

Appendix 5 - Acoustic Assessment – Passenger Rail (Herring Storer Acoustics)



**EGLINTON EDUCATIONAL VILLAGE
LOT 9008 MARMION AVENUE, EGLINTON**

SUBDIVISION

**ROAD TRAFFIC AND FREIGHT RAIL (SPP 5.4)
ACOUSTIC ASSESSMENT FOR FUTURE PASSENGER RAIL**

DECEMBER 2023

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**SPP 5.4 PASSENGER RAIL ACOUSTIC ASSESSMENT
EGLINTON EDUCATIONAL VILLAGE – SUBDIVISION**

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FOR

SATTERLEY

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1. INTRODUCTION

Herring Storer Acoustics were commissioned to carry out an acoustical assessment of noise received within the Eglinton Educational Village, being Lot 9008 Marmion Avenue, Eglinton with regards to the future extension of the passenger railway line.

It is noted that the land located adjacent to the passenger line is to be educational.

As part of the study, the following was carried out:

- Determine by noise modelling the noise levels that would be received within the LSP from trains travelling on the future passenger rail line.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.4 *“Road and Rail Noise”* (SPP 5.4).
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, the local structure plan is attached in Appendix A.

2. SUMMARY

It is noted that schools are only occupied during the day period, thus under State Planning Policy 5.4 *“Road and Rail Transport Noise”* only the criteria for the day period is applicable.

Firstly, it is noted that the proposed primary school is outside the trigger distance for the passenger railway. Thus, under the Policy there are no acoustical requirements for the development of the primary school.

With regards to the senior school, it is noted that the land designated for the school is within the trigger distance. We note that under SPP 5.4, the trigger distance for passenger rail is up to 100 metres for which *“quiet House”* design is required, however, this distance relates to residential premises (i.e. bedrooms), whereas schools are a day time usage and the internal design criteria is determined using the noise levels listed in Table 1 of AS/NZS 2107: 2000. Under AS/NZS 2017:2000 apart from a few specialist areas the recommended background noise level is an L_{Aeq} of 45 dB(A). Based on this noise level the buffer distance required for a school would be 50 metres. Therefore, we believe that it is possible to design the school such that the buildings are outside the noise impact distance and standard construction would be acceptable. If this is not an option, compliance with the internal criteria should easily be obtained via the use of upgraded construction or *“Quiet House”* design.

An assessment of noise ingress with regards to the complying with the requirements of SPP 5.4 should be undertaken as part of the school design to ensure compliance with the appropriate acoustic criteria.

3. CRITERIA

3.1 ROAD AND RAIL TRAFFIC NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 "Road and Rail Noise". The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

- a) *noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in **Table 1**;*
- b) *New or major upgrades of roads as specified in **Table 1** and maps (**Schedule 1,2 and 3**); or*
- c) *New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3**); or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

Policy trigger distances (Section 4.1.2)

Table 1 identifies the State's transport corridors and the trigger distances to which the policy applies.

*The designation of land within the trigger distances outlined in **Table 1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

*Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent."*

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	Trigger distance	Distance measured from
Roads		
Strategic freight and major traffic routes Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume	300 metres	Road carriageway edge
Other significant freight/traffic routes These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)	200 metres	Road carriageway edge
Passenger railways		
	100 metres	Centreline of the closest track
Freight railways		
	200 metres	Centreline of the closest track

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

Table 2 sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

In the application of the noise targets the objective is to achieve:

- indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

Proposals	New/Upgrade	Noise Targets		
		Outdoor		Indoor
		Day ($L_{Aeq}(\text{Day})$ dB) (6 am-10 pm)	Night ($L_{Aeq}(\text{Night})$ dB) (10 pm-6 am)	(L_{Aeq} dB)
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	L_{Aeq} (Day) 40(Living and work areas) L_{Aeq} (Night) 35 (bedrooms)
Roads	New	55	50	N/A
	Upgrade	60	55	N/A
Railways	New	55	50	N/A
	Upgrade	60	55	N/A

Notes:

- The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.
- The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.

Noise Exposure Forecast (Section 6.2)

When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:

- no further measures is required;
- noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or
- noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan.”

3.2 AS/NZS 2107:200

Passenger train noise received at a sensitive premise needs to comply with the requirements of State Planning Policy 5.4 “Road and Rail Transport Noise”. Under this policy, for non-residential noise sensitive premises, such as school, the internal noise levels should meet the design sound levels as listed in Table 1 of AS/NZ 2107:2000 “Acoustics – Recommended design sound levels and reverberation times for building interiors”. Under AS 2017, the internal criteria would be as listed in Appendix C.

4. ASSESSMENT

Table 2 of the Implementation Guidelines for State Planning Policy 5.4 outline the “Quiet House” Design packages required at various distances. For information, the relevant section of Table 2 is shown below as Table 4.1.

TABLE 4.1 – TABLE 2 OF IMPLEMENTATION GUIDELINES FOR SPP.4

Railway Transport Corridor Classification		Forecast period average noise level 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	
Passenger railways	Fremantle, Midland and Thornlie main lines only	68	64	62	60	59	58	56	56	55	54	53	52	52	51	51	49	48		
	All other metro passenger rail lines, and where multiple metro rail services share the same transport corridor	70	66	64	62	61	60	58	57	56	56	55	54	54	53	52	51	50		

It is noted that the based on the above, with the building (i.e. classroom etc) constructed outside 100m (i.e. the trigger distance stated in SPP 5.4) from the future passenger railway line, no action is required. It is also noted that the above is based on achieving compliance within a residential premises where the internal acoustic criteria is 40 dB(A) during the day. However, apart from a few specialist areas, as such as assembly hall and music rooms, the internal criteria with a school building would be an L_{Aeq} of 45 dB(A). Thus, for buildings located at a distance of greater than 50 metres from the railway line, standard construction would achieve compliance with the internal acoustic criteria.

Based on the above, it should be possible to design the school (i.e. with sufficient buffer to the railway line) such that standard construction are required. We note that even if the school was development adjacent to the railway line upgraded constructions (i.e. “Quiet House” design) could be used to achieve compliance with the requirements of State Planning Policy 5.4.

The assessment of noise ingress and the determination of the construction requirements would be undertaken as part of the design of the school.

Note : It is understood that the future railway line would be constructed in a cutting, however, the results listed in Table 1 of the Implementation Guidelines are for railway lines at grade. Thus, the above assessment would be conservative.

For information, Appendix B shows the noise contour plot for the passenger Rail Line.

5. DISCUSSION / RECOMMENDATION

It is noted that schools are only occupied during the day period, thus under State Planning Policy 5.4 "*Road and Rail Transport Noise*" only the criteria for the day period is applicable.

Firstly, it is noted that the proposed primary school is outside the trigger distance for the passenger railway. Thus, under the Policy there are no acoustical requirements for the development of the primary school.

With regards to the high school, it is noted that the land designated for the school is within the 100m trigger distance of the railway line. However, the distance of the school buildings from the railway would determine, if any, the "quiet House" design requirements.

SETBACKS OR BUFFER AREAS

Based on the above, given the area available, it may be possible to provide the distance for separation (buffer) of the rail line (at grade) and school premises sufficient that noise amelioration by way of upgraded constructions ("Quiet House" design) would not be required.

Based on Table 2 of the Implementation Guidelines, this distance would be between 50 and 100 metres depending on the usage of the building.

UPGRADED CONSTRUCTIONS / QUIET HOUSE DESIGN

If the design of the school dictated that building were located within the above buffer zones, then upgrade construction (i.e. "Quiet House" design) would be used to ensure compliance with the internal acoustic criteria.

Thus, it is recommended that an SPP 5.4 assessment for the senior school be undertaken as part of the design.

APPENDIX A

SUBDIVISION PLAN FOR SCHOOLS

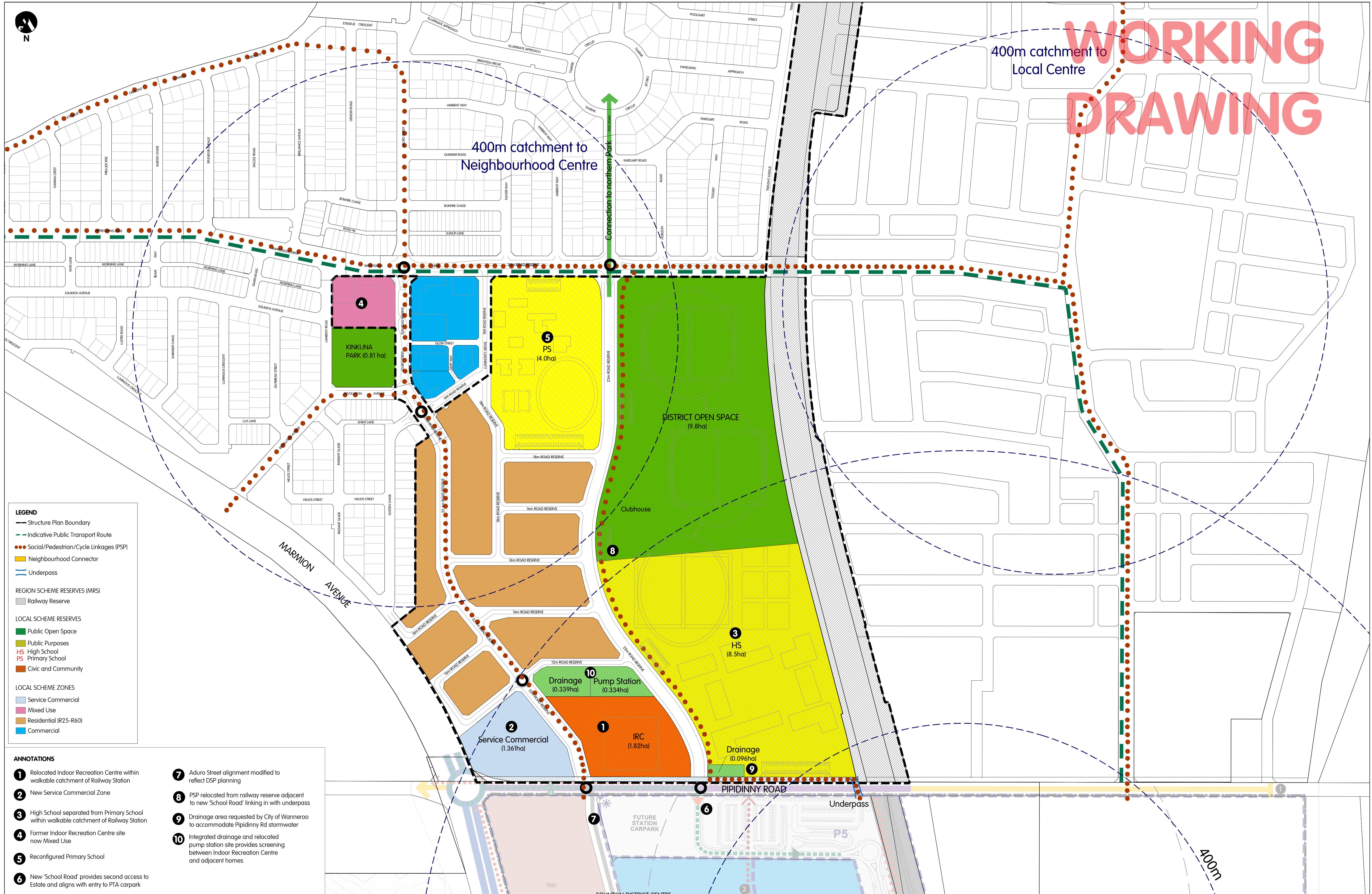


WORKING DRAWING

400m catchment to Local Centre

400m catchment to Neighbourhood Centre

Connection to northern Park

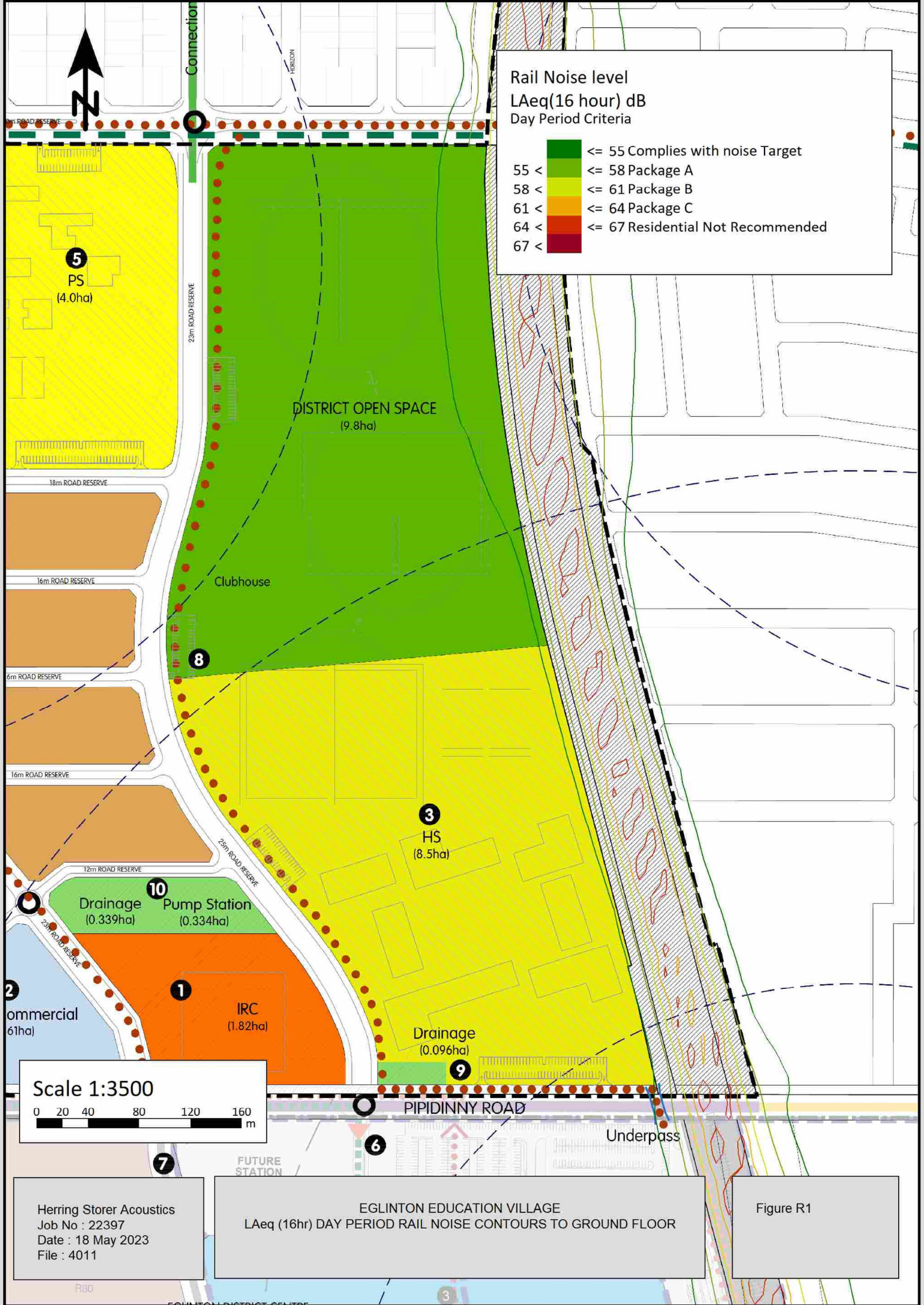


- LEGEND**
- Structure Plan Boundary
 - Indicative Public Transport Route
 - Social/Pedestrian/Cycle Linkages (PSP)
 - Neighbourhood Connector
 - Underpass
- REGION SCHEME RESERVES (MRS)**
- Railway Reserve
- LOCAL SCHEME RESERVES**
- Public Open Space
 - Public Purposes
 - HS High School
 - PS Primary School
 - Civic and Community
- LOCAL SCHEME ZONES**
- Service Commercial
 - Mixed Use
 - Residential (R25-R60)
 - Commercial

- ANNOTATIONS**
- 1 Relocated Indoor Recreation Centre within walkable catchment of Railway Station
 - 2 New Service Commercial Zone
 - 3 High School separated from Primary School within walkable catchment of Railway Station
 - 4 Former Indoor Recreation Centre site now Mixed Use
 - 5 Reconfigured Primary School
 - 6 New 'School Road' provides second access to Estate and aligns with entry to PTA carpark
 - 7 Aduro Street alignment modified to reflect DSP planning
 - 8 PSP relocated from railway reserve adjacent to new 'School Road' linking in with underpass
 - 9 Drainage area requested by City of Wanneroo to accommodate Pipidiny Rd stormwater
 - 10 Integrated drainage and relocated pump station site provides screening between Indoor Recreation Centre and adjacent homes

APPENDIX B

NOISE CONTOUR PLOT



Rail Noise level
L_{Aeq}(16 hour) dB
 Day Period Criteria

■	<= 55 Complies with noise Target
■	55 < <= 58 Package A
■	58 < <= 61 Package B
■	61 < <= 64 Package C
■	64 < <= 67 Residential Not Recommended
■	67 <

Scale 1:3500

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EGLINTON EDUCATION VILLAGE
 L_{Aeq} (16hr) DAY PERIOD RAIL NOISE CONTOURS TO GROUND FLOOR

Figure R1

APPENDIX C

AS2107: 2000

RECOMMENDED INTERNAL NOISE LEVELS FOR EDUCATIONAL FACILITY

Australian/New Zealand Standard™

Acoustics—Recommended design sound levels and reverberation times for building interiors

Originated as AS 2107—1977.
Previous edition AS 2107—1987.
Jointly revised and designated as AS/NZS 2107:2000.
This edition 2016.

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Where the control of reverberation in spaces is carried out for noise control purposes, the reverberation time should be minimized as far as practicable.

NOTE: The location of sound-absorbing surfaces and sound-reflecting surfaces to achieve the design reverberation time is important.

TABLE 1
DESIGN SOUND LEVELS AND REVERBERATION TIMES
FOR DIFFERENT AREAS OF OCCUPANCY IN BUILDINGS

Item	Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
1	EDUCATIONAL BUILDINGS		
	Art/craft studios	40 to 45	< 0.8
	Assembly halls up to 250 seats	30 to 40	0.6 to 0.8
	Assembly halls over 250 seats	30 to 35	Curve 1*
	Audio-visual areas	35 to 45	0.6 to 0.8
	Computer rooms—		
	Teaching	40 to 45	0.4 to 0.6
	Laboratories	45 to 50	0.4 to 0.6
	Conference rooms	35 to 40	0.6 to 0.7
	Corridors and lobbies	< 50	< 0.8
	Drama studios	35 to 40	Curve 1*
	Engineering workshops—		
	Teaching	< 45	See Note 1
	Non-teaching	< 60	See Note 1
	Weight training/Fitness room	< 50	< 1.0
	Interview/counselling rooms	40 to 45	0.3 to 0.6
	Laboratories—		
	Teaching	35 to 45	0.5 to 0.8
	Working	40 to 50	0.5 to 0.8
	Lecture rooms up to 50 seats	30 to 35	Curve 3*
	Lecture theatres—		
	Without speech reinforcement	30 to 35	Curve 3*
	With speech reinforcement	30 to 40	Curve 3*
	Libraries—		
	General areas	40 to 50	< 0.6
	Reading areas	40 to 45	< 0.6
	Manual arts workshops	< 45	< 0.8
	Medical rooms (First Aid)	40 to 45	0.6 to 0.8
	Music practice rooms	40 to 45	0.7 to 0.9
	Music studios	30 to 35	Curve 2* (see Note 3)
	Office areas	40 to 45	0.4 to 0.7
	Professional and administrative offices	35 to 40	0.6 to 0.8
	Teaching spaces/single classroom—		
	Open plan teaching spaces	35 to 45	Curve 3* (see Note 1)
	Primary schools	35 to 45	Curve 3* (see Note 2)
	Secondary schools	35 to 45	Curve 3*

(continued)

TABLE 1 (continued)

Item	Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
1 (cont)	Staff common rooms	40 to 45	< 0.6
	Staff studies/collegiate	40 to 45	0.4 to 0.6
	Sports hall	< 50	Curve 4*
	Toilet/change/showers	< 55	—
2	HEALTH BUILDINGS		
	Audiological test rooms	See AS/NZS 1269.4 and AS ISO 8253	See Note 3
	Emergency areas	40 to 45	< 0.6
	Control rooms	40 to 50	0.4 to 0.6
	Corridors and lobby spaces	< 50	See Note 1
	Consulting rooms	40 to 45	0.4 to 0.6
	Delivery suites	45 to 50	0.4 to 0.6 (see Note 8)
	Dental clinics	40 to 45	0.4 to 0.6
	Dining areas	40 to 45	See Note 1
	Geriatric rehabilitation	40 to 45	< 0.6
	Intensive care wards	40 to 45	< 0.6
	Kitchens, sterilizing and service areas	< 55	< 0.8 (see Note 8)
	Laboratories	40 to 50	0.4 to 0.7
	Maintenance workshops	< 60	See Note 1
	MRI/CT Scan/X-Ray areas/Ultra sound	45 to 50	See Note 1
	Nurseries	35 to 45	0.4 to 1.0
	Nurses' stations	40 to 45	0.4 to 0.7
	Office areas	35 to 45	0.4 to 0.7
	Operating theatres	40 to 50	See Notes 1, 8
	Patient lounge	40 to 45	0.4 to 0.6
	Post-Op, Pre-Op, recovery rooms	40 to 45	0.4 to 0.6 (see Note 8)
	Pharmacies	45 to 50	0.4 to 0.6
	Staff rooms	40 to 45	0.4 to 0.6
	Sterilizing areas in operating theatres	40 to 45	< 0.9 (see Note 8)
	Surgeries/treatment/procedure rooms	40 to 45	0.4 to 0.7
	Utility rooms	50 to 60	—
	Ward bedrooms—		
Single bed	35 to 40	0.4 to 0.7	
Multiple beds	35 to 40	0.4 to 0.7 (see Note 8)	
Waiting rooms, reception areas	40 to 50	< 0.7	

(continued)