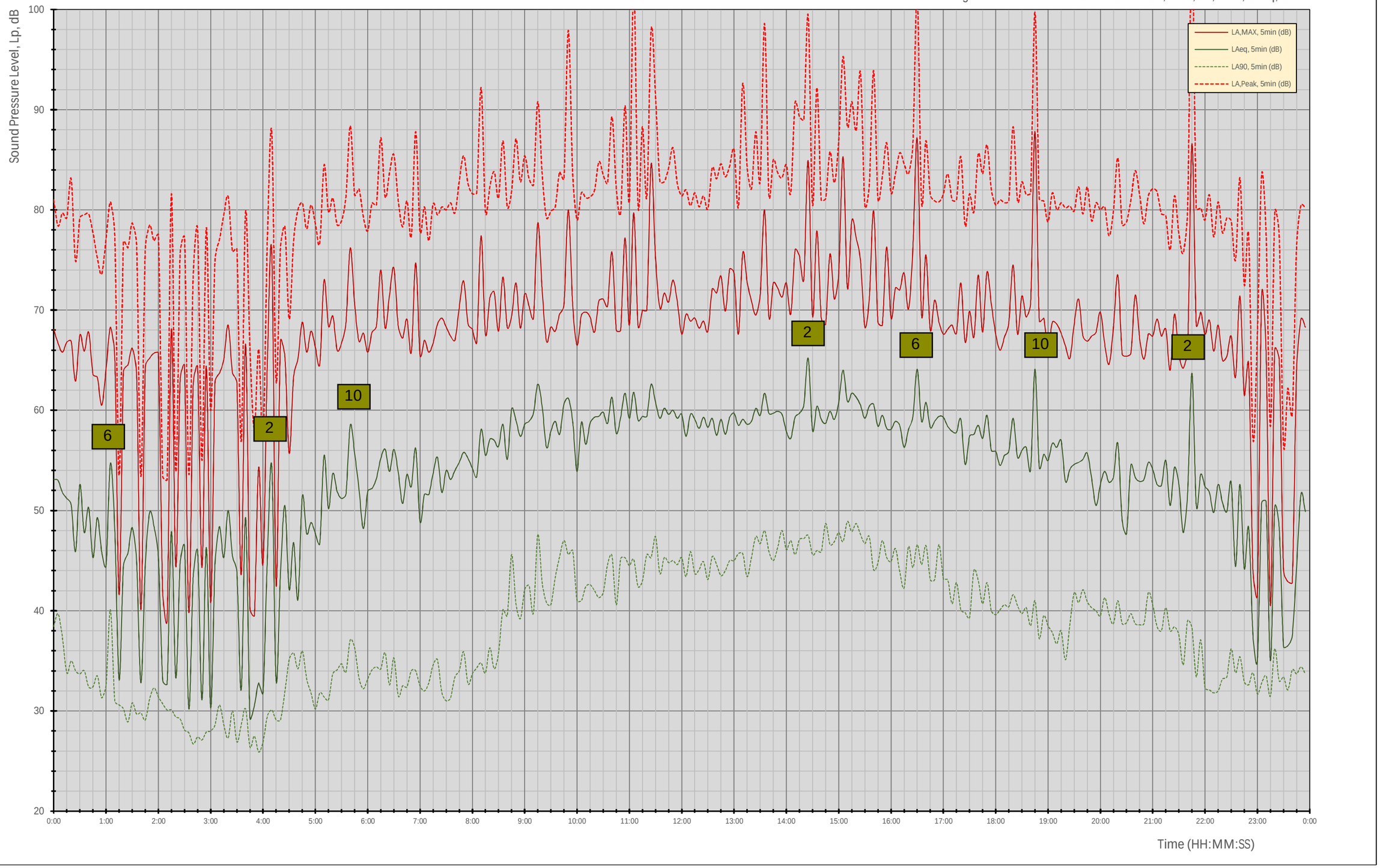
Time (HH:MM:SS)

01 DEC 18
A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90



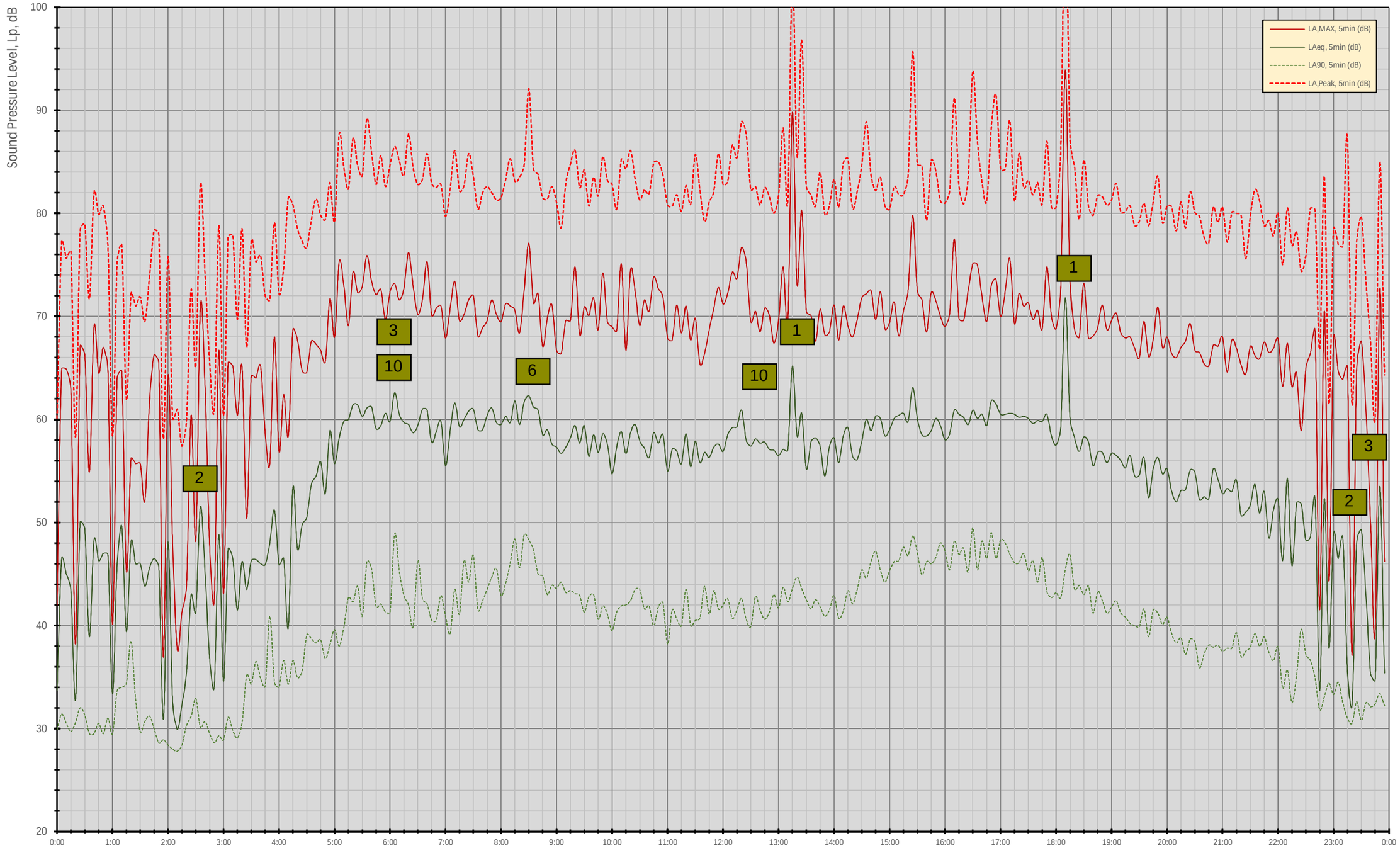
02 DEC 18

A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90



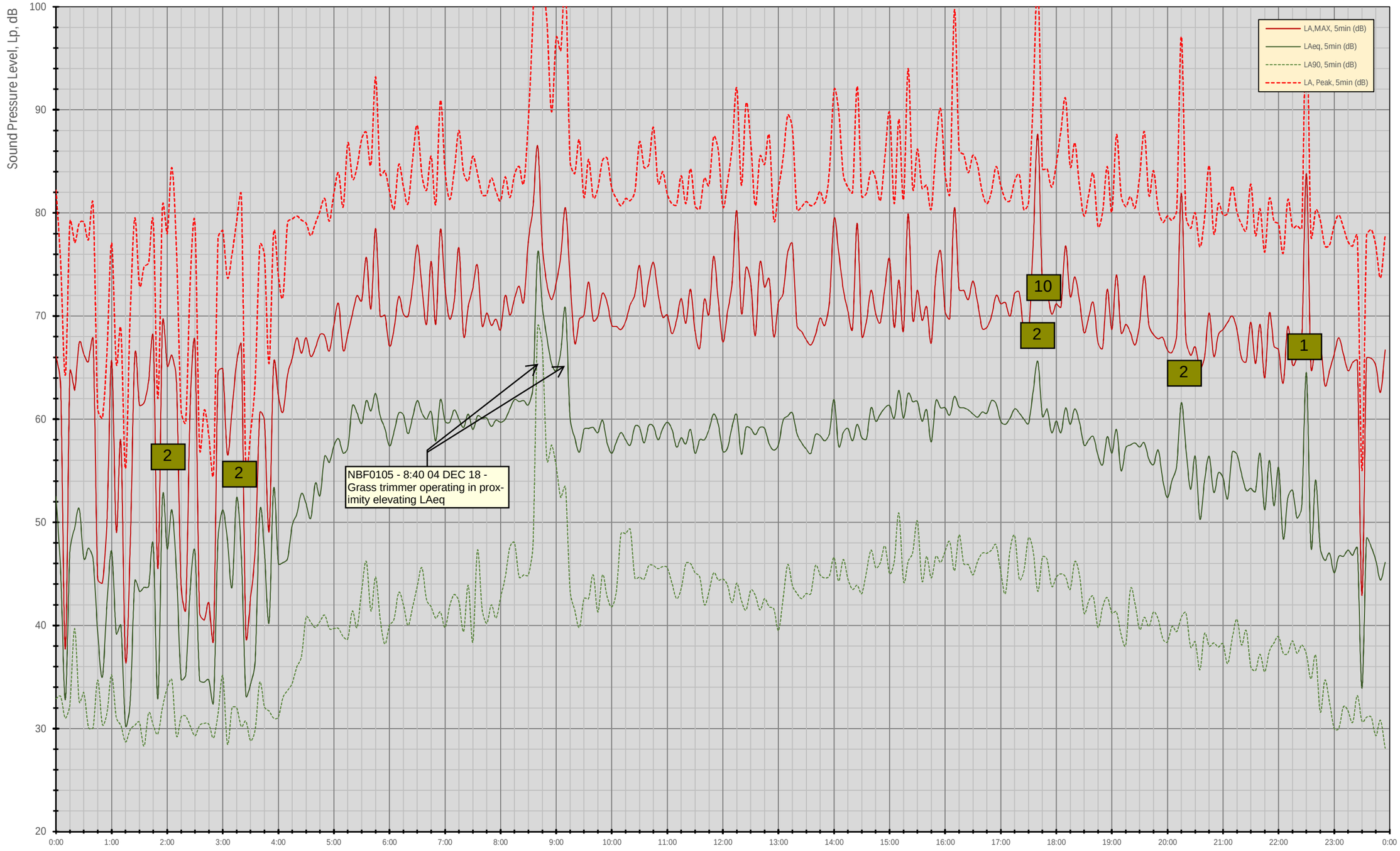
03 DEC 18

A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90



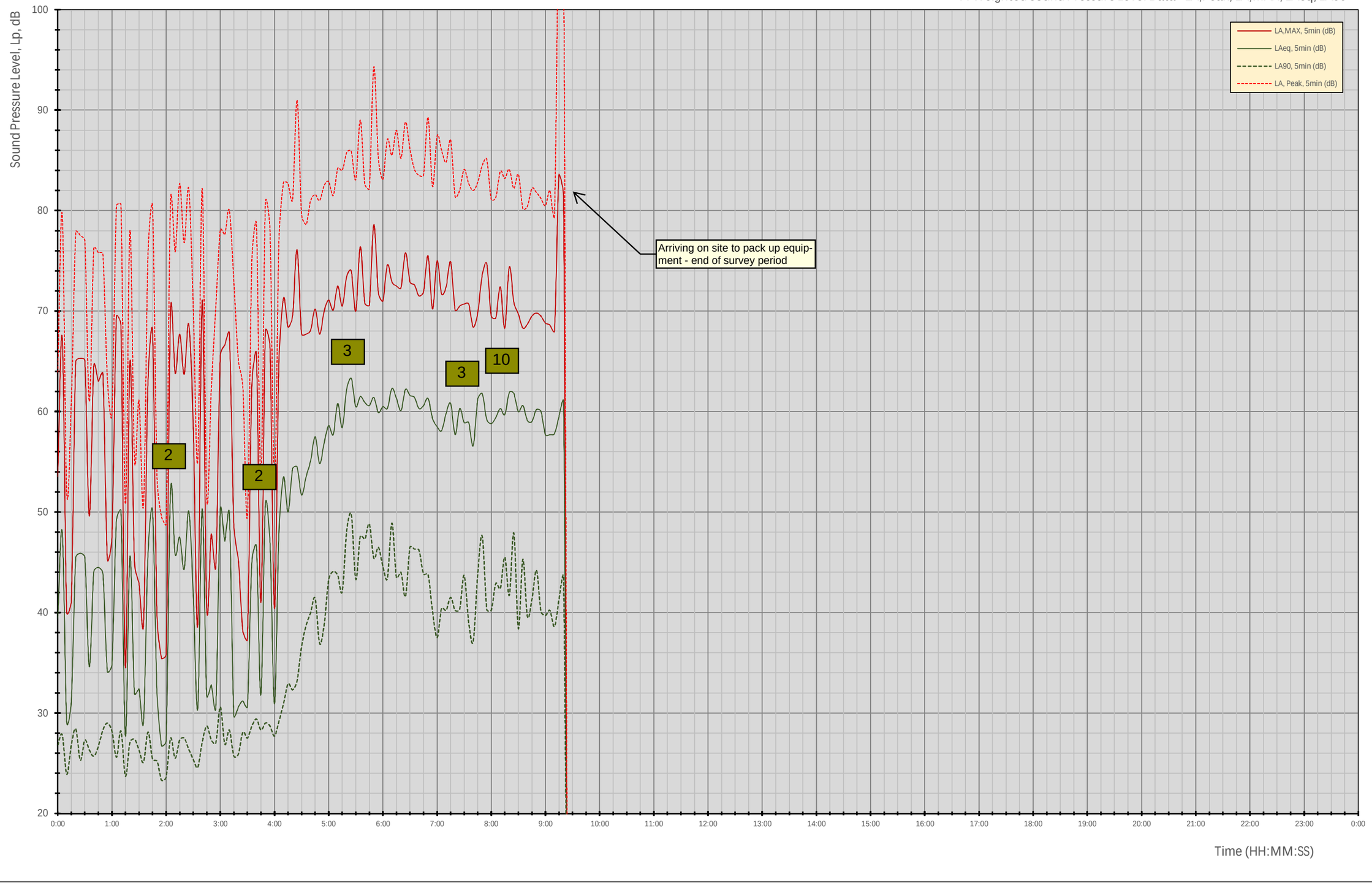
04 DEC 18

A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90



05 DEC 18

A-Weighted Sound Pressure Level Data - LA,Peak, LA,MAX, LAeq, LA90



D. CALCULATION OF NOISE EMISSIONS LIMITS

An Assigned Noise Level is calculated for each noise sensitive receiver using a combination of environmental factors local to the receiver. A standard set of ANL's exist to provide a base level of acoustic amenity, as shown in the Table below. These levels are modified by an Influencing Factor (IF) to reflect noise sensitivity in the specific environment relative to the subject development.

To calculate the additional Influencing Factor (IF), concentric circles are drawn around the nearest noise-sensitive reception point; one at 450m radius and one at 100m radius. Percentages are calculated for the amount of land area within the circles used for noise emitting purposes (e.g. industrial or commercial uses) which are compared to the total area encompassed by the concentric circles.

Traffic volume is taken into account in order to reach an acceptable ANL, or noise reception level, appropriate for the area in which the receiver is to be situated.

Part of Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15m of a building directly associated with a noise sensitive use	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sundays and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days	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	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises at locations further than 15m of a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and Utility premises	All hours	65	80	90

Calculation of Influencing Factor (IF)

The Influencing Factor (IF) is calculated using the following equation:

Influencing Factor (IF) = I + C + TF

Where;

I = (% of industrial land usage within 100m + %industrial land usage within 450m) x 1 / 10

C = (% of commercial land usage within 100m + %commercial land usage within 450m) x 1 / 20

TF = +6 if there is a major road within 100m of the development
+2 if there is a major road within 450 m of the development
+ 2 if there is a secondary road within 100m of the development

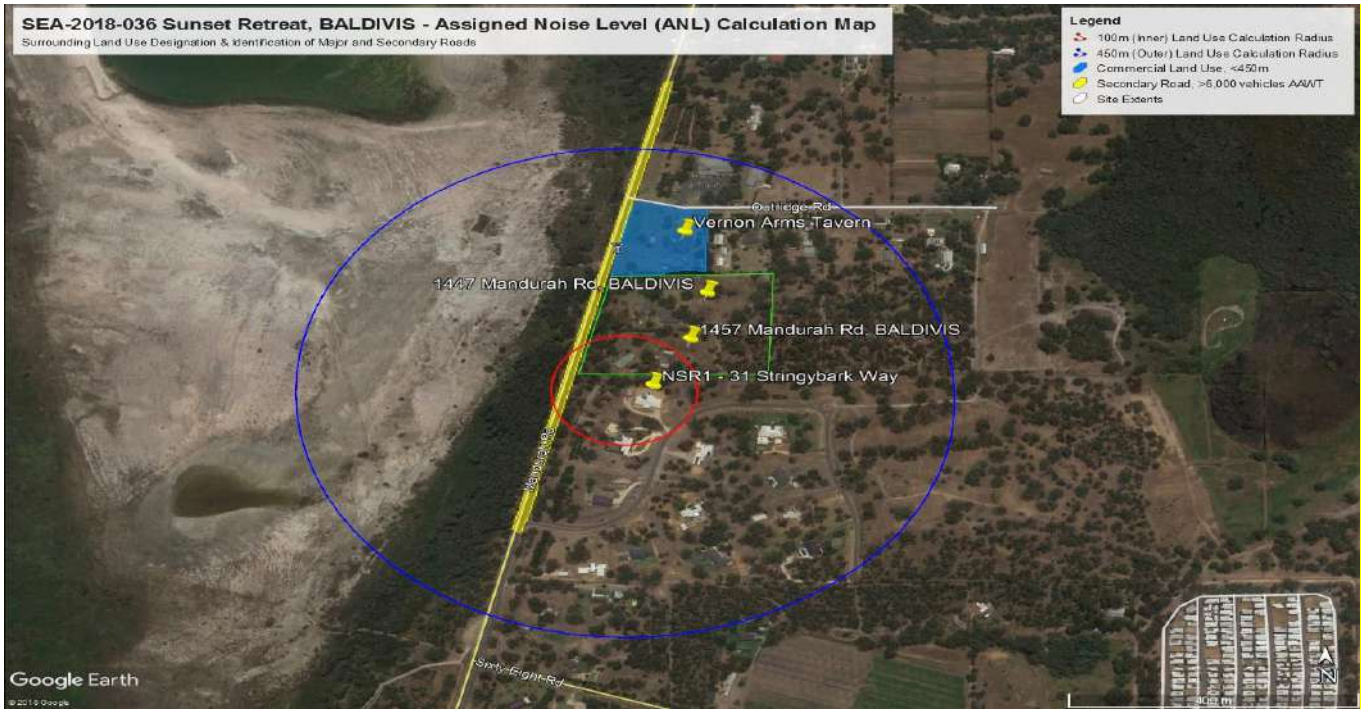
The maximum value the transport factor (TF) can reach is 6;

A major road is defined as having Annual Average Weekday Traffic (AAWT) flows in excess of 15,000 vehicle movements per day. A secondary road is defined as having Annual Average Weekday Traffic (AAWT) flows in excess of 6,000 vehicle movements per day.

Identification of Land Use

The image below presents review and classification of surrounding Commercial (C) and Industrial (I) land use in the inner and outer radii in the vicinity of the nearest NSR. land use determinations surrounding the proposed development site and NSR(s) is semi-rural/bush land parcels on the outskirts of BALDIVIS, with "Commercial Land Use" in the form of the Vernon Arms Tavern, immediately north of Lot 1457. The Tavern represents 0.1% land use area in the "Outer circle" (450m radii) only. No "Industrial Land Use" were identified. Where residential-only land uses are determined, the land use remains neutral in the calculation of the Assigned Noise Level.

In terms of road transport infrastructure, Mandurah Road is defined as a "Secondary" Road, located <100m of the NSR;



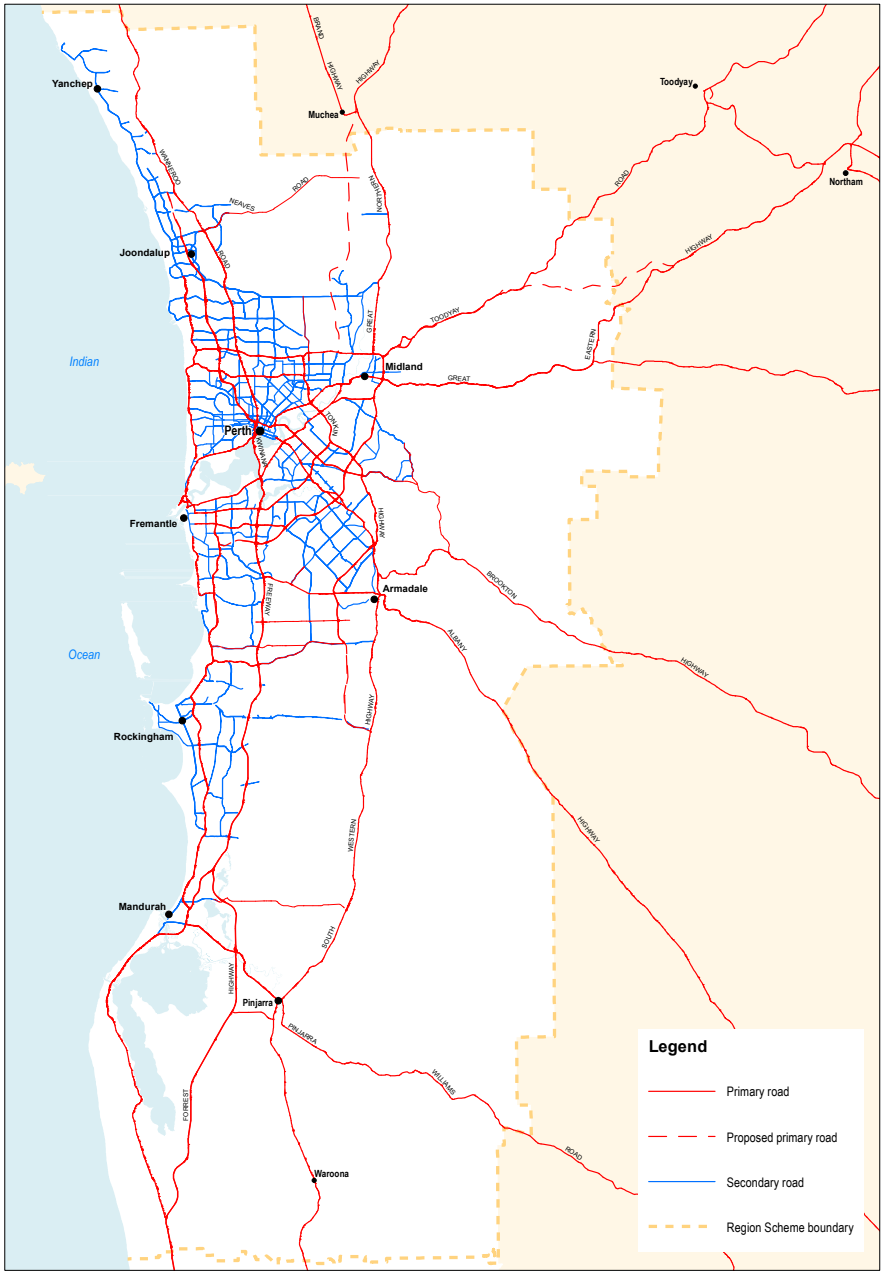
ASSIGNED NOISE LEVEL LIMITS – SUMMARY CALCULATION TABLE

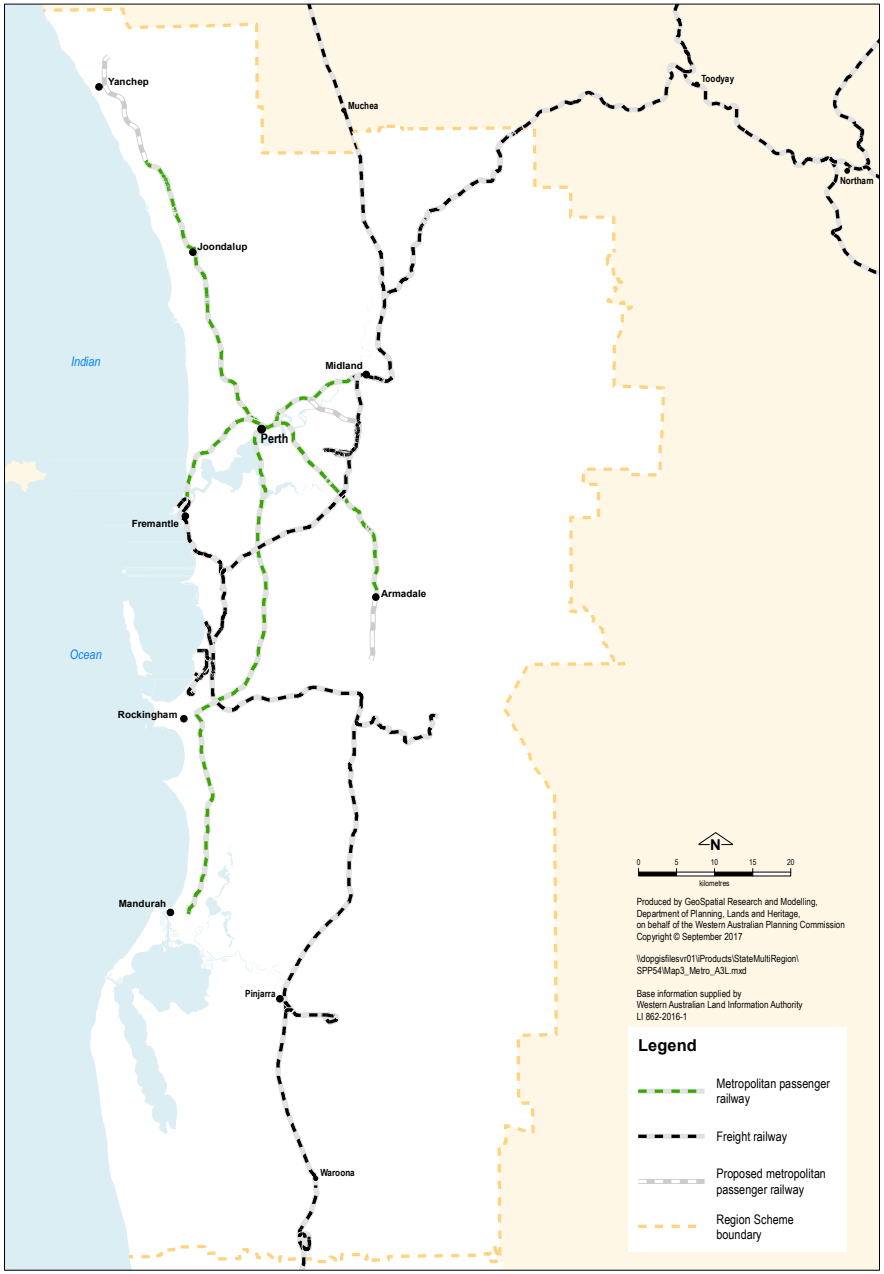
Land Use Type & IF Calculation					
Industrial					"I"
% Area in Inner Circle	0%				0
% Area in Outer Circle	0%				
Commercial					"C"
% Area in Inner Circle	1%				+0.18
% Area in Outer Circle	2%				
Roads	**Location**	**Estimated vehicle Movements per day**	**Classification**	**Result**	"TF"
Mandurah Rd	iNNer Circle	6,960	Secondary	2	2
INFLUENCING FACTOR					+2.18

The resultant IF therefore equals 2, determining the applicable Assigned Noise Level limits at the NSR.

E. SPP 5.4 REFERENCE INFORMATION

E.1 Schedule 1 – Primary Freight and Rail Routes





Map 3: Perth and Peel

E.2 Table 2 – Noise Exposure Forecast Sheet

Table 2: *Noise forecast*

Transport Corridor Classification		Vehicles/day	Forecast noise level (LAeq,Day) and exposure category based on distance from edge of nearest road carriageway (m)																						
			adjacent	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300
Primary roads[1] * State roads (Freeways, highways, primary distributors) * Primary regional roads (Red roads under region schemes) * Metropolitan freight roads (in the Perth and Peel regions - typicallly 7.5% heavy vehicles) Map 1, 2, 3		up to 25,000	71	66	64	62	61	59	59	58	57	56	56	56	55	55	54	53	52	51	51	50	50
		~ 30,000	71	67	64	63	61	60	59	58	58	57	57	57	56	56	54	54	53	52	51	51	50
		~ 35,000	72	68	65	63	62	61	60	59	58	58	58	57	56	56	55	54	53	53	52	51	51
		~ 40,000	72	68	66	64	62	61	60	59	59	58	58	58	57	57	56	55	54	53	52	52	51
		~ 45,000	73	68	66	64	63	62	61	60	59	59	59	58	57	57	56	55	54	54	53	52	52
		~ 50,000	73	69	66	65	63	62	61	60	60	59	59	59	58	58	56	56	55	54	53	53	52
		~ 55,000	74	69	67	65	64	62	62	61	60	59	59	59	58	58	57	56	55	54	54	53	53
		~ 60,000	74	70	67	66	64	63	62	61	61	60	60	60	59	59	58	57	56	55	54	54	53
		~ 70,000	75	71	68	66	65	64	63	62	61	61	61	61	59	59	58	57	56	56	55	54	54
		~ 80,000	75	71	69	67	65	64	63	62	62	61	61	61	60	60	59	58	57	56	55	55	54
		~ 90,000	76	72	69	67	66	65	64	63	62	62	62	61	60	60	59	58	57	57	56	55	55
		~ 100,000	77	72	70	68	67	66	65	64	63	62	62	61	61	61	60	59	58	57	57	56	56
		~ 120,000	77	73	70	69	67	66	65	64	64	63	63	63	62	62	61	60	59	58	57	57	56
		more than 140,000	78	74	71	69	68	67	66	65	64	64	64	64	62	62	61	60	59	59	58	57	57
* **Regional freight roads** (Regional freight roads are defined by Department of Transport Western Australian Regional Freight Transport Network Plan) Maps 1 and 2	up to 10% heavy vehicles	up to 10,000	72	69	67	65	64	63	62	61	61	60	60	59	59	58	58	57	56	56	55	55	54
		more than 10,000	74	70	68	67	65	64	63	63	62	61	61	60	60	59	59	58	57	57	56	56	55
	10 to 20% heavy vehicles	up to 10,000	74	70	68	67	65	64	64	63	62	62	61	61	60	60	59	59	58	57	57	56	56
		more than 10,000	76	72	70	68	67	66	65	64	63	63	62	62	61	61	61	60	59	58	58	57	57
	more than 20% heavy vehicles	up to 10,000	75	72	70	68	67	66	65	64	64	63	63	62	62	61	61	60	59	59	58	58	57
		more than 10,000	77	73	71	70	68	67	66	66	65	64	64	63	63	62	62	61	60	60	59	59	58
Secondary roads[1] * Other regional roads (Blue roads under region schemes) * District Distributor A (Typicallly 5%heavy vehicles) Map 3		up to 5,000	60	57	55	54	53	52	51	51	50	50	49	49	48	48	48	47	47	46	46	45	45
		~ 7,500	63	60	58	57	56	55	54	54	53	53	52	52	51	51	51	50	50	49	49	48	48
		~ 10,000	65	62	60	59	58	57	56	55	55	54	54	54	53	53	53	52	51	51	50	50	49
		~ 15,000	66	63	61	60	59	58	57	57	56	56	55	55	54	54	54	53	53	52	52	51	51
		~ 20,000	67	64	62	61	60	59	58	58	57	57	56	56	55	55	55	54	54	53	53	52	52
		~ 25,000	68	65	63	62	61	60	59	58	58	57	57	57	56	56	56	55	54	54	53	53	52
		~ 30,000	68	65	64	62	61	60	60	59	59	58	58	57	57	57	56	56	55	55	54	54	53
		more than 35,000	69	66	64	63	62	61	60	60	59	59	58	58	58	57	57	56	56	55	55	54	54

Transport Corridor Classification		Movements/day	Forecast noise level (LAeq,Day) and exposure category based on distance from nearest rail centreline (m)																						
			adjacent	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300
Passenger railways Map 3	Joondalup-Butler	260	68	64	61	60	59	58	57	56	56	55	55	54	54	53	53	52	52	51	50	50	49	
	Midland	170	66	62	59	58	57	56	55	54	54	53	53	52	52	52	51	51	50	49	48	48	47	
	Fremantle	160	66	61	59	58	56	56	55	54	53	53	52	52	52	51	51	50	49	49	48	48	47	
	Armadale-Thornlie	290	68	64	62	60	59	58	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	
	Mandurah	250	68	64	61	60	59	58	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49	
	Other lines	300	68	64	62	60	59	58	57	57	56	56	55	55	54	54	54	53	52	51	51	50	50	
Freight railways Map 1, 2, 3 (LAeq,Night)		-	70	66	64	62	61	60	59	59	58	58	57	57	56	56	55	55	54	53	53	52	52	

Forecast Noise Level (LAeq,day, dB)	Exposure Category	Policy requirements for noise-sensitive land use and/or development
55 or less		No further measures
56 to 58	A	Noise-sensitive land use and/or development is acceptable, subject to: Mitigation measures in accordance with an approved Noise Management Plan; or Quiet house A (see Table 3)
59 to 62	B	Noise-sensitive land use and/or development is acceptable, subject to: Mitigation measures in accordance with an approved Noise Management Plan; or Quiet house B (see Table 3)
63 to 66	C	Noise-sensitive land use and/or development is acceptable, subject to: Mitigation measures in accordance with an approved Noise Management Plan; or Quiet house C (see Table 3)
67 to 70	D[1]	Noise-sensitive land use and/or development is not recommended.[2]
71 +	E[1]	Noise-sensitive land use and/or development is strongly discouraged.[2]

1 For Exposure Categories D and E there is no quiet house option.

2 If noise-sensitive land use and/or development is unavoidable, an approved Noise Management Plan is required to demonstrate compliance with the noise criteria (see Table 1).

1. Specific data for Primary, Regional freight and Secondary Roads vehicles per day and % heavy vehicle mix can be obtained from the Main Roads WA Traffic Map website: http://mrapps.mainroads.wa.gov.au/TrafficMap

Assumptions:

- The NEF table does not account for the risk of short-term noise / vibration impacts which have historically been the cause of various complaints in Western Australia.
- Forecast noise levels assume level and open ground between the noise source and the receiver and neutral weather effects. All values include a +2.5 dB façade correction.
- It is acceptable to estimate noise levels where values lie between distance intervals.
- Primary, Regional freight and Secondary Roads noise levels are based on the following traffic mixes:
- Primary roads – 80 km/h traffic speed and heavy vehicle percentage of 7.5%, dense graded asphalt road surface.
- Freight roads – 110 km/h traffic speed and heavy vehicle percentages of 10%, 20% or 30%, 14mm chip seal road surface.
- Secondary roads – 80 km/h and heavy vehicle percentage of 5% or 10%, dense graded asphalt road surface.
- Primary, Regional freight and Secondary Roads for each road traffic volume range are already adjusted to account for future traffic growth rates of 2.5% per year over 20 years.
- Railway noise levels are based on current traffic volumes and mixes with adjustments included for future growth over 20 years in line with historical averages.

E.3 Standard "Quiet House" Specification Levels

Table 3: *Quiet house requirements*

Exposure Category	Orientation to corridor	Acoustic rating and example constructions				Mechanical ventilation / air conditioning
		Walls	**Windows / external doors**	**Roof and ceiling**	**Outdoor living areas**	
A **Quiet House A**	Facing	**Bedroom and indoor living and work areas to Rw+Ctr 45dB** • One row of 92mm studs at 600mm centres with: - Resilient steel channels fixed to the outside of the studs; and - 9.5mm hardboard or 9mm fibre cement sheeting or 11mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and - 75mm glass wool (11kg/m³) or 75mm polyester (14kg/m³) insulation, positioned between the studs; and - Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs. • Single leaf of 150mm brick masonry with 13mm cement render on each face. • Double brick: two leaves of 90mm clay brick masonry with a 20mm cavity between leaves.	**Bedroom to Rw+Ctr 28 dB, total glazing area up to 40% of room floor area [if Rw+Ctr 31dB: 60%] [if Rw+Ctr 34dB: 80%]** • Sliding or double hung window with single pane glazing to Rw 36dB (or 10mm glass) or 6mm-12mm-10mm double insulated glass; • Fully glazed hinged door with certified Rw 31dB rated door and frame including seals and 6mm glass; and/ or • Glazed sliding door with 10mm glass **Indoor living and work areas to Rw+Ctr 25dB, total glazing area limited to 40% of room floor area. [if Rw+Ctr 28dB: 60%] [if Rw+Ctr 31dB: 80%]** • Sliding or double hung window with single pane glazing to Rw 33dB (or 6mm glass) or 6mm-12mm-6mm double insulated glass **External doors other than glass doors to Rw+Ctr 26dB** • 35mm solid core timber frame and door, side hinged with certified Rw 28dB acoustically rated door and frame system including seals • Glazed sliding door with 10mm glass	**To Rw+Ctr 35dB** • Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling	At least one outdoor living area located on the opposite side of the building from the transport corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level.	• Evaporative systems require attenuated ceiling air vents to allow closed windows • Refrigerant-based systems need to be designed to achieve fresh air ventilation requirements • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw and 40dB into sensitive spaces • Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable
	Side on		Rw+Ctr values may be 3dB less, or max % area increased by 20%			
	Opposite	No requirements				
B **Quiet House B**	Facing	**Bedroom and indoor living and work areas to Rw+Ctr 50dB** • Single leaf of 90mm clay brick masonry with: - A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres; - A cavity of 25mm between leaves; - 75mm glass wool (11kg/m³) or 75mm polyester (14kg/m³) insulation between studs; and - One layer of 10mm plasterboard fixed to the inside face • Single leaf of 220mm brick masonry with 13mm cement render on each face • 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face • Double brick: two leaves of 90mm clay brick masonry with: - A 50mm cavity between leaves - 50mm glass wool (11kg/m³) or 50mm polyester (14kg/m³) cavity insulation - resilient ties where required to connect leaves • Double brick: two leaves of 110mm clay brick masonry with a 50mm cavity between leaves and 50mm glass wool (11kg/m3) or 50mm polyester (14kg/m³) cavity insulation	**Bedroom Rw+Ctr 31dB, total glazing area up to 40% of room floor area [if Rw+Ctr 34dB: 60%]** • Fully glazed hinged door with certified Rw 34dB acoustically rated door and frame including seals and 10mm glass • Fixed sash, awning or casement window with single pane glazing to Rw 33dB (or 6mm glass) or 6mm-12mm-6mm double insulated glass **Indoor living and work areas to Rw+Ctr 28dB, total glazing area up to 40% of room floor area [if Rw+Ctr 31dB: 0%] [if Rw+Ctr 34dB: 80%]** • As per Quiet House A example above **External doors other than glass doors to Rw+Ctr 26dB** • As per Quiet House A example above	**To Rw+Ctr 35dB** • Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling	At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level	
	Side-on		Rw+Ctr may be 3dB less, or max % area increased by 20%			
	Opposite	As per Quiet House A 'Side-on'				
C **Quiet House C**	Facing	**Bedroom and indoor living and work areas to Rw+Ctr 50dB** • As per Quiet House B example above	**Bedroom to Rw+Ctr 34dB, total glazing area limited to 40% of room floor area [if 20% of floor area or less, Rw+Ctr 31dB]** • Fixed sash, awning or casement window with single pane glazing to Rw 36dB (or 10mm glass) or 6mm-12mm-10mm double insulated glass **Indoor living and work areas to 31dB, total glazing area up to 40% of room floor area [if Rw+Ctr 34dB: 60%]** • As per Quiet House B example above **External doors other than glass doors to Rw+Ctr 30dB** • 40mm solid core timber frame and door (without glass or with glass inserts not less than 6mm), side hinged with certified Rw 32dB acoustically rated door and frame system including seals	**To Rw+Ctr 40dB** • 2 layers of 10mm plasterboard • Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling, 50mm glass wool (11kg/m³) or 50mm polyester (20kg/m³) cavity insulation	At least one outdoor living area located on the opposite side of the building from the transport corridor	
	Side-on		Rw+Ctr may be 3dB less, or max % area increased by 20%			
	Opposite	As per Quiet House A 'Facing'				

Footnotes:

- The airborne weighted sound reduction index (Rw) and traffic correction term (Ctr) are published by manufacturers/suppliers, can be determined by acoustical consultants or measured in accordance with AS ISO 717.1. Higher Rw+Ctr values infer greater sound insulation. All values are minimum Rw+Ctr (dB)
- Example construction for different external wall ratings of Rw+Ctr 45dB and 50dB are provided and are listed within Specification F5.2 in Volume 1 Part F of the National Construction Code. These values are based on the installation and sealing of joints and penetrations in accordance with Specification F5.2.
- Window and external door sound reduction values provided are based on the provision of suitable acoustic seals to prevent sound leakage. To comply with the above ratings, all external glass windows and doors specified under requirements A, B and C must have the following:
  - Operable windows and external doors must have a seal to restrict air infiltration fitted to each edge and doors must have a drop seal to provide an airtight seal when closed
  - Within doors or fixed framing, glazing must be set and sealed using an airtight arrangement of non-hardening sealant, soft rubber (elastomer) gasket and/or glazing tape, or be verified by manufacturer or approved person that the construction system as to be installed achieves the relevant Rw+Ctr value
  - In this context, a seal is foam or silicon based rubber compressible strip, fibrous seal with vinyl fin interleaf or the like. Brush / pile type seals without this seal included are not allowed.
  - Glazing referenced can be monolithic, laminated or toughened safety glass
- Any penetrations in a part of the building envelope must be acoustically treated so as not to degrade the performance of the building elements affected. Most penetrations in external walls such as pipes, cables or ducts can be sealed through caulking gaps with non-hardening mastic or suitable mortar
- No requirements for other indoor areas other than bedrooms and indoor living or work areas

F. EQUIPMENT CALIBRATION CERTIFICATES

Instrulabs Pty. Ltd.

SOUND LEVEL METER CALIBRATION CERTIFICATE

Calibration Date : **Friday, 21 September 2018**

Device and Calibration Information

Client : **Sealhurst Pty Ltd**
51 Knight Road
Gnangara
WA 6077

Contact : **David Kudla, 9306 4481**

Meter : **Norsonic NOR140, S/N: 1406036, Class 1**

Firmware Revision: 3.0.1793

Preamp : **Norsonic, 1209, s/n: 20076**

Microphone : **Norsonic, 1225, s/n: 208154**

Laboratory Reference Equipment Used:

Bruel & Kjaer Acoustic Calibrator Type 4226, S/N: 2692340, Cal Due: 27/03/2019

Fluke 8846A Precision Multimeter, S/N: 2479018, Cal Due: 9/07/2019

Test Environment (at start/at end):

22.6 C, 1017.3 hPa, 47.1 %R.H.
23.7 C, 1017.1 hPa, 47.3 %R.H.

Acoustic stimuli for the calibration tests were generated by a Bruel & Kjaer 4226 multifunction acoustic calibrator. Electrical stimuli for the calibration tests were generated by a TTi 1241 Arbitrary Waveform Generator and signal levels were verified using a Fluke 8846A Voltmeter. All reference calibration artefacts have current NATA endorsed calibration documentation.

SUMMARY OF CERTIFIED RESULTS / STATEMENT OF CONFORMANCE

Periodic tests were performed in accordance with procedures from AS IEC 61672-3:2006

Pass	IEC61672.3 cl 9 - Absolute Acoustic Sensitivity	N/T	IEC61672.3 cl 15 - Level Range
Pass	IEC61672.3 cl 10 - Self Generated Noise	Pass	IEC61672.3 cl 16 - Toneburst Response
Pass	IEC61672.3 cl 11 - Frequency Weighting Acoustic	Pass	IEC61672.3 cl 17 - Peak C Sound Level
Pass	IEC61672.3 cl 12 - Electrical Frequency Weightings	Pass	IEC61672.3 cl 18 - Overload Indication
Pass	IEC61672.3 cl 13 - Frequency & Time Weightings	Pass	AS/NZS 4476 cl 4.4 - Relative attenuation, 1/1 Oct
Pass	IEC61672.3 cl 14 - Level Linearity	Pass	AS/NZS 4476 cl 4.4 - Relative attenuation, 1/3 Oct

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of AS IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with AS IEC 61672-2:2004, to demonstrate that the model of sound level meter fully conformed to the requirements in AS IEC 61672-1:2004, the sound level meter submitted for testing conforms to the class 1 requirements of AS IEC 61672-1:2004.

Signature _____ **Signature** _____

Calibrated by Jason Dixon
Lab Manager, Approved Signatory

Checked by Alena Fry
Admin Manager, Lab Assistant

LABORATORY ACCREDITATION NUMBER 1943 - Since 1985
Mail : PO Box 1211, East Victoria Park WA 6102
Lab : 3 Hopkinson Way, Wilson WA 6107
Ph: 08 9356 2605
email: info@instrulabs.com.au web : www.instrulabs.com.au

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025:2005 - Calibration
Approved for issue by Erik Fry, 09 January 2018. Document ID number: C11

Issue Date: 21/09/2018
Report# 2810J3578

Report printed 21/09/2018 2:20:30 PM

Instrulabs Pty. Ltd.

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE

THIS IS TO CERTIFY THAT THE ACOUSTIC CALIBRATOR

MAKE : **Norsonic**

MODEL : **1251**

SERIAL : **34172**

OWNED BY : **Sealhurst Pty Ltd**

Address: 51 Knight Road

Gnangara WA 6077

HAS BEEN CALIBRATED ON : **21-Sep-18**

SUMMARY

A sound level meter connected to a digital acquisition system is adjusted to a known reference sound pressure level, then the digital acquisition system records the frequency and sound pressure levels of the acoustic calibrator under test. All instruments used have current NATA endorsed calibration documentation

CALIBRATION INSTRUMENTS USED

Rion NA-28 Sound Level Meter	s/n 01270691	Recalibration due	17-Jan-20
Bruel & Kjaer Acoustic Calibrator Type 4226	s/n 2692340	Recalibration due	27-Mar-19
NI USB-6221-BNC Multifunction DAQ	s/n 14E9DD2	Recalibration due	12-Mar-19

CERTIFIED QUANTITIES

Frequency - AS IEC 60942-2004 clause B3.5

Limits ± 1%, Uncertainty ± 0.05%, C.F. = 2, C.L. = 95%

Frequency : **999.9** Hz **Pass**

THD+N - AS IEC 60942-2004 clause B3.6

Limits ± 3%, Uncertainty ± 0.8%, C.F. = 2, C.L. = 95%

THD+N : **0.84** % **Pass**

SPL - AS IEC 60942 clause B3.4.3.2

Limits ± 0.4dB, Uncertainty ± 0.2dB, C.F. = 2, C.L. = 95%

Amplitude : **114.17** dB **Pass**

Signature _____ **Signature** _____

Calibrated by Jason Dixon

Lab Manager, Approved Signatory

Checked by Alena Fry

Admin Manager, Lab Assistant

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Accredited for compliance with ISO/IEC 17025:2005 - Calibration

Approved for issue by Erik Fry, 01 November 2017. Document ID number: CR2

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Report# 647J3578

Instrulabs Pty. Ltd.

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE

THIS IS TO CERTIFY THAT THE ACOUSTIC CALIBRATOR

MAKE : **Bruel & Kjaer** OWNED BY : **Sealhurst Pty Ltd**

MODEL : **4230** Address: 51 Knight Road

SERIAL : **1026428**

Gnangara WA 6077

HAS BEEN CALIBRATED ON : **21-Sep-18**

SUMMARY

A sound level meter connected to a digital acquisition system is adjusted to a known reference sound pressure level, then the digital acquisition system records the frequency and sound pressure levels of the acoustic calibrator under test. All instruments used have current NATA endorsed calibration documentation

CALIBRATION INSTRUMENTS USED

Rion NA-28 Sound Level Meter	s/n 01270691	Recalibration due	17-Jan-20
Bruel & Kjaer Acoustic Calibrator Type 4226	s/n 2692340	Recalibration due	27-Mar-19
NI USB-6221-BNC Multifunction DAQ	s/n 14E9DD2	Recalibration due	12-Mar-19

CERTIFIED QUANTITIES

Frequency - AS IEC 60942-2004 clause B3.5

Limits ± 2%, Uncertainty ± 0.05%, C.F. = 2, C.L. = 95%

Frequency : 1005.9 Hz **Pass**

THD+N - AS IEC 60942-2004 clause B3.6

Limits ± 4%, Uncertainty ± 0.8%, C.F. = 2, C.L. = 95%

THD+N : 1.05 % **Pass**

SPL - AS IEC 60942 clause B3.4.3.2

Limits ± 0.75dB, Uncertainty ± 0.2dB, C.F. = 2, C.L. = 95%

Amplitude : 93.95 dB **Pass**

Signature _____ **Signature** _____

Calibrated by Jason Dixon

Lab Manager, Approved Signatory

Checked by Alena Fry

Admin Manager, Lab Assistant

NATA WORLD RECOGNISED ACCREDITATION

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Accredited for compliance with ISO/IEC 17025:2005 - Calibration

Approved for issue by Erik Fry, 01 November 2017. Document ID number: CR2

Issue Date: 21/09/2018

Report# 648J3578

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G. NOISE DURING CONSTRUCTION PHASE

G.1 Extract from Appendix D AS 2436 - Section 4.6

AS2436:2010 Appendix D

Section 4.6

In demolition work alongside occupied premises there should, if possible, be a break in solid connections, e.g. concrete paving, between the working area and the adjoining buildings. This will reduce the transmission of vibration and structure-borne noise. Care should be taken that any such break is of no structural significance in relation to the planned system of demolition. The break could result in premature collapse due to lack of continuity or restraint. Care should be taken not to drop materials from a height either into or out of trucks. The surfaces on to which the materials are being moved should be covered by some resilient material. Particular care should be taken during the loading and unloading of scaffolding. Where material cannot be lowered in skips or by other means, it is recommended that properly constructed and damped chutes be used. The effectiveness of noise enclosures and screens can be partially lost if they are used incorrectly. For example, the noise being enclosed should be directed into and not out of the enclosure. There should also be no reflecting surfaces opposite the open side.

4.5.5 Maintenance of equipment Increases in plant noise are often indicative of future mechanical failure. Regular and effective maintenance of plant and equipment including vehicles is essential and will do much to maintain noise levels near to that of new plant. Maintenance should be carried out only by trained persons. Where maintenance work has to be done at night, precautions may be necessary to minimize any nuisance. Vibration from machinery with rotating parts can be reduced by attention to proper balancing. Frictional noise from the cutting action of tools and saws may be reduced if the tools are kept sharp. Other noises caused by friction in machines, conveyor rollers and trolleys can be reduced by proper lubrication.

4.6 CONTROLLING THE SPREAD OF NOISE

4.6.1 General

If noisy processes cannot be avoided, then the amount of noise reaching the receiver should be minimized. Two ways of doing this are either to increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens. Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. Practices that will reduce noise from the site include: (a) Increasing the distance between noise sources and sensitive receivers. (b) Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportables can be effective barriers). (c) Constructing barriers that are part of the project design early in the project to afford mitigation against site noise. (d) Installing purpose built noise barriers, acoustic sheds and enclosures.

4.6.2 Distance

Increasing the distance is often the most effective method of controlling noise. This may not be possible where work takes place on fixed structures, e.g. railway tracks. The effect of distance on noise levels is explained in Appendix B. Stationary plant such as compressors and generators can be located away from the work area so as to avoid being close to any noise-sensitive area.

4.6.3 Screening

On sites where distance is limited, the screening of noise may be of benefit and this should be taken into account at the planning stages. Appendix B illustrates the effect of the screen in reducing the noise level and Appendix D describes the performance of different types of acoustic screens and enclosures and the materials they are made of. If structures such as stores, site offices and other temporary buildings are situated between the noisiest part of the site and the nearest dwellings, some of the noise emission from the site can be reduced. If these buildings are occupied, then sound insulation measures may be necessary to protect workers in them.

A hoarding that includes a site office on an elevated structure offers a superior noise reduction when compared with a standard (simple) hoarding. This performance is further enhanced when the hoarding is a continuous barrier. Storage of building materials or the placement of shipping containers between the noise source and any noise-sensitive area may also provide useful screening and the same is true of partially completed or demolished buildings.

Noisy stationary plant can be put in a basement, the shell of which has been completed, provided reverberant noise can be controlled. Where compressors or generators are used in closed areas, it is necessary to ensure that the exhaust gases are discharged directly to the outside air and that there is good cross-ventilation to prevent the build-up of poisonous carbon monoxide fumes and to allow an adequate air supply to maintain efficient running.

Where such noise barriers are not practicable, a worthwhile reduction in noise can be obtained by siting the plant behind and as close as possible to mounds of earth, which may effectively screen the plant from any noise-sensitive areas. These can often be designed into the construction schedule or site arrangement for future landscaping. Water pumps, fans and other plant and equipment that operate on a 24-hour basis may not be a source of noise nuisance by day but can create problems at night. They should therefore be effectively screened either by being sited behind a noise barrier or by being positioned in a trench or a hollow in the ground provided this does not generate reverberant noise. In such cases, however, adequate ventilation should also be ensured.

Long, temporary earth embankments can provide quite an effective noise screen for mobile equipment moving, for example, on a haulage road. When the earthworks are complete, the earth mounds should be removed if possible with smaller, quieter excavators. A noise barrier may be a more reliable method of noise control than the imposition of restrictions on throttle settings. In many cases it will not be practicable to screen earthmoving operations effectively, but it may be possible to partially shield construction plant or to build-in at the early stages protective features ultimately required to screen traffic noise. Where earth noise barriers are not a practical proposition because of lack of space, consideration should be given to the possibility of constructing temporary screens from wood or any of the materials suggested in Appendix D.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and to the listener, and the material from which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected to a distance of not less than ten times the shortest measurement from the property to the barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend to a distance beyond the direct line between the noise source and the receiver to a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver. If the works are predominately within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

4.7 CONTROL OF NOISE AT THE RECEIVER

In cases where noise emissions cannot be adequately controlled at the source or by controlling the spread of noise, consideration should be given to control of noise received at nearby sensitive locations. Provision of treatments at the affected residence or other sensitive land use is normally only suited to addressing noise from longer term construction projects at a stationary site, or where the work site is relatively isolated, or where only a few residences or other sensitive land uses are affected.

Practices that will mitigate the impacts of noise include: (a) Providing localized noise barriers adjacent to the receiving location. (b) Providing acoustic insulation to reduce airborne noise entering buildings, for example, heavyweight glazing or double glazing. (c) Providing ventilation to enable windows and doors to remain closed. (d) Providing access to temporary relocation for noise-affected occupants for short periods, for example, when high noise levels from construction occur at night and there are no feasible and reasonable ways of reducing noise levels.

4.8 CONTROL OF VIBRATION

4.8.1 General

Vibration can be more difficult to control than noise, and there are few generalizations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Impulsive vibration can, in some cases, provide a trigger mechanism that could result in the failure of some building component that had previously been in a stable state. It can also trigger annoyance being elevated into action by occupants of exposed buildings, and should therefore be included in planning of communication with impacted communities.

It should be remembered that failures, sometimes catastrophic, can occur as a result of conditions not directly connected with the transmission of vibrations, e.g. the removal of supports from retaining structures to facilitate site access. BS 7385-2 provides information on managing groundborne vibration and its potential effects on buildings.

Where site activities may affect existing structures, a thorough engineering appraisal should be made at the planning stage. General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive receivers is recommended when these are relatively close, depending on the magnitude of source of the vibration or the distance involved. Relatively simple prediction methods are available in texts, codes of practice or other standards, however it is preferable to measure and assess site transmission and propagation characteristics between source and receiver locations.

Comparison of predicted levels of vibration with preferred or regulatory levels will indicate when either more detailed predictions are required or mitigation of transmitted vibration is advisable or necessary. Guidance in measures available for mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228-2 or policy documents, such as the NSW DEC Assessing Vibration: A technical guideline.

Identifying the strategy best suited to controlling vibration follows a similar approach to that of noise—of avoidance, control at the source, control along the propagation path, control at the receiver, or a combination of these. It is noted that vibration sources can include stationary plant (pumps and compressors), portable plant (jackhammers and pavement vibrators), mobile plant, pile-drivers, tunnelling machines and activities, and blasting, amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially with piling.

H. ACOUSTIC GLOSSARY

Acoustic Measurement Parameter Definitions

dB

Decibel: a logarithmic scale applied to acoustic units such as sound pressure and sound power. Decibels are always the ratio between two numbers. Sound Pressure in Pascals becomes "Sound Pressure Level re $2x10^{-5}$Pa" in decibels. Sound Power in watts becomes "Sound Power Level re 10^{-12}W" in decibels. It is also used for sound reduction or sound insulation and is the ratio of the amount of sound energy incident upon a partition and the proportion of that energy which passes through the partition. The result is stated as a "decibel reduction".

dB(A)

A-weighting: This is an electronic filter which attenuates sound levels at some frequencies relative to the sound levels at other frequencies. The weighting is designed to produce the relative response of a human ear to sound at different frequencies. The A-weighted sound level is therefore a measure of the subjective loudness of sound rather than physical amplitude. A-weighting is used extensively and is denoted by the subscript A as in L_{A10}, L_{Aeq} etc. (Levels given without the subscript 'A', are linear sound levels without the A-weighting applied, e. g. L_{10}, L_{eq} etc.).

Sound Power Level, (SWL)

Sound power level refers to the reference value of acoustic power (of a noise source, e.g. building services plant unit). Given a well-defined operation condition, (i.e. steady state), the sound power level of a machine is a fixed value and describes the rate at which sound energy is emitted, reflected, transmitted or received, per unit time. The SI unit of sound power is the watt (W), and is expressed as a logarithmic ratio of sound power versus reference sound power, re 10^{-12}W" in decibels (dB), or A-Weighted decibels, dB(A);

Sound power level (SWL) is the acoustic energy emitted by a source which produces a resulting Sound Pressure Level (SPL) at some distance. While the Sound Power Level (SWL) of a given source is fixed, the resultant Sound Pressure Level (SPL) at a given receiver location depends upon the distance and angle from the noise source, and the acoustic characteristics of the area in which the receiver is located;

Sound Pressure Level, (SPL)

Sound Pressure Level (SPL) is a measure for the resulting effect of the energy (Sound Power Level, SWL) of an acoustic source (or a collection of sources) and is dependent upon the distance and angle between the source(s) and receiver location, the acoustic properties of the surrounding geometry and influencing surface finishes between the source-receiver path;

Sound Pressure Level (SPL) is always depends on position and environment.

$L_{Aeq,T}$

The "A" weighted equivalent continuous sound pressure level. This may be thought of as the "average" sound level over a given time "T". It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises.

$L_{A90,T}$

The "A" weighted sound pressure level that is exceeded for 90% of the time T. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is used for setting noise emission limits for industrial and commercial premises.

L_{Amax}

The maximum "A" weighted sound pressure level during a given time on fast or slow response.

L_{pA}

The "A" weighted sound pressure Level. The sound pressure level is filtered through a standard frequency weighting known as A-weighting. This filter copies the frequency response of the human ear, so that the resulting sound level closely represents what people actually hear.

R

Is the sound reduction index of a construction element in octave or 1/3 octave bands and can only be measured in a laboratory. There must be no flanking transmission.

R'

Is the sound reduction index of a construction element in octave or 1/3 octave bands measured on site, and normally includes flanking transmission (i.e. where sound travels via paths other than straight through the element being tested, such as columns, ducts, along external walls, etc.).

R_w

To get the weighted sound reduction index (R_w) of a construction, the R values are measured in octave or 1/3 octave bands covering the range of 100Hz to 3150Hz. The curve is adjusted so that the unfavourable deviation (or shortfall of the actual measurements below this standard curve) averaged over all the octave or 1/3 octave bands is not greater than 2dB. The value of the curve at 500Hz is the R_w.

R'_w

The apparent sound reduction index, which is determined in exactly the same way as the R_w but on site where there is likely to be some flanking transmission.

D

This is the "level difference". It is determined by placing a noise source in one room and measuring the noise levels in that room (the "source room") and an adjacent room (the "receiver room"). The level difference is calculated by simply deducting the "receiver" noise level (dB) from the "source" noise level (dB).

D_w

This is the weighted level difference. D is measured on site in octave or 1/3 octave bands covering the range of 100Hz to 3150Hz. The D values are compared to a standard weighting curve. The curve is adjusted so that the "unfavourable deviation" (or shortfall of the actual measurements below this standard curve) averaged over all the octave or 1/3 octave bands is not greater than 2dB. The D_w is then the value of the curve at 500Hz.

D_{nw}

This is the weighted normalised level difference. D is measured on site in octave or 1/3 octave bands covering the range of 100Hz to 3150Hz. As the level difference is affected by the area of the common wall/ floor and the volume of the receiving room, as well as the amount of absorption in the receiving room, in the case of the $D_{nT,w}$, the results are "normalised" by a mathematical correction to 10m^2 of absorption (D_n). The same weighting curve as for D_w is used to obtain the single figure: D_{nw}.

Acoustic Performance Guide

$D_{nT,w}$

This is the weighted standardised level difference. D is measured on site in octave or 1/3 octave bands covering the range of 100Hz to 3150Hz. As the level difference is affected by the area of the common wall/ floor and the volume of the receiving room, as well as the amount of absorption in the receiving room, in the case of the $D_{nT,w}$, the results are "standardised" by a mathematical correction a reverberation time, usually 0.5 seconds (D_{nT}). The same weighting curve as for D_w is used to obtain a single figure "$D_{nT,w}$"

$D_{nT(Tmf, max),w}$

This is the weighted BB93 standardised level difference corresponding to a Building Bulletin 93 reference value reverberation time in a receiving room. It is measured on site in accordance with *BS EN ISO 140- 4:1998.*

$D_{n,c}$

Suspended ceiling normalised level difference. This is the sound level difference between two rooms, separated by a suspended ceiling, normalised to a reference value of absorption in the receiving room (10m2 for the Laboratory as specified in *ISO 140-9:1985*). It is measured in 1/3 octave or octave frequency bands.

$D_{n,c,w}$

Weighted suspended ceiling normalised level difference. This is a single number quantity representing the sound reduction between two rooms separated a suspended ceiling. It is obtained by applying specified weightings to the 1/3 octave band suspended ceiling normalised level differences in the frequency range 100Hz to 3150Hz.

C_{tr}

Spectrum adaptation term: Value, in decibels, to be added to a single-number rating (e. g. Rw) to take account of the characteristics of particular sound spectra. Ctr is calculated using an A-weighted urban traffic noise spectrum as defined in *BS EN ISO 717-1:1997.*

NR

Stands for Noise Rating. (It is NOT noise reduction). It is (e. g. NR30, NR35 etc.) a single number, which represents the sound level in a room and takes account of the frequency content of the noise. The lower the NR value, the quieter the room will be. It is mainly used for assessing noise from mechanical services systems. In leisure developments it is used as a standard for noise break-in to rooms from external noise sources such as traffic.

NC

Stands for Noise Criteria. It is very similar to NR but (e.g. NC30, NC35 etc.) uses slightly different frequency weightings.

NRC

Stands for Noise Reduction Coefficient. The noise reduction coefficient of a material is the average, to the nearest multiple of 0.05, of the absorption coefficients at 250Hz, 500Hz, 1kHz and 2kHz.

α

Stands for Absorption Coefficient, which represents the proportion of incident sound energy arriving from all directions that is not reflected back into the room. It ranges between 0 and 1, where 0 is reflective and 1 is totally absorptive.

α_w

Stands for Weighted Absorption Coefficient. Single- number frequency dependent value which equals the value of the reference curve at 500Hz after shifting it as specified in *EN ISO 11654:1997.*

α_p

Stands for practical absorption factor. It is a frequency dependent value of sound absorption coefficient which is based on measurements in one- third- octave bands in accordance with ISO 354 and which is calculated in octave bands in accordance with *EN ISO 11654:1997.* It is the arithmetic mean of the three 1/3 octave sound absorption coefficients within the octave being considered. The mean value is calculated to the second decimal place and rounded in steps of 0.05 up to a value of 1.0.

Class X

Stands for the Absorption Class between 250Hz and 4kHz, as defined by *EN ISO 11654*. Class A is the best classification representing the highest level of absorption, and Class E offers to lowest classification.

RT or T_{60}

Reverberation Time is a measure of the echoic nature of a room. It is normally measured in 1/3 octave or octave bands by exciting the space with a high level interrupted source or impulse, and measuring the time taken for the signal to decay to silence. The longer the reverberation time, the more 'echoic' a room sounds. For dwellings, a reverberation time of 0.5 seconds or less is normal. Cinema auditoria will have reverberation times of 1.0 second or below when fitted out, but up to 9 seconds at shell completion.

When designing acoustically sensitive areas such as concert halls or lecture theatres, it is necessary to design the room finishes to achieve optimum reverberation times. These will vary depending on the type of activity in the room and the room volume.

T_{mf}

Stands for the arithmetic average of the reverberation times in the 500Hz, 1kHz and 2kHz octave bands, for the type of receiving room, as defined in UK Schools design manual, Building Bulletin 93.


Sealhurst
Acoustic Design
& Engineering

BALDIVIS SUNSET RETREAT WASTE MANAGEMENT PLAN

Waste Management and Resource Recovery

Lot 159 Moylan Road, Wattleup

Version 1.0

Issue Date: 12/11/2018

Author: Tim Hyatt

1. **CONTACT INFORMATION**

Company Name:	Coastal Waste
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Standard Customer Service No	(08) 9592 9420
Business Manager	Tim Hyatt
Contact No.	(08) 9592 9420
Email Address	**t.hyatt@coastalwaste.com.au** **info@coastalwaste.com.au**
Parent Company:	West Coast Bins Pty Ltd

2. BUSINESS BACKGROUND

Coastal Waste is a Waste Management company based in Wattleup Western Australia. The business provides fully integrated waste and environmental management services to the commercial, industrial and municipal sectors across Perth. Coastal Waste is a Western Australian privately-owned company, part of a group of companies including:

- Eco Resources – Construction and Demolition Waste Transfer Station, based in Hope Valley, Western Australia, providing sorting, recycling and resale of construction materials,
- Premium All Sands – Owns and operates a Sand Quarry in Waroona, Western Australia, providing all types of sand products,
- Premium Waste Management – Owns and operates a Class 1 Landfill in Waroona, Western Australia, landfilling of materials for its own and a range of businesses across Western Australia.

Coastal Waste is continually seeking opportunities to capitalize on our core values:

- Safety First – If it's not safe for people or the environment, don't do it
- Turning waste into a resource – through a range of initiatives, we will extract value from our community's waste streams to achieve maximum recovery rates and minimize the impact on landfills
- Developing our people – We will provide training and development opportunity to our employees, customers and community stakeholders
- Providing exceptional levels of service and value to our clients

Through the implementation of well-designed plans, policies and processes, Coastal Waste will be the market leader in Sustainable Waste Resource Recovery.

3. PROJECT OVERVIEW

Coastal Waste share the responsibility of ensuring that the environmental objectives are achieved during the term of a project. This Waste Management Plan is the tool we use to achieve these objectives

This WMP has been tailored to provide a roadmap to sustainable waste and recyclables management.

The WMP outlines the functions of both company's representatives, who will meet regularly as required, to review the implementation and ongoing improvement of our waste management plan and recycling initiatives. It also provides the type of waste management containers that will be used on the project, the process for booking waste collections and the regularity of services, along with emergency contacts.

The WMP addresses the following:

- Scope and Objectives
- Waste Stream Segregation & Bin Storage
- Waste Management Fates & Working Hours
- Performance Tracking
- Responsibilities and Compliance requirements

Coastal Waste looks forward to working with Braude Architects to develop and implement initiatives, which achieve environmental best practise through maximising the diversion of our waste resources from conventional landfill.

3.1 SCOPE AND OBJECTIVES

3.1.1 SHARED OBLIGATIONS

Coastal Waste, in conjunction with its customers will meet the following obligations relating to any Development:

We will:

- Provide consultation and where necessary, training to site personnel,
- Encourage recycling where possible,
- Accurately measure and report on activities undertaken,
- Ensure legal compliance is achieved and maintained,
- Through segregation and recovery, ensure waste to landfill is minimised,
- Work with its customers to minimise impacts on the environment from non-essential travel,
- Manager on site to ensure that bins are presented for collection as required.

3.1.2 KEY PERFORMANCE INDICATORS

As part of the WMP Coastal Waste has agreed to the following key performance indicators:

- 0 Lost Time Injuries for the project duration
- 0 Environmental incidents for the project duration
- Report monthly on total waste and recovered waste resource
- Monitor and adjust optimal driving routes and report by exception when not followed
- 0 legal non-compliance events
- Ensure that all waste is recycled where possible.

3.1.3 WASTE STREAM SEGREGATION & RECYCLING

The waste diversion from conventional landfill target of minimum 25% by weight, will be a cornerstone objective of the project. Coastal Waste has developed a structured resource recovery program that focuses on each individual waste stream and identifies appropriate recovery and resale routes for all major waste streams, once they have been extracted and processed. These activities minimise waste volumes sent to conventional landfill and will ensure that the project meets its waste related environmental objectives.

3.1.5 WASTE REPORTING

Coastal Waste will provide monthly reports which detail the volume of waste able to be diverted from landfill for each bin collected. Monthly reports are designed to give a comprehensive overview of how the different aspects of your project are performing against the agreed standards. Below is an excerpt from a report provided to other customers as a standard report.

Date	Total Collected (tonnes)	Refuse	Recycling	% Recycled Volume	% Landfill Volume
28/02/2018	2	1.5	.5	75.00%	25.00%
04/03/2018	1	.75	.25	75.00%	25.00%
06/03/2018	3	2.25	.75	75.00%	25.00%
10/03/2018	4	3	1	75.00%	25.00%
12/03/2018	2	1.5	.5	75.00%	25.00%

3.1.6 SITE ASSESSMENTS

Coastal Waste will perform regular site assessments as required. The assessment will enable us to ensure that we are providing for the current specific needs of the project including bin types and sizes, along with optimum locations for the placement of bins to enable efficient waste capture, user compliance and other necessary issues. There will be a permanent manager on site who will be required to take part in each periodical site assessment.

3.1.7 WASTE BIN TYPE, COLLECTION & STORAGE

Coastal Waste will provide clearly labelled, waste collection bins for the following waste streams:

- Refuse & General Household Waste (General Waste)
    - Foodwaste
    - Organics
    - Hard Plastics
    - Polystyrene
    - General Household Waste
- Recycling
    - Newspaper & Magazines
    - Plastic Bottles and Containers
    - Aluminium Cans
    - Steel Food Tins
    - Cardboard

Coastal Waste will provide 120 litre MGB's for General Waste, which will be serviced on a weekly basis, and 240 litre MGB's for Recycling which will be serviced on a fortnightly basis. The MGB's will both be supplied by David Gray & Son and will be manufactured by Sulo. Spare parts will be supplied and fitted on an as required basis.

Bins will be stored in the Store Room at each unit and also at the main hall in the Store Room. A bin collection schedule will be published in each unit and at the main hall. Bins will be serviced on the

same day each time, during normal business hours 08:30am – 5:00pm Monday to Friday (day to be agreed).

3.1.8 WASTE FATES

Coastal Waste will dispose of waste resources in a way that causes the least harm to the environment. Understanding the final fate of waste resources is an important part of the education process, linking waste management providers to waste generators.

General Waste will be disposed of at Millar Road Landfill or at another licenced facility which is authorised by the DWER to accept this type of waste.

Recycling waste will be disposed of at Suez or at another licenced facility which is authorised by the DWER to accept this type of waste.

4.0 COMPLIANCE QUALITY AND SAFETY

Coastal Waste has an integrated WHS&E Management System in place to assist in meeting the corporate objectives of the business.

This management system adheres to standards:

- ISO 14001:2004 (Environmental Management Systems)
- AS 4801:2001 (OHS Management Systems)
- ISO 9801:2008 (Quality Management Systems).

4.1 COASTAL WASTE SAFE WORK PROCEDURES

The information management system that houses the system allows each employee to have access to policies, procedures and instructions including how best to manage health and safety environment matters. This assists the company to comply with all relevant legislation

Every employee has been trained in accordance to relevant procedures such as:

- Spill response,
- Vehicle operating procedure,
- Daily routines and delivery process,
- Management of non-conforming waste,
- Collection, Transportation and Storage of Hazardous Waste,

These procedures aim to help employees to minimise risks to the safety of themselves, others, and the environment whilst at work. The procedures are carried in a file which belongs to the employee, is carried in the collection vehicle and is regularly updated for currency and relevancy.

End of Document…

URBANISTA
TOWN PLANNING

8 January 2019

David Banovic
Senior Planning Officer
City of Rockingham
PO Box 2142, Rockingham DC WA 6967

Dear Mr Povey

NO. 1447 & 1457 MANDUARH ROAD, BALDIVIS
VISUAL LANDSCAPE ASSESSMENT

Urbanista Town Planning has been engaged to prepare a submission for planning approval for the proposed development at No. 1447 and 1457 Mandurah Road, Baldivis.

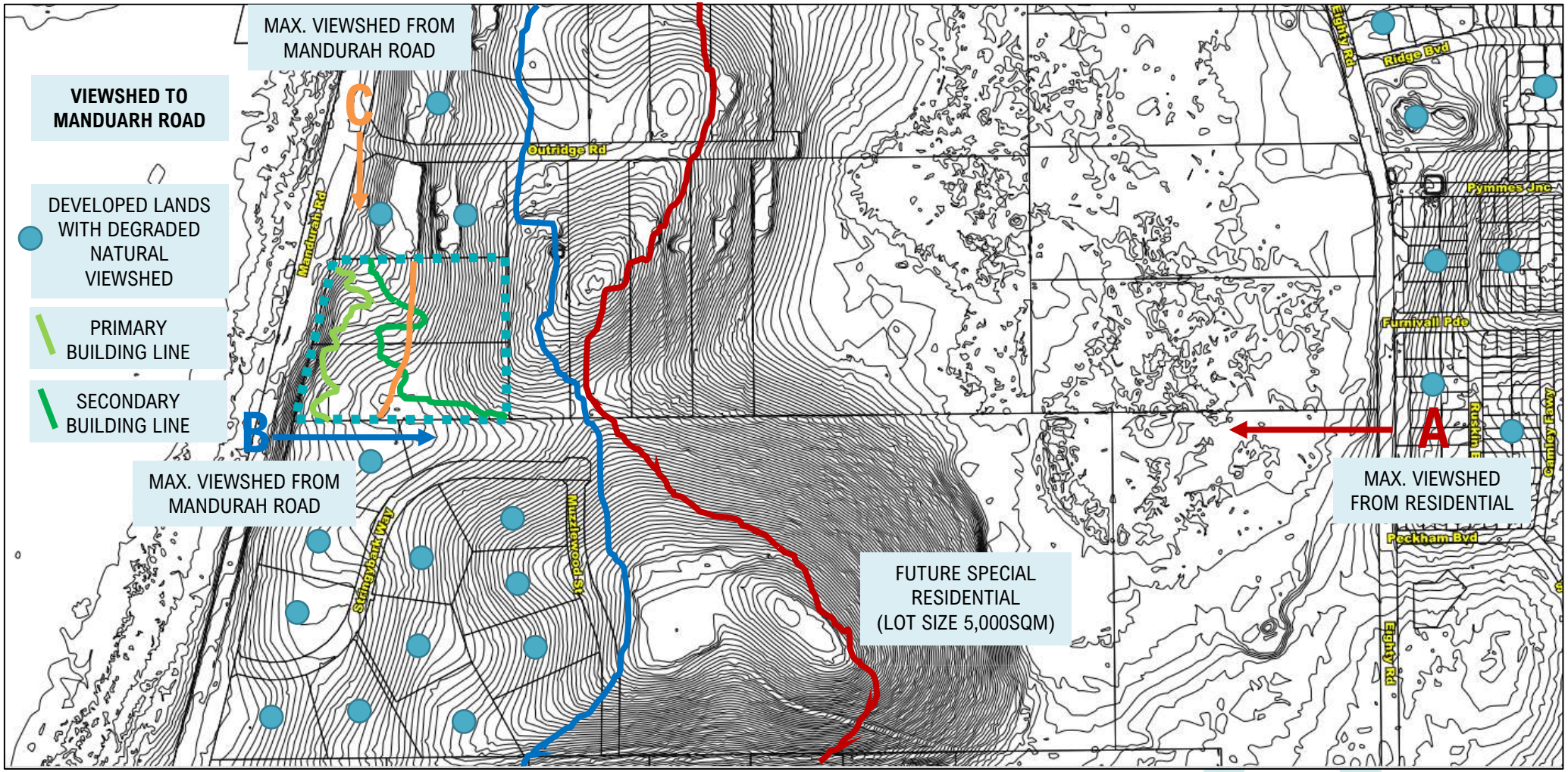
SUBJECT SITE

PROPERTY DESCRIPTION

The subject lot is located on Mandurah Road opposite Lake Walyungup. The lot is zoned Rural under the City's Local Planning Scheme. The lot proposes a lifestyle village development of a comparable scale to similar lifestyle village developments nearby on Rural zoned land. The total land area of the two lots is 40,467sqm with a total frontage of 189.12m to Mandurah Road to the west. Each lot currently has a residential dwelling and several outbuildings. A number of these buildings or structures are proposed to be retained in association with the development.

TOPOGRAPHY

The topography of the lot has a gentle rise toward the east (rear) as illustrated in the site feature survey which has been prepared for the development. The topography does not create any notable design constraints for the construction of the proposed development.



0.5m Site Contour Map. Not to scale. Source: City of Rockingham
Map includes "seen area" / viewshed analysis based on contour data.
Trees, buildings and other features may alter this viewshed analysis.
View from residential area to Mandurah Road "A". View from Mandurah Road eastward "B".

URBANISTA
TOWN PLANNING

AERIAL MAP

0 30 60 120 180 240 300 m

1:3,000 @ A4

1447 & 1457 MANDURAH ROAD
BALDIVIS

Coordinate System: GCS WGS 1984
Datum: WGS 1984 Units: Degree

N

URBANISTA
TOWN PLANNING

AERIAL MAP

0 30 60 120 180 240 300 m

1:3,000 @ A4

1447 & 1457 MANDURAH ROAD
BALDIVIS

Coordinate System: GCS WGS 1984
Datum: WGS 1984 Units: Degree

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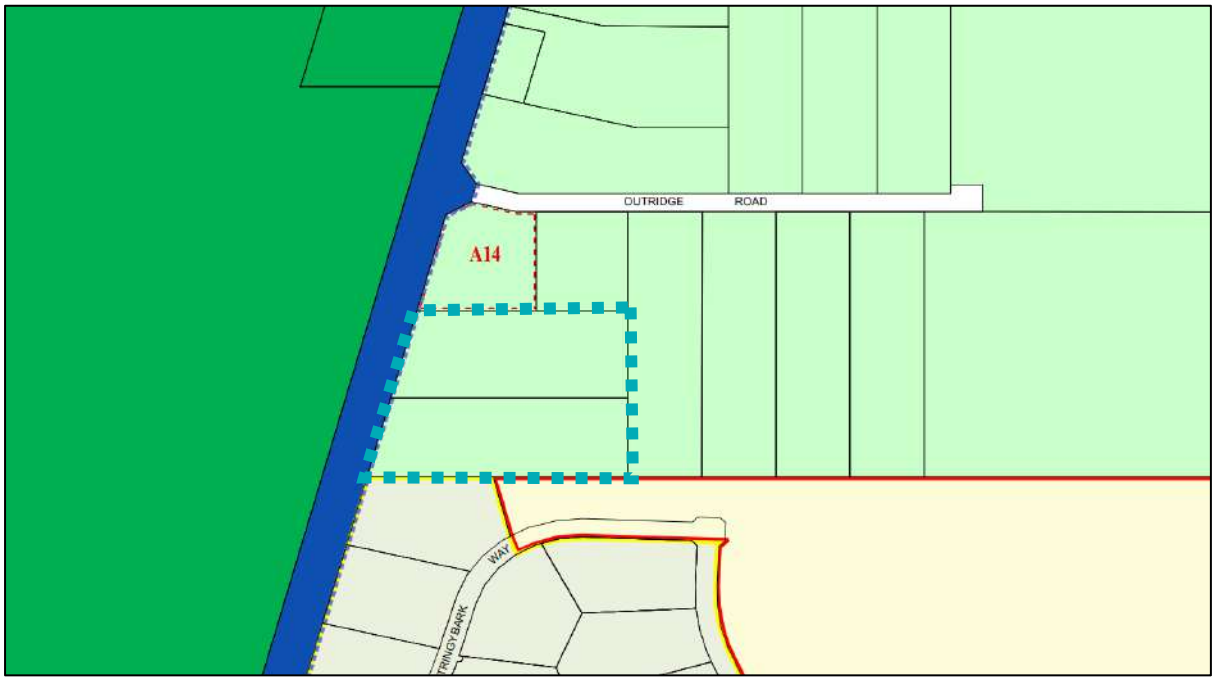

City of Rockingham Local Planning Scheme No. 2 Scheme Map 10. Source: WAPC

Site Plan (indicative) and site aerial map (note: based on old revision of plans). Source: Bushfire Prone Planning.

VISUAL LANDSCAPE ASSESSMENT

The proposed development has been assessed in accordance with the City's Local Planning Policy 3.1.1 as detailed in the following sections provided subsequently. The City's planning officer specifically requested the following information which has been addressed in this document:

> *…[T]he provisions reference the importance of development which enhances the landscape and natural resource attributes in order to provide a natural viewshed to Mandurah Road. Given that this development proposes a significant increase in residential density, it is requested that a demonstration of how the development will not impact the rural viewshed from Mandurah Road and adjoining properties be provided.*

Assessment	
City of Rockingham Local Planning Policy 3.1.1	**Comment**
The primary objective for this Planning Unit is to • encourage special rural/special residential development which recognises and enhances the landscape and natural resource attributes of the unit and • provides a natural viewshed to Mandurah Road and a rural context to proposed urban development to the east.	• Mandurah Road has been specifically identified as an important area where a "rural" viewshed is to be maintained. • The development proposal is for a lifestyle village. The development proposes the retention of numerous mature trees throughout the site and situates the predominant proportion of dwellings towards the east (rear) of the lot where they are obstructed by buildings, trees, and topography, and not otherwise visible or prominent from Mandarah Road. • The site will respond to the natural topography and proposes minimal site works and minimal clearing of vegetation beyond that within building footprints. • As shown in the 0.5m Site Contour Map the viewshed from location "B" ('urban development to the east') is obstructed by the ridgeline and will not otherwise be visible from that residential development. • Indicative perspectives are also shown, and as also evident though the various other plans and maps in this document illustrate that the development largely integrates into the existing landscape and will have a minimal impact on viewsheds, view corridors and the visual aesthetic as

	viewed from Mandurah Road, other local roads, and surrounding private land. • As shown in the 0.5m contour map, most new buildings (secondary building line) are situated behind the view corridor from Mandarah Road ("C"). Those buildings forward of that viewshed ("C") are mostly retained buildings, with the exception of three dwellings to the north of the lot (1, 2, 12) and a group of 6 dwellings more toward the south (33, 34, 35, 43, 44, 45). Given the retention of vegetation, and an embankment these buildings will largely not be visible from Mandurah Road.
Lot sizes should be determined by the need to protect natural bushland and other landscape values while minimising impacts on wetland areas. A minimum lot size of 1 hectare is recommended west of the ridgeline to maintain a rural viewshed from Mandurah Road and protect the landscape value of the region.	• The recommended lot size is 10,000sqm. Directly to the south, the adjoining former parent lot has been subdivided, and approved for residential subdivision with lot sizes of 5,000sqm per lot. • It is understood other similar developments such as the lifestyle village on Sixty Eight Road exist nearby which are of a similar or greater density and built form impact, and which have had an undue negative impact on the rural aesthetic of that local area. The proposed development is of a lesser impact and density, • Not withstanding the objectives of this Local Planning Policy, the Visual Landscaping Planning in Western Australia manual identifies that factors such as screening potential should be considered, together with an assessment of the extent to which the strategies listed below can be used.
Development shall be of a scale that minimises intrusion into the landscape.	Part 3 of the Visual Landscape Planning in Western Australia manual identifies that how many buildings a lot is capable of supporting can be determined by evaluating how many are capable of being screened through either natural landscape features such as topography, or

	vegetation or otherwise capable of being screened through structures or other design features though development conditions. We appreciate the City's due regard of Local Planning Policy 3.1.1, and are open to design changes of a minor nature to enable the development to proceed, including but not limited to non-intrusive screening elements.

The Visual Landscape Planning in Western Australia manual provides a comprehensive background and toolkit or use by planning practitioners and developers in the use and development of land where visual aesthetic and viewsheds have been determined as important considerations in that area. The Visual Landscape Planning in Western Australia manual identifies the following visual elements which can impact the visual aesthetic in rural residential development and its surrounding areas.

1. developable area (site constraints and opportunities);
2. number of lots and buildings, including water tanks and outbuildings;
3. lot size and configuration;
4. siting and design of buildings and other structures such as tanks;
5. fencing and firebreaks;
6. access roads and driveways;
7. remnant vegetation and new planting; and
8. site development/gardens/mini rural production.

The following key points of the Visual Landscape Planning in Western Australia manual have been highlighted, and comment has been provided accordingly.

Number of lots and / or buildings:

A starting point in deciding on the number of blocks is to consider how many buildings it is acceptable to see. The next step is to ascertain whether the landscape is capable of obscuring the balance of the number of buildings proposed. Factors such as screening potential should be considered, together with an assessment of the extent to which the strategies listed below can be used.

Comment:

Given that the buildings will be largely screened by topography and retained vegetation, the number of buildings is supportable.

Siting of buildings:

Preferred building sites are those that are:

- in the vicinity of remnant vegetation, including parkland cleared sites;
- in open areas that have been or will be revegetated;
- in low positions in the landscape, or on foot-slopes of ranges;
- in small, enclosed valleys; and
- at natural breaks in slope to minimise need for cut and fill.

Comment:

Most buildings are behind the secondary building line as shown in the 0.5m contour map, and are sited in those preferred locations described.

Building Design:

The following features are important considerations in building design to maintain visual aesthetic, these are:

- Building materials should blend with the natural colours and textures of the landscape, such as soil colour, rocks and vegetation.
- Colours or materials that may cause glare should be avoided, as should colours that are bright, light or reflective.
- Building height limits need to be low enough to have a rural appearance and to allow screening where required.
- Can be softened by vegetation planted around the buildings, as plants redirect attention away from the buildings. Responsibility for such planting needs to be determined to ensure that it occurs.

Comment:

The design has undergone changes and the material palette will include rooves of a dark grey / black colour (with limited reflectivity) and walls of natural materials and colour palette including red face brick and rendered grey walls. Please see submitted documentation for materials schedule. Building height is single storey with top of wall heights being 2.4m and top of roof heights being approximately 4.4m at the top of the ridge.

Access roads and driveways:

Roads and driveways should be positioned where they are not oriented towards key viewpoints. Canopied vegetation across roads or driveways should be retained or introduced wherever feasible. Groundcovers are also suitable for planting on verges. Vegetation may be used to screen driveways by being planted on the down-slope side.

Comment:

The proposed development has undergone design changes which have reduced the visual impact to Mandurah Road, and the visibility of the proposed development from that road. This includes a reduced amount of retaining walls for the purpose of car parking, and reduced size of car parking areas. Please see submitted documentation and plans for details. Vegetation clearing of mature trees is not proposed outside of areas for building footprints, vehicle accessways, and vehicle parking.

Remnant vegetation and new planting:

The manual recommends the preparation of a strategic planting plan. The objectives of the planting plan would be to ensure that:

- planting looks natural where native plants are used;
- planting includes areas in which vegetation restoration would assist in addressing environmental degradation, such as on steep slopes, around wetlands, and in riparian zones;
- the choice of species to be used takes into account height, growth rate and characteristics likely to apply to these species when planted in the particular soil slope and climatic conditions of the site;
- trees chosen are suitable for being pruned as required eg to allow for views;
- plants intended to soften the impacts of buildings and other structures will grow to the required dimensions and are located where they will achieve their landscape design objective;
- screen planting:

  - looks natural (for example, by use of local species, natural planting layout, varied ages and plant forms);
  - is the required height and density;
  - is accurately located to provide a screen (also refer to strategies for screening in Part 3: Introduction);
  - screens views of houses while still providing desirable views from houses to landscape features;
  - does not become an intrusive element in itself; and
  - does not inadvertently draw attention to the built features which are to be made less obvious.
- all remnant vegetation should be retained wherever feasible; and
- natural revegetation should be encouraged.

Comment:

As prior, limited clearing is proposed, and the siting of buildings responds to established vegetation, reducing the areas of clearing of mature remnant trees. The development proposed is a lifestyle village which will pride itself on its connection with nature and "natural" landscapes. Resultantly there is incentive to retain these natural areas within the development. Additional native vegetation planting and other garden and communal areas are proposed through the site which will include a range of complimentary plant species.

Indicative site perspective due south along Mandurah Road. Source: Google

Indicative site perspective due north along Mandurah Road (note: not visible from road). Source: Google

Indicative site perspective due north from Stringybark Way. Source: Google

Comparable development on Sixty Eight Road of a greater visual impact than the proposed development, and with limited vegetation apart from in setback areas.
Source: Google

CONCLUSION

The City's Local Planning Policy 3.1.1 has been duly considered alongside feedback from the City's planning officers. Comment has been provided accordingly, with reference to a summary Visual Landscape Assessment, given the available information at hand. The design proposed creates a positive outcome for the site and local area through provision of affordable housing options in a high-quality rural / residential setting, targeting "retirees" and "tree-changers" who still require to be close to an urban area and the facilities of those areas. The site proposes a high amount of landscaped and retained natural areas. Although the development will increase the residential density of the local area, given factors including State housing targets, nearby suburban development, and other growing pressures to provide housing options in higher-amenity areas, the development proposal is considered a healthy compromise and middle ground, which will secure the long-term interests of the City. The development has been shown to satisfy the objectives of the City, as justified in this and other submissions, and the City's support for development approval is therefore welcomed.

Should you have any question in relation to the details provided in this submission, please contact Daniella Mrdja on 6441 9171 or daniella@urbanistaplanning.com.au.

Yours sincerely,

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