RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT 200230R1

Revision 2

Noise Impact Assessment

Proposed Residential Development

638 Pittwater Road, Brookvale

PREPARED FOR:

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1 May 2024

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Proposed Residential Development

638 Pittwater Road, Brookvale

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
200230R1	Revision 0	8 July 2021	Camilo Castillo	Rodney Stevens	Rodney Stevens
200230R1	Revision 1	14 July 2021	Camilo Castillo	Rodney Stevens	Rodney Stevens
200230R1	Revision 2	1 May 2024	Camilo Castillo	Rodney Stevens	Rodney Stevens

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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Barry Rush & Associates Pty Ltd to prepare a Mechanical Noise Impact Assessment for the proposed Residential Development at 638 Pittwater Road, Brookvale.

This report details the results of an ambient noise survey and stablishes the noise criteria for mechanical plant for the development.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix A.

2 PROPOSED DEVELOPMENT

2.1 Development Site

The proposed four storey residential development is to be located at 638 Pittwater Road, Brookvale. The development site is bounded by adjoining commercial receivers to the north, south, east and west.

There are a number of sensitive receivers surrounding the proposed development, these receivers will be affected by noise generated by the proposed development. The following table shows the most affected receivers

Table 2-1 Sensitive Receivers

Receiver	Sensitive Receiver's Address
C1	Mimmos Pizza
C2	Brookvale Dance Centre
C3	Hudson Building Supplies
C4	Col Crawford BMW

Figure 2-1 shows an aerial image of the site area and the surrounding environment.

Figure 2-1 Site Location

Image Courtesy of Google Maps © 2021.

3 NOISE GUIDELINES AND CRITERIA

Northern Beaches Council's DCP 2011 provides noise requirement for mechanical plant noise from residential developments, the main requirement is as follows:

> *D3 Noise*
> *Applies to Land*
> *This control applies to land to which Warringah Local Environmental Plan 2011 applies.*
> *Objectives*
> *• To encourage innovative design solutions to improve the urban environment.*
> *• To ensure that noise emission does not unreasonably diminish the amenity of the area or result in noise intrusion which would be unreasonable for occupants, users or visitors.*
> *Requirements*
> *1. Noise from combined operation of all mechanical plant and equipment must not generate noise levels that exceed the ambient background noise by more than 5dB(A) when measured in accordance with the NSW Industrial Noise Policy at the receiving boundary of residential and other noise sensitive land uses.*
>
> *See also NSW Industrial Noise Policy Appendices (now superseded by the Noise Policy for Industry).*
> *2. Development near existing noise generating activities, such as industry and roads, is to be designed to mitigate the effect of that noise.*
> *3. Waste collection and delivery vehicles are not to operate in the vicinity of residential uses between 10pm and 6am.*
> *4. Where possible, locate noise sensitive rooms such as bedrooms and private open space away from noise sources. For example, locate kitchens or service areas closer to busy road frontages and bedrooms away from road frontages.*

5. Where possible, locate noise sources away from the bedroom areas of adjoining dwellings/properties to minimise impact.

3.1.1 Noise Emission (*Noise Policy for Industry*)

Wilkinson Murray carried out an ambient noise survey in January 2019, mechanical plant noise criteria was stablished in Wilkinson Murray's report number 19035 version A dated 22nd January 2019. The noise criteria presented below is based on Wilkinson Murray's report and will be used in accordance to the Northern Beaches Council:

Table 3-1 Operational Project Trigger Noise Levels

Receiver	Time of Day	RBL 1	Intrusive Criterion $L_{Aeq(15min)}$
Residential	Day	54	59
	Evening	49	54
	Night	41	46

Note 1: RBL = "Rating Background Level".

For commercial and industrial receivers the following noise emission criteria, based on the NSW Noise Policy for Industry, is applicable:

- Commercial Receivers 65 dBA
- Industrial Receivers 70 dBA

4 MECHANICAL NOISE IMPACT

4.1 Mechanical Plant Schedule

Barry Rush & Associates Pty Ltd has provided the following mechanical plant schedule. This includes air conditioning units as well as exhaust and air supply fans used throughout the development.

Table 4-1 Mechanical Plant Schedules

		Octave Frequency Band Sound Power Level (dB)							
Plant Type	Reference	63	125	250	500	1000	2000	4000	8000
Basement Fan	CPEF B1.1	96	90	93	93	92	90	87	81
Basement Fan	CPSF B1.1	83	77	87	85	87	85	83	75
Stair Fan	SPSF - G1	94	90	91	86	85	84	79	74
Exhaust Fan	LDEF B.1	89	84	84	84	82	78	75	72

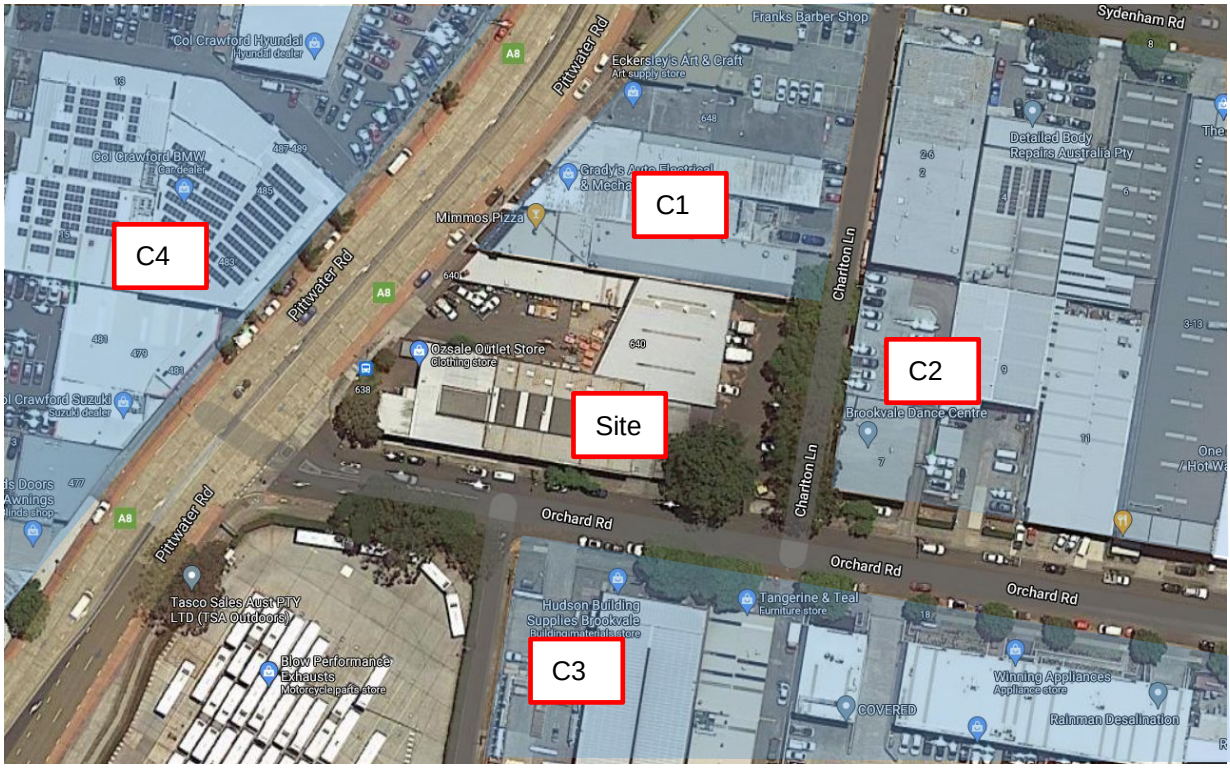
In the absence of specific AC condenser unit models, RSA has used a Daikin RXYMQ4AV4A condenser unit, the units will be installed in the basement, balconies and roof top. The rated sound power level of the unit is 71 dB(A).

4.2 Mechanical Plant Noise Emission

Calculations of the noise levels from the operation of the proposed mechanical plant have been carried out using the data in Table 4-1. We have used the worst case scenario where all plant is running at the same time. Calculations take into account factors such as distance, shielding from buildings and barriers.

The following figure presents the proposed development and all sensitive receivers

Figure 4-1 Sensitive Receiver Location



4.3 Predicted Noise Levels

Predictive resultant noise levels have been calculated for all mechanical plant items. Noise emissions at the nearest residential receivers are presented in the table below. The predicted noise calculations take into account the following:

- Heights of receivers are assumed to be 1.5 meters above respective level.
- All mechanical plant is operational at the same time (worst case scenario)
- All ground floor boundary fences are 1.8 meters high
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers

Table 4-2 Predicted Noise Levels At Sensitive Receivers.

Receiver	Period	Calculated Noise Level L_{Aeq} – dB(A)	Criteria	Compliance
C1	When in Use	34	65	Yes
C2		45	65	Yes
C3		52	65	Yes
C4		31	65	Yes

5 ACOUSTIC REVIEW

The building works are required to be carried out in accordance with the provisions of the requirements outlined in Wilkinson Murray's report number 19035 Version A, dated 22nd January 2019 and condition 25 as follows:

> *25. Noise reduction measures - design*
>
> *In addition to the recommendations in the Acoustic Assessment by Wilkinson Murray Pty that prior to commencement, a further review be carried out by an acoustic engineer to require:*
>
> *1. Windows to all habitable rooms be upgraded to reduce noise to residents from potential future light industrial uses on neighbouring premises and reflected noise from hard surfaces within the Development.*
>
> *2. Air conditioning (or alternative air supply to National Building Code requirements) being provided to habitable rooms to allow for adequate ventilation when windows are closed.*
>
> *3. Review proposed mechanical plant and equipment, fans, and air conditioning before installation to ensure noise compliance with assessment by Wilkinson Murray Pty Ltd.*
>
> *Reason: To provide acoustic amenity for residential residents from surrounding light industry and main road.*

Wilkinson Murray's report number 19035 Version A, dated 22nd January 2019, provides recommendations for the proposed mixed use development to comply with the requirements of SEPP (Infrastructure) 2007 and condition 25.

The recommendations in Wilkinson Murray's report number 19035 Version A present the minimum glazing requirements that must be met in order to comply with Council requirements. The glazing requirements are shown in the table below

Table 5-1 Recommended Glazing

Level	Unit	Living	Bed 1	Bed 2	Bed 3
1	1	C	B	C	
	2	D	D	C	
	3	D	D	C	
	4	D	D	C	
	5	D	C	Standard	
	6	Standard	Standard	C	C
2	21	C	B	C	
	22	D	D	C	
	23	D	D	C	
	24	D	D	C	
	25	D	C	Standard	
	26	Standard	Standard	C	C
3*	41	C	B	C	
	42	D	D	C	
	43	D	D	C	
	44	D	D	C	
	45	D	C	Standard	
	46	Standard	Standard	C	C

* The proposed level 3 has the same layout as level 2, therefore the same acoustic treatment applies the units overlooking Pittwater Road

The specific Rw ratings and thicknesses as per Wilkinson Murray's report number 19035 Version A, are as follows:

- Type A – RW 28 – 6mm Laminated Glass
- Type B – RW 35 – 10.38mm Laminated Glass
- Type C – RW 38 – 10.5mm VLam Hush Laminated Acoustic Glass
- Type D – Winter Garden effectively Double Glazing

The R_w rating required for each window will vary from room to room. Recommendations for windows also apply to any other item of glazing located on the external facade of the building in a habitable room unless otherwise stated.

Note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be therefore necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the requirements below

The window systems must be tested in accordance with both of the following:

- Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing; and
- AS 1191 Acoustics – Method for laboratory measurement of airborne sound insulation of building elements.

It is necessary to submit such Laboratory certification for the proposed glazing systems (i.e. windows and framing systems) (e.g. NAL or CSIRO) for approval by RSA prior to ordering or commitment.

The entire frame associated with the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed.

It is possible that structural demands for wind loading or fire rating or the like may require more substantial glass and framing assemblies than nominated above. Where this is the case the acoustic requirements must clearly be superseded by the structural or fire rating demands.

6 CONCLUSION

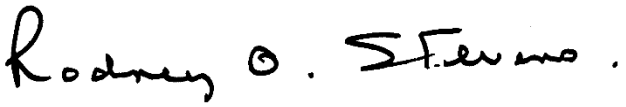
A noise impact assessment has been conducted in relation to the operation of the proposed mechanical plant servicing the proposed residential development at 638 Pittwater Road, Brookvale

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Northern Beaches Council's requirements.

This report shows that under the most conservative operating scenarios and the implementation of the recommendations, operational noise emission from the proposed mechanical plant will achieve the established criteria at neighbouring residences.

The proposed mixed use development at 638 Pittwater Road, Brookvale, will comply with the noise intrusion requirements with implementation of the recommendations presented in Wilkinson Murray's report number 19035 Version A, dated 22nd January and Condition 25 as presented in Section 5.

Approved:-



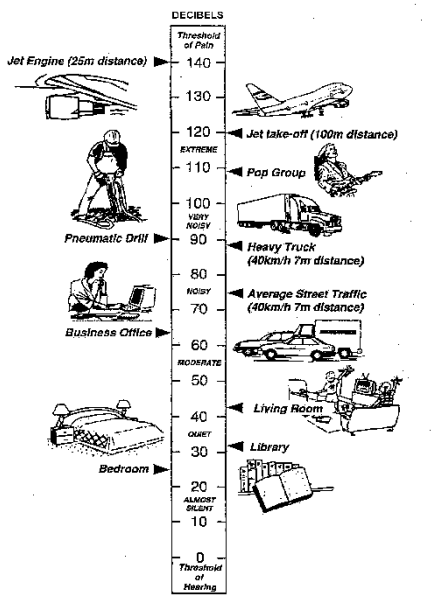
Rodney Stevens

Manager/Principal

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) ▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry) ▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) ▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: ▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected). ▪ Cost of mitigation (cost of mitigation versus benefit provided). ▪ Community views (aesthetic impacts and community wishes). ▪ Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.

Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10^{th} percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

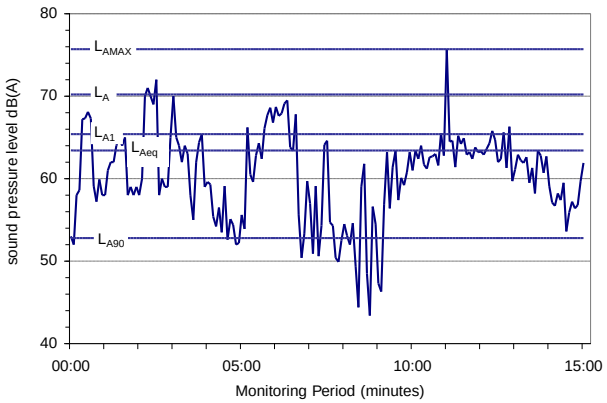
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.

L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

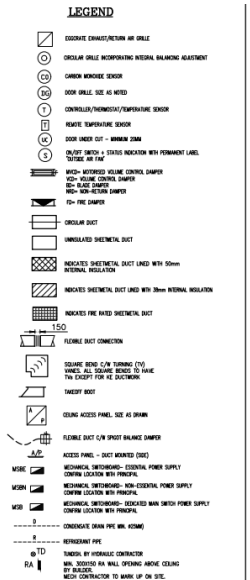
Appendix B – Mechanical Schedules

FANs SCHEDULE

Ref.	AREA/SYSTEM SERVED	No OFF	Air Flow L/s	Nominal Static Pressure (Pa)	Make / MODEL	Minimum Motor (kW/Phase)	MAX. dBA @ 3M	Remarks	Switchboard
CPEF–B1.1	CARPARK EXHAUST	1	16,000	300	FANTECH/APS1256 SERIES	11.0/3	75	SMOKE SPILL FAN WITH HIGH TEMPERATURE MOTOR. TIMECLOCK. FFCP OVERRIDE. TO COMPLY WITH AS/NZS1668.1–2015 INCLUDING PART 5.5 AND AS1668.2–2012, C/W VSD AND 'CO' MONITORING SYSTEM, METAL BLADE	MSB. MUST BE SUPPLIED FROM MAIN SWITCH TO AS/NZS1668.1–2015 REQUIREMENT
CPSF–B1.1	CARPARK SUPPLY	1	4,500	200	FANTECH/APQ804 SERIES	2.42/3	62	TIMEWSCLOCK. FFCP OVERRIDE. TO COMPLY WITH AS/NZS1668.1–2015 INCLUDING PART 5.5 AND AS1668.2–2012, C/W VSD AND SMOKE SAMPLING SENSOR. INTERLOCK TO RUN WITH CPEF–B1.1	MSB. MUST BE SUPPLIED FROM MAIN SWITCH TO AS/NZS1668.1–2015 REQUIREMENT
CPSF–B1.1	CARPARK SUPPLY	1	6,000	295	FANTECH/APQ904 SERIES	4.4/3	67	TIMEWSCLOCK. FFCP OVERRIDE. TO COMPLY WITH AS/NZS1668.1–2015 INCLUDING PART 5.5 AND AS1668.2–2012, C/W VSD AND SMOKE SAMPLING SENSOR. INTERLOCK TO RUN WITH CPEF–B1.1	MSB. MUST BE SUPPLIED FROM MAIN SWITCH TO AS/NZS1668.1–2015 REQUIREMENT
SPSF–G.1 SPSF–G.2 SPSF–G.3	BASEMENT STAIR PRESSURISATION FAN	3	9,000	350	FANTECH / APQ804 SERIES	8.25/3	69	TIMEWSCLOCK. FFCP OVERRIDE. TO COMPLY WITH AS/NZS1668.1–2015 INCLUDING PART 5.5 AND AS1668.2–2012, C/W VSD AND SMOKE SAMPLING SENSOR. ESSENTIAL POWER SUPPLY.SUBJECT TO FIRE ENGINEER SOLUTIONS.	MSBE
LDEF–B.1	CARPARK EXHAUST – LOADING DOCK EXHAUST – BLOCK D	1	3,500	300	FANTECH / APQ634 SERIES	2.42/3	62	TIMEWSCLOCK. FFCP OVERRIDE. TO COMPLY WITH AS/NZS1668.1–2015 INCLUDING PART 5.5 AND AS1668.2–2012, C/W VSD AND 'CO' MONITORING SYSTEM, METAL BLADE	MSB. MUST BE SUPPLIED FROM MAIN SWITCH TO AS/NZS1668.1–2015 REQUIREMENT
EAF–B1.1	HYDRANT PUMP ROOM	1	1200	250	FANTECH / PUE454DD	1.1/3	51	TIMECLOCK. TO INTERLOCK AND RUN WITH THE LIGHTS AND DIESEL PUMP. FAN TO ALSO RUN AUTOMATICALLY IN FIRE ALARM MODE	MSBE–1
SAF–B1.1	ELECTRICAL SWITCH AND COMMS ROOMS	1	200	180	FANTECH / RIL–SW200	0.12/1	47	INTERLOCK & RUN WITH THE LIGHTS. ALLOW FOR THERMOSTAT CONTROL @ TO RUN FAN WHEN TEMPERATURE REACHES 28 DEG C AND TO TURN OFF WHEN TEMPERATURE DROP TO 24 DEG C ADJUSTABLE.	MSBN
TEF–G.1	TOILET EXHAUST	1	450	180	FANTECH/PUE354ER	0.37/1	43	INTERLOCK WITH THE LIGHT C/W 30 MINUTES RUN–ON TIMER	TENANCY DB
GEF–G.1	GARBAGE EXHAUST	1	600	250	FANTECH/PUE354ER	0.37/1	43	TIMECLOCK. TO RUN 24/7	MSBN
SAF–G.1	BASEMENT COMMERCIAL TENANCY SUPPLY AIR	1	700	180	FANTECH/PUE354ER	0.37/1	43	PROGRAMABLE TIMECLOCK. TO RUN DURING TRADING HOURS	TENANCY DB
TEF–G.2	TOILET EXHAUST	1	70	125	PACIFIC HVAC/BEC150HP HEADER BOX FAN	0.05/1	39	INTERLOCK WITH THE LIGHT C/W 30 MINUTES RUN–ON TIMER	HOUSE POWER
TEF	APARTMENTS BATH/ENSUITE EXHAUST	XX	50	145	PACIFIC HVAC/BEC150HP HEADER BOX FAN	0.05/1	39	MANUAL ON/OFF SWITCH WITH SWITCH INCORPORATED WITH THE LIGHT SWITCH PLATE. C/W BACKDRAFT NON RETURN DAMPER	APARTMENT DB
EAF	APARTMENTS STORAGE ROOM EXHAUST	XX	50	145	PACIFIC HVAC/BEC150HP HEADER BOX FAN	0.05/1	39	TIMECLOCK. TO RUN 24/7	APARTMENT DB
OAF	OUTSIDE AIR FAN	XX	60	150	FANTECH/RIL150SW–Hi	0.05/1	43	ALLOW FOR A DEDICATED ON/OFF SWITCH AND STATUS INDICATION C/W PERMENANT LABEL 'OUTSIDE AIR VENTILATION'	APARTMENT DB

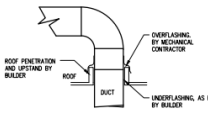
FANs SCHEDULE NOTES:
1. CARPARK VENTILATION FANS MUST FULLY COMPLY WITH AS/NZS1668.1–2015 AND AS1668.2–2012
2. xx REQUIRED NUMBER OFF, AS DETAILED ON THE MECHANICAL DRAWINGS
3. SELECT FANS TO COMPLY WITH BCA PART J5
4. USE "FANTECH" FANS OR EQUIVALENT
5. ALLOW FOR A BCA COMPLIANT TIME SWITCH TO DE–ACTIVATE FANS > 1000 L/s WHEN PLANT IS NOT OCCUPIED.
6. ALLOW FOR MOTORISED DAMPERS OR SELF CLOSING DAMPER FOR EXHAUST FANS TO COMPLY WITH BCA SECTION J3.5
7. FAN STATIC PRESSURE IS NOMINAL ONLY. CONTRACTOR TO DETERMINE ACTUAL STATIC BASED ON AS INSTALLED DUCT CONFIGURATION
8. ALL ROOF MOUNTED FANS EXPOSED TO THE WEATHER TO BE WEATHERPROOF
9. ALL FANS TO BE MOUNTED ON ADEQUATE ANTI VIBRATION MOUNTS AND TO HAVE FLEXIBLE CONNECTIONS TO SHEETMETAL DUCTWORK
10. ALL FANS > 1000 L/s AND NOT REQUIRED TO OPERATE IN FIRE/SMOKE MODE, TO SHUT DOWN UPON A FIRE/SMOKE SIGNAL
11. ALL NON–ESSENTIAL COMMON AREAS FANS TO BE SUPPLIED FROM THE HOUSE NON–ESSENTIAL MECHANICAL SWITCHBOARD. COORDINATE WITH ELECTRICAL CONTRACTOR AND THE PRINCIPAL FOR ALL REQUIREMENTS INCLUDING LOCATION AND LOADS
12. ALL ESSENTIAL COMMON AREAS FANS TO BE SUPPLIED FROM THE HOUSE ESSENTIAL MECHANICAL SWITCHBOARD. COORDINATE WITH ELECTRICAL CONTRACTOR AND THE PRINCIPAL FOR ALL REQUIREMENTS INCLUDING LOCATION AND LOADS
13. ALL CARPARK VENTILATION FANS TO BE SUPPLIED FROM THE MAIN SWITCH SUPPLY MECHANICAL SWITCHBOARD. COORDINATE WITH ELECTRICAL CONTRACTOR AND THE PRINCIPAL FOR ALL REQUIREMENTS INCLUDING LOCATION AND LOADS
14. ALL FANS TO HAVE A LOCAL ELECTRICAL ISOLATOR SWITCH
15. APARTMENTS KEF AIRFLOW TO MATCH RANGE HOOD. CHECK WITH PRINCIPAL FOR DETAILS
16. MECH. CONTRACTOR TO ALLOW FOR BACK DRAFT NON–RETURN DAMPER FOR ALL TE AND KE FANS.

LEGEND



NOMENCLATURE

AF	AIR FILTER	MIN.	MINIMUM
AP	ACCESS PANEL	NTS	NOT TO SCALE
AC	AIRCONDITIONING	OBD	OPPOSED BLADE DAMPER
BE	BLANK END	REM	REMOVABLE
CU	CONDENSER UNIT	SD	BOTTOM SET–DOWN
C/W	COMPLETE WITH	SU	BOTTOM SET–UP
DD	DOUBLE DEFLECTION REGISTER	TBA	TO BE ADVISED
EA	EACH	TBC	TO BE CONFIRMED
EG	EGGCRATE GRILLE	UNO	UNLESS NOTED OTHERWISE
F/A, I/A	FROM ABOVE, TO ABOVE	VRF	VARIABLE REFRIGERANT FLOW
F/B, I/B	FROM BELOW, TO BELOW	VSD	VARIABLE SPEED DRIVE
FFL	FINISHED FLOOR LEVEL	LDG	LINEAR BAR GRILLE WITH 15° DEFLECTION FRONT BLADE AND 0–45° ADJUSTABLE REAR BLADES
FCU	FAN COIL UNIT		
FR	FIRE RATED	FW	FLOOR WASTE
		H/A; L/A	HIGH LEVEL; LOW LEVEL



TYPICAL DETAIL OF SHEETMETAL DUCT PENETRATION THROUGH ROOF
N.T.S.

AIR COOLED WALL MOUNTED REVERSE CYCLE INVERTER SPLIT AC SCHEDULE

Label	AREA SERVED	No OFF	Nominal Cool Capacity kW	Nominal Heat Capacity kW	Nominal Input Power (kW/PHASE)	Remarks
AC CU	LIVING ROOM	xx	5.0	6.0	2.49/1	SPLIT SYSTEM

REVERSE CYCLE INVERTER SPLIT AC NOTES:
1. AIRCONDITIONING SYSTEMS TO COMPLY WITH MEPS AND NCC VOLUME 1 PART J5
2. XX REQUIRED NUMBER OFF, AS DETAILED ON THE MECHANICAL DRAWINGS

AIR COOLED WALL MOUNTED REVERSE CYCLE INVERTER MULTI–HEAD AC SCHEDULE

Label	AREA SERVED	No OFF	Nominal Cool Capacity kW	Nominal Heat Capacity kW	Nominal Input Power (kW/PHASE)	Remarks
AC	LIVING ROOM		5.0	6.0		
AC–1	MASTER BEDROOM / BEDROOM 1	xx	2.5	3.0		SPLIT SYSTEM, MULTI–HEAD CONDENSER UNIT
CU–1			8.0	9.0	3.2/1	

REVERSE CYCLE INVERTER MULTI–HEAD AC NOTES:
1. AIRCONDITIONING SYSTEMS TO COMPLY WITH MEPS AND NCC VOLUME 1 PART J5
2. XX REQUIRED NUMBER OFF, AS DETAILED ON THE MECHANICAL DRAWINGS

FLEX. DUCT SCHEDULE

AIRFLOW L/S	FLEX DIA MM
0 – 20	100
21 – 50	150
51 – 100	200
101 – 185	250
186 – 250	300
251 – 350	350
351 – 450	400

UNLESS NOTED OTHERWISE

FLEX. DUCT SCHEDULE NOTES:
1. ALLOW A MIN. LENGTH OF 1.0M FLEX. DUCT BETWEEN FAN AND NEAREST GRILLE WITHIN WET AREAS.
2. FLEXIBLE DUCT SHALL BE INSTALLED USING NOT MORE THAN TWO LENGTHS OF UP TO 6 M EACH OF ANY ONE DUCT DIAMETER IN A GIVEN DUCT RUN BETWEEN AIR TERMINAL DEVICES.
3. ALL IN–LINE CONNECTIONS OF TWO FLEXIBLE DUCTS THE SAME DIAMETER SHALL USE A JOINER.
4. ALL CONDITIONED FLEXIBLE DUCTS MUST HAVE MINIMUM THERMAL "R" VALUE TO COMPLY WITH SECTION J5 AND NO LESS THAN R–1.2. THE INSULATION MUST ALSO ACT AS ACOUSTIC INSULATION

CLIENT
PMC CONSTRUCTIONS

BARRY RUSH & ASSOCIATES

DATE	REV	DESCRIPTION	BY
20.06.21	A	FOR APPROVAL	MS

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DO NOT SCALE DRAWING	A1	DRAWN: TWO MS	SCALE: NTS, UNO
CHECKED BY: MS		ENGINEER: M. Sarkis	DATE: JUNE 2020
PROJECT: 638 PITTWATER ROAD BROOKVALE NSW			PROJECT No: 1673
TITLE: MECHANICAL SERVICES NOTES, LEGEND, DETAILS & SCHEDULES			DRG No: M–01 A