

FLCWA SUBMISSION

DRAFT SPP 5.4 ROAD AND RAIL NOISE

17-091 FLCWA

PREPARED FOR:
FREIGHT AND LOGISTICS COUNCIL OF WA Inc

DECEMBER 2017



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Prepared for: **FREIGHT AND LOGISTICS COUNCIL OF WA INC**

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1. EXECUTIVE SUMMARY

The Western Australian Planning Commission (WAPC) has released an updated version of State Planning Policy 5.4 (State Planning Policy No. 5.4 Road and Rail Noise; September 2017) to supersede the previous version (State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning, 2009).

In addition, the Guidelines associated with the Policy have also been updated. The Guidelines associated with the 2009 Policy (Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning; May 2009) were updated in 2014 (Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning; December 2014) and have now again been updated (State Planning Policy 5.4 Road and Rail Noise Implementation Guidelines; September 2017) in line with the current Draft Policy.

CURRENT SPP 5.4 AND IMPLEMENTATION GUIDELINES		DRAFT SPP 5.4 AND IMPLEMENTATION GUIDELINES	
			
2009	2014	2017	
Policy	Guidelines	Policy	Guidelines

The following submission has been prepared by SITE planning + design (SITE) and Lloyd George Acoustics (LG Acoustics), on behalf of the industry members of the Freight and Logistics Council of WA Inc (FLCWA) and in consultation with these members and a broad range of other stakeholders.

The FLCWA comprises senior decision-makers from both industry and Government and was established to provide independent policy advice to the State Minister for Transport on developments impacting the delivery of freight and logistics services throughout Western Australia. This submission is made on behalf of the industry members of the FLCWA.

State Planning Policy 5.4 Road and Rail Noise and the Implementation Guidelines (SPP 5.4), together with the recently released Draft State Planning Policy 4.1 Industrial Interface, are the State’s key, and only, land use planning policies that guide regulatory authorities in making decisions on proposals for land use, subdivision and development that may impact on the productivity and efficiency of the freight and logistics industry.



In that context, the FLCWA appreciates the opportunity to engage in the process to inform and influence the wording of the Draft SPP 5.4 and the Implementation Guidelines to deliver better outcomes for industry, in terms of transport corridor protection for supply chain productivity and efficiency, economic development and better outcomes for the community, in terms of urban amenity and liveable neighbourhoods.

The FLCWA strongly urges the State Government to adopt an SPP 5.4 that will deliver strategic integrated land use and transport planning outcomes which acknowledge the need for:

- long term sustainable, liveable and prosperous growth of the State's cities, towns and regions;
- greater protection of strategic transport corridors that support economic development through the efficient operation of major supply chain infrastructure such as sea ports, airports and intermodal terminals; and
- protection of residential amenity for urban and regional communities.

With major transport infrastructure initiatives fundamental to the present State Government's policy agenda, SPP 5.4 should ensure the long-term protection of, and a strategic policy return on investment in strategic freight transport corridors, by prohibiting urban encroachment that threatens the productivity and competitiveness of the State's economy.

The practical implementation experience and research undertaken by the FLCWA, in partnership with specialist consultants, and detailed in this submission provides a compelling evidence base in support of the recommended changes outlined in in Section 1.2 and Section 7. Most importantly, the research and outcomes demonstrate that the implications for the cost of dwelling construction through the introduction of a L_{Amax} noise metric are marginal (+2.48%) and/or reduced (-6.90%) within the critical distance of 25 - 40m from the freight rail track. This demonstrates that appropriate noise metrics can be implemented and work in synergy with affordable housing objectives.

It should also be noted that the FLCWA on behalf of industry is highly conscious of its important role in addressing this issue and it is taking on that responsibility as described later in this submission at Section 6.1.6.

1.1 KEY MESSAGES

To achieve better protection for strategic freight corridors for the ongoing benefit of industry, the economy and neighbouring urban communities, the Policy should:

1. Be supported by **agreed mapping of the principal strategic freight network** (road and rail, metro and regional) tied to stronger land use control (avoidance principle) requirements, so that the network can be better protected.
2. Include **L_{Amax} noise measurement and modelling for freight rail** as the current LA_{eq} noise metric underestimates the true level of noise impact and disturbance to residential



amenity and human health, leading to inappropriate noise-sensitive land use and development adjacent to freight rail lines.

3. Provide for **agreed “design max” capacities for freight roads** and LA_{max} noise metrics for freight rail, because of the difficulty in obtaining reliable long-term traffic forecasts.
4. Offer **guidance on monitoring, modelling and mitigating ground-borne vibration**, drawing on successful overseas experience, because vibration generates adverse impacts for residential amenity and human health.
5. Include **stronger requirements on appropriate construction standards**, consistent with affordable housing objectives, for noise/vibration-sensitive developments in the vicinity of freight corridors because the current and draft standards do not offer adequate protection.
6. **Consider road and rail impacts during the earliest stages of the planning process** (local scheme amendments and structure plans) and not be deferred to the subdivision and/or development stages where there are few, if any, options to properly address the impacts and plan for an appropriate interface.
7. **Use language that provides greater certainty in outcomes and transparency and clarity in process** as the present language is confusing, indecisive and open to interpretation.
8. Be supported by **Deemed Provisions for Special Control Areas within the Planning and Development (Local Planning Schemes) Regulations 2015** to trigger the compliance for single and ancillary dwellings, resulting in more consistent implementation and capturing all proposals for noise/vibration sensitive development.
9. Require **extensive training for regulatory decision makers, the planning profession and the land development industry** on the Policy objectives, intent and practical implementation because these factors are not well understood presently.
10. **Ensure that regulatory decision makers can access high standard independent acoustic advice as a prerequisite for all land use planning decisions** as there is currently limited capability and experience within regulatory decision-making organisations to properly interrogate and assess land use planning proposals.

1.2 SUMMARY OF RECOMMENDATIONS

The recommendations made through-out this submission are evidence based and summarised below, against the 10 key messages outlined above:

1. Be supported by **agreed mapping of the principal strategic freight network** (road and rail, metro and regional) tied to stronger land use control (avoidance principle) requirements, so that the network can be better protected.



- a. Map and publish the strategic freight road network within the Implementation Guidelines and the online mapping, with associated “design max” vehicle volume capacities, agreed to by relevant Government departments.
- b. Adopt the LA_{max} noise metric for freight rail noise to support the successful and consistent implementation of the policy, by removing the need to forecast rail movements to a 20-year planning horizon.
- c. Adopt the LA_{max} noise metric for freight rail noise and “design max” vehicle volume capacities for strategic freight roads tied to stronger wording around land use controls, as opposed to built form controls (i.e. avoid noise-sensitive land use) and the requirement to provide a site specific acoustic assessment (not screening assessment) for all proposals for noise-sensitive land use, subdivision and/or development.
- d. The policy should be amended to reflect different types of road functions, as follows:
 - High speed, low amenity regional and freight roads (e.g. Kwinana Freeway, Tonkin Highway, Anketell Road) – proposals for noise-sensitive land use within proximity to these roads should apply the precautionary principle of avoidance of noise-sensitive land uses. i.e. it is a land use control mechanism first where built form control is implemented only in instances where noise-sensitive land use is unavoidable;
 - Low speed, high amenity local and district urban activity corridors (e.g. Canning and Stirling Highways and Beaufort Street) – proposals for noise-sensitive land use within proximity to these roads should be guided by built form control mechanisms;
- e. The road network terminology to be standardised across all Government agencies to reduce confusion and uncertainty.
- f. Remove strategic freight roads and freight rail from Table 2: Noise Forecast (Implementation Guidelines).
- g. Mapping to be updated to include:
 - the realignment of the freight rail line out of Midland, through Hazelmere;
 - the realignment of the freight rail line out of Mundijong to the western frontage of the Tonkin Highway extension;
 - the Dixon Road freight rail corridor;
 - the Thornlie to Cockburn MetroNet passenger rail line;
 - the extension of the Midland passenger rail line to Bellevue (MetroNet); and
 - other MetroNet passenger rail lines as alignments are determined.



and vibration monitoring, modelling and mitigation studies to inform an amendment to the relevant local planning scheme to introduce a special control area and associated provisions (as per the City of Cockburn approach), complemented by increased residential densities. This approach provides an incentive for the redevelopment of housing stock and the implementation of higher construction standards to address rail noise and vibration.

- c. Consult with the City of Cockburn on further research into the mitigation measures and associated constructions costs to address ground-borne vibration.
 - d. Consult with UWA ground-borne vibration expert Dr Kirsty Kuo on the methodology that would underpin a meaningful reference to ground-borne vibration mitigation in the policy.
5. Include **stronger requirements on appropriate construction standards**, consistent with affordable housing objectives, for noise/vibration-sensitive developments in the vicinity of freight corridors because the current and draft standards do not offer adequate protection.
- a. Support for the inclusion of roofing materials within the recommended quiet house design packages, noting that the use of clay tiles to mitigate freight rail noise should be mandatory within SPP 5.4 Packages B and C on the basis that zincalume sheeting is not suitable to mitigate the noise impacts from freight rail.
 - b. Adopt the LG Acoustics quiet house design packages to mitigate freight rail noise.
6. **Consider road and rail impacts during the earliest stages of the planning process** (local scheme amendments and structure plans) and not be deferred to the subdivision and/or development stages where there are few, if any, options to properly address the impacts and plan for an appropriate interface.
- a. Introduce clear and strong wording requiring the freight road and rail noise and vibration impacts to be monitored and modelled at every stage of the planning process, to ensure that the land use avoidance principle is implemented at the earliest stages of land use assessment and decision making.
 - b. Require and provide extensive and ongoing training following the release of SPP 5.4, especially for local government, to highlight policy changes and to stress the importance of the consideration of road and rail noise impacts during the early stages of the land use planning process.
7. **Use language that provides greater certainty in outcomes and transparency and clarity in process** as the present language is confusing, indecisive and open to interpretation.



- a. Amend the policy to expand the list of definitions to include unavoidable, switches / turnouts, signalling systems, spurs or passing loops, the modification to the track support structure, crossovers, refuges, relief lines, straightening of curves or re-sleepering.
 - b. Amend the policy to provide stronger and clearer intent to meaning of the words “discouraged” and “not recommended”, in Table 2 Noise Forecast (Guidelines).
 - c. Remove reference to railway upgrade works that will result in a decrease in rail noise levels, such as straightening of curves.
 - d. Delete Questions 9 and 11 and the answers in the Frequently Asked Questions.
8. Be supported by **Deemed Provisions for Special Control Areas within the Planning and Development (Local Planning Schemes) Regulations 2015** to trigger the compliance for single and ancillary dwellings, resulting in more consistent implementation and capturing all proposals for noise/vibration sensitive development.
- a. Introduce deemed provisions into the *Planning and Development (Local Planning Scheme) Regulations* for a Special Control Area and associated provisions for freight road and rail noise to trigger planning approval requirements for single and ancillary dwellings (including alterations or additions to existing dwellings that involve more than 2 habitable rooms and result in an increase exceeding 25% of habitable floor space).
9. Require **extensive training for regulatory decision makers, the planning profession and the land development industry** on the Policy objectives, intent and practical implementation because these factors are not well understood presently.
- a. Require extensive and ongoing training for regulatory decision-makers following the release of the policy that highlights the key policy changes and provides guidance on the practical implementation of the policy.
 - b. Prepare and release a “procedures manual” to guide regulatory decision makers on the processing, assessment and determination of land use planning proposals, including guidance on appropriate sources of independent technical advice.
10. **Ensure that regulatory decision makers can access high standard independent acoustic advice as a prerequisite for all land use planning decisions** as there is currently limited capability and experience within regulatory decision-making organisations to properly interrogate and assess land use planning proposals.
- a. Provide greater support to regulatory land use planning organisations for the assessment and interrogation of acoustic assessments and noise management plans



through either the Department of Water and Environmental Regulation or a panel of accredited acoustic consultants.



TABLE OF CONTENTS

- 1. EXECUTIVE SUMMARY i
 - 1.1 KEY MESSAGES ii
 - 1.2 SUMMARY OF RECOMMENDATIONS iii
- TABLE OF CONTENTS ix
- 2. INTRODUCTION 1
 - 2.1 INDUSTRY ENGAGEMENT 3
 - 2.2 ABBREVIATIONS 3
- 3. NATIONAL AND LOCAL CONTEXT 5
- 4. PROBLEM DEFINITION 6
- 5. PRACTICAL EXPERIENCE WITH SPP 5.4 9
 - 5.1 PROJECT EXPERIENCE 9
 - 5.1.1 ANKETELL NORTH LOCAL STRUCTURE PLAN AMENDMENT, ANKETELL 9
 - 5.1.2 CITY OF ALBANY LOCAL PLANNING SCHEME No. 1 AMENDMENT NO. 20 10
 - 5.1.3 ELIZA PONDS LOCAL STRUCTURE PLAN, SPEARWOOD 13
 - 5.2 KEY CONSIDERATIONS 14
- 6. RESEARCH OUTCOMES 16
 - 6.1 FREIGHT RAIL NOISE 16
 - 6.1.1 NOISE METRICS 16
 - 6.1.2 QUIET HOUSE DESIGN PACKAGES 17
 - 6.1.3 EXTENT OF LAND ACROSS PERTH METROPOLITAN REGION AFFECTED BY THE LAMAX 17
 - 6.1.4 COMPARISON OF QUIET HOUSE DESIGN PACKAGE COSTS AND NOISE REDUCTION OUTCOMES 18
 - 6.1.5 RESEARCH CONCLUSIONS 20
 - 6.1.6 ADDRESSING RAIL NOISE AT SOURCE 20
 - 6.2 CITY OF COCKBURN LOCAL PLANNING SCHEME AMENDMENT NO. 118 21
 - 6.2.1 FLCWA SUPPORT FOR AMENDMENT NO. 118 AND LPP 1.17 25
- 7. REVIEW AND RECOMMENDATIONS 27
 - 7.1 RECOMMENDATIONS 27
 - 7.1.1 STRATEGIC FREIGHT NETWORK 27
 - 7.1.2 LAEQ VS LAMAX (DAY AND NIGHT) FOR FREIGHT RAIL 29
 - 7.1.3 ROAD AND RAIL TRAFFIC FORECAST DATA 30
 - 7.1.4 GROUND-BORNE VIBRATION 31
 - 7.1.5 CONSTRUCTION STANDARDS 33
 - 7.1.6 EARLY CONSIDERATION 34
 - 7.1.7 TERMINOLOGY, PHRASING AND LANGUAGE 34
 - 7.1.8 SPECIAL CONTROL AREAS FOR SINGLE + ANCILLARY DWELLINGS 35
 - 7.1.9 TRAINING 36
 - 7.1.10 ACOUSTIC ADVICE 36



8. CONCLUSION37

FIGURES

Figure 1 Indicative Concept Plan
 Figure 2 Aerial photograph illustrating the subject site (yellow border), the freight rail line (blue dashed line) and Princess Royal Drive (red dashed line)
 Figure 3 Proposed local planning scheme provisions
 Figure 4 Overlooking Lots 380 and 381 Cristalline Road, Spearwood to the elevated freight rail line
 Figure 5 R20, R30 , R60 + R100 residential density development
 Figure 6 Notification on title, noise and vibration mitigation required on a lot by lot basis

TABLES

Table 1 Quiet House Design Packages and Application Distance
 Table 2 Cost of Quiet House Design Packages
 Table 3 Summary of Construction Cost Difference
 Table 4 Construction Cost Per dB Reduction

APPENDICES

Appendix 1 Policy and Guidelines Review
 Appendix 2 Lloyd George Acoustics SPP 5.4 Report
 Appendix 3 FLCWA Schedule of Stakeholder Engagement
 Appendix 4 FLCWA Bulletin #7 - Freight Rail Noise Policy and Practice (October 2014)
 Appendix 5 Draft Anketell North Local Structure Plan Modification
 Appendix 6 Packham North - Entrance Road (Eliza Ponds) Local Structure Plan
 Appendix 7 Lloyd George Acoustics "Cost of Acoustic Architectural Packages" Report
 Appendix 8 FLCWA Comments on Department of Planning Technical Working Group Draft SPP 5.4



2. INTRODUCTION

The following submission has been prepared by SITE planning + design (SITE) and Lloyd George Acoustics (LG Acoustics), on behalf of the industry members of the Freight and Logistics Council of WA Inc (FLCWA) and in consultation with a broad range of industry and Government stakeholders.

The FLCWA comprises senior decision-makers from both industry and Government and was established to provide independent policy advice to the State Minister for Transport on developments impacting the delivery of freight and logistics services throughout Western Australia. This submission is made on behalf of the industry members of the FLCWA.

As population growth, urban consolidation and housing affordability (among other factors) continue to drive the form of our cities and towns, the growth and productivity of the country's national, state and local freight supply chains is under threat and facing pressure not seen before in Australia.

Strategic economic infrastructure, such as sea ports, airports, intermodal terminals, freight road and rail networks that were historically remote from urban communities, are now at their heart, resulting in land use conflicts that threaten urban amenity and the country's national competitiveness.

As Perth and regional cities and towns across Western Australia continue to grow, with a clear State Government mandate for urban consolidation and transit orientated development, encroachment on freight transport corridors and hubs has become a priority concern for the FLCWA on behalf of industry.

State Planning Policy 5.4 Road and Rail Noise (SPP 5.4), the SPP 5.4 Implementation Guidelines, and the recently released Draft State Planning Policy 4.1 Industrial Interface, are the State's key, and only, land use planning policies that guide regulatory authorities in making decisions on proposals for land use, subdivision and development that may impact on the productivity and efficiency of the freight and logistics industry.

In that context, the FLCWA appreciates the opportunity to engage in the process to inform and influence the wording of Draft SPP 5.4 and the Implementation Guidelines to deliver better outcomes for industry, in terms of transport corridor protection for supply chain productivity and efficiency, the economy, and for the community, in terms of urban amenity and liveable neighbourhoods.

The FLCWA is mindful that the opportunity to participate in the review of, and inform and influence key State Planning Policy that impacts the freight and logistics industry, such as SPP 5.4, may only occur once every decade or so. Across that period, critical decisions will be taken on the basis of SPP 5.4 related to major transport initiatives impacting both industry and the community. It is



essential that the policy measures in place adequately protect the balance between the two or it will be seriously damaging for each. The context includes:

- major Federal and State Government investment in, and the construction of, transport infrastructure across Western Australia; and
- future decisions on integrated land use and transport planning outcomes (such as MetroNet passenger lines and stations) and major transport and supply chain infrastructure (such as new freight handling facilities in the Fremantle Outer Harbour and supporting inland supply chains) over the coming decade; in addition to,
- the State Government's commitment to increasing the volume of shipping containers moving in/out of Fremantle Inner Harbour on freight rail from the current 14% to 30% of Port trade as will be demonstrated by the Government's forthcoming announcement of an increase to the freight rail subsidy;
- the forecast tripling of the freight task by 2050;
- the State Government's commitment to urban consolidation and infill development around key public transport nodes and areas of high urban amenity; and
- growing tensions between the competing objectives of supply chain productivity and urban amenity;

the FLCWA urges the State Government to endorse an SPP 5.4 that will deliver strategic integrated land use and transport planning outcomes which acknowledge the need for:

- long term sustainable, liveable and prosperous growth for the State's cities, towns and regions;
- greater protection for strategic transport corridors that support economic development and underpin the efficient operation of major supply chain infrastructure such as sea ports, airports and intermodal terminals and ensure the community gain access to an extensive range, and competitively priced, products and goods; and
- the protection of residential amenity for urban and regional communities.

With substantial infrastructure investments to be made across Western Australia in coming years, SPP 5.4 must ensure the long-term protection of, and a strategic return on, Government investment in strategic freight transport corridors, by prohibiting urban encroachment that threatens unconstrained 24/7 operations and impact on the productivity and competitiveness of our supply chains and economy.

While the FLCWA has invested considerable time, effort and funding investigating freight rail noise within the Perth metropolitan region over recent years, as detailed in Section 6.1.6, it should be stressed that the FLCWA places equal importance on the need to protect freight road and rail corridors as it does protecting the amenity of surrounding urban communities across metropolitan Perth and regional Western Australia.

The following submission covers:



National and Local Context – provides an insight into national deliberations on this issue and their implications for Western Australia.

Problem Definition – provides an overview of identified shortfalls and key concerns with the current SPP 5.4.

Practical Experience with SPP 5.4 – provides a case-based insight into the experience of the FLCWA, SITE and LG Acoustics in relation to the practical implementation challenges (of both) the current and draft SPP 5.4.

Research Outcomes – provides an overview of the research undertaken by the FLCWA, SITE, LG Acoustics and Responsive Environments into freight rail noise and the implications for land use planning, along with subsequent work undertaken by the City of Cockburn, LG Acoustics and the Public Transport Authority (PTA) that advanced the work of the FLCWA.

Review and Recommendations – provides FLCWA’s overview of the draft policy, together with recommendations to strengthen its content and its implementation to deliver greater protection for both freight transport corridors and urban amenity.

A detailed Policy and Guidelines Review was undertaken by LG Acoustics and SITE and is enclosed at **Appendix 01 – Policy and Guidelines Review**. Please refer to Appendix 07 for detailed comments, particularly in relation to concerns and suggested improvements to the terminology, phrasing and language used throughout the policy. LG Acoustics’ Review of Proposed (September 2017) SPP 5.4 & Guidelines for FLCWA is enclosed at **Appendix 02**.

2.1 INDUSTRY ENGAGEMENT

The following submission has been prepared following extensive industry and Government engagement and consultation by the FLCWA, supported by SITE planning + design.

Please refer to **Appendix 3 – FLCWA Schedule of Stakeholder Engagement** for a detailed schedule of the consultation undertaken by the FLCWA in support of this submission.

2.2 ABBREVIATIONS

ANLSP	Anketell North Local Structure Plan (refer to Section 5.1.1)
DPLH	Department of Planning, Lands and Heritage
Draft SPP 5.4	Draft State Planning Policy 5.4 Road and Rail Noise (released for public comment in September 2017)
Draft SPP 5.4 Guidelines	Draft State Planning Policy 5.4 Road and Rail Noise Guidelines (released for public comment in September 2017)
DWER	Department of Water and Environmental Regulation
FLCWA	Freight and Logistics Council of Western Australia



FLCWA Chair	Ms Nicole Lockwood
FLCWA Secretariat	Mr Mark Brownell
FLCWA Policy Advisor	Ms Kellie Houlahan
LAeq	Average measured noise
LAm_{ax}	Maximum noise level
LG Acoustics	Lloyd George Acoustics (acoustic consultants)
MRS	Metropolitan Region Scheme
MRWA	Main Roads WA
PTA	Public Transport Authority
SCA FRNA	Special Control Area - Freight Rail Noise Area (refer to Section 6.2)
SITE	SITE planning + design (town planning consultants)
SPP 5.4	2009 State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning
SPP 5.4 Guidelines	2014 Road and Rail Transport Noise and Freight Considerations in Land Use Planning Implementation Guidelines
TWG	Department of Planning's Technical Working Group for the review of SPP 5.4
WAPC	Western Australian Planning Commission



3. NATIONAL AND LOCAL CONTEXT

At a national level, first the COAG Reform Council in 2010/11, then the Productivity Commission in 2014 and, most recently, Infrastructure Australia in 2017 have all pointed to the overwhelming case for better transport corridor protection in this country on both economic and community grounds.

Notwithstanding, Infrastructure Australia comments, “Despite broad consensus on the merits of corridor protection, action to protect corridors has been the exception rather than the rule over recent years.”

The inaction is hard to understand when looked at against the facts. Failure to protect transport corridors can result in the corridor being built out, resulting in less direct routes having to be established, alternative approaches such as tunnelling being utilised or ongoing (and unsustainable) conflict between industry and community interests being created.

The cold hard dollar figures associated with the issue make a compelling case. Independently audited modelling carried out this year by Infrastructure Australia showed that the cost of not protecting seven of the country’s key transport corridors would cost taxpayers an extra \$10.8 billion (in discounted 2016 dollars), or \$57.1 billion in real undiscounted terms, through extra land purchase and construction costs.

Rising urban populations and rising urban densities, in both capital cities and in major regional centres, suggest that such costs could continue to increase at significant rates into the short, medium and long-term future. Add to that un-costed impacts on community amenity and wellbeing and the overall significance of not protecting transport corridors becomes starkly apparent.

The present review of State Planning Policy 5.4 is an important opportunity to press the case for better protection of transport corridors in Western Australia that should not be lost. The importance of the issue is no better illustrated than by reference to the Government’s plans to establish new port facilities in the Outer Harbour south of Fremantle.

Opponents of this important initiative point to the amount of capacity that exists within the present Fremantle Inner Harbour as reason not to develop alternative facilities. There is no doubt that with appropriate investment, the current arrangements within the Fremantle Inner Harbour Port could serve the State for many years to come. However, it is highly doubtful whether the road and rail services outside of the Port could match this horizon – without the corridors they use being better protected than they are at present.

The new Port facilities to the south of Fremantle are presently un-costed. But experience elsewhere suggests many billions of dollars will be required to bring them to fruition. This is not an investment that the State Government would welcome any sooner than is absolutely necessary. Better protection of present freight corridors will maximise that opportunity. And at the same time, identify and preserve a strategic freight network that will serve Western Australia, whether at the existing Inner Harbour or at a new Outer Harbour, into the long-term future.



4. PROBLEM DEFINITION

The introduction outlined in SPP 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (2009) succinctly describes the importance of the protection of urban amenity and human health, the functionality of freight transport corridors, and the challenge that presents for land use planners and regulatory authorities in avoiding land use conflict between the two, as outlined below.

“Road and rail transport corridors play a vital role in moving people and goods safely, efficiently and effectively, and they provide wide-ranging economic and social benefits to the community. Growing volumes of general traffic and freight, and a greater community awareness of amenity and quality of life issues, have led to transport noise becoming an increasingly important consideration in land use planning.

Excessive noise has the potential to affect the health and amenity of a community, as well as the wellbeing of an individual. Sleep, relaxation and conversation can all be adversely affected by high levels of noise. There is also documented evidence that long-term exposure to high levels of noise may cause serious health, learning and development problems...

...In addition to considering the amenity of the acoustic environment for the community, land use planners must consider the need to protect transport corridors from encroaching incompatible development and ensure proposed developments support the functionality of essential freight operations. The efficient movement of freight is critical to the sustainability of Western Australia, and as the population and resource industry grow, the increase in the volume of freight and the vast distances involved in distribution will put further pressure on the transport infrastructure.”

(State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations, 2009)

SPP 5.4 has been an operational policy of the WAPC for over eight years following gazettal in 2009, providing guidance to State and Local Governments on land use, subdivision and development proposals. Accordingly, it is timely to review the success and failings of the policy across this eight-year period of practical implementation to inform amendments to the policy that will strengthen delivery of its intent and objectives, ensure greater consistency in its implementation and provide greater certainty to the land development and freight and logistics industries, which in turn translates into investment, job creation and a sound economy.

In that context, industry is well placed to provide advice to Government on the practical implementation of the policy, the outcomes that have been delivered on the ground and its success and/or failings in achieving its stated objectives.



While the FLCWA represents industry in respect of the protection of freight transport corridors from urban encroachment that threaten unconstrained 24/7 operations, the FLCWA considers that the objectives of SPP 5.4, in respect of both industry and community interests, are not mutually exclusive and that a sustainable balance between the two is possible if supported by appropriate policy settings.

The successful protection of freight transport corridors from encroachment by noise-sensitive land uses, in turn ensures the protection of residential amenity for adjacent urban communities. Similarly, the protection of residential amenity through increased construction standards and appropriate setbacks in noise-sensitive locations provides a greater level of protection for the unconstrained operation of freight transport corridors.

If formulated and implemented successfully, the policy can deliver a win-win scenario that benefits communities, the freight transport industry, supply chains and the overall economy. However, if the policy fails, the outcomes will threaten Western Australia's enviable high standards of urban amenity and economic productivity.

The FLCWA is strongly supportive of the intent of the policy, but is mindful that the current and draft policies face a series of fundamental challenges that could limit successful and consistent implementation if not adequately addressed, including:

- noise monitoring and modelling is a highly complex and technical process;
- there is extremely limited related capability, experience and technical understanding within regulatory decision-making organisations and across the land development industry in general;
- the absence of agreed mapping of the principal strategic freight network;
- freight rail noise is considerably different in character to road and passenger rail noise profiles due to the intermittent nature of freight rail movements, low frequency components, vibration and the actual level of noise disturbance is not well reflected in, or addressed by, the LAeq metric;
- the absence of a policy position on ground-borne vibration;
- planning approval exemptions for single and ancillary dwellings and the requirement for these types of noise-sensitive land uses to comply with the requirements of the policy, including alterations or additions to existing dwellings that involve more than 2 habitable rooms and result in an increase exceeding 25% of habitable floor space;
- access to robust road and rail traffic data and forecasts to determine the potential noise impacts for a 20-year planning horizon; and
- inadequate construction standards in respect of noise and vibration associated with freight operations.

Regulatory land use planning organisations are challenged with the task of balancing often competing land use planning pressures typically associated with urban communities experiencing economic and population growth, including:



- urban consolidation and infill development;
- transit oriented development;
- housing affordability; and
- the efficient movement of people and freight.

While there is growing evidence of community concern about freight impacts, primarily in relation to freight rail noise, the true scale of the problem may not become apparent for many years when freight rail traffic volumes have grown considerably consistent with Government policy and as new people move into areas affected by freight rail noise.

As Western Australia enters a decade that will deliver:

- MetroNet's Stage 1 passenger rail line extensions and stations;
- planning frameworks for higher density land use and development around existing and future passenger train stations (transit oriented development);
- the announcement of new port facilities in the Fremantle Outer Harbour;
- planning and transport frameworks for efficient and productive supply chains that support freight import and export activities for the Perth, Peel, Greater Bunbury and South West regions (Westport Taskforce); and
- an inevitable return to population and economic growth across the State,

it is essential that SPP 5.4 is built on a strategic vision that acknowledges: the ultimate form of the State's urban communities, towns and cities, and the strategic freight transport corridors that are required to maintain the community's quality of life through ease of access to consumer goods and to support the growth of the economy, including local business, manufacturers and producers who rely on access to regional, national and international markets.



5. PRACTICAL EXPERIENCE WITH SPP 5.4

The FLCWA, SITE planning + design and LG Acoustics have been involved in the assessment of a number of land development projects within close proximity to freight rail and road transport corridors in various roles, including the preparation of submissions during public comment periods and the provision of professional advice acting on behalf of stakeholders.

Outlined below is a brief overview of a selection of projects that highlight the challenges, shortcomings and opportunities presented by the current and draft SPP 5.4 and key considerations for the review of SPP 5.4.

5.1 PROJECT EXPERIENCE

5.1.1 ANKETELL NORTH LOCAL STRUCTURE PLAN AMENDMENT, ANKETELL

SITE was engaged by the City of Kwinana to undertake a peer review of a proposed amendment to the Anketell North Local Structure Plan (ANLSP), which proposed Residential R80 land use directly abutting the southern frontage of Anketell Road (refer to **Appendix 04 – Draft Anketell North Local Structure Plan Modification**). The review included an assessment of the proposed amendment against the draft SPP 5.4.

Anketell Road is identified as a strategic freight road under Perth @ 3.5 million, that will ultimately function as a primary freight corridor for servicing new freight handling facilities within the Outer Harbour, provide RAV 7 access (allowing for heavy vehicles up to 36.5m in length) and will function as the key route for transporting Over-Size Over-Mass and High Wide Load cargos.

The review of the proposed amendment to the ANLSP revealed challenges in the interpretation and application of noise policy requirements at the local government officer level and the difficulty in obtaining accurate and up to date traffic forecast data to then determine compliance with the policy. In this regard, SITE was unable to provide clear guidance to the City of Kwinana on the application of the policy, in the absence of agreed traffic forecast data.

This experience also highlighted the reliance on the technical capability and experience of regulatory decision makers to interrogate the data used to inform acoustic modelling and noise management plans.

This absence of traffic forecast data presents a considerable challenge in preparing a Noise Level Contour Map using the noise level information as per Part 3.3 and Table 2 of Draft SPP 5.4 and the Guidelines. Identification of appropriate land use and development setback requirements based on vehicles/day assumptions is reliant on readily available, accessible and accurate vehicle movement information/forecasting.

An additional challenge in this example is that Draft SPP 5.4 asks applicants and decision makers to consider whether the proposed residential land use is “unavoidable”, but provides no guidance on what constitutes unavoidable development. As the subject land is a largely vacant greenfield site



and is not constrained by established patterns of land use and development, it is considered that residential land use is avoidable.

SITE recommended the use and development of the land abutting Anketell Road for commercial and service commercial purposes, which would avoid urban encroachment on a strategic freight road and provide an opportunity to develop a typical bulk goods commercial built form that would act to mitigate the impact of future road noise on residential development to the south.

5.1.2 CITY OF ALBANY LOCAL PLANNING SCHEME NO. 1 AMENDMENT NO. 20

Amendment No. 20 to the City of Albany Local Planning Scheme No. 1, advertised for public comment in March 2017, highlights several concerns in relation to consideration of noise-sensitive land use and development adjoining existing freight rail and road infrastructure, as well as the City’s understanding of their obligations under SPP 5.4. Scheme Amendment No. 20 proposes to increase the residential density of several lots abutting the main freight line and Princess Royal Drive into Albany Port, from R30 to R60.



FIGURE 1 Indicative Concept Plan (Source: City of Albany Local Planning Scheme No. 1 Amendment No. 20, Rev 16 September 2016, Ayton Baesjou Planning)

The reporting supporting the scheme amendment request and subsequent adoption by the City of Albany (for the purpose of public advertising) failed to properly acknowledge, model and manage the noise impacts from the abutting freight rail corridor (connecting to the Albany Port approximately 1,200m to the south east) and Princess Royal Drive, the primary freight route to Albany Port, located approximately 40m south of the site.



FIGURE 2 Aerial photograph illustrating the subject site (yellow border), the freight rail line (blue dashed line) and Princess Royal Drive (red dashed line). (Source: Google Maps 2017)

Noise monitoring and modelling demonstrating the suitability of the land to accommodate higher residential densities was not undertaken or provided in support of the amendment. Furthermore, a noise impact assessment and management plan were not required to inform the scheme amendment.

The amendment proposed changes to the scheme text to include the following provisions.



Modifying the Local Planning Scheme No.1 by incorporating the Amity Quays Special Control Area within Part 6 – Special Control Areas of the Scheme Text in the following manner:

Part 6 – Special Control Areas

6.8 Amity Quays Special Control Area

6.8.1 The purpose of the Amity Quays Special Control area is to -

- a) Increase the residential density code from R30 to R60;
- b) Ensure appropriate noise mitigation measures are incorporated within the development to address noise impact from road and rail; and
- c) Encourage high quality built form given the prominent location on Princess Royal Drive and proximity to the Amity Historic Precinct.

6.8.2 In considering an application for planning approval within the Amity Quays Special Control Area, the Local Government shall have particular regard to -

- a) The provisions of the Environmental Protection (Noise) regulations 1997 and any advice received from the Environmental Protection Authority in relation to noise impacts from road and rail; and
- b) Any relevant design guidelines administered by the local Government.

6.8.3 The Local Government may grant approval and impose conditions on the approval to require the applicant to incorporate design and construction methods/materials to reduce noise impacts into the dwelling.

6.8.4 The Local Government shall request the commission impose a condition on any subdivision approval requiring a notification to be placed on the Certificate of Title stating that the land may be affected by noise from the nearby road and rail.

FIGURE 3 Proposed local planning scheme provisions (Source: City of Albany Local Planning Scheme No. 1 Amendment No. 20, Rev 1 6 September 2016, Ayton Baesjou Planning)

This approach failed to acknowledge that noise impacts are largely unavoidable at the development stage, and failed to recognise that any resultant single residential dwelling would likely be exempt from planning approval requirements, if compliant with Residential Design Code. Furthermore, no reference was made to compliance with noise targets within SPP 5.4, instead referring to the Environmental Protection (Noise) Regulations 1997, which does not provide guidance on transport noise.

No rigour was applied as part of the rezoning of the land to determine whether the proposed use (let alone proposed density increase) would satisfy noise-sensitive land use requirements, potentially resulting in future dwellings that would be impacted by, and potentially impact on, the operation of the freight rail line and Princess Royal Drive

This example highlights significant concerns in relation to the understanding of the existing and draft SPP 5.4 requirements, particularly in relation to the rigour applied by local government when considering rezoning of land adjacent to freight rail and road corridors.

In addition, the Environmental Protection Authority, in assessing the potential environmental impacts of the proposed amendment, determined that “Referral Examined, Preliminary Investigations and Inquiries Conducted. Scheme Amendment Not to be Assessed Under Part IV of EP Act. No Advice Given.” It is expected that the proposed amendment would be classified as not



to be assessed on the basis that the proposal would not result in significant environmental impacts. However, it is surprising that no advice was provided in relation to transport noise.

The concerns described here if left unaddressed could jeopardise trade through the Port of Albany. In particular, Albany is the main regional port in the State for the export of grain, which is, of course, a seasonal product. The suggestion in the Implementation Guidelines of the draft policy that seasonal movements do not satisfy the general principle underpinning the policy is ill-founded. The adoption of that logic would put at risk the export of agricultural products through all Western Australian ports at unacceptable cost to the State's economy.

5.1.3 ELIZA PONDS LOCAL STRUCTURE PLAN, SPEARWOOD

The Packham North - Entrance Road (Eliza Ponds) Local Structure Plan, and subsequent subdivision and development, realised the redevelopment of what was industrial zoned land containing the former Watsonia small goods factory site for a new urban community, abutting the freight rail line connecting Fremantle Port to Forrestfield. Refer to **Appendix 05 - Packham North - Entrance Road (Eliza Ponds) Local Structure Plan**.

This project highlights the shortcomings of SPP 5.4, in enabling the creation of residential lots at R30 and R40 densities, backing on to an elevated freight rail line that sits at roof level of adjoining single storey single dwellings.



FIGURE 4 Overlooking Lots 380 and 381 Cristalline Road, Spearwood to the elevated freight rail line (Source: SITE planning + design)

While the Local Structure Plan triggers the need to obtain planning approval for single and ancillary dwellings (which are otherwise generally exempt) and for the implementation of quiet house design requirements (subject to a final acoustic assessment), it is concerning that SPP 5.4 allows noise-sensitive land use and development directly abutting an elevated freight rail line, particularly given that there is limited to no opportunity to construct an acoustic wall to reduce the noise



impact on adjoining residential dwellings due to the width of the rail corridor and the level difference.

Furthermore, as illustrated in the image above the current policy does not specify preferred or recommended roofing materials and as such allows for the use of zincalume sheeting, which provides limited noise attenuation against freight rail noise, particularly when the rail line site level with the roof of the adjoining dwelling. It is acknowledged that Draft SPP 5.4 includes guidance on roofing materials. However, further guidance is required to require the use of clay roof tiles for noise-sensitive development within proximity to freight rail lines.

5.2 KEY CONSIDERATIONS

A recurring theme with the above examples is that in all instances, be it a scheme amendment or structure plan, noise monitoring, modelling and/or the preparation of Noise Management Plans is consistently deferred to subsequent development approval stages. This results in the potential impact on both future residents and infrastructure operations not being wholly understood until after land use, density and design decisions are already set. Furthermore, single and ancillary residential developments are generally exempt from development approval requirements, and the opportunity to apply appropriate noise mitigation measures is further compromised at this late stage in the process.

Key considerations for SPP 5.4 taken from the project experience outlined above include the need for:

- road and rail noise impacts, and compliance with the policy, should be assessed at the earliest stages of the planning process (i.e. local planning scheme amendments) and not be deferred to the development stage when there are limited options available to address and mitigate noise impacts;
- extensive and obligatory up-front and annual training sessions for regulatory decision makers and the land development industry to highlight the key policy changes and explain the practical implementation of the policy;
- the strategic freight road network to be mapped with associated “design max” vehicle volume capacities (similar to the approach taken to determining noise contour mapping for Perth Airport) in the absence of totally reliable traffic forecast data to provide clear guidance and certainty to the land development industry on the long term role and function of strategic freight roads and greater consistency in the application of the policy, as occurs for State Planning Policy 5.1 Land Use Planning in the Vicinity of Perth Airport;
- unambiguous clear language that avoids the use of terms such as “unavoidable” development;
- the introduction of online mapping to provide greater clarity on the roads and rail lines that trigger application of the policy; and
- the inclusion of appropriate roofing materials within the recommended quiet house design packages (SPP 5.4 Packages B and C) (noting that zincalume sheeting is not considered suitable to mitigate noise impacts from freight rail).



These key considerations have informed the comments and recommendations in Section 7. Review and Recommendations.



6. RESEARCH OUTCOMES

6.1 FREIGHT RAIL NOISE

In 2014, the FLCWA investigated the effectiveness of the WAPC's State Planning Policy 5.4 (SPP 5.4) "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" in considering and planning for freight rail noise and urban development.

The research, guided by the FLCWA and supported by Lloyd George Acoustics (LG Acoustics), SITE planning + design (SITE) and Responsive Environments, led to the publication of the *Freight and Logistics Council Bulletin # 7 Freight Rail Noise Policy and Practice* (**Refer to Appendix 06**), prior to the Department of Planning initiating the review of SPP 5.4.

Bulletin # 7, together with subsequent work undertaken by the group to advance the research, informed the FLCWA's position as a member of the Department of Planning's Technical Working Group (TWG) for the review of SPP 5.4 and the FLCWA's comments on earlier drafts of SPP 5.4.

Outlined below is a summary of previous research into freight rail noise and the practical application of SPP 5.4. Reference to SPP 5.4 relates to the 2009 Policy and the 2014 Guidelines.

6.1.1 NOISE METRICS

SPP 5.4 requires the use of the LAeq metric (an average of the measured noise) to determine the level of noise disturbance on land adjoining transport corridors (road, passenger and freight rail) and subsequently the appropriate land use planning response. Historically land use planning responses on land affected by freight rail and road noise include construction of noise walls, notification on the titles of new lots and the requirement for new residential dwellings to meet recommended construction standards, as outlined in the SPP 5.4 Guidelines.

A study by LG Acoustics into freight rail noise at Cockburn Coast considered the LAeq and LAmax metrics in the context of the intermittent nature and character of freight rail noise. Refer to **Appendix 07 - Lloyd George Acoustics "Cost of Architectural Packages" Report**.

The study found that the use of the LAeq metric does not adequately reflect the level of noise disturbance generated by freight rail and therefore the implementation of the LAeq metric through SPP 5.4 is failing to achieve two of the policy's objectives of:

- protecting people from unreasonable levels of transport noise; and
- protecting major transport corridors and freight operations from incompatible urban encroachment.

It was concluded (by the members of the research group) that:

The use of the LAeq metric to inform land use planning decisions regarding freight rail noise is inadequate to provide a reasonable level of internal amenity for new residential dwellings and that the review of SPP 5.4 should consider the use of the LAmax metric with appropriate target and limit noise standards.



The FLCWA recommendation (via the LG Acoustics report) is for a target criterion of 75 dB LA_{max} outside, deemed to be equivalent to 60 dB LA_{max} inside. The recommended level was taken from the draft 2005 version of SPP 5.4 where a 75 dB LA_{max} criterion was proposed.

6.1.2 QUIET HOUSE DESIGN PACKAGES

Using the LA_{max} metric and noise measurements recorded at Cockburn Coast, LG Acoustics produced a set of alternative quiet house design packages to achieve the recommended indoor design sound levels (60dB LA_{max}) for new residential dwellings.

Revised quiet house design packages that address the LA_{max} metric, prepared by LG Acoustics, included specific treatments for noise mitigation in new residential dwellings, including the introduction of standards for roof materials, recommending the use of clay tiles.

The work outlined above formed the basis for the preparation of the FLCWA's Bulletin #7 - Freight Rail Noise Policy and Practice and submissions to the Western Australian Planning Commission on the review of SPP 5.4. Refer to **Appendix 08 - FLCWA Comments on the Department of Planning's Technical Working Group Draft SPP 5.4.**

The key difference between the SPP 5.4 and the LG Acoustics quiet house design packages, was the introduction of mandatory clay roof tiles for dwellings affected by freight rail noise within comparable Packages BF and CF.

6.1.3 EXTENT OF LAND ACROSS PERTH METROPOLITAN REGION AFFECTED BY THE LAMAX

The recommended use of a 75 dB LA_{max} outside noise target (as outlined in Bulletin #7) affects noise sensitive development within approximately 135m of the freight railway line. The current LA_{eq} standard outlined in SPP 5.4 Guidelines affects noise-sensitive development up to 150 metres and Draft SPP 5.4 affects noise-sensitive development up to 300 metres.

Using a 135m setback from the centreline of the freight railway reservation (under the MRS) the FLCWA determined that:

The area of land zoned Urban, Urban Deferred and City Centre under the Metropolitan Region Scheme (MRS) within 135m of a freight railway line equates to less than 1% of all land zoned Urban and Urban Deferred under the MRS in 2013 (figures taken from the WAPC's 2015 Urban Land Monitor)

In response, the Department of Planning provided advice outlining that approximately 5,000 new dwellings would be affected by the implementation of the LA_{max} metric and requested further advice be provided on the cost differential between the current SPP 5.4 construction packages and those prepared by LG Acoustics and supported by the FLCWA.



6.1.4 COMPARISON OF QUIET HOUSE DESIGN PACKAGE COSTS AND NOISE REDUCTION OUTCOMES

The FLCWA’s Bulletin 7 proposed revised guidance for freight rail noise with alternative quiet house design treatment packages for noise-sensitive development within proximity to freight rail to address the LAm_{ax} noise metric. The LG Acoustics quiet house design packages obtain improved noise reductions. As a result, the SPP Guideline packages and costs cannot be directly compared, i.e. Package A cannot be directly compared to Package AF, and Package B cannot be directly compared to Package BF etc. For the data set studied as a part of the FLCWA’s Bulletin # 7, the distance to which each package applies is compared in Table 1.

Table 1 Quiet House Design Packages and Application Distance

Distance from the Freight Railway Line	SPP Guideline Packages	LG Acoustics Packages
25 - 30m	C	CF
30 -40m	C	BF
40 -60m	B	BF
60 -75m	A	BF
75m +	A	AF

LG Acoustics, with the assistance of quantity surveyors Rawlinsons (W.A.), prepared estimated construction costs for a typical four bedroom, two bathroom project home design (sourced from Blueprint Homes) using both the SPP 5.4 quiet house design packages and the LG Acoustics quiet house design packages. Refer to **Appendix 07 Lloyd George Acoustics “Cost of Acoustic Architectural Packages” Report**.

Table 2 (below) draws a direct comparison between the applicable SPP 5.4 and the LG Acoustics quiet house design packages and the additional construction costs above the baseline construction cost attributable to the acoustic upgrade requirements, based on distance from the freight railway line.

Table 2 Cost of Quiet House Design Packages

Distance from the Freight Railway Line	Applicable SPP 5.4 Package	Additional Construction Cost for a typical house (SPP)	Applicable FLCWA/ LG Acoustics Package	Additional Construction Cost for a typical house (LG Acoustics)
20 – 25m	Site specific study	House specific	Package CF	\$23,236.00
25 – 30m	Package C	\$20,914.00	Package CF	\$23,236.00
30 – 40m	Package C	\$20,914.00	Package BF	\$14,454.00
40 – 60m	Package B	\$10,703.00	Package BF	\$14,454.00
60 – 75m	Package A	\$4,362.00	Package BF	\$14,454.00
75m +	Package A	\$4,362.00	Package AF	\$4,994.00

Based on advice from LG Acoustics, it is considered that the quiet house design packages and associated construction costs applicable to land within 25 – 40m of the freight railway line



(highlighted in blue text in Table 2 above) are the most relevant to this discussion, as noise sensitive dwellings greater than 40m away are likely to be buffered from freight rail noise impacts by the first row of dwellings immediately abutting the railway line in many circumstances. Between 30-40m, Package BF is applicable under the LG Acoustics approach and is cheaper than Package C, which would apply under the SPP 5.4 Guidelines approach.

In addition to Package BF reducing the construction costs compared to Package C, Package BF provides improved noise reduction (28 dB) compared to 25 dB from Package C, as outlined in Table 4.

It was suggested that the SPP 5.4 Guidelines quiet house design packages could be simply revised to include the LG Acoustics quiet house design packages for freight rail noise assessment only and thereby achieve the higher standard of protection sought by the FLCWA and outlined in Bulletin 7.

This would result in the construction costs detailed in Table 3. While the LG Acoustics package results in a 2.48% increase between 25-30 metres, it decreases costs by 6.90% in the critical 30-40 metres distance where the first row of noise sensitive development is likely to be located (see Table 2 above).

Table 3 Summary of Construction Cost Difference

Distance from the Freight Railway Line	Applicable SPP 5.4 Package	Construction Cost Difference LG Acoustics Package	Applicable FLCWA/ LG Acoustics Package
20 - 25m	Site specific study		Package CF
25 - 30m	Package C	+ \$2,323.00	Package CF
30 - 40m	Package C	- \$6,459.00	Package BF
40 - 60m	Package B	+ \$3,752.00	Package BF
60 - 75m	Package A	+ \$10,092.00	Package BF
75m +	Package A	+ \$632.00	Package AF

It is also important to highlight that while the quiet house design packages prepared by LG Acoustics increase the dwelling construction cost in all but the 30 - 40m distance, they achieve a greater noise reduction across all distance ranges (with the exception of 75m+, which is very similar to SPP 5.4) and achieve a greater dB noise reduction per dollar spent on construction (dB reduction/\$ spent) than the SPP quiet house design packages, within the critical 25 - 40m from the freight rail.

Table 4 Construction Cost per dB Reduction

Distance from the Freight Railway Line	Applicable SPP 5.4 Package	Total Noise Reduction (dB)	Cost per dB	Applicable FLCWA/ LG Acoustics Package	Total Noise Reduction (dB)	Cost per dB
20 - 25m	Site specific study		House specific	Package CF	32	\$726.00
25 - 30m	Package C	25	\$837.00	Package CF	32	\$726.00



30 - 40m	Package C	25	\$837.00	Package BF	28	\$516.00
40 - 60m	Package B	23	\$465.00	Package BF	28	\$516.00
60 - 75m	Package A	20	\$218.00	Package BF	28	\$516.00
75m +	Package A	20	\$218.00	Package AF	20	\$250.00

Table 4 above demonstrates that the LG Acoustics quiet house design Packages BF and CF achieve a greater total noise reduction than the SPP 5.4 quiet house design Package C. Furthermore, Table 4 illustrates that the cost per dB reduction of the FLCWA Packages BF and CF is less than the SPP 5.4 Package C.

6.1.5 RESEARCH CONCLUSIONS

The analysis indicates that moving to a LMax approach with the revised LG Acoustics treatment packages may add construction cost by 2.5% for housing in close proximity to a freight rail line (within 30 metres) but would reduce the cost by some 6.9% for the most affected housing, being housing that is within 30 to 40 metres.

The evidence suggests that the application of the LMax noise metric and LG Acoustic packages at the most effected first row of houses (30 - 40m from the freight rail) may result in lower dwelling construction costs and achieve significantly greater internal amenity for the residents.

6.1.6 ADDRESSING RAIL NOISE AT SOURCE

The rail industry is well aware that it has a role to play in addressing rail noise and contributing to the achievement of a sustainable balance between its own operational efficiency and the amenity of the community adjacent to the corridors it uses. Industry acknowledges that freight train operations do result in wheel squeal, locomotive engine pass-by noise and the use of horns at level crossings. It understands that these impacts are not addressed by land-use planning policy.

As a result, both above and below rail operators are contributing time, funds and expertise to a current FLCWA project aimed at identifying and, where practicable, addressing noise at source. The project has already established a formalised community complaints system relating to rail noise, detailed the “hot-spots” on the metropolitan freight rail network and commenced liaison with community members experiencing particular noise impacts. The project is presently finalising sophisticated noise monitoring at key locations, the results of which will indicate not only noise levels, but also the specific sources of the noise.

From these results, it will be possible to consider operational solutions such as enhanced track maintenance, re-profiling of misaligned wagon wheels, modification of selected wagon bogie types, track lubrication, locomotive speed reduction and minimising the use of train horns within safety limits. Better understanding of the factors giving rise to excessive rail noise impacts will also allow the commencement of a comprehensive communications strategy which aims at better community understanding of the issue.



There are, however, several qualifications that should be noted in the discussion about addressing rail noise at source.

Firstly, freight rail services in this State are private, commercially-driven operations. Decisions are necessarily made on the basis of stringent business case analysis. Rail volumes on the metropolitan freight rail network are relatively small by national standards and margins extremely tight. The need for a Government subsidy to underpin the freight rail service to Fremantle Port is indicative of these circumstances. In this commercial climate, the rail industry will not make unconstrained investment to address rail noise at source. Unrealistic expectations in this respect will merely put the operation in jeopardy and threaten the freight being shifted to be moved by road with considerably higher community impacts in terms of truck volumes.

Secondly, it has become apparent from analysis of community complaints about freight rail operations that a high degree of concern relates to level crossing noise. Boom-gate bells, pedestrian buzzers and train horns are all common subjects of complaint. This is not an issue within the influence of the rail industry. It is a rail safety issue and therefore defined by Government regulations. Industry has informed views on safety regulations including a belief that some are in need of updating to benefit community amenity without compromising safety. Industry is prepared to be part of that discussion, but it does need to be understood that this key area of community concern is a Government responsibility in the final analysis.

6.2 CITY OF COCKBURN LOCAL PLANNING SCHEME AMENDMENT NO. 118

During 2016 and 2017, the City of Cockburn, in partnership with the Public Transport Authority and Lloyd George Acoustics (LG Acoustics), undertook detailed investigations into road and rail noise and vibration impacts on sensitive land uses within the suburbs of South Lake, Bibra Lake and North Lake.

The investigations were initiated in response to the outcomes of the *2016 City of Cockburn Lakes Revitalisation Strategy*, which aimed to:

- meet the City's targets for infill development in accordance with State planning policy and strategy; and
- enhance the quality of the existing neighbourhoods of North Lake, Bibra Lake and South Lake.

Furthermore, the Strategy recognised that in addition to increasing the residential densities across large areas of land, consideration needed to be given to the impact of noise and/or vibration from major roads and the freight rail line on sensitive land uses through the preparation of acoustic guidelines for the Lakes suburbs.

Reports prepared by LG Acoustics to support the *Lakes Revitalisation Strategy*, Local Planning Scheme Amendment No. 118 and Local Planning Policy No. 1.17 outlined:

- the results of noise monitoring and modelling based on the LAeq and LMax metrics, including the impact on land within proximity to road and freight rail corridors;



- the results of vibration monitoring and modelling, including the impact on land within proximity to road and freight rail corridors;
- the noise mitigation achieved by the first row of development at varying residential densities and built form outcomes. The reports demonstrate that in a brownfields site the typical built form of development at an R30 residential density - minimum lot/dwelling size of 260m² and an average lot/dwelling size of 300m² - provides the most effective noise mitigation to subsequent rows of development;
- the measures required to be undertaken by developers of sensitive land use developments to achieve compliance with the noise target and/or limit required by SPP 5.4; and
- how the results of the monitoring and modelling could be implemented through the local planning framework.

Copies of the LG Acoustics acoustic reports prepared to support the Lakes Revitalisation Strategy and Local Planning Scheme Amendment No. 118, can be provided on request.



Figure 5, below, illustrates the likely built form outcome across varying residential densities within a brownfields redevelopment context, demonstrating that the typical built form resulting from a R30 density, comprising development built to a nil side boundary setback, delivers the greatest benefit for subsequent rows of development through the contiguous built form acting as a secondary noise wall to the noise source.

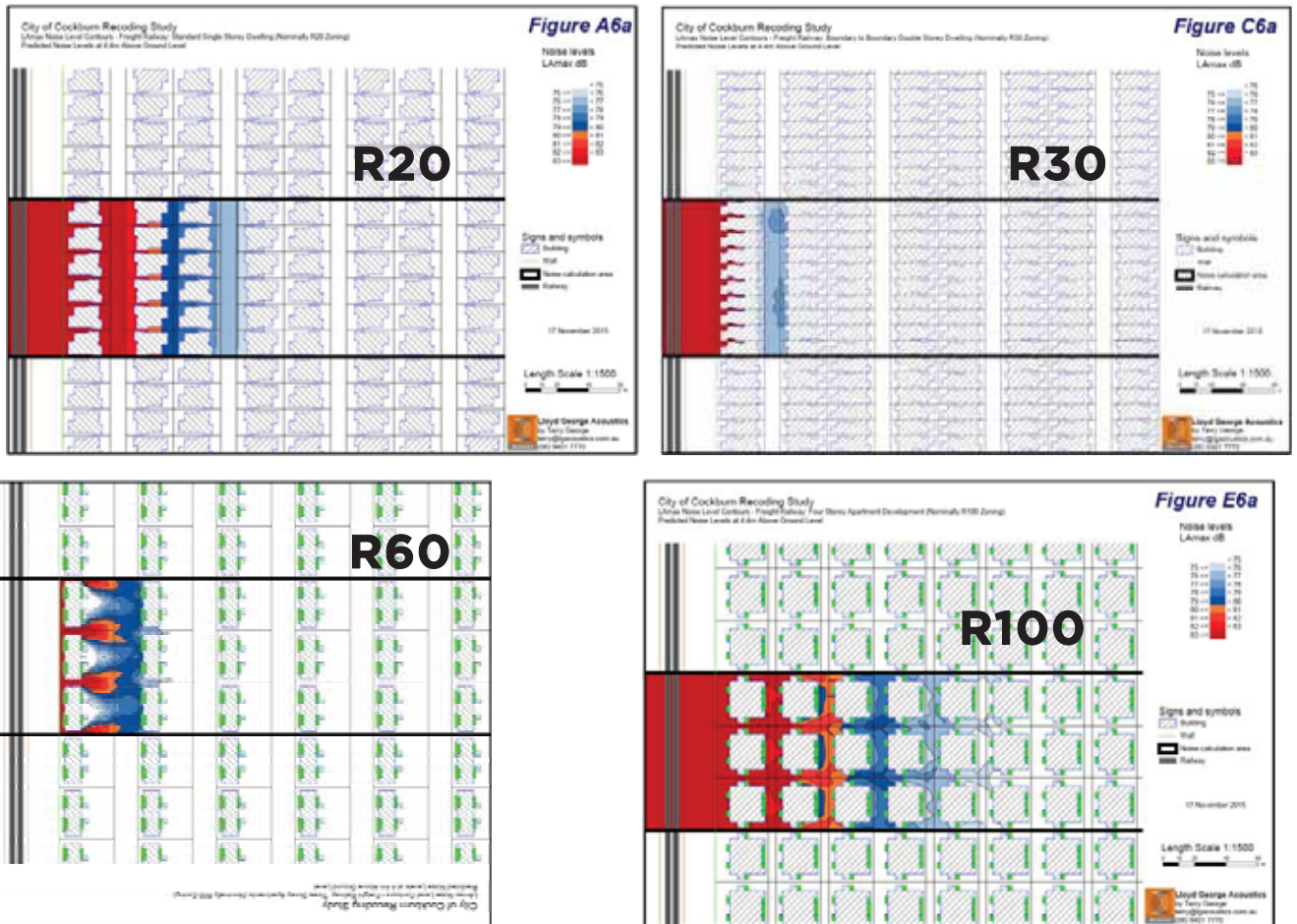


FIGURE 5 R20, R30, R60 + R100 residential density development – typical built form and noise mitigation outcomes (Source: *The Lakes Revitalisation Strategy Acoustic Analysis*: 8 July 2016, Lloyd George Acoustics)



Figure 6, below, illustrates the results of the freight rail noise and vibration impacts and the application of notifications on title, quiet house (ground level) and vibration packages on a lot by lot basis. The figure illustrates that noise mitigation measures are generally not required to the full extent of 300m from the freight rail lines as required by Draft SPP 5.4.

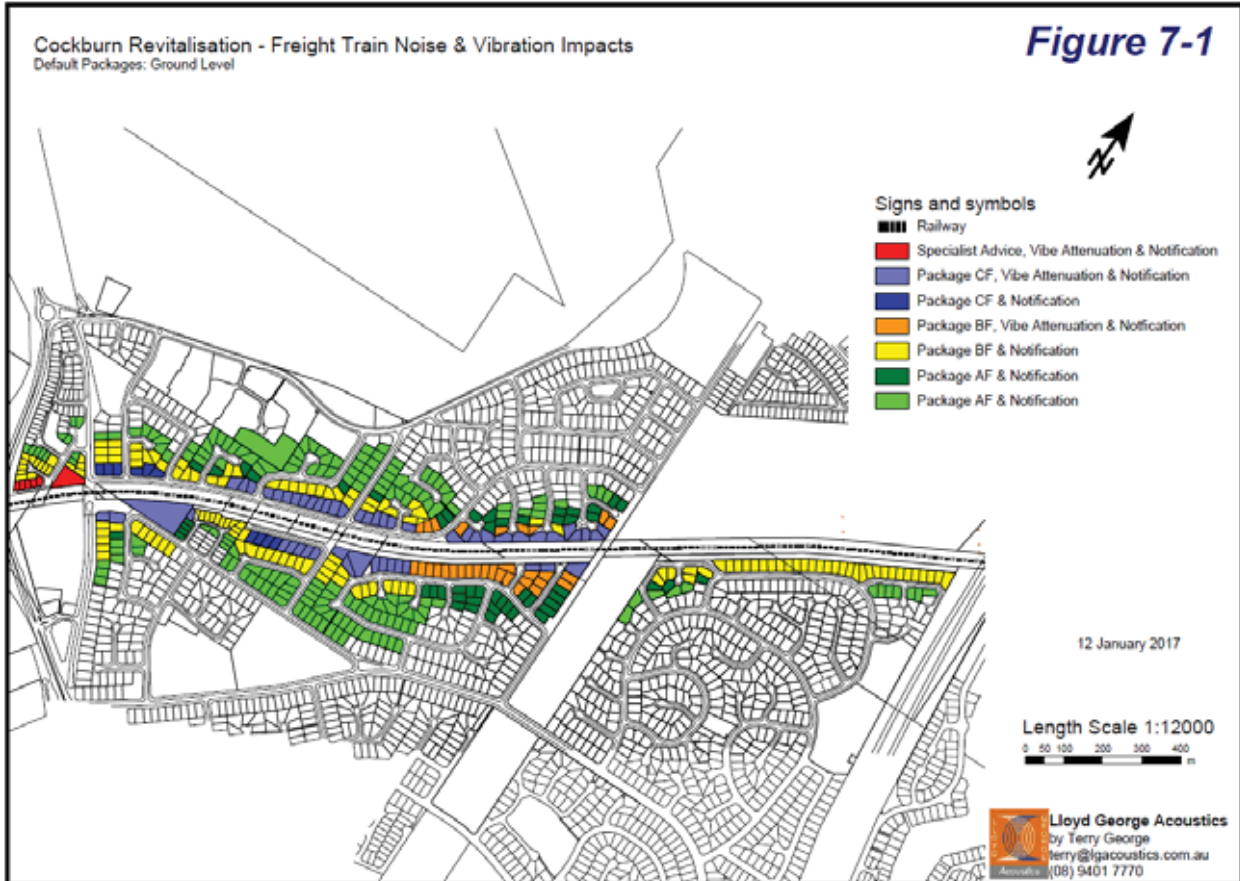


FIGURE 6 Notification on title, noise and vibration mitigation required on a lot by lot basis (Source: *The Lakes Revitalisation Strategy Acoustic Analysis: 8 July 2016*, Lloyd George Acoustics)

The outcome of the investigations informed the preparation of the City of Cockburn’s Local Planning Scheme Amendment No. 118 and Local Planning Policy No. 1.17, which proposes:

- to amend the local planning scheme maps to declare a Special Control Area – Freight Rail Noise Area (SCA FRNA), 300m either side of the freight rail line;
- to amend the local planning scheme maps to increase residential densities within the SCA FRNA from R20 (minimum lot/dwelling size of 450m² and an average lot/dwelling size of 350m²) to predominantly;
 - R30 (minimum lot/dwelling size of 260m² and an average lot/dwelling size of 300m²); and
 - R40 (minimum lot/dwelling size of 180m² and an average lot/dwelling size of 220m²);

with limited areas of



- R60 (minimum lot/dwelling size of 120m² and an average lot/dwelling size of 150m²);
and
- R80 (minimum lot/dwelling size of 100m² and an average lot/dwelling size of 120m²);

in areas of higher urban amenity, such as those close to public open space, public transport networks, local shops and community facilities, and for larger development sites.

- To amend the local planning scheme text to include provisions associated with the SCA FRNA

6.2.1 FLCWA SUPPORT FOR AMENDMENT NO. 118 AND LPP 1.17

The FLCWA is strongly supportive of the City of Cockburn's approach and considers that it will deliver a more balanced outcome and greater protection for both urban amenity and freight rail transport corridor protection, in the area under discussion.

The proposed increase in residential densities provides a commercial incentive for landowners, current or future, to undertake subdivision and/or redevelopment, which may offset the additional construction costs associated with incorporating quiet house design treatments for noise and vibration mitigation in dwelling design.

Redevelopment of established residential areas will result in new noise-sensitive buildings being constructed to mitigate the impacts of the maximum freight rail noise levels and vibration impacts, in turn reducing the likelihood of community dissatisfaction and pressure on Government to place restrictions on the operation of the freight rail line.

The Special Control Area triggers the requirement to obtain planning approval for single and ancillary dwellings, which would otherwise be generally exempt from the need to obtain planning approval, and in turn the need to comply with the requirements of SPP 5.4. For this reason, the FLCWA strongly supports and encourages the mandatory implementation of Special Control Areas within local planning schemes in Local Government areas with freight rail lines and strategic freight roads, through Deemed Provisions within the *Planning and Development (Local Planning Scheme) Regulations 2015*

Furthermore, the site-specific noise and vibration monitoring and modelling demonstrate that mitigation measures are not always required to be implemented up to 300m from the freight rail line, as required under Draft SPP 5.4. The 300m blanket approach to the implementation of quiet house design principles may result in additional costs to landowners and developers in areas where it may not be required.

Stakeholder consultation undertaken as a part of the preparation of this submission indicates that several Local Governments support the approach taken by the City of Cockburn and are considering implementing a similar approach within their respective local planning schemes.



Accordingly, the FLCWA does not support statements within the Policy and the Guidelines that limit the ability of Local Government to implement alternative and/or higher standards to mitigate noise and vibration impacts.

It is a widely accepted practice, and provided for within the planning framework, that Local Government's may vary and/or require higher standards than what is required by a number of WAPC policies, such as the Residential Design Codes.



7. REVIEW AND RECOMMENDATIONS

Outlined below are the key findings, areas of key concern and recommendations to improve and strengthen the policy and its subsequent implementation.

7.1 RECOMMENDATIONS

A detailed Policy and Guidelines Review was undertaken by LG Acoustics and SITE and is enclosed at **Appendix 01 - Policy and Guidelines Review**. Please refer to Appendix 07 for detailed comments, particularly in relation to concerns and suggested improvements to the terminology, phrasing and language used throughout the policy. LG Acoustics' Review of Proposed (September 2017) SPP 5.4 & Guidelines for FLCWA is enclosed at **Appendix 02**.

The recommendations below relate to the content of the Policy and Guidelines, the implementation of the Policy and Guidelines and the training requirements for planning professionals to ensure consistent and effective implementation of the Policy and Guidelines.

7.1.1 STRATEGIC FREIGHT NETWORK

With regard to the road network, the FLCWA recommends that the strategic freight road network be mapped with associated "design max" vehicle volume capacities agreed to by relevant Government departments and included within the Implementation Guidelines and online mapping. The current SPP 5.4 includes mapping of the freight road network but this is not clear within the Draft SPP 5.4 which applies a blanket approach to primary and other regional roads.

This recommended approach is consistent with the methodology used to inform SPP 5.1 Land Use Planning in the Vicinity of Perth Airport, which maps the noise contours associated with the operation of Perth Airport based on a design capacity of 350,000 aircraft movements per year.

Taking this approach for freight roads would provide clear guidance and certainty to the land development industry on the long-term role and function of strategic freight roads and greater consistency in the application of the policy, as occurs for State Planning Policy 5.1.

Furthermore, it would eliminate the need for regulatory land use planning organisations and the land development industry to gain access to, and agree on, forecast road traffic volumes. It would also streamline the process, enable easier and more consistent implementation and provide greater certainty for land owners and developers.

This point is further highlighted by the fact that Main Roads WA (MRWA) forecast traffic volumes to 2031 and not a 20-year horizon as required by Draft SPP 5.4, and that the current traffic forecast model has not been updated to reflect current Government decisions to proceed with new freight handling facilities within the Outer Harbour.

At present, Draft SPP 5.4 applies a blanket approach to the application of Policy requirements and standards regardless of the role and function of the road. For example, Canning Highway and Stirling Highway which function as high amenity urban activity corridors and carry local and district



traffic at lower speeds are subject to the same policy provisions as the Kwinana Freeway, Tonkin Highway and Anketell Road, which currently, or will in the future, function as key transport corridors, carrying high volumes of regional and freight traffic travelling at high speeds.

There is a clear need for a different policy approach to the two road types outlined above where stronger land use control principles apply to the strategic freight road and rail network, with built form controls applicable to lower order roads.

The FLCWA also supports the introduction of online mapping to provide greater clarity on the roads and rail lines that trigger application of the policy. Further work is required to map existing and future freight rail lines, similar to the future road alignments that are mapped, such as the Bunbury Outer Ring Road and the Tonkin Highway extension.

RECOMMENDATIONS

1. Map and publish the strategic freight road network within the Implementation Guidelines and the online mapping, with associated “design max” vehicle volume capacities, agreed to by relevant Government departments.
2. Adopt the LA_{max} noise metric for freight rail noise to support the successful and consistent implementation of the policy, by removing the need to forecast rail movements to a 20-year planning horizon.
3. Adopt the LA_{max} noise metric for freight rail noise and “design max” vehicle volume capacities for strategic freight roads tied to stronger wording around land use controls, as opposed to built form controls (i.e. avoid noise-sensitive land use) and the requirement to provide a site specific acoustic assessment (not screening assessment) for all proposals for noise-sensitive land use, subdivision and/or development.
4. The policy should be amended to reflect different types of road functions, as follows:
 - High speed, low amenity regional and freight roads (e.g. Kwinana Freeway, Tonkin Highway, Anketell Road) – proposals for noise-sensitive land use within proximity to these roads should apply the precautionary principle of avoidance of noise-sensitive land uses. i.e. it is a land use control mechanism first where built form control is implemented only in instances where noise-sensitive land use is unavoidable;
 - Low speed, high amenity local and district urban activity corridors (e.g. Canning and Stirling Highways and Beaufort Street) – proposals for noise-sensitive land use within proximity to these roads should be guided by built form control mechanisms;
5. The road network terminology to be standardised across all Government agencies to reduce confusion and uncertainty.
6. Remove strategic freight roads and freight rail from Table 2: Noise Forecast (Implementation Guidelines).
7. Mapping to be updated to include:
 - the realignment of the freight rail line out of Midland, through Hazelmere;
 - the realignment of the freight rail line out of Mundijong to the western frontage of the Tonkin Highway extension;



- the Dixon Road freight rail corridor;
 - the Thornlie to Cockburn MetroNet passenger rail line;
 - the extension of the Midland passenger rail line to Bellevue (MetroNet); and
 - other MetroNet passenger rail lines as alignments are determined.
8. Following the identification and mapping of strategic freight roads, design max volume capacities and agreement to the principal of avoidance of noise-sensitive land uses, these roads should be mapped on PlanWA in a different colour to indicate their role and function as strategic freight roads.

7.1.2 LAEQ VS LAMAX (DAY AND NIGHT) FOR FREIGHT RAIL

The FLCWA maintains its long-held position that the LAmax noise metric should be used to guide decision making on proposals relating to freight rail noise. In its related consultations, FLCWA did not find any overt disagreement with this position. Indeed, it understands that the Department's own acoustic consultants assisting with the preparation of the revised policy recommended the inclusion of LAmax.

From the Cockburn study, the existing LAeq(Night) at one particular resident measured 55.8 dB and this would be increased to 57.1 dB LAeq(Night) placing the residence within Package B and 7 dB above the target. For the assessment of LAmax, the Cockburn study used the average + 1 Standard Deviation, which was approximately equal to the 88th percentile of the 140 trains measured, being 87 dB LAmax, being 12 dB above the 75 dB LAmax noise target suggested (being Package BF). On this basis, this shows that the LAmax is more critical and the LAeq metric may underestimate the level of actual noise disturbance. Noise monitoring by LG Acoustics at Cockburn Coast recorded noise levels as high as 105dB.

The use of the LAmax noise metric eliminates the requirement to obtain data on current and forecast traffic volumes, on the basis that land use, subdivision and development responds to the maximum noise levels recorded for a site, regardless of the current and forecast number of train movements per hour or day. Given the unavoidable imperfection of freight forecasts, this is a fundamental consideration.

The MetroNet Forresterfield to Cockburn passenger line and the two (2) associated stations at Ranford Road and Nicholson Road are likely to be followed by more intensive land use and development, including increased residential densities, around new train stations.

Any increase in residential densities may provide a commercial incentive for landowners, current or future, to undertake subdivision and/or redevelopment, which may offset the additional construction costs associated with incorporating quiet house design treatments to address the LAmax noise levels in dwelling design.

Redevelopment of established residential areas using appropriate construction standards will result in new noise-sensitive buildings being built that mitigate the impacts of the maximum freight and



passenger rail noise levels, in turn reducing the likelihood of community dissatisfaction and pressure on Government to place restrictions on the operation of either the future passenger or existing freight rail lines and/or compensate affected landowners.

RECOMMENDATIONS

1. Adopt the LAmax noise metric for freight rail noise to support the successful and consistent implementation of the policy.
2. Encourage State and Local Governments with sections of the rail corridor between Thornlie and Cockburn, that will form part of MetroNet Stage 1 works, to fund noise and vibration monitoring, modelling and mitigation studies to inform an amendment to the relevant local planning scheme to introduce a special control area and associated provisions (as per the City of Cockburn approach), complemented by increased residential densities. This approach provides an incentive for the redevelopment of housing stock and the implementation of higher construction standards to address rail noise and vibration.
3. Remove strategic freight roads and freight rail from Table 2: Noise Forecast (Implementation Guidelines).

7.1.3 ROAD AND RAIL TRAFFIC FORECAST DATA

As discussed throughout this submission, one of the biggest challenges limiting the successful and consistent implementation of the policy is the reliance on obtaining accurate and up to date traffic forecast data to inform noise management plans.

With regard to freight rail, it is understood that Table 2: Noise Forecast (Implementation Guidelines) (refer to the figure below) is based on an average of two (2) train movements per hour. This is considered conservative for large parts of the metropolitan and regional freight rail network which currently carry less than two (2) trains per hour on average.

However, this methodology fails to acknowledge that sections of the freight rail network currently carry more than 2 trains per hour (on average) and will continue to experience growth in freight rail movements in line with the forecast growth in the freight task, both nationally and across WA. Additionally, seasonal rail freight movements are not captured within the Policy and Guidelines. These movements must be recognised as during periods throughout the year they will result in significant increases in rail movements.



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)																				
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300
Primary roads* * State roads (Freeways, highways, primary distributors) * Primary regional roads (Red roads under region schemes) * Metropolitan freight roads (in the Perth and Peel regions - typically 7.5% heavy vehicles) Map 1, 2, 3	up to 25,000	71	66	64	62	61	59	59	58	57	56	56	55	55	54	53	52	51	51	50	50	50
	~ 20,000	71	67	64	63	61	60	59	58	57	57	57	56	56	54	54	53	52	51	51	50	50
	~ 15,000	72	68	65	63	62	61	60	59	58	58	58	57	56	56	55	54	53	52	51	51	50
	~ 10,000	72	68	66	64	62	61	60	59	59	58	58	57	57	56	55	54	53	52	51	51	50
	~ 45,000	73	68	66	64	63	62	61	60	59	59	59	58	57	57	56	55	54	53	52	52	51
	~ 50,000	73	69	66	65	63	62	61	60	59	59	59	58	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	61	60	59	58	57	56	55	54	54
	~ 80,000	75	71	69	67	65	64	63	62	62	61	61	61	61	60	60	59	58	57	56	55	54
~ 90,000	76	72	69	67	66	65	64	63	62	62	62	62	61	60	60	59	58	57	56	55	54	
~ 100,000	77	72	70	68	67	66	65	64	63	62	62	62	61	61	60	59	58	57	56	55	54	
~ 120,000	77	73	70	69	67	66	65	64	64	63	63	62	62	61	60	59	58	57	56	55	54	
more than 140,000	78	74	71	69	68	67	66	65	64	64	64	64	62	62	61	60	59	58	57	56	55	
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 10,000	72	69	67	65	64	63	62	61	61	60	60	59	59	58	57	56	55	55	54	54	
	more than 10,000	74	70	68	67	65	64	63	63	62	61	61	60	60	59	59	58	57	57	56	55	55
	up to 10,000	74	70	68	67	65	64	63	62	62	61	61	60	60	59	59	58	57	57	56	55	55
	more than 10,000	76	72	70	68	67	66	65	64	63	63	62	62	61	61	60	59	58	58	57	57	56
Secondary roads* * Other regional roads (Other roads under region schemes) * District Distributor A (Typically 5% heavy vehicles) Map 3	up to 5,000	60	57	55	54	53	52	51	51	50	50	49	49	48	48	47	46	46	45	45	45	
	~ 7,500	63	60	58	57	56	55	54	54	53	53	52	52	51	51	50	50	49	49	48	48	
	~ 10,000	65	62	60	59	58	57	56	55	55	54	54	53	53	52	51	51	50	50	49	49	
	~ 15,000	66	63	61	60	59	58	57	56	55	55	54	54	53	53	52	51	51	50	49	49	
	~ 20,000	67	64	62	61	60	59	58	57	57	56	56	55	55	54	54	53	52	51	51	50	
	~ 25,000	68	65	63	62	61	60	59	58	58	57	57	56	56	55	54	54	53	52	51	51	50
~ 30,000	68	65	64	62	61	60	60	59	59	58	58	57	57	56	56	55	54	54	53	52	51	
more than 35,000	69	66	64	63	62	61	60	60	59	59	58	58	57	57	56	56	55	54	54	53	52	
Passenger railways Map 1	Joondalup-Butler	260	68	64	61	60	59	58	57	56	56	55	55	54	54	53	52	51	51	50	49	49
	Midland	170	66	62	59	58	57	56	55	54	54	53	53	52	52	51	51	50	49	48	48	47
Freight railways Map 1, 2, 3 (LAeq,Night)	Freemantle	560	66	61	59	58	56	56	55	54	53	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	52	51	51	50	50
	Mandurah	250	68	64	61	60	59	58	57	56	56	55	55	54	54	53	52	51	51	50	50	49
	Other lines	300	68	64	62	60	59	58	57	57	56	56	55	55	54	54	53	52	51	51	50	50

Forecast Noise Level (LAeq,Day (dB))	Exposure Category	Policy requirements for noise-sensitive land use and/or development
50 or less		No further measures
50 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 Neighbourhood Plan
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 Neighbourhood Plan
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 Neighbourhood Plan
67 to 70	D	Noise sensitive land use and/or development is not recommended ¹
71+	E	Noise sensitive land use and/or development is strongly discouraged ²

- For Exposure Categories B and C there is a quiet Neighbourhood Plan option.
 - Noise sensitive land use and/or development is unacceptable, 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://mtrapps.mainroads.wa.gov.au/TrafficMap>
- Assumptions:
- The NMT 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 local weather effects. All values include a +2.5 dB fade margin.
 - 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%, loose 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 noise with adjustments included for future growth over 20 years in line with historical averages.

The adoption of the LMax noise metric eliminates the inconsistency that will result from the implementation of Table 2 (Implementation Guidelines) and the need to obtain accurate current and forecast traffic data.

The implementation of the LMax noise metric eliminates the need to forecast freight rail movements (addressing the challenges of traffic forecasting outlined in this submission) on various sections of the track on the basis that it provides for mitigation based on the maximum noise level, regardless of the number of freight rail movements.

The LMax noise metric and “design max” volume capacities as outlined in 7.1.1 above, should be tied to stronger wording around the “avoidance” principle and guidance on land use control (i.e. no noise-sensitive land use), as opposed to built form control.

RECOMMENDATIONS

- Map and publish within the Implementation Guidelines and the online mapping, the strategic freight road network with associated “design max” vehicle volume capacities, agreed to by relevant Government departments.
- Remove strategic freight roads and freight rail from Table 2: Noise Forecast (Implementation Guidelines).

7.1.4 GROUND-BORNE VIBRATION

Draft SPP 5.4 maintains the previous policy position of not providing guidance on the monitoring, modelling and mitigation of ground-borne vibration impacts from road and rail. It understands that



the Department's own acoustic consultants assisting with the preparation of the revised policy recommended the inclusion of ground-borne vibration measures.

Anecdotal evidence suggests that a number of complaints received in relation to freight rail impacts have a component of concern in regard to ground-borne vibration. The FLCWA strongly encourages further investigation into this aspect and the formulation of monitoring, modelling and mitigation guidance to be incorporated into the Draft SPP 5.4 and Implementation Guidelines.

The City of Cockburn, in partnership with the PTA and LG Acoustics, has undertaken research into ground-borne vibration and proposes to address it through Local Planning Scheme Amendment No. 118 and Local Planning Policy 1.17. It is understood that the City of Cockburn is working with a project home builder to better understand the mitigation options and associated additional costs for house construction.

As outlined under Section 7.1.1, the application of the City of Cockburn approach to land within 300m either side of the MetroNet Forrestfield to Cockburn passenger line and stations may provide a commercial incentive for landowners, current or future, to undertake subdivision and/or redevelopment, which may offset the additional construction costs associated with incorporating quiet house design treatments to address ground-borne vibration in dwelling design.

Redevelopment of established residential areas will result in new buildings being constructed to mitigate the impacts of ground-borne vibration, in turn reducing the likelihood of community dissatisfaction and pressure on Government to place restrictions on the operation of either the future passenger or existing freight rail lines and/or compensate affected landowners.

The University of Western Australia has recently engaged an academic with international expertise in ground-borne vibration monitoring, modelling and mitigation from the United Kingdom and Europe. Dr Kirsty Kuo is actively looking for projects to test her modelling that informs the development of new transport activities and the impact on adjacent buildings.

RECOMMENDATIONS

1. Further investigation into ground-borne vibration and the inclusion of guidance within SPP 5.4 and the Implementation Guidelines.
2. Encourage State and Local Governments with sections of the rail corridor between Thornlie and Cockburn, that will form part of MetroNet Stage 1 works, to fund noise and vibration monitoring, modelling and mitigation studies to inform an amendment to the relevant local planning scheme to introduce a special control area and associated provisions (as per the City of Cockburn approach), complemented by increased residential densities. This approach provides an incentive for the redevelopment of housing stock and the implementation of higher construction standards to address rail noise and vibration.
3. Consult with the City of Cockburn on further research into the mitigation measures and associated constructions costs to address ground-borne vibration.



4. Consult with UWA ground-borne vibration expert Dr Kirsty Kuo on the methodology that would underpin a meaningful reference to ground-borne vibration mitigation in the policy.

7.1.5 CONSTRUCTION STANDARDS

In relation to concerns about impacts on housing affordability, research by the FLCWA demonstrates that within 25 – 40m from the freight rail line, which is considered the most important area of influence, on the basis that the first row of development provides a buffer to subsequent rows of development, the LG Acoustics quiet house design packages add 2.48% to the cost of a standard project home between 25 – 30m, and reduce construction costs by 6.90% between 30 – 40m from the freight rail line when compared to the packages outlined in SPP 5.4 (2009).

It should also be noted that the additional construction costs applicable to multiple dwelling development (apartments) are likely to be marginal on the basis that:

- Each apartment generally only has one or two external façades, as opposed to four for a single or grouped dwelling;
- Apartments above, below and to the side assist in mitigating noise intrusion;
- Larger apartment buildings are generally constructed with concrete rooves, which removes the requirement for the installation of clay tiles (for land affected by freight rail noise); and
- A proportion of the additional construction costs are averaged across a number of dwellings, resulting in lower per dwelling costs.

These conclusions suggest that the objective of affordable housing will not be compromised by the adoption of the recommended construction standards.

In brownfield areas, up-coding residential densities is encouraged to facilitate redevelopment and the construction of new housing stock built to mitigate noise and vibration. Based on the City of Cockburn research prepared to support Amendment No. 118 and the policy approach to SPP 5.1 Land Use Planning in the Vicinity of Perth Airport, residential densities directly abutting transport corridors should be limited to R30 and R40 to limit the number of people exposed to the health impacts of road and rail noise and to achieve a contiguous built form that acts as a secondary noise wall to subsequent rows of noise-sensitive development.

Further consideration should be given to the requirement to mitigate to noise impacts above the first floor. The outcome of this provision is likely to result in large noise walls along transport corridors to the detriment of:

- visual, pedestrian and cyclist amenity at the street level;
- pedestrian and cyclist permeability and connectivity through urban areas;
- personal safety and security;
- the amenity of adjoining private space associated with solar access and overshadowing;

all of which conflict with other Government policies and priorities for the creation of liveable and sustainable cities and regions.



RECOMMENDATIONS

1. Support for the inclusion of roofing materials within the recommended quiet house design packages, noting that the use of clay tiles to mitigate freight rail noise should be mandatory within SPP 5.4 Packages B and C on the basis that zincalume sheeting is not suitable to mitigate the noise impacts from freight rail.
2. Adopt the LG Acoustics quiet house design packages to mitigate freight rail noise.

7.1.6 EARLY CONSIDERATION

The FLCWA supports the introduction of clearer and stronger wording to require road and rail noise impacts to be assessed at the earliest stages of the planning process i.e. region and local planning scheme amendments, and not be deferred to the development stage when there are limited options available to address noise and vibration impacts.

RECOMMENDATIONS

1. Introduce clear and strong wording requiring the freight road and rail noise and vibration impacts to be monitored and modelled at every stage of the planning process, to ensure that the land use avoidance principle is implemented at the earliest stages of land use assessment and decision making.
2. Require and provide extensive and ongoing training following the release of SPP 5.4, especially for local government, to highlight policy changes and to stress the importance of the consideration of road and rail noise impacts during the early stages of the land use planning process.

7.1.7 TERMINOLOGY, PHRASING AND LANGUAGE

The FLCWA and its members are concerned about comments in Draft SPP 5.4 about freight rail that mention on-track mitigation and short-term noise events being more effectively controlled at source. It is considered that these comments may result in unrealistic expectations within the community as discussed in Section 6.1.6. The freight industry are aware of their obligations and are working with the FLCWA to investigate options for reducing noise at source, as outlined in Section 6.1.6.

There are a number of terms and phrases throughout the policy and the guidelines that require greater clarity.

Language such as “strongly discouraged” and “not recommended” is open to interpretation that will lead to the inconsistent application of the policy. It also reduces certainty for infrastructure developers, managers and operators which creates investment risk.

Clarification should also be provided within SPP 5.4 on what constitutes “unavoidable” development.



Section 4.1.3 Railways of Draft SPP 5.4 outlines what constitutes an upgrade to a railway, and includes works that are considered to reduce the noise levels generated by rail operations, including straightening of curves. Further consideration should be given to the wording and/or definitions.

RECOMMENDATIONS

1. Amend the policy to expand the list of definitions to include unavoidable, switches / turnouts, signalling systems, spurs or passing loops, the modification to the track support structure, crossovers, refuges, relief lines, straightening of curves or re-sleepering.
2. Amend the policy to provide stronger and clearer intent to meaning of the words “discouraged” and “not recommended”, in Table 2 Noise Forecast (Guidelines).
3. Remove reference to railway upgrade works that will result in a decrease in rail noise levels, such as straightening of curves.
4. Delete Questions 9 and 11 and the answers in the Frequently Asked Questions.

7.1.8 SPECIAL CONTROL AREAS FOR SINGLE + ANCILLARY DWELLINGS

As discussed throughout this submission, single and ancillary dwellings are generally exempt from the requirement to obtain planning approval and therefore are not required to comply with the requirements of SPP 5.4.

The 2016 Australian Government Census results revealed that single dwellings comprise 76.9% of all dwellings across Greater Perth (Greater Capital City Statistical Area) (Source: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/5GPER?opendocument). This represents an enormous gap in the successful and consistent implementation of SPP 5.4.

The implementation of a Special Control Area through the local planning scheme, such as the one proposed by the City of Cockburn, triggers the requirement to obtain planning approval for single and ancillary dwellings, and in turn the need to comply with the requirements of the policy and any other specific provisions sought by the Local Government.

The FLCWA strongly supports and encourages the mandatory implementation of Special Control Areas within local planning schemes in Local Government areas with freight rail lines and strategic freight roads.

RECOMMENDATION

1. Introduce deemed provisions into the *Planning and Development (Local Planning Scheme) Regulations* for a Special Control Area and associated provisions for freight road and rail noise to trigger planning approval requirements for single and ancillary dwellings (including alterations or additions to existing dwellings that involve more than 2 habitable rooms and result in an increase exceeding 25% of habitable floor space).



7.1.9 TRAINING

Given the complexity and technical nature of the matter, there is a need for extensive and annual training sessions following the release of the policy for regulatory decision makers and the land development industry to highlight the key policy changes and explain the practical implementation of the policy.

The FLCWA has offered its support to work with the planning and development industries to improve their understanding of the freight and logistics sector in order to ensure that mutually beneficial outcomes are achieved for both the freight industry and communities.

RECOMMENDATIONS

1. Require extensive and ongoing training for regulatory decision-makers following the release of the policy that highlights the key policy changes and provides guidance on the practical implementation of the policy.
2. Prepare and release a “procedures manual” to guide regulatory decision makers on the processing, assessment and determination of land use planning proposals, including guidance on appropriate sources of independent technical advice.

7.1.10 ACOUSTIC ADVICE

The case studies cited earlier in this submission clearly illustrate the uncertainty and inconsistency in implementing the policy. Greater support should be given to regulatory land use planning organisations in the assessment and interrogation of acoustic assessments and noise management plans through either the Department of Water and Environmental Regulation or a panel of accredited acoustic consultants.

RECOMMENDATION

1. Provide greater support to regulatory land use planning organisations for the assessment and interrogation of acoustic assessments and noise management plans through either the Department of Water and Environmental Regulation or a panel of accredited acoustic consultants.



8. CONCLUSION

State Planning Policy 5.4 Road and Rail Noise and the Implementation Guidelines (SPP 5.4), together with the recently released Draft State Planning Policy 4.1 Industrial Interface, are the State's key, and only, land use planning policies that guide regulatory authorities in making decisions on proposals for land use, subdivision and development that may impact on the productivity and efficiency of the freight and logistics industry by way of seeking limitations on the operation of strategic freight transport corridors and key supply chain facilities such as ports.

In that context, the FLCWA appreciates the opportunity to engage in the process to inform and influence the wording of the Draft SPP 5.4 and the Implementation Guidelines to deliver better outcomes for industry, in terms of transport corridor protection for supply chain productivity and efficiency, the economy, and better outcomes for the community, in terms of urban amenity and liveable neighbourhoods.

The practical implementation experience and research undertaken by FLCWA, in partnership with specialist consultants, and detailed in this submission provides a compelling evidence base in support of the recommended changes to the Draft Policy.

The FLCWA is confident that the recommendations outlined in Section 7 will assist in providing:

- More consistent implementation of the policy;
- Greater capacity and understanding within regulatory land use planning organisations and across the land development industry;
- A greater level of protection for strategic freight transport corridors from urban encroachment, which threaten unconstrained 24/7 operations;
- A greater level of residential amenity for communities within 300m of freight rail lines and strategic freight roads; and
- Greater certainty for the land development and freight and logistics industries, which in turn translates in to investment and job creation for the economic development of the State.

To achieve better protection for strategic freight corridors for the ongoing benefit of both industry and neighbouring urban communities, the Policy should:

1. Be supported by **agreed mapping of the principal strategic freight network** (road and rail, metro and regional) tied to stronger land use control (avoidance principle) requirements, so that the network can be better protected.
2. Include **LAmox noise measurement and modelling for freight rail** as the current LAeq noise metric underestimates the true level of noise impact and disturbance to residential amenity and human health, leading to inappropriate noise-sensitive land use and development adjacent to freight rail lines.
3. Provide for **agreed "design max" capacities for freight roads** and LAmox noise metrics for freight rail, because of the difficulty in obtaining reliable long-term traffic forecasts.



4. Offer guidance on monitoring, modelling and mitigating ground-borne vibration, drawing on successful overseas experience, because vibration generates adverse impacts for residential amenity and human health.
5. Include stronger requirements on appropriate construction standards, consistent with affordable housing objectives, for noise/vibration-sensitive developments in the vicinity of freight corridors because the current and draft standards do not offer adequate protection.
6. Consider road and rail impacts during the earliest stages of the planning process (local scheme amendments and structure plans) and not be deferred to the subdivision and/or development stages where there are few, if any, options to properly address the impacts and plan for an appropriate interface.
7. Use language that provides greater certainty in outcomes and transparency and clarity in process as the present language is confusing, indecisive and open to interpretation.
8. Be supported by Deemed Provisions for Special Control Areas within the Planning and Development (Local Planning Schemes) Regulations 2015 to trigger the compliance for single and ancillary dwellings, resulting in more consistent implementation and capturing all proposals for noise/vibration sensitive development.
9. Require extensive training for regulatory decision makers, the planning profession and the land development industry on the Policy objectives, intent and practical implementation because these factors are not well understood presently.
10. Ensure that regulatory decision makers can access high standard independent acoustic advice as a prerequisite for all land use planning decisions as there is currently limited capability and experience within regulatory decision-making organisations to properly interrogate and assess land use planning proposals.



APPENDICES INDEX

- Appendix 1 – Draft SPP 5.4 Policy and Implementation Guidelines Review
- Appendix 2 – Lloyd George Acoustics SPP 5.4 Report
- Appendix 3 – FLCWA Consultation Schedule
- Appendix 4 – Draft Anketell North Local Structure Plan Modification
- Appendix 5 – Packham North – Entrance Road (Eliza Ponds) Local Structure Plan
- Appendix 6 – FLCWA Bulletin # 7 Freight Rail Noise Policy and Practice
- Appendix 7 – Lloyd George Acoustics *“Cost of Architectural Packages” Report*
- Appendix 8 – FLCWA Comments on Department of Planning Technical Working Group Draft SPP 5.4



APPENDIX 1

1. DRAFT SPP 5.4 POLICY AND IMPLEMENTATION GUIDELINES REVIEW



DRAFT SPP 5.4 POLICY AND IMPLEMENTATION GUIDELINES REVIEW

DRAFT STATE PLANNING POLICY 5.4: ROAD AND RAIL NOISE			
No.	Clause	Lloyd George Acoustics	SITE planning + design
1.	<p>Citation: This is a State Planning Policy prepared under Part Three of the <i>Planning and Development Act 2005</i>. It may be cited as <i>State Planning Policy No. 5.4 Road and Rail Noise</i> (the Policy).</p>	<p>Title is simpler than previous version and removes freight handling facilities, which is endorsed.</p>	<p>We understand that the removal of reference to freight handling facilities is in anticipation of a review of State Planning Policy 4.1 Industrial Interface.</p> <p>It is noted that Draft SPP 4.1 makes reference to freight handling facilities under the term “infrastructure facilities”, however the policy does not apply retrospectively (to, for example, existing intermodal terminals) and as such there is no longer protection afforded to existing rail facilities (SPP 5.4 only refers to corridors), such as the Forrestfield Marshalling Yards, from urban encroachment.</p> <p>Further clarification is required in SPP 5.4 and 4.1 to ensure that noise impacts generated by existing rail activities outside of a “transport corridor” are considered in the context of proposals for new noise sensitive land use and development.</p>
2	<p>Policy Intent: The purpose of the Policy is to minimise the adverse impact of road and rail noise on noise-sensitive land use and/or development within the specified trigger distance 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.</p> <p>The Policy should be read in conjunction with the <i>State Planning Policy 5.4 Road and Rail Noise – Implementation Guidelines (the Guidelines)</i>; and is supported by State Government mapping which specifies the State’s major road and railway corridors and the Policy’s trigger distances which can be viewed at www.dplh.wa.gov.au.</p>	-	<p>The use of the term “incompatible development” should be defined and should include reference to noise and vibration sensitive development.</p>
3	<p>Background: Road and rail transport corridors play a vital role in moving people and goods safely and efficiently around the State and provide wide-ranging economic and social benefits to the community. However, road and rail noise can have an adverse impact on human health and the amenity of nearby communities, so it is important that it is carefully considered in land use planning and development. Urban consolidation is placing increasing development pressure on land near busy transport corridors. The Policy ensures acceptable levels of acoustic amenity can be achieved through appropriate interface management when noise-sensitive land use and/or development is located in areas impacted by road and rail noise.</p>	-	<p>Edit wording as follows:</p> <p>The Policy ensures acceptable levels of acoustic amenity can be achieved through appropriate interface management when noise-sensitive land use and/or development is located proposed in areas impacted by road and rail noise.</p>
4	<p>Policy Application:</p>	-	-
4.1	<p>When and Where it Applies: The Policy 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:</p>	-	-
4.1.a	<p>noise-sensitive land use within the Policy’s trigger distance of a transport corridor as specified in Table 1;</p>	-	-
4.1.b	<p>new or major upgrades of existing primary and secondary roads; or</p>	-	-
4.1.c	<p>new railways or upgrades of existing railways or any other works that increase capacity for rail vehicle storage or movement</p>	<p>The definition of what constitutes an upgrade should be better defined. Advice should be sought from MRWA, PTA & FLCWA.</p>	<p>Edit wording for consistency with 4.1.b as follows:</p> <p>new railways or major upgrades of existing railways...</p>



<p>T1</p>	<p>Table 1: Transport corridor classification and trigger distances</p> <table border="1"> <thead> <tr> <th>Transport corridor classification</th> <th>Trigger distance</th> <th>Distance measured from</th> </tr> </thead> <tbody> <tr> <td colspan="3">Primary Roads</td> </tr> <tr> <td>State Roads (freeways/highways/primary distributors)</td> <td rowspan="3">300 metres</td> <td rowspan="3">Road carriageway edge</td> </tr> <tr> <td>Primary Regional Roads (red roads under region schemes)</td> </tr> <tr> <td>Freight roads (Perth and Peel regions) Regional freight roads</td> </tr> <tr> <td colspan="3">Secondary Roads</td> </tr> <tr> <td>Other Regional Roads (blue roads under region schemes) District Distributor A</td> <td>200 metres</td> <td>Road carriageway edge</td> </tr> <tr> <td colspan="3">Passenger railways</td> </tr> <tr> <td></td> <td>60 metres</td> <td>Centreline of the closest track</td> </tr> <tr> <td colspan="3">Freight railways</td> </tr> <tr> <td></td> <td>300 metres</td> <td>Centreline of the closest track</td> </tr> </tbody> </table>	Transport corridor classification	Trigger distance	Distance measured from	Primary Roads			State Roads (freeways/highways/primary distributors)	300 metres	Road carriageway edge	Primary Regional Roads (red roads under region schemes)	Freight roads (Perth and Peel regions) Regional freight roads	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	<p>The distances do not necessarily align with those required in the Table 2 Guidelines.</p> <p>For instance, to achieve the outdoor noise criteria, Table 2 shows this is not achieved at 300m and would likely require 400m.</p> <p>It is understood Table 2 Guidelines includes an increase in noise level to account for forecast volumes, so should this then also be accounted for in the trigger distances?</p> <p>If the trigger distances change this would also affect the mapping.</p>	
Transport corridor classification	Trigger distance	Distance measured from																														
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<p>4.1.1</p>	<p>Noise-Sensitive Land Use and/or Development: This is generally determined by land uses 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.</p>	<p>-</p>	<p>-</p>																													
<p>4.1.2</p>	<p>Roads: Major roads are identified in appendix 9 of the Guidelines and the Department's map viewer. A major upgrade of an existing road involves:</p>	<p>-</p>	<p>-</p>																													
<p>4.1.2.a</p>	<p>physical construction works designed to facilitate an increase in traffic-carrying capacity (such as carriageway duplication or the addition of a traffic lane);</p>	<p>-</p>	<p>-</p>																													
<p>4.1.2.b</p>	<p>substantial change in the alignment that moves the asset closer to existing noise sensitive land use; or</p>	<p>-</p>	<p>-</p>																													
<p>4.1.2.c</p>	<p>modifications which may improve road capacity, performance or function, such as an intersection expansion, grade separation or the like.</p>	<p>-</p>	<p>-</p>																													
<p>4.1.3</p>	<p>Railways: Passenger and freight railways are identified in appendix 9 of the Guidelines and the Department's public mapping viewer. An upgrade of a railway means:</p>	<p>-</p>	<p>Edit wording as follows: An major upgrade of a railway means:</p>																													
<p>4.1.3.a</p>	<p>a proposed realignment, either inside or outside the existing corridor;</p>	<p>-</p>	<p>-</p>																													
<p>4.1.3.b</p>	<p>a rail track duplication; or.</p>	<p>-</p>	<p>-</p>																													
<p>4.1.3.c</p>	<p>works such as the installation of switches / turnouts, signalling systems, spurs or passing loops, the modification to the track support structure, crossovers, refuges, relief lines, straightening of curves, or re-sleepering.</p>	<p>Terminology and those which could result in a noise increase should be checked with PTA/FLCWA/ARC etc.</p>																														
<p>4.2</p>	<p>Planning Horizon: The application of the Policy should consider future development and associated increases in traffic anticipated for the next 20 years. This includes any transport corridor proposals where there is sufficient certainty regarding the corridor's alignment and function.</p>	<p>Previous Policy used a planning horizon of 15-20 years as such, this is not seen as a significant change.</p> <p>It should be noted however that traffic forecasts for trains are not commonly available. The Guidelines require an adoption of at least 1 train movement per hour. It is recommended a better approach may be to adopt 1 train movement per hour or an increase of at least 2 dB. The reason for this is that if an existing track is already at 1 train movement per hour, no increase is required for future growth. A 2 dB increase</p>	<p>A 20 year planning horizon is not considered sufficient to protect the ultimate function of strategic freight routes, particularly those that will support the unconstrained and efficient operation of new freight handling facilities in Fremantle Ports Outer Harbour, from incompatible urban encroachment.</p>																													



		<p>relates to a change from 1 train per hour (24 per day) to 1.6 trains per hour (38 per day).</p> <p>Furthermore, a 20 year horizon would relate currently to traffic volumes in 2037. MRWA currently only provide 2031 traffic forecasts. As such, it may not be possible to obtain the traffic volume information for a 20 year horizon at this stage. Perhaps some additional words such as ‘or best available forecast information’.</p> <p>Alternatively, a methodology could be provided in the guidelines to scale up to the relevant year based on % growth, however the accuracy of this could be questionable and may need advice from MRWA.</p>	
4.3	Policy Exemptions:	-	-
4.3.a	retrospectively to noise from existing railways or roads to an existing noise-sensitive land use and/or development within the Policy’s trigger distance;	-	-
4.3.b	to subdivision/development proposals that do not result in intensification of land-use, that is, boundary alignments;	Can this be clarified? SPP 5.1 requires an assessment if an extension is undertaken increasing the floor area by 25%. Could something similar be adopted in SPP 5.4?	-
4.3.c	to increases in road and rail traffic/noise in the absence of physical construction works, however infrastructure providers are encouraged to continuously enhance assets to reduce noise levels;	-	Edit wording as follows: ...however infrastructure providers, operators and governing bodies are encouraged to continuously enhance assets to reduce noise levels
4.3.d	upgrades of existing or new major road and railway construction proposals in existing reserves generally do not require planning approval, however transport infrastructure providers are expected to carry out these works in a manner that is consistent with the Policy;	SPP 5.4 (current and proposed) provides criteria for upgrades to road and railway. This implies that these projects do not need to comply with the Policy criteria? Can this be reworded/clarified what the intention of this clause is?	-
4.3.e	road works such as routine maintenance, re-sealing, minor changes in alignment or minor changes required for safety reasons, unless such works would result in a significant increase in road transport noise levels;	-	A similar exemption should be included for railway works.
4.3.f	for single houses which are exempt under the deemed provisions of the <i>Planning and Development (Local Planning schemes) Regulations 2015</i> . However landowners/proponents are strongly encouraged to consider the incorporation of the Guidelines quiet house design requirements to mitigate the impacts of transport noise;	Should these be exempt? As discussed for Section 4.3b, SPP 5.1 applies to a 25% increase in floor area to an existing dwelling so should something similar be adopted for SPP 5.4? Some Local Governments already require such an assessment for new single dwellings in any case.	This exemption highlights the need for special control areas for freight rail noise and vibration to be included in the deemed provisions of the <i>Planning and Development (Local Planning Scheme) Regulations 2015</i> .
4.3.g	fixed sources of noise such as, but not limited to, horns, warning bells and sirens, safety warning devices installed on road or rail vehicles or any noise produced during the actual construction of new road and rail infrastructure, are governed by the <i>Environmental Protection (Noise) Regulations 1997</i> ;	-	-
4.3.h	to aircraft or watercraft transport noise; and	-	-
4.3.i	to ground-borne vibration.	If the intent of the Policy is to protect people and freight corridors from urban encroachment, it is recommended that vibration be considered in some way in the Policy, even if not in detail. To completely ignore it does not seem to fulfil the objectives of the policy.	-



		<p>A simple approach may be to mandate a 50-metre buffer between freight rail and residences. The only time this distance could be encroached would be where a site specific study demonstrates vibration levels can be appropriately managed. If WAPC do not want to nominate the acceptable criteria, this could simply be passed on to DWER.</p> <p>At least with this approach the issue is not completed ignored.</p> <p>Reviewing the SLR report it appears that the PRG supported the incorporation of vibration within the Policy. This has not been adopted and therefore the Policy may not be fulfilling its objectives.</p>	
5	<p>Policy Objectives: The objectives of this policy are to:</p>	-	-
5.a	protect the community from unreasonable levels of transport noise;	-	-
5.b	protect major transport corridors from incompatible urban encroachment;	-	-
5.c	ensure that noise impacts are addressed as early as possible in the planning process; and	-	-
5.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.	-	-
6	<p>Policy Measures: The planning process should apply the precautionary principle of avoidance where there is risk of future land use conflict.</p> <p>Where it is unavoidable to place a proposed noise-sensitive land use and/or development to which the Policy applies, it will be necessary to demonstrate that the noise impact on the proposed noise-sensitive land use and/or development can be adequately mitigated to meet the Policy’s Noise criteria.</p>	-	<p>Stronger wording is required to apply the avoidance principle (land use control) to the strategic freight road and rail network that the FLCWA is advocating for within this submission.</p> <p>What constitutes “unavoidable”, needs to be clearly defined.</p>
6.1	<p>Noise Criteria: Table 2 sets out the Noise criteria that are to be achieved by proposals to which the Policy applies using the A-weighted average sound level LAeq metric.</p>	<p>Reviewing the SLR report, it appears that the PRG supported the introduction of an LAmx criteria within the Policy for freight trains. This has not been adopted and therefore the Policy may not be fulfilling its objectives.</p>	-



T2

**Table 2:
Noise Criteria**

Proposals	New/upgrade	Noise Criteria ¹			Where outdoor criteria must be met
		Outdoor		Indoor	
		Day (LAeq(Day) dB) (6 am–10 pm)	Night (LAeq(Night) dB) (10 pm–6 am)	(LAeq(Day) or LAeq(Night) 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	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	

Noise Sensitive

Indoor criteria wording should be rewritten. Current wording implies that requirements are 40 dB LAeq(Day) and 40 dB LAeq(Night) in living areas and 35 dB LAeq(Day) and 35 dB LAeq(Night) in bedrooms. It is assumed this is not the intention and this should be 40 dB LAeq(Day) in living and 35 dB LAeq(Night) in bedrooms.

Removing the limit (60 dB LAeq(Day)/55 dB LAeq(Night)) may force development to front the transport corridors so that the outdoor living area of a residence is at the back of the property. Based on the proposed criteria, where houses back on to a transport corridor, wall heights may need to increase from nominally 3m to 6-7m high.

Under the current Policy, only a reasonable amenity is required in the outdoor living area, which has historically been designed to be within the margin. Clearly such high walls are unlikely to be practicable. The alternate will be that nominal 3m high walls are still constructed but the home owner now must provide an additional outdoor area that achieves the target by creating an alcove or similar.

This will make selling such land more difficult for developers due to the additional restrictions. It will also increase costs for the home owner (often a first time home owner) to create the alcove type living area. Is there any evidence that such an approach is required? For example, is 56-60 dB LAeq(Day) in an outdoor living area considered to affect health or causing complaints? I would think it is more important to protect the internal amenity and as per the existing Policy, allow a + 5 dB margin for compliance for such areas.

New Roads/New Railways

Proposed approach is more stringent and is likely to cause community consultation issues. The current Policy requires new roads/railways to achieve the limit and investigate achieving the target where practicable. Whilst the intent may be the same in the proposed criteria, the interpretation from the community will be that the target must be achieved.

When it is explained that the target cannot be reasonably/practicably achieved, the community are unlikely to accept this when they review the Noise Criteria table.



		<p>Furthermore, the change to assess first floor (and others where practicable) is significant. Is it expected that noise walls will be designed to accommodate the upper floors? This could create scenarios of unusual steps in noise walls – 4m for the majority stepping up to 7m to accommodate a double storey residence. Is this the intention?</p> <p>Alternatively, MRWA/PTA would design noise walls for ground floor compliance and then have to upgrade windows/walls/ceilings of existing dwellings. Is this the intention? Reviewing the SLR report shows that this was not supported by the PRG.</p> <p><u>Road/Railway Upgrades</u> Proposed approach is more stringent and is likely to cause community consultation issues. In many cases, existing noise levels will be above the limit and achieving the limit, taking into account a forecast volume will simply not be practicable.</p> <p>Again, a reasonable/practicable argument will need to be made by the proponent as to why the limit cannot be achieved. The community may not accept this argument when reading the noise criteria table which says the limit must be achieved.</p> <p>Whilst the existing Policy is ‘wordy’ it at least shows the community that a best practice approach is to be undertaken rather than an absolute noise level.</p> <p>The issue with the first and higher floors in the same as described for the new roads/railways scenario.</p>	
T2.1	The Noise Criteria set out above apply to the emission of road and rail noise as received at a noise-sensitive land use and/or development. These criteria apply at the following locations:	-	-
T2.1.a	for new noise-sensitive land use and/or development proposals, to be measured at one metre from the most exposed, habitable façade of the proposed building, at indoor and outdoor (all floors). If mitigation is not reasonable and/or practicable, then at least one outdoor living area for each dwelling or multiple dwelling development; or	-	-
T2.1.b	for new or upgrade road or rail infrastructure proposals, to be measured at one metre from the most exposed, habitable façade of the building, at the first two floors (i.e. ground and first floor) and other floors where practicable, is encouraged.	Refer T2 comments.	-
T2.2	For all other non-residential noise-sensitive land use and/or development, acceptable indoor noise levels are to meet the recommended design sound levels in Table 1 of <i>Australian Standard/New Zealand Standard AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended)</i> .	This standard has been reviewed 2016.	-
T2.3	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.	Refer T2 comments.	-
6.2	Noise Exposure Forecast: When it is determined that the Policy applies to a planning proposal as outlined in Section 4, a preliminary assessment using Table 2: Noise Exposure Forecast in the Guidelines is encouraged to determine the likely noise impacts on noise-sensitive land use and/or development within the trigger distance of a specified transport corridor. Completion of a Noise Exposure Forecast Worksheet may minimise the need for a site specific assessment as part of a Noise Management Plan.	-	-



	<p>Depending on the outcomes of the noise exposure forecast assessment, the forecast noise level will identify if:</p> <ul style="list-style-type: none"> ▪ no further measure is required; ▪ noise-sensitive land use and/development is acceptable subject to mitigation measures; ▪ noise-sensitive land use and/development is not recommended; or ▪ noise-sensitive land use and/development is strongly discouraged. 		
6.3	<p>Noise Level Contour Map: Where it is determined that noise impacts on noise-sensitive land use and/or development within the trigger distance of Table 1 is 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.</p> <p>If the Noise Level Contour Map identifies that no part of the site is estimated to be affected by noise levels above the criteria, no further measures are required.</p>	-	-
6.4	<p>Noise Management Plan: Preparation of a Noise Management Plan is required early in the planning process to determine actual noise levels across the subject site and demonstrate that the proposal can adequately mitigate the noise impacts through use of noise attenuation measures. Noise Management Plans are required where:</p>	-	-
6.4.a	a Noise Level Contour Map identifies that part of the site that is noise-sensitive is estimated to be affected by noise levels above the criteria in Table 2 and where it is unavoidable to propose new or additional noise-sensitive development on any part of the site estimated to be affected by noise levels above the criteria;	-	As per earlier comments clarity is required on what constitutes “unavoidable”.
6.4.b	all practicable steps to avoid or minimise transport noise have been taken but the outdoor noise levels are predicted or measured to exceed the Policy’s noise criteria, specific noise mitigation measures should be considered in accordance with any Noise Management Plan;	-	-
6.4.c	a new noise-sensitive land use and/or development is located adjacent to a specified primary road or railway identified in the Policy’s mapping, which is not yet planned for construction but is anticipated within the Policy’s planning horizon; and	-	As per comments within the body of the report, proposed freight rail realignments and new passenger rail lines are required to be mapped to trigger compliance with the Policy.
6.4.d	a new or major upgrade of a primary road or railway construction proposal is located adjacent to undeveloped land zoned with the potential to accommodate noise-sensitive land use and/or development.	-	-
6.4.e	for (c) and (d) the Noise Management Plan should include treatments which meet the indoor noise criteria, and outdoor noise criteria 10 dB greater than the noise criteria, as outlined in Table 2.	It is unclear what this statement means and should be clarified what the criteria is in this scenario.	-
6.4 Cont.	Noise Management Plans are to be prepared by a suitably qualified professional acoustics engineer or consultant (refer to Guidelines). Noise Management Plans already approved by the relevant state agency responsible for noise regulations at the time of gazettal of this Policy are deemed to be satisfactory.	Should there also be a 6 month period of overlap such as is applied when the NCC is updated for instance?	-
7	<p>Implementation: As a general principle, noise should be considered at the earliest stages of the planning process and not defer its resolution or management to subdivision or development assessment stage, where mitigation options are more limited.</p> <p>The level and recommended type of noise management and mitigation measure will be dependent on the severity of the noise source, the intensity of the proposed land use and the information available at the particular stage of the planning process.</p> <p>There is a general presumption against approving proposals that cannot achieve the Policy’s noise criteria. However it is acknowledged that in some circumstances, it may not be reasonable or practicable for the Policy’s noise criteria to be met. Discretion may be exercised by the decision-maker.</p> <p>The decision-maker should consider:</p> <ul style="list-style-type: none"> ▪ the justification as to why the noise criteria cannot be achieved and whether the noise can be reduced to an acceptable level; ▪ the intent and objectives of this Policy; ▪ the requirements of other relevant plans and policies; ▪ the impact of proposed mitigation measures on the amenity of the built environment; ▪ the seasonality of train movements, particularly in regional towns; and ▪ advice received from relevant referral agencies. 	-	Stronger wording is required to make it mandatory for the consideration of transport impacts at the earliest stages of the planning process.



	The Guidelines assist in outlining ways in which some reasonable and practicable limitations can be addressed in a manner that also minimises transport noise.		
7.1	High-Order Strategic Planning: Strategic planning documents such as sub-regional frameworks and strategies, and local planning strategies should:	-	-
7.1.a	seek to avoid the risk of future land use conflict with noise by identifying compatible land use zones and/ or reserves to provide spatial separation.	-	This should be tied to the strategic freight road and rail network, as outlined earlier in the submission.
7.1.b	where it is unavoidable to place a proposed noise-sensitive land use and/or development within the trigger distance of a transport corridor to which the Policy applies, it will be necessary to:	-	What constitutes “unavoidable”, needs to be clearly defined.
7.1.b.i	identify the location of relevant transport corridors on the maps;	-	-
7.1.b.ii	outline why alternative design solutions are not suitable; and	-	-
7.1.b.iii	demonstrate that the noise impact on the proposed noise-sensitive land use and/or development can be adequately mitigated through planning mechanisms at the next stage of the planning process to meet the Policy’s noise criteria.	-	-
7.2	Region and Local Planning Scheme and Amendments, Structure Plans and Activity Centre Plans: The key objective for the above planning instruments for where noise-sensitive land use and/or development to which the Policy applies, is to address the impact of noise through the:	-	-
7.2.a	identification of appropriate compatible land use zoning such as Mixed Use zones;	The term mixed-use zone could still contain apartments with ground floor commercial. Is this the intention? This would still result potentially in noise sensitive premises close to transport corridors.	Mixed Use zones generally provide for a range of noise-sensitive land uses and development. Further clarity should be provided.
7.2.b	design solutions that utilise street and lot configuration to screen and/or buffer noise;	-	-
7.2.c	consideration of density and built form outcomes that will help alleviate and/or manage noise; and	-	Refer to the research undertaken by City of Cockburn, LG Acoustics and the PTA.
7.2.d	consideration to local planning scheme Special Control Areas with appropriate provisions for land in the vicinity of a transport corridor to ensure more detailed planning is undertaken at the subdivision and development stage, which may include the requirements for a Local Development Plan.	-	The FLCWA seeks the mandatory inclusion of special control areas within local planning schemes through the deemed provisions of the <i>Planning and Development (Local Planning Scheme) Regulations 2015</i> .
7.2 Cont.	Information to be accompanied by region and local planning scheme and amendments, structure plans and activity centre plans prepared in accordance with the Guidelines: <ul style="list-style-type: none"> ▪ Noise Exposure Forecast Worksheet; and/or ▪ Noise Level Contour Map; and/or ▪ Noise Management Plan, where deemed appropriate. 	-	-
7.3	Subdivision and development applications should take into consideration any noise assessment and a Noise Management Plan conducted earlier in the planning process. Subdivision and development should seek to manage and avoid land use conflict through:	-	-
7.3.a	the design of the street, lot and building configuration in accordance with the Guidelines;	-	-
7.3.b	consideration to the preparation of a site specific Local Development Plan; and	-	-
7.3.c	quiet house requirements in accordance with the Guidelines.	-	The FLCWA seeks the inclusion of the LG Acoustics quiet house design packages to mitigate freight rail noise.
7.3 Cont.	Subdivision and development applications are to be accompanied by the following information prepared in accordance with the Guidelines: <ul style="list-style-type: none"> ▪ Noise Exposure Forecast Worksheet; and/or ▪ Noise Management Plan, where deemed appropriate. 	-	-
7.3.1	Conditions of Subdivision and Development: Subdivision and development applications are to be accompanied by the following information prepared in accordance with the Guidelines: <ul style="list-style-type: none"> ▪ Noise Exposure Forecast Worksheet; and/or ▪ Noise Management Plan, where deemed appropriate. Notifications on title should also be required as a condition of subdivision (including strata subdivision) and development approval informing of the existence of transport noise where noise levels are forecasted or estimated to exceed the Policy’s outdoor noise criteria	-	-



	following the implementation of noise mitigation measures.		
7.4	Major Road and Railway Construction Proposals: To achieve overall noise management outcomes proposals for new or major upgrade of major roads and railways should consider:	-	-
7.4.a	route selection and alignment that maximises separation distances from existing or future noise-sensitive land uses;	-	-
7.4.b	natural topography to shield the transport corridor, reducing the reliance on noise walls; and	-	-
7.4.c	acquiring or preserving adequate space in the corridor reserve to ensure that a suitable set-back to receivers or other mitigation measure can be achieved.	-	-
7.4 Cont.	The following information should accompany a proposal for a major road and railway in accordance with the Guidelines: <ul style="list-style-type: none"> ▪ A Noise Management Plan to determine actual noise levels across the subject land accounting for any relevant adjacent zoning under an applicable region or local scheme. ▪ Demonstrate that the proposal can adequately mitigate the noise impacts through utilising noise attenuation measures. 	-	-
7.5	Local Planning Policies: Local governments may prepare local planning policies to supplement or elaborate on measures associated with the implementation of this policy. Local planning policies should be consistent with the objectives and intent of this policy, as reflected in local planning strategies and schemes.	-	-
7.6	State Authority Advice on Noise: The advice of the State authority responsible for noise regulation is to be sought and considered by the decision-maker in the preparation and determination of all proposals outlined in Sections 7.1 to 7.4 where:	With reference to 4.3.i, this could be a relevant area to place the requirement. For example: Where a noise sensitive premises is to be constructed within 50 metres of a railway or a railway is to be constructed within 50 metres of noise sensitive premises.	-
7.6.a	compliance with these policy measures is unlikely to be achieved;	-	-
7.6.b	additional/alternative noise mitigation measures are proposed; and/or	-	-
7.6.c	assumptions informing Noise Management Plans are not agreed to by a decision-maker.	-	-
7.6 Cont.	Proposals in the vicinity of a State Agreement shall be referred to the relevant agency responsible for the administration of the <i>State Agreements Act</i> .	-	-

DRAFT STATE PLANNING POLICY 5.4: ROAD AND RAIL NOISE: IMPLEMENTATION GUIDELINES

No.	Clause	Lloyd George Acoustics	SITE planning + design
1	Introduction: These Guidelines should be read in conjunction with <i>State Planning Policy 5.4: Road and Rail Noise</i> (the Policy). These Guidelines replace the Implementation Guidelines for <i>State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning</i> published in 2014.	-	-
1.1	Purpose of these Guidelines: These Guidelines provide supporting information for decision-making authorities, planners, landowners/ proponents, referral agencies and infrastructure providers to implement the Policy. Specifically, they assist with: <ul style="list-style-type: none"> ▪ determining appropriate land use planning in areas impacted by transport noise; ▪ identifying, assessing and managing the impacts of transport noise; and ▪ specifying the requirements of the Policy at each stage of the planning process. 	-	-
1.2	How to Use: These Guidelines are structured into chapters that follow the logical steps a proponent and or decision-maker will need to undertake for the preparation and assessment of a planning proposal to which the policy applies. Further guidance on noise assessment methodology, site verification, worksheets, and example templates for management plans, and planning instruments are included in the appendix.	-	-
1.3	Mapping: The Policy and these Guidelines are supported by maps which specify Western Australia’s major road and rail networks to which the policy applies that are considered of key economic importance due to their high vehicle movements and freight handling functions but can also adversely affect land adjacent to these corridors due to noise (Refer to appendix 9). The major roads and rail, along with approximate trigger distances for each transport corridor classification, can also be viewed on the Department of Planning, Lands and Heritage public map viewer, PlanWA at www.dplh.wa.gov.au . The trigger distances act as a mechanism for further investigation to ascertain likely noise levels through a Noise Exposure Forecast and or Noise Management Plan (refer to Table 1 of the Policy).	With regards to the comment on rural roads, it is agreed that these carry lower traffic volumes, however they also use a substantially noisier road surface so can produce as much noise as a higher traffic volume road. For instance, a road carrying 20,000 vpd on a dense graded asphalt road surface would be equivalent to a road carrying around 10,000 vpd on a chip seal road surface (assuming the same traffic composition).	-



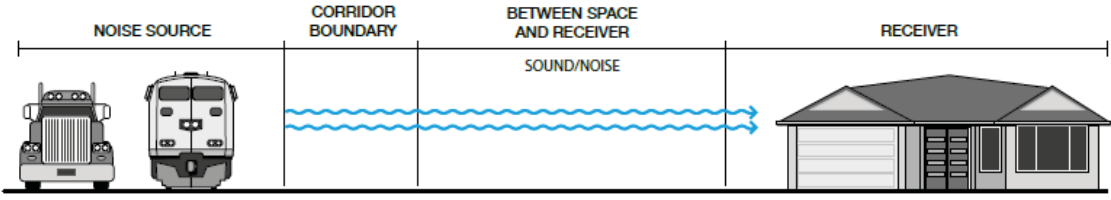
	<p>The inclusion of other transport corridors and their trigger distance will be added to the mapping in the event of a road/rail being reclassified into one of the corridor types listed in Table 1 of the Policy (for example, a region scheme amendment or an update to Main Roads Western Australia’s Road Information Mapping System) and considered by the WAPC where it can be demonstrated that the noise generated by those corridors is sufficient to justify application of the Policy.</p> <p>Discretion should be exercised for areas not subject to a region scheme, which are less likely to be affected by noise generated by the transport corridors subject to the policy. For example, many rural areas where roads classified as Primary Distributors in the State’s road hierarchy carry comparatively low levels of traffic and therefore generate levels of noise that are not sufficiently high to justify the Policy being applied. Similarly, many railways operated solely to carry grain are only in use seasonally, which do not satisfy the general principle that transport corridors subject to the policy must generate high levels of noise consistently.</p>	<p>Seasonal trains, whilst they may not generate high levels of noise year round, may still impact on residents. As such, it is recommended these railways still require assessment. If some are to be excluded, a quantitative number of trains per day what qualifies as seasonal use should be specified.</p>	
<p>2</p>	<p>Policy Application: This section provides guidance to determine if and when the policy applies as outlined in section 4 and Table 1 of the Policy.</p> <p>Western Australia’s planning system includes strategic and statutory planning functions set out in the <i>Planning and Development Act 2005</i>. The planning system is hierarchical, requiring increasing levels of detail as a proposal progresses through regional, district and local planning to subdivision and development of individual sites. It is intended that transport noise considerations and any mitigation measures are addressed as early as possible in the planning process, with the level of information provided becoming progressively more detailed.</p> <p>Table 1 of these guidelines provides an overview of how the policy is addressed at each stage of the planning process.</p>	<p>-</p>	<p>-</p>
<p>2.1</p>	<p>High-Order Strategic Planning: High-order planning documents such as sub-regional strategies and frameworks, and local planning strategies guide land use and infrastructure planning for relatively large areas through broad coordination of land use provision and distribution, infrastructure and community facilities. At this stage of planning, the principle aim is to avoid land use conflict from the impact of transport noise. This is achieved through measures that rely on compatible land use zones, and reserves to provide spatial separation (refer to section 4: Noise Mitigation).</p> <p>As a minimum, high-order strategic planning should clearly map the transport corridors to which the policy applies and the surrounding areas potentially impacted by transport noise. A Noise Exposure Forecast work sheet and/or Noise Level Contour Map are required where the level of information is available to provide greater detail on the transport noise impacts (refer to section 3: Assessing Noise).</p> <p>Where the provision of noise-sensitive land use and/ or development within the trigger distance cannot be avoided high-order planning documents should outline options for site-specific statutory planning processes to be addressed later in the planning process such as the designation of new zones and reserves to adequately mitigate noise constraints and meet the policy’s noise criteria.</p>	<p>-</p>	<p>Greater clarity required on what constitutes “cannot be avoided”.</p>
<p>2.2</p>	<p>Schemes and Amendments, Structure Plans and Activity Centre Plans: The level of information available at this stage of planning should allow for a more comprehensive assessment of the noise constraints. At this stage there is still an opportunity to avoid the introduction or intensification of noise-sensitive land use and/or development. The proponent should consider design solutions that utilise street and lot configuration, and densities that inform built form outcomes (refer to section 4: Noise Mitigation).</p> <p>Where it is unavoidable to propose new or additional noise-sensitive development on any part of the site, a Noise Exposure Forecast worksheet and/or a Noise Level Contour Map can be used to facilitate the introduction or intensification of noise-sensitive land uses and/or development in areas likely to be affected by transport noise. Where the noise estimated to be affected by noise levels is above the criteria, a Noise Management Plan is required (refer to section 3: Assessing Noise). While Noise Management Plans represent an initial cost, they provide the opportunity to avoid land-use conflict and achieve better land planning outcomes. Once land is zoned for a noise-sensitive land use or a transport corridor is constructed, the practicable options for achieving the noise criteria are more limited and generally more expensive.</p> <p>The designation of a Special Control Area may assist to address site-specific noise modelling; topography and natural environment; existing and proposed built environment; site-specific noise mitigation; and/or interface management necessary to address railways covered by State Agreements as advised by the Department of Jobs, Tourism, Science and Innovation. Special Control Areas should not define alternative noise metrics. Appendix 7 includes model Special</p>	<p>The PRG showed support for L_{Amax} to be considered for freight. This has not been adopted and therefore the Policy may not be fulfilling its objectives.</p> <p>Appendix 7 should be Appendix 8.</p>	<p>The Guidelines should include a list of current railways covered by State Agreements and these should be included on a map within the Appendices and added to the online mapping.</p> <p>Structure Plans should clearly identify lots subject to a Noise Management Plan, requirements for the preparation and adoption of Local Development Plans and/or the requirement to obtain planning approval for the development of single and ancillary dwellings.</p>



<p>2.3</p>	<p>Control Area provisions for inclusion in local planning schemes.</p> <p>Subdivision and Development: An assessment of the noise impacts should have been undertaken prior to this stage of planning. In the absence of a structure plan and/or noise assessment, the provision and/or intensification of noise-sensitive land use and/or development should be determined to be appropriate through an initial completion of a Noise Exposure Forecast worksheet as per the above. The Noise Exposure Forecast worksheet will assist with determining how the subject land/development is affected by noise and what exposure category and subsequently which mitigation measures apply.</p> <p>More complex and large scale subdivision and development applications may require the preparation of a site-specific Noise Management Plan that may result in a recommendation to construct physical barriers and/ or quiet house requirements (refer to section 4: Noise Mitigation). A Local Development Plan or other localised planning mechanisms may also be considered to support the design and coordination of appropriate development outcomes that address noise constraints.</p> <p>This stage of planning generally focuses on physical mitigation measures that, once implemented, will contribute to the achievement of the Policy's noise criteria. Conditions of subdivision should be imposed as appropriate in order to ensure that the recommendations of any Noise Exposure Forecast worksheet and or Noise Management Plan are implemented, as relevant. If there are measures recommended in a Noise Management Plan that relate to the subsequent development stage, advice should also be included indicating the WAPC's expectation that such measures will be implemented at that stage.</p> <p>Notifications on title are required informing of the existence of road and/or railway transport noise for all proposals where noise levels are forecasted to exceed the Policy's outdoor noise criteria (refer to Appendix 6 and 7 - Recommended wording for notification on title).</p>	<p>-</p>	
<p>2.4</p>	<p>Road and Railway Construction: Road and railway transport infrastructure providers are responsible for ensuring that proposals for new infrastructure, and for upgrades of infrastructure constituting a major upgrade, are compliant with the relevant requirements of the Policy. For these proposals, it is expected that infrastructure providers prepare a Noise Management Plan.</p> <p>It is expected that transport infrastructure providers will implement design and construction features aimed at minimising the generation and emission of noise (as far as is practicable within the transport corridor), with the objective of achieving the noise criteria. Land use planning controls and infrastructure upgrades can only mitigate noise to a certain extent; it is imperative that service providers contribute to minimising the generation and emission of noise.</p> <p>While the Policy does not apply to increases in road noise in the absence of physical construction works, infrastructure providers are encouraged to maintain or enhance assets to reduce noise levels.</p> <p>Other types of proposals that are likely to impact on noise-sensitive land use and/or development and as such may also require a Noise Management Plan include:</p> <ul style="list-style-type: none"> ▪ road or rail infrastructure (including intersections) that result in undergrounding or grade separations; ▪ roads that have significant gradients or may become a future freight route; ▪ rail segments that have newly introduced elements that could create additional noise impacts, such as track switch points, crossings, or track curve radii less than 600 metres; or ▪ where there may be a substantial change in noise from that currently, such as metropolitan fringe greenfield sites or rural areas. <p>Infrastructure providers should consider the policy measures and the benefits of preparing a Noise Management Plan where:</p> <ul style="list-style-type: none"> ▪ the nature of the noise emissions likely to emanate as a result of the minor redevelopment will probably increase in level or duration, for example, a new crossing where there was none previously or tighter track curvature leading to new or additional wheel squeal; ▪ projected cumulative noise levels exceed the noise criteria; and/or ▪ past consultations with State environmental agencies indicated a need to apply policy measures on similar minor redevelopments. 	<p>-</p>	<p>Amend wording as follows:</p> <p>Road and railway transport infrastructure providers are responsible for ensuring that proposals for new infrastructure, and for major upgrades...</p> <p>Further clarity is required on the bullet point below:</p> <ul style="list-style-type: none"> ▪ where there may be a substantial change in noise from that currently, such as metropolitan fringe greenfield sites or rural areas.



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Administering and applying the Building Code of Australia in Western Australia.</p>	<p>-</p>	<p>Land use plan should also be listed as a plan provision against “Region and local scheme and amendments, structure plans and activity plans”.</p> <p>This stage of the planning process provides for the detailed planning of, proposals for, and the assessment of, land use and on that basis, this is the stage of the planning process where the “avoidance principle” is most relevant and should be implemented.</p>
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<p>3</p>	<p>Assessing Noise: This section sets out the key assessment and management tools of noise impacts to enable implementation of the policy measures outlined in section 6 of the Policy.</p> <p>For further guidance on measurement and on-site verification and noise assessment methodology, refer to Appendix 3 and 4).</p>	<p>-</p>	<p>-</p>																
<p>3.1</p>	<p>Understanding Noise: Sound may be simply described as what we hear. Noise is unwanted sound, which carries a variety of negative effects that can adversely affect community health and amenity. Figure 1 shows a range of typical noise levels.</p> <p>Figure 2 illustrates the road noise source (typically engine exhausts, braking vehicle aerodynamics-flow turbulence and the interaction between wheel and road or track) and rail noise (generally interaction/shunting between cars and wheel squealing on tight curves) to which the Policy applies.</p>	<p>-</p>	<p>-</p>																
<p>3.2</p>	<p>Noise Criteria: Table 2 of the Policy sets out the noise criteria that apply to proposals for new noise-sensitive land use and/or development or new/upgraded major roads and railways assessed under this Policy.</p> <p>Transport noise levels can change very quickly so it is more convenient to use a single number which is equivalent (‘eq’) in level (L) to the total sound energy measured over a given time period. Sound is also perceived differently according to its frequency. In general, human hearing is less sensitive to airborne sound at lower frequencies (such as a rumble) compared to those at higher frequencies (like a hiss).</p>	<p>-</p>	<p>-</p>																

<p>F1</p>	<p>Typical Noise Levels:</p> <table border="1"> <tr> <td rowspan="4">Painful</td> <td>120</td> <td>Jet aircraft take off at runway edge</td> </tr> <tr> <td>110</td> <td>Rock concert</td> </tr> <tr> <td>100</td> <td>225mm angle grinder at 1 metre</td> </tr> <tr> <td>90</td> <td>Heavy industrial factory interior</td> </tr> <tr> <td rowspan="3">Noisy</td> <td>80</td> <td>Shouting at 1 metre</td> </tr> <tr> <td>70</td> <td>Freeway at 20 metres</td> </tr> <tr> <td>60</td> <td>Normal conversation at 1 metre</td> </tr> <tr> <td rowspan="3">Quiet</td> <td>50</td> <td>Night time outdoor noise target</td> </tr> <tr> <td>40</td> <td>Office air conditioning</td> </tr> <tr> <td>30</td> <td>Typical bedroom design target</td> </tr> <tr> <td rowspan="3">Very Quiet</td> <td>20</td> <td>Whisper, rural bedroom at night</td> </tr> <tr> <td>10</td> <td>Human breathing at 3 metres</td> </tr> <tr> <td>0</td> <td>Threshold of typical hearing</td> </tr> </table> <p>Note: The levels above are L_{Aeq} (dB re 20 μ Pa). Sound and noise is measured in decibels (dB). It is important to realise that the decibel is just a ratio between two quantities, and there needs to be a common reference value ('re'). The usual reference value for sound pressure in air is 20 micropascals (20 μ Pa) – a value associated with the minimum threshold of typical hearing. Although the correct way to present a unit of a sound pressure level against this reference value is in 'dB re 20 μ Pa', the reference value is very common and some simplify the measurement result to just 'dB'.</p> <p>Figure 1: Typical noise levels</p>	Painful	120	Jet aircraft take off at runway edge	110	Rock concert	100	225mm angle grinder at 1 metre	90	Heavy industrial factory interior	Noisy	80	Shouting at 1 metre	70	Freeway at 20 metres	60	Normal conversation at 1 metre	Quiet	50	Night time outdoor noise target	40	Office air conditioning	30	Typical bedroom design target	Very Quiet	20	Whisper, rural bedroom at night	10	Human breathing at 3 metres	0	Threshold of typical hearing	<p>-</p>	<p>-</p>
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<p>F2</p>	 <p>Figure 2: Experience of noise</p>	<p>-</p>	<p>-</p>																														
<p>3.2 Cont.</p>	<p>Given the above, the unit used in this Policy is the 'A- weighted equivalent continuous sound pressure level', or 'LAeq'. Care should be taken to note that LAeq values are averages over large time periods. Consider that a quiet night with a loud single event (such as a road train passing) may result in a higher degree of annoyance than the overall LAeq value may indicate.</p>	<p>This contradicts not adopting an L_{Amax} criteria. If a single event causes annoyance then the Policy, to fulfil its objectives should be giving this consideration.</p>	<p>The FLCWA seeks the application of the L_{Amax} for the modelling and mitigation of freight rail noise, for this reason.</p>																														
<p>3.2.1</p>	<p>Exceeding the Noise Criteria: The Policy recognises that in some instances it may not be 'reasonable' and/or 'practicable' to implement noise mitigation measures in order to achieve the noise criteria. The determination of 'reasonable' and/or 'practicable' is to be to the satisfaction of the responsible decision-maker. A submission outlining the reasonable and practicable considerations should help to facilitate a determination on the matter and should assist in communicating that decision to the community in a transparent way.</p>	<p>Because of the removal of the limit for new noise sensitive and new roads/railways, the reasonable and practicable argument will need to be made more often. This is then subject to inconsistencies depending on the particular person assessing the proposal.</p>	<p>-</p>																														



	<p>About the Term 'reasonable': An assessment of reasonableness should demonstrate that efforts have been made to resolve conflicts without compromising on the need to protect noise-sensitive land use activities. For example, if residents are concerned about the height of a transport noise barrier, have reasonable efforts been made to design, relocate or vegetate the barrier to address these concerns?</p> <p>Whether a noise mitigation measure is reasonable might include a consideration of:</p> <ul style="list-style-type: none"> ▪ the noise reduction benefit provided ▪ the number of people protected ▪ the relative cost of mitigation ▪ existing and future noise levels, including changes in noise levels ▪ aesthetic amenity and visual impacts ▪ compatibility with other planning policies ▪ differences between metropolitan and regional situations ▪ differences between greenfield and infill development ▪ the benefits arising from the proposed development. <p>About the term 'practicable': 'Practicable' considerations for the purposes of the Policy normally relate to the engineering aspects of the noise mitigation measures under evaluation. It is defined as "reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge" (<i>Environmental Protection Act 1986</i>).</p> <p>These may include:</p> <ul style="list-style-type: none"> ▪ limitations of the different mitigation measures to reduce transport noise ▪ safety issues (such as impact on crash zones or restrictions on road vision) ▪ topography and site constraints (such as space limitations) ▪ drainage requirements ▪ access requirements (for driveways, pedestrian access and the like) ▪ maintenance requirements ▪ suitability of the building for acoustic treatments. 	<p>Similarly, the changes discussed earlier in relation to assessing upper floors and road/rail upgrades now having a criteria will require the reasonable and practicable argument to be used more often. This may create issues when explaining to the community why the noise criteria cannot be achieved.</p>	
<p>3.3</p>	<p>Noise Level Contour Map: A Noise Level Contour Map is a scale map of the subject site illustrating the likely noise levels and associated noise exposure categories. It is typically used for planning proposals to provide decision makers with information on the likely impacts of transport noise upon the subject site.</p> <p>The Noise Level Contour Map can be prepared in two different ways.</p>	<p>-</p>	<p>-</p>
<p>3.3.1</p>	<p>A map (Figure 3) can be prepared using the noise level information contained within the Noise Exposure Forecast Table 2.</p>	<p>-</p>	<p>-</p>
<p>3.3.2</p>	<p>A map can be prepared using site-specific noise level information provided by a suitably qualified acoustic Consultant/engineer, usually as part of the preparation of a Noise Management Plan.</p>	<p>-</p>	<p>For the strategic freight road and rail network, the FLCWA is seeking mandatory requirements for site specific acoustic assessments and noise management plans.</p>



F3

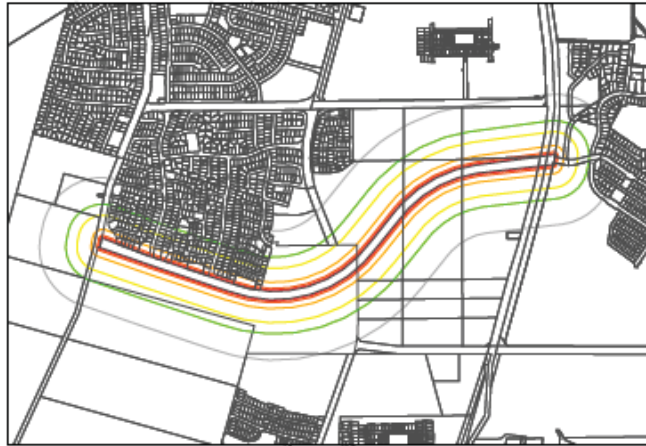


Figure 3: Example Noise Level Contour Map

T2

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* * State roads (freeways, highways, primary distributors) * Primary regional roads (red roads under region schemes) * Metropolitan freight roads (in the Perth and Peel regions - typically 7.5% heavy vehicles) Map 1, 2, 3	up to 25,000	71	66	64	62	61	59	59	58	57	56	56	55	55	54	53	52	51	51	50	50									
	~ 30,000	71	67	64	63	61	60	59	58	57	57	57	56	56	54	54	53	52	51	51	50	50								
	~ 35,000	72	68	65	63	62	61	60	59	58	58	57	56	56	55	54	53	53	52	51	51	50	50							
	~ 40,000	72	68	66	64	62	61	60	59	59	58	58	57	57	56	55	54	53	52	51	51	50	50							
	~ 45,000	73	68	66	64	63	62	61	60	59	59	58	57	57	56	55	54	54	53	52	51	51	50	50						
	~ 50,000	73	69	66	65	63	62	61	60	60	59	59	59	58	58	56	56	55	54	53	53	52	51	51	50	50				
	~ 55,000	74	69	67	65	64	62	62	61	60	59	59	59	58	58	57	56	55	54	54	53	53	52	51	51	50	50			
	~ 60,000	74	70	67	66	64	63	62	61	61	60	60	60	59	59	58	57	56	55	54	54	53	53	52	51	51	50	50		
	~ 70,000	75	71	68	66	65	64	63	62	61	61	61	61	61	60	60	59	58	57	56	55	55	54	54	53	53	52	51	51	50
	~ 80,000	75	71	69	67	65	64	63	62	61	61	61	61	60	60	59	58	57	56	55	55	54	54	53	53	52	51	51	50	50
~ 90,000	76	72	69	67	66	65	64	63	62	62	61	61	60	60	59	58	57	57	56	55	55	54	54	53	53	52	51	51	50	
~ 100,000	77	72	70	68	67	66	65	64	63	62	61	61	61	61	60	59	58	57	57	56	55	55	54	54	53	53	52	51	51	
~ 120,000	77	73	70	69	67	66	65	64	64	63	63	62	62	61	60	59	58	57	57	56	55	55	54	54	53	53	52	51	51	
more than 140,000	78	74	71	69	68	67	66	65	64	64	64	62	62	61	60	59	58	57	57	56	55	55	54	54	53	53	52	51	51	
* 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	72	69	67	65	64	63	62	61	61	60	60	59	59	58	58	57	56	56	55	55	54	54	53	53	52	51	51	50	
	more than 10,000	74	70	68	67	65	64	63	62	61	61	60	60	59	59	58	57	57	56	55	55	54	54	53	53	52	51	51	50	
	10 to 20% heavy vehicles	74	70	68	67	65	64	64	63	62	62	61	61	60	60	59	59	58	57	57	56	56	55	55	54	54	53	53	52	
	more than 10,000	76	72	70	68	67	66	65	64	63	63	62	62	61	61	60	59	58	57	57	56	55	55	54	54	53	53	52	51	51
more than 20% heavy vehicles	75	72	70	68	67	66	65	64	64	63	63	62	62	61	61	60	59	58	57	57	56	55	55	54	54	53	53	52	51	
more than 10,000	77	73	71	70	68	67	66	66	65	64	64	63	63	62	62	61	60	59	58	57	57	56	55	55	54	54	53	53	52	
Secondary roads* * Other regional roads (blue roads under region schemes) * District Distributor A (Typically 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	45	44	44	43	43	42		
	~ 7,500	62	60	58	57	56	55	54	54	53	53	52	52	51	51	51	50	50	49	49	48	48	48	47	47	46	46	45		
	~ 10,000	65	62	60	59	58	57	56	55	55	54	54	53	53	53	52	51	51	50	50	49	49	48	48	47	47	46	46	45	
	~ 15,000	66	63	61	60	59	58	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49	49	48	48	47	47	46	
	~ 20,000	67	64	62	61	60	59	58	58	57	57	56	56	55	55	54	54	53	52	51	51	50	50	49	49	48	48	47	47	
	~ 25,000	68	65	63	62	61	60	59	58	58	57	57	56	56	55	55	54	54	53	52	51	51	50	50	49	49	48	48	47	
~ 30,000	68	65	64	62	61	60	60	59	59	58	58	57	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49		
more than 35,000	69	66	64	63	62	61	60	60	59	59	58	58	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49		
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	Jooindup-Butler	260	68	64	61	60	59	58	57	56	56	55	55	54	54	53	53	52	52	51	51	50	49	49	48	48	47	47	46	
	Midland	170	66	62	59	58	57	56	55	54	54	53	53	52	52	51	51	50	49	49	48	48	47	47	46	46	45	45	44	
	Fremantle	160	66	61	59	58	56	56	55	54	53	53	52	52	51	51	50	49	49	48	48	47	47	46	46	45	45	44	44	
	Armadale-Thornlie	290	68	64	62	60	59	58	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49	49	48	48	47	47	
	Mandurah	250	68	64	61	60	59	58	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49	49	48	48	47	47	46	
	Other lines	300	68	64	62	60	59	58	57	57	56	56	55	55	54	54	53	53	52	51	51	50	50	49	49	48	48	47	47	
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	51	51	50	50	49	49	48	47	

Title should be Noise Exposure Forecast as this is used in other areas.

Some of the colour coding is incorrect and should be checked.

The fact that freight railways are using LAeq(Night) is noted in a different location to all others that use LAeq(Day). This should be provided in a consistent area.

Noise levels for freight trains may not be conservative enough given these are to represent forecast noise levels.

The exposure categories should provide the relevant LAeq(Night) value as well as the LAeq(Day).

The external noise level where the packages apply have shifted, although the package requirements are unchanged. Previous Package A was permitted up to 60 dB LAeq(Day), whereas this now stops at 58 dB LAeq(Day). Was any work undertaken to justify this shift? It has been our experience that the Packages are generally already conservative (other than for freight train noise in the higher Packages B & C). By making this shift will also have cost implications to future residents by potentially having to enforce Package B more often and/or will affect the way subdivisions are designed. For instance, higher noise walls so that external noise levels are no more than 58 dB LAeq(Day) and Package A applied may be 1 approach. An alternative approach may

It is understood that Table 2: Noise Forecast (Implementation Guidelines) (refer to the figure below) is based on an average of two (2) train movements per hour. This is considered conservative for large parts of the metropolitan and regional freight rail network which currently carry less than two (2) trains per hour on average.

However, this methodology fails to acknowledge that sections of the freight rail network currently carry more than 2 trains per hour (on average) and will continue to experience growth in freight rail movements in line with the forecast growth in the freight task, both nationally and across WA.

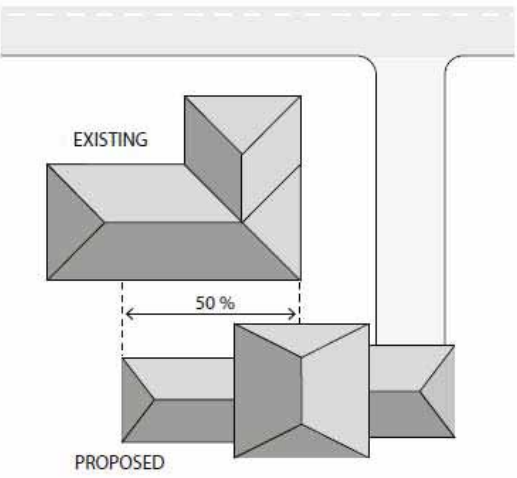
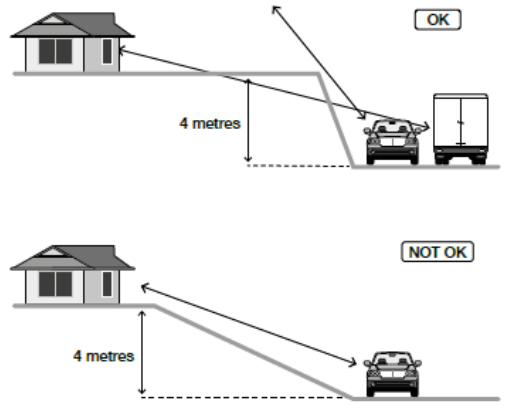
Additionally, seasonal rail freight movements are not captured within the Policy and Guidelines. These movements must be recognised as during periods throughout the year they will result in significant increases in rail movements.

For these reasons, the FLCWA recommends that the strategic freight road and rail network be identified and mapped and be subject to a mandatory requirement for site specific acoustic assessments and noise management plans and the removal of reference to these transport corridors from Table 2.

Further consideration should be given to the use of "not recommended" and "strongly discouraged" to provide greater



Forecast Noise Level (L _{Aeq,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)		be since residents will already fall into Package B (if at 60 dB L _{Aeq(Day)}), reduce the wall heights so external noise level aligns with the top of Package B. Unless there is justification, it is recommended the external noise levels where packages apply stay reasonably similar.
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)		Whilst Exposure Categories D & E do not recommend and discourage noise sensitive development respectively, a noise management plan can circumvent this. This is an issue for vibration impacts where the noise can be mitigated to allow housing within 20 metres for instance, however vibration levels may be unacceptable. Again, ignoring potential vibration issues does not seem appropriate or in line with the Policy objectives.
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).				
3.4	Noise Exposure Forecast: When it is determined that the Policy applies to a planning proposal the Noise Exposure Forecast enables proponents and/or decision-makers to undertake a simple assessment of the risk of noise impacts on noise-sensitive land use and/or development within the trigger distance of road or railway infrastructure through forecasts on noise levels which has been verified through noise monitoring. Proponents can complete the worksheet (Appendix 1) to accompany subdivision, development and building licence applications to demonstrate the forecast noise levels at a noise-sensitive land use and/or development and the required noise mitigation measure through quiet house requirements. Proponents and/or decision-makers can also identify future development areas where transport noise may present an unacceptable impact on noise-sensitive land use and/or development which may result in consideration of more compatible land uses. The Noise Exposure Forecast can be used to prepare a Noise Level Contour Map to inform high-order planning documents and planning proposals.		-	clarity and certainty. As per the comments above, the FLCWA recommends that the strategic freight road and rail network be identified and mapped and be subject to a mandatory requirement for site specific acoustic assessments and noise management plans and the removal of reference to these transport corridors from Table 2.
3.4.1	Noise Reductions from Existing Screening Building and Structures: The Noise Exposure Forecast table contains noise levels assuming open and level ground. It does not account for existing screening buildings, terrain, structures or noise walls/fencing that is located between the noise source and the receiver, which enable reductions in noise levels lower than what is presented in the Noise Exposure Forecast table. A 4dB reduction to the noise levels contained in the Noise Exposure Forecast table which equates to at least one exposure category/quiet house specification (i.e. quiet house C (63dB) to quiet house B (59dB)) can be applied in the following situations. <ul style="list-style-type: none"> An existing building or structure (at least one storey high) screens more than 50% (not intermittently) of the most exposed frontage of a noise-sensitive land use and/or development (Figure 4). An existing solid continuous two metre noise wall/ fence. Topographical difference of at least four metres that is not a direct line of sight (that is, where the infrastructure corridor is lower than the subject site) as illustrated in Figure 5. 		-	-

<p>F4</p>	 <p>Figure 4: Illustration of a building or structure screening more than 50% of the most exposed, habitable façade of a noise-sensitive building</p>	<p>-</p>	<p>-</p>
<p>F5</p>	 <p>Figure 5: Illustration of a topographically uninterrupted and interrupted line-of-sight between a noise source and the most exposed, habitable façade of a noise-sensitive building</p>	<p>-</p>	<p>-</p>
<p>3.4.1 Cont.</p>	<p>Caution should be applied when considering a reduction to noise levels contained in the Noise Exposure Forecast table if proponents desire a higher quality acoustic environment that would be achieved through the customised performance-based mitigation measures. This is particularly relevant for above ground floor levels not screened that have a direct line of sight to the road or rail line and are therefore still significantly impacted by the noise source.</p> <p>A site-specific Noise Management Plan is required to quantify the noise reduction performance of existing screening buildings and structures beyond the 4dB reduction.</p>	<p>-</p>	<p>-</p>
<p>3.5</p>	<p>Noise Management Plan: A Noise Management Plan provides a site-specific noise assessment and recommended noise mitigation measures to achieve the Policy’s criteria. They are commonly prepared by a competent professional such as an acoustics engineer or other consultant on behalf of the developer or proponent.</p>	<p>-</p>	<p>-</p>



Those accepted as being suitably qualified are:

- a person holding membership of the Australian Acoustical Society (AAS) in the grade of Member or Fellow (designated by the post-nominal letters M.A.A.S. or F.A.A.S. respectively); and/or
- a company holding current corporate membership of the Australian Association of Acoustical Consultants (AAAC). An acoustics engineer is defined as a person eligible for professional membership to the Institute of Engineers Australia (MIEAust).

Both the AAS and AAAC require their members to meet and maintain standards of technical competency. The AAS and AAAC retain current lists of their members on their respective websites.

Section 2 outlines when a Noise Management Plan is to be prepared, with a preference of it being prepared as early as possible in the planning process.

For noise-sensitive land use and/or development proposals, where there is an existing road or railway, noise measurement to inform preparation of the plan must be undertaken. Noise modelling in the absence of noise measurement should only be undertaken where a road or railway is proposed but not yet constructed. Appendix 4 includes a checklist for road and rail noise modelling.

Appendix 5 provides a recommended template for the content of a Noise Management Plan which typically outlines:

- how the proposed noise mitigation measures will achieve the noise criteria (see Figure 6 and 7);
- recommended mitigation measures for the proposal including extent of noise walls/bunds and consideration of amenity impacts and residential lots with quiet house requirements;
- outlining the stage of the planning process, responsible parties, staging and timing;
- a description of other noise management measures, for example post-construction noise monitoring, complaint response, ongoing maintenance requirements; and/or
- outcomes of community and stakeholder consultations (where a noise wall is proposed on a common boundary).

If the development is occurring prior to the construction of a nearby planned major road or railway, the developer should seek details of the infrastructure design and work with the infrastructure provider to develop a joint Noise Management Plan to outline responsibilities and commitments in relation to noise mitigation.

The proponent should be tasked with ensuring that what is designed and constructed remains consistent with the Noise Management Plan.

The Department of Water and Environmental Regulation is available to provide noise-related advice and expertise, as well as other stakeholders potentially affected such as the State government transport portfolio. Local government may play a role in the clearance of certain conditions.

F6

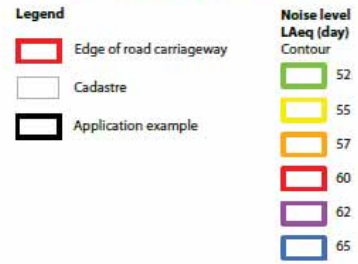
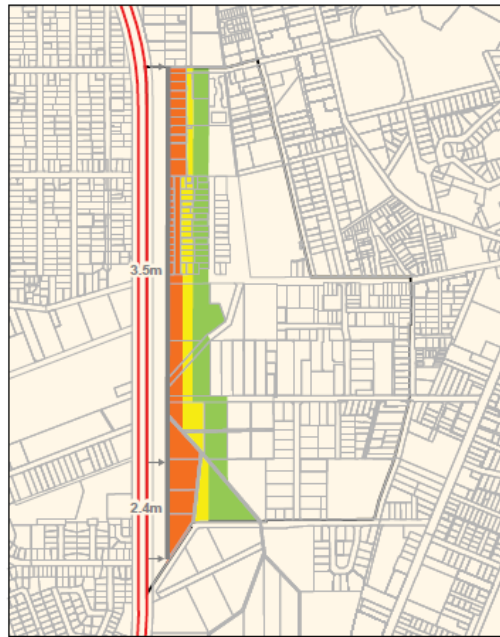


Figure 6: Noise Management Plan Contour Map
- prior to any proposed noise mitigation

F7



Legend








-  Edge of road carriageway
-  Cadastre
-  Noise abatement wall
-  Application example
-  Exposure category A - requires Quiet House Package A
-  Exposure category B - requires Quiet House Package B on upper floor and Package A on ground floor
-  Exposure category C - requires Quiet House Package C on upper floor and Package B on ground floor

Figure 7: Noise Management Plan Contour Map
- showing noise mitigation measures

4

Techniques for Noise Avoidance and Mitigation:
This section outlines the various ways to minimise noise from road and rail from the strategic planning stage through to the detailed design at the development approval stage.

The most straightforward way of minimising the noise-related impact of transport corridors is to avoid proposing noise-sensitive land use and/or development in close proximity to such infrastructure.

As previously highlighted and captured in the statement below, the wording associated around the avoidance principle and land use control needs to be strengthened and tied to the strategic freight road and rail network.

The most straightforward way of minimising the noise-related impact of transport corridors is to avoid proposing noise-sensitive land use and/or development in close proximity to such infrastructure.

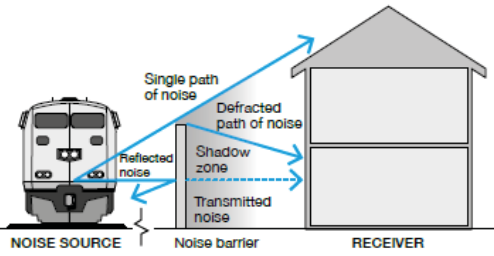
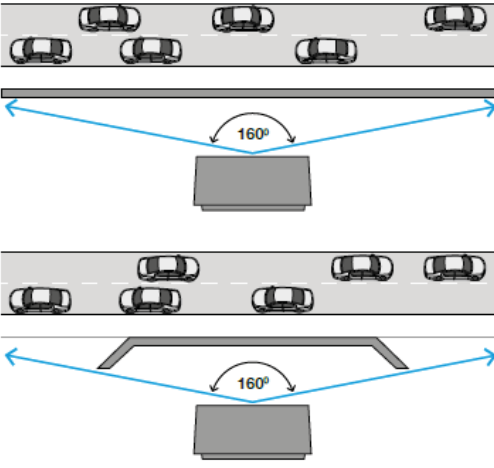
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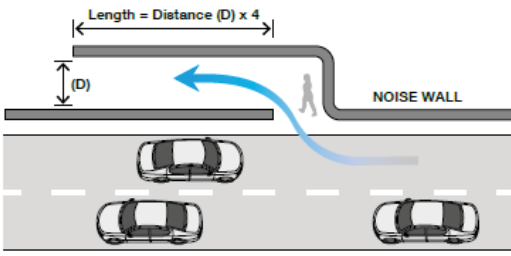
Physical Separation and Compatible Land Uses:
The allocation of non-noise-sensitive land uses in the vicinity of transport corridors serves two purposes. Firstly, it provides spatial separation for noise-sensitive land use and/or development and secondly it can, depending on built

Further consideration should be given to the benefits of public space as a physical separation and/or providing further guidance on the design of the open space



	<p>form, create a physical barrier protecting land beyond.</p> <p>Physical separation between the transport infrastructure and noise-sensitive areas could include:</p> <ul style="list-style-type: none"> ▪ Local streets and road reserves including shared paths/cycle lanes (in compliance with Liveable Neighbourhoods) that provide further separation from the noise source, promote passive surveillance of the street and allow for planting and landscaping; ▪ Open public spaces of a size and function that can be designed to ensure the spaces are usable to residents and preferably have areas that are quieter; and ▪ Defined easements or building setbacks in new estates along road/rail corridors should be considered. The vesting/management authority for such reserves on greenfield site subdivisions should be local government. <p>At the strategic planning stage proponents should consider route alignment for a new road or railway that maximises separation distances from existing or future noise-sensitive land uses is critical to achieving overall noise management outcomes. The planning and design should also consider the likely hours of operation of those routes, for example whether they will carry increased numbers of freight vehicles during night periods. Natural ground topography can also be used to better shield the transport corridor. Cuttings, with a finished surface below natural ground level, can be significantly quieter and improve the effective height of nearby noise screening walls.</p> <p>Acquiring or preserving adequate space in the corridor reserve is important to ensure that suitable set-back distances to receivers can be achieved and that, if necessary, bunds and barriers can be constructed close to either the source or receiver, but preferably closer to the source.</p> <p>In the vicinity of transit stations and precincts, non-noise-sensitive land uses such as commercial buildings, including mixed use developments, community and recreational facilities will help to facilitate a self-contained walkable neighbourhood that can support public transport and reduce car dependence.</p> <p>Along freight corridors, service commercial and industrial activity would be more appropriate and would benefit from proximity to transport links. Establishment and maintenance of land along transport corridors for non-noise-sensitive development is achievable through the designation of appropriate land use zones in local planning schemes.</p> <p>For locations where land zoned for residential purposes abuts or is in close proximity to a transport corridor, opportunities for non-noise-sensitive development are more limited but do exist. Drainage corridors and community facilities are examples of non-noise-sensitive development that could be located along transport corridors. If residential development is unavoidable, consideration should be given to the siting and layout of dwellings and form particularly of multiple dwellings, which are built at a scale that is more likely to make mitigation measures more economically feasible.</p>		<p>to mitigate noise through the use of architectural features and/or earth bunds that also act as noise walls.</p> <p>Alternative land use zones that do not provide for noise sensitive development and/or noise sensitive development at very low densities, such as rural and rural residential should also be encouraged.</p> <p>Research undertaken by the City of Cockburn, LG Acoustics and PTA demonstrated that the R30 density is likely to result in a typical built form outcome that provides a contiguous barrier or secondary noise wall to subsequent rows of development.</p> <p>Refer Figure 5 in Section 6.2 of this report for a comparison of the typical R20, R30, R60 and R100 built form and noise mitigation outcomes.</p>
<p>4.2</p>	<p>Noise Walls:</p> <p>Where a subdivision or development backs onto a major transport corridor and from which access is not permitted, it is normal practice to provide a continuous wall along the property boundary. Noise walls – also referred to as noise screens and barriers – are a solid wall or fence designed to reduce airborne noise. In this context, ‘walls’ usually refer to heavy or primary walls immediately adjacent to transport infrastructure. Fences usually refer to lighter and shorter structures located on residential lot boundaries.</p> <p>Noise walls used near Perth major roads generally reduce transport noise (LAeq) levels by between 5dB and 10dB, depending on the design (materials, density, height and other such factors) of the barrier and the topography of the site. Reducing noise by more than this with a wall is usually very difficult and not economical.</p> <p>Low noise walls, that is those around two metres high, should be used with high caution when used in close proximity to transport infrastructure. While low barriers may be effective at reducing noise from sources close to the ground, such as noise from the wheels of passenger cars or freight wagons, they are likely to have no effect on elevated noise sources such as exhaust discharges from trucks or locomotives.</p>	<p>-</p>	<p>-</p>

<p>F8</p>	 <p>Figure 8: Effect of a noise barrier on the path of noise</p>	<p>-</p>	<p>-</p>
<p>4.2.1</p>	<p>Positioning: The most effective place to position a noise wall is generally as close as possible to the road or railway, as this will tend to reduce the overall height of the wall required to attenuate traffic noise. However, construction of such a barrier is usually limited to transport infrastructure providers who operate within the province of the road or railway reserve.</p> <p>Figure 9 depicts that to minimise the transmission of noise around the ends of a transport noise barrier, it should generally be long enough to subtend an angle of 160 degrees from the receiver to the road or railway. This results in a barrier with a total length of about eight times the distance from receiver to barrier. The length of the barrier can be effectively reduced by moving the barrier closer to the receiver or by bending the ends of the barrier away from the road or railway.</p> <p>Figure 10 depicts that overlapping barriers can be used to suit pedestrian walkways, egress points or service roads.</p>	<p>This isn't always true.</p> <p>Where a residence is higher than a road/railway, it is better to build a wall as close as possible to the residence.</p> <p>Where the road or railway is elevated, then as close to the road or railway is preferable.</p> <p>Where the land is flat, either as close to the road/railway or residence is effective, with a wall neither close to the noise source or residence being the least effective.</p>	<p>-</p>
<p>F9</p>	 <p>Figure 9: Reduction of barrier length through end treatment</p>	<p>-</p>	<p>-</p>

<p>F10</p>		<p>4 x is overkill but as this is just for guidance is ok.</p>	<p>-</p>
<p>4.2.2</p>	<p>Materials: Noise walls must be continuously airtight or without gaps but can be made from a range of materials including precast concrete panels, brickwork, limestone blocks, concrete blockwork, timber, transparent acrylic, fibre cement, recycled plastic, and metal sheeting.</p> <p>It is generally recommended that walls in close proximity to transport noise have a minimum surface density of at least 15 kilograms per square metre to effectively reduce the noise passing through the barrier. This surface density is readily achieved with masonry or timber walls which meet relevant structural/wind-loading requirements. Heavier walls do not necessarily perform better since at this point the dominant noise path is probably over the top of the wall.</p> <p>Lightweight fences such as post and rail and sheet steel are not substitutes for noise walls but provide some benefit for heights up to two metres and locations immediately adjacent to outdoor living areas and ground floor openings to habitable rooms. Lightweight materials may be sheeted on both sides of supports to form a double layer construction for comparable performance and planks or sheeting must be tight fitting and overlaid by a minimum of 30 millimetres, with no gaps between materials or between the base of the fence and the ground.</p>	<p>-</p>	<p>-</p>
<p>4.2.3</p>	<p>Reducing Visual Impacts: Often the strongest resistance to implementing noise walls is in relation to their appearance. The design should consider scale, proportion, deliberate use and/or variation of:</p> <ul style="list-style-type: none"> ▪ colour; ▪ texture; ▪ pattern; ▪ transparency; ▪ height; ▪ materials; ▪ non-linear forms; and ▪ lighting <p>to improve the aesthetics of the noise wall. The design should consider the local character taking account of the urban fabric and natural, historic and cultural context. In some cases it may also be appropriate to integrate the noise wall design with an entrance statement or public art. Where practical planting can assist with breaking down the scale of a noise wall by reducing its visual dominance, which is more critical on the receiver side of the transport noise barrier.</p> <p>Figure 11 shows the use of transparent viewing panels, textured surfaces and planting to reduce the visual impact of noise walls and Figure 12 shows how block work, planting and the incorporation of other pedestrian elements give a noise wall a more human scale.</p>	<p>-</p>	<p>-</p>
<p>4.3</p>	<p>Earth Mounds/Bunds: Landscaped earth mounds or bunds can provide benefits in terms of natural landscape values and good visual screening where there is fill and space available, for example in rural areas. However they are generally not suitable in urban areas as they require large footprints. They also attract ongoing maintenance costs for weeding, erosion, litter, fire prevention, and may need structural retaining of the soil to enable steeper vertical slopes to bring the bund closer to the transport corridor, or to enable the retention of mature trees on lower slopes.</p> <p>Bunds will often need to be built slightly higher than an equivalent vertical wall because the top of the bund cannot be placed as close to the noise source and requires significant horizontal spacing. For example, a two-metre high unreinforced earth bund requires approximately 17 metres of horizontal space; for every metre of additional height, approximately six metres of additional horizontal space is needed.</p>	<p>-</p>	<p>-</p>

- 4.4** Building Design and Configuration:
Acoustic design to mitigate noise for single and multi-storey buildings generally recommend:
- positioning noise-sensitive spaces such as bedroom and living areas away from noise source and less noise sensitive spaces, such as the garage, bathrooms and laundry, closer to the noise source (Figure 13);
 - private and communal open space located furthest away from the noise source, preferably screened by the building itself;
 - use of podiums and extended facade elements to provide useful shielding of floors above and provide distance offset (Figure 14);
 - designing balustrades to be continuous without gaps to shield noise sources below;
 - fully enclosing balconies with operable windows to create winter gardens;
 - applying sound-absorptive/diffusive elements to the underside of balcony ceilings (soffit) to reduce reflected sound into the dwelling;
 - avoiding designs and configurations which 'collect' and 'focus' noise (Figure 15).

Refer to *Draft State Planning Policy 7.3 Apartment Design* for more detailed guidance on built form design for multi-storey buildings.

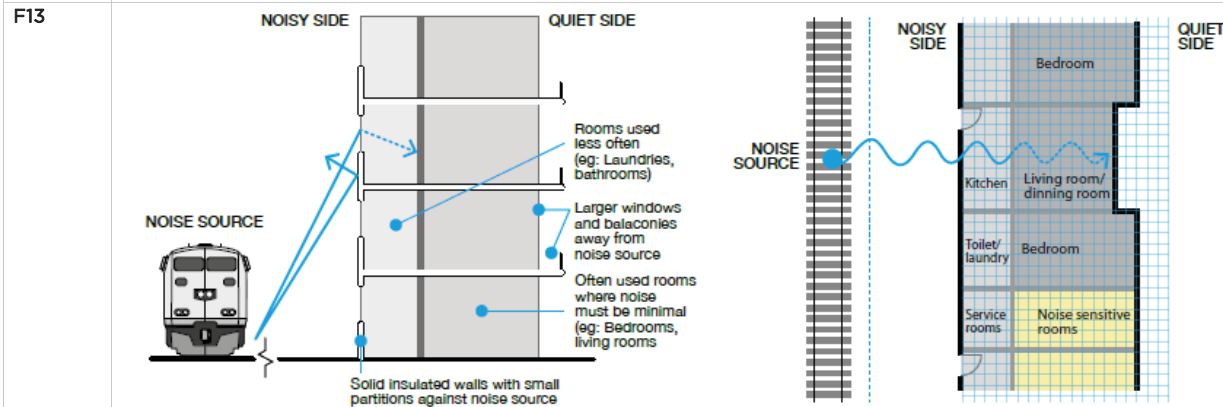


Figure 13: Locating noise-sensitive rooms away from the noise source

F14

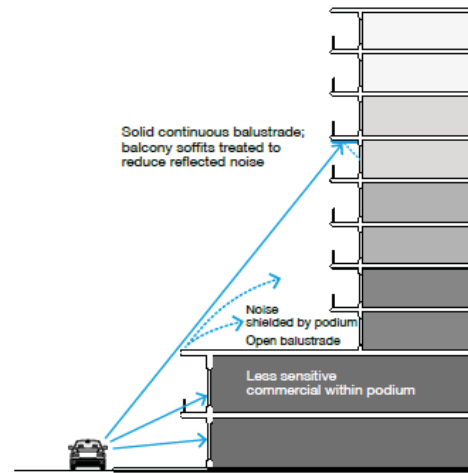


Figure 14: Shielding effects of commercial podium developments

F15

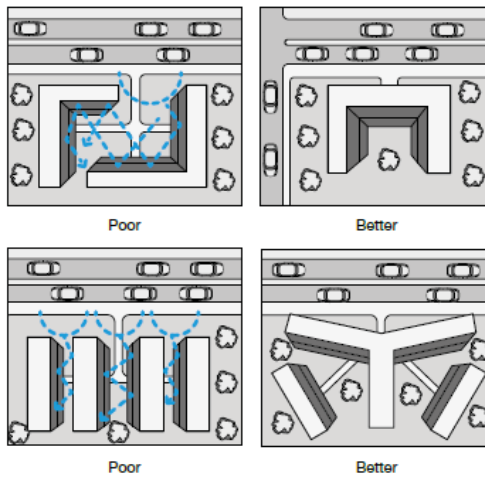


Figure 15: Acoustic design for the effective orientation of buildings in transport noise zones

4.5

Quiet House Requirements:
Where outdoor and indoor noise levels received by a noise-sensitive land use and/or development exceed the Policy's noise criteria, implementation of quiet house requirements (Table 3) is an acceptable solution.

Quiet house acoustic design aims to minimise the extent of noise insulation needed to meet the indoor noise level standards and provide for at least one protected outdoor living.

Table 3 also introduces several new terms defined below and illustrated in Figure 16:

- 'Facing' the transport corridor (red): Any part of a building facade is 'facing' the transport corridor if any straight line drawn perpendicular (at a 90 degree angle) to its nearest road lane or railway line intersects that part of the façade without obstruction (ignoring any fence).
- 'Side on' to transport corridor (blue): Any part of a building facade that is not 'facing' is 'side on' to the transport

The FLCWA recommends the adoption of the LG Acoustic quiet house design packages for freight rail noise mitigation.

corridor if any straight line, at any angle, can be drawn from it to intersect the nearest road lane or railway line without obstruction (ignoring any fence).

- 'Opposite' to transport corridor (green): Neither 'side on' nor 'facing', as defined above.

The most common approaches to acoustic treatment of a building are providing mechanical ventilation or air conditioning so windows can remain closed; providing acceptable glazing thicknesses (refer to Figure 17); and improving insulation to the roof and above-ceiling space.

A mechanical ventilation system is usually required to allow windows to be closed when quiet indoor conditions are required. Mechanical ventilation systems need to comply with AS 1668.2 - The use of mechanical ventilation and air-conditioning in buildings and natural ventilation arrangements of F4.6 and F4.7 of Volume One and 3.8.5.2 of Volume Two of the National Construction Code.

F16

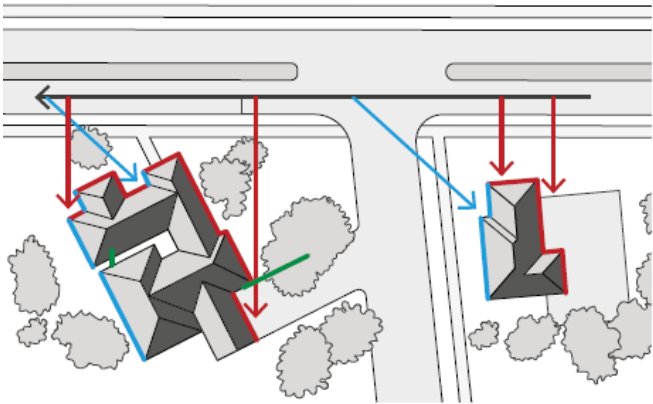


Figure 16: Determining building face orientation



F17

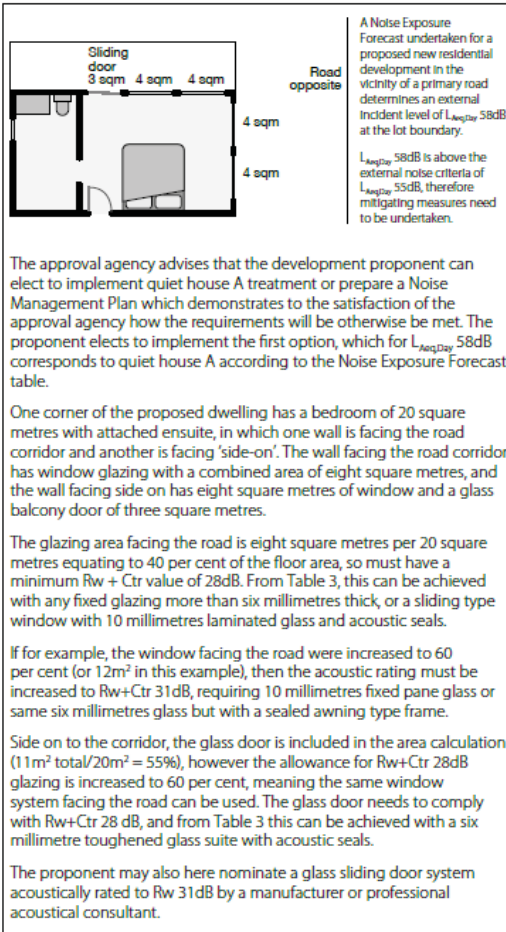


Figure 17: Example of determining acceptable treatment glazing



T3

Table 3: Quiet house requirements

Exposure Category	Orientation to corridor	Acoustic rating and example construction				
		Walls	Windows / external doors	Roof and ceiling	Outdoor living area	
A Quiet House A	Facing	Bedrooms and indoor living and work areas to Rw+Cw 45dB • One row of 120mm stud at 600mm centres with: - 120mm plasterboard or 120mm Gypsum cement plaster on 120mm Gypsum cement plasterboard or one layer of 120mm board (solid facing) to the outside of the studs, and - 20mm glass wool (2.8kg/m³) or 20mm polystyrene (2.8kg/m³) insulation, positioned between the studs, and - Two layers of 120mm fire-retardant grade plasterboard fixed to the inside face of the studs. • Single leaf of 120mm thick masonry with 120mm cement render on each face • Double brick, two leaves of 120mm clay brick masonry with a 20mm cavity between leaves. • 200mm glass wool (2.8kg/m³) or 200mm polystyrene (2.8kg/m³) cavity insulation • 200mm fire-retardant grade plasterboard fixed to the inside face of the masonry. • Double brick, two leaves of 120mm clay brick masonry with a 20mm cavity between leaves and 200mm glass wool (2.8kg/m³) or 200mm polystyrene (2.8kg/m³) cavity insulation	Bedrooms to Rw+Cw 28dB , total glazing area up to 40% of room floor area (Rw+Cw 28dB 40%) (Rw+Cw 24dB 40%) • Fully glazed longest door with certified low E glass and frame including seals and frame glass, and/or • Glazed sliding door with 120mm glass Indoor living and work areas to Rw+Cw 25dB , total glazing area limited to 40% of room floor area (Rw+Cw 20dB 40%) (Rw+Cw 18dB 40%) • Fully glazed longest door with certified low E glass and frame including seals and frame glass, and/or • Glazed sliding door with 120mm glass External doors other than glass doors to Rw+Cw 26dB • 200mm solid core timber frame and door, with triple glazed low E glass and frame system including seals • Glazed sliding door with 120mm glass	To Rw+Cw 15dB • Concrete or terrazzo tile or solid stone with backing and at least 100mm downward ceiling • 200mm downward ceiling	Outdoor living area • A hard one surface being area located on the opposite side of the building from the transport corridor or from any ground level surface being area covered using a solid continuous floor to their structure of minimum 2 metres height above ground level	Mechanical ventilation air conditioning • Mechanical systems require appropriate sealing air vents to allow cross flow. • Redundant sound systems needs to be designed to achieve high air ventilation requirements. • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of the air conditioning system. • Opening such as doors, vents and air vents must be acoustically treated, except where the building with facing away from the corridor where practicable
		Side on	No requirements	Rw+Cw may be 1dB less, or more W area increased by 20%		
		Opposite	No requirements			
B Quiet House B	Facing	Bedrooms and indoor living and work areas to Rw+Cw 50dB • Single leaf of 120mm clay brick masonry with: - A row of 120mm x 200mm timber studs at 600mm stud at 600mm centres; - A cavity of 20mm between leaves, - 20mm glass wool (2.8kg/m³) or 20mm polystyrene (2.8kg/m³) insulation between studs, and - The layer of 120mm plasterboard fixed to the inside face • Single leaf of 120mm thick masonry with 120mm cement render on each face • 120mm thick solid concrete panel or 200mm thick concrete panel with one layer of 120mm plasterboard or 120mm cement render on each face • Double brick, two leaves of 120mm clay brick masonry with a 20mm cavity between leaves. • 200mm glass wool (2.8kg/m³) or 200mm polystyrene (2.8kg/m³) cavity insulation • 200mm fire-retardant grade plasterboard fixed to the inside face of the masonry. • Double brick, two leaves of 120mm clay brick masonry with a 20mm cavity between leaves and 200mm glass wool (2.8kg/m³) or 200mm polystyrene (2.8kg/m³) cavity insulation	Bedrooms to Rw+Cw 28dB , total glazing area up to 40% of room floor area (Rw+Cw 28dB 40%) (Rw+Cw 24dB 40%) • Fully glazed longest door with certified low E glass and frame including seals and 200mm glass • Fixed sets, window or curtain window with single pane glazing to the 120mm low E glass or 120mm 200mm double insulated glass • As per Quiet House A example above External doors other than glass doors to Rw+Cw 26dB • As per Quiet House A example above	To Rw+Cw 15dB • Concrete or terrazzo tile or solid stone with backing and at least 100mm downward ceiling • 200mm downward ceiling	Outdoor living area • A hard one surface being area located on the opposite side of the building from the transport corridor or from any ground level surface being area covered using a solid continuous floor or other structure of minimum 2 metres height above ground level	Mechanical ventilation air conditioning • Mechanical systems require appropriate sealing air vents to allow cross flow. • Redundant sound systems needs to be designed to achieve high air ventilation requirements. • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of the air conditioning system. • Opening such as doors, vents and air vents must be acoustically treated, except where the building with facing away from the corridor where practicable
		Side on	No requirements	Rw+Cw may be 1dB less, or more W area increased by 20%		
		Opposite	As per Quiet House A Side on			
C Quiet House C	Facing	Bedrooms and indoor living and work areas to Rw+Cw 50dB • As per Quiet House B example above	Bedrooms to Rw+Cw 24dB , total glazing area limited to 40% of room floor area (Rw+Cw 20dB 40%) (Rw+Cw 18dB 40%) • Fixed sets, window or curtain window with single pane glazing to the 120mm low E glass or 120mm 200mm double insulated glass • As per Quiet House B example above External doors other than glass doors to Rw+Cw 26dB • 200mm solid core timber frame and door (solid facing) with glass inserts and frame system, with triple glazed low E glass and frame system including seals • 120mm solid core timber frame and door, with triple glazed low E glass and frame system including seals • 120mm solid core timber frame and door, with triple glazed low E glass and frame system including seals	To Rw+Cw 15dB • 2 layers of 200mm plasterboard • Concrete or terrazzo tile or solid stone with backing and at least 100mm downward ceiling • 200mm downward ceiling • 200mm downward ceiling • 200mm downward ceiling	Outdoor living area • A hard one surface being area located on the opposite side of the building from the transport corridor	Mechanical ventilation air conditioning • Mechanical systems require appropriate sealing air vents to allow cross flow. • Redundant sound systems needs to be designed to achieve high air ventilation requirements. • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of the air conditioning system. • Opening such as doors, vents and air vents must be acoustically treated, except where the building with facing away from the corridor where practicable
		Side on	No requirements	Rw+Cw may be 1dB less, or more W area increased by 20%		
		Opposite	As per Quiet House A Facing			

Footnotes:
 • The airborne weighted sound reduction index (Rw) and traffic contribution (Tc) are published by manufacturers and can be determined by a specialist acoustician or measured in accordance with AS/NZS 1717.1. Night Time Tc values are greater sound reduction. All values are minimum Rw+Cw (dB).
 • Example construction for different external wall ratings of Rw+Cw 45dB and 50dB are provided and are listed within Specification 1.1, or Volume 1 Part 1 of the National Construction Code. These values are based on the insulation and ceiling of joints and penetrations in accordance with Specification 1.1.2.
 • Windows and external door sound reduction values provided are based on the provision of suitable acoustic seals to prevent leakage. To comply with the above ratings, all external glass windows and doors should comply with Requirements A, B and C. Must have the following:
 - Operable windows and external doors must have a seal to prevent air infiltration. Windows must edge and door must have a drip seal to prevent air leakage when closed.
 - Within doors or frame framing, glazing must be set and installed using an airtight arrangement of non-framing gaskets, with upper gasketing gasket and/or glazing gasket, as reflected by manufacturer or approved person that the construction system is to be installed in. The relevant Rw+Cw value.
 • In this context, a seal is foam or silicon based rubber compatible with the sealant and with sealant to be installed on the face. Sealant is a gasket made without this seal included or not allowed.
 • Sealing effectiveness can be measured, measured as roughness along gaps.
 • Any penetration in a part of the building envelope must be acoustically treated or sealed to degrade the performance of the building envelope, affected. Most penetrations in external walls such as doors, cables or ducts can be sealed through caulking gaps with non-hardening mastic or suitable mastic.
 • No requirements for other noise areas other than bedrooms and indoor living & work areas.

As discussed in T2, the external noise levels where the Packages apply has shifted but this is not considered justified unless a particular study has been undertaken.

It is recommended that as a minimum, concrete or clay roof tiles be nominated in Packages B & C where the noise source is freight trains in order to control low frequency noise. Without this, the internal noise criteria may not be achieved.

4.6

At the Source (On-Corridor):
 Management of noise at its source (known as 'at-source or, more specifically for road and railway noise, 'on-corridor' is beyond the scope of the planning system As such, effective mitigation of road and railway transport noise is reliant on measures that minimise the generation and emission of noise.

Controlling noise at its source is often the most cost-effective way to minimise noise impacts as part of the planning and design of new road and railway infrastructure proposals. The key noise mitigation options available to transport infrastructure operators are briefly summarised as follows:

- Design and construction
- Low-noise surfaces. Low-noise road surfaces can be an effective noise mitigation tool. For roads, open graded asphalt can be up to 3dB quieter than standard asphalt pavement types. Chip seal surfaces are noisier. For rail vehicles, noise generated by the wheel/rail interaction is strongly influenced by the design and roughness of the track. Routine maintenance is crucial.
 - Appropriate speeds. Vehicle noise increases with speed and acceleration rates. In noise-sensitive areas, controls which limit speeds and/or heavy acceleration can be an effective form of noise mitigation. For example, traffic noise levels near roundabouts, where vehicles do not need to stop fully are quieter in comparison to stop-controlled intersections. On the other hand, speed humps may increase noise if they are likely to be heavily trafficked or used by commercial vehicles (e.g. noise from loose items).
 - Minimising gradients. Reducing gradients reduces noise from freight vehicles. This can be an effective noise mitigation tool. Because engines work harder and produced more noise to go up gradients, while on steep down gradients, trucks may use engine braking.
 - Eliminating tight rail curves. Rail squeal can be a significant source of noise annoyance and can be eliminated in design by avoiding tight curves (generally defined as less than 600 metres in radius). A less effective option post-construction may be the use of specific trackside lubrication systems.

Refer to the comments contained in Section 6.1.6 of this report.




	<p>Maintenance</p> <ul style="list-style-type: none"> ▪ Investment in new vehicles and rolling stock. Investing in modern road vehicles and railway rolling stock (including locomotives, carriages and wagons) takes advantage of new technologies that improve their operational efficiency and quietness. ▪ Infrastructure maintenance. Track grinding, loco exhaust refurbishment, wheel alignment, track lubrication, brake refurbishment, road surface management. ▪ Monitoring. Collation of complaints data in a centralised repository and the use of monitoring equipment such as noise monitoring cameras allows noise ‘hotspots’ and vehicles or rolling stock requiring targeted maintenance to be identified. <p>Driver behaviour</p> <ul style="list-style-type: none"> ▪ Education. Educating drivers about the importance of responsible driving and vehicle maintenance (particularly for road traffic) can lessen noise impacts. For example, minimising the use of horns (within safety parameters) and minimising the use of compression braking in residential areas through the use of signage and enforcement. ▪ Demand management. Encouragement of alternative routes (i.e. designated freight routes) and alternative transport modes (i.e. public transport) can result in reduced noise levels in areas comprising noise sensitive development. <p>Standards</p> <ul style="list-style-type: none"> ▪ Vehicle and infrastructure standards. New or more stringent vehicle standards or regulations can be used to limit noise emissions from road and rail vehicles. 		
5	Other Considerations	-	-
5.1	<p>Stakeholder Engagement:</p> <p>The management of road and railway transport noise is the shared responsibility of various stakeholders and noise mitigation is most effective when balanced, comprehensive and coordinated action occurs.</p> <p>Proponents should engage with decision-making authorities and any other relevant stakeholders as early as possible where any proposal is located within the Policy’s trigger distance (refer to Table 1 of the Policy).</p> <p>This provides opportunities for early design to minimise the exposure of noise-sensitive land use and/or development to sources of transport noise. Doing so may result in reducing the need for physical barriers, such as noise walls, quiet house requirements and/or notifications on title.</p> <p>Specifically, proponents’ responsibilities include (but are not limited to) the following:</p> <ul style="list-style-type: none"> ▪ Being aware of the road and railway transport noise impacting the subject land, with an understanding that such noise cannot be completely eliminated. ▪ Consulting with the State government transport portfolio, Department of Planning, Lands and Heritage, and/or the local government in relation to strategic planning for the infrastructure ▪ Preparing noise level contour maps or a noise management plan in accordance with the Policy requirements, and in doing so, seeking advice from the Department of Water and Environmental Regulation on technical matters, as required. ▪ Ensuring the initial and ongoing implementation of any noise management plan applying to the subject land. 	-	-
5.2	<p>Monitoring and Evaluating:</p> <p>Monitoring and evaluation is an integral part of the Policy lifecycle and is vital for continuous improvement.</p> <p>The Department of Planning, Lands and Heritage will, on behalf of the Western Australian Planning Commission, monitor the implementation of the Policy and the planning and development outcomes delivered, to determine if outcomes are being achieved as intended.</p> <p>The mapped road and railway corridors to which the Policy applies will be regularly reviewed to ensure the planning of construction of new road and railway corridors or deletion of any road or railway reservations is reflected in the Policy’s mapping. Mapping may also need to be updated to reflect movement per day increases.</p> <p>Future policy review, amendment or changes to the policy’s mapping will be subject to full consultation with relevant stakeholders</p>	-	-
5.3	<p>Vibration:</p> <p>The Policy does not address ground-borne vibration. Vibration is a common emission involving the same physical processes as air-borne noise and the two are interrelated in a complicated manner. Vibration is most commonly associated with freight and passenger railways and at close distances to rail corridors, can cause a loss of amenity to</p>	<p>Vibration is acknowledged as a concern.</p> <p>To avoid having a detailed criteria and the</p>	<p>The FLCWA recommends that the Policy and Guidelines provide guidance on the monitoring, modelling and mitigation of vibration.</p>

	<p>sensitive land uses.</p> <p>Vibration levels are dependent on ground composition and groundwater levels, rail track and rolling stock condition, train speeds and other factors, making it difficult to predict and mitigate. Vibration is best and most cost-effectively addressed 'at-source' through measures including rail track grinding, wheel maintenance or speed restrictions in built up areas.</p> <p>Vibration is challenging and costly to mitigate generally and mitigation options for single detached housing is generally cost prohibitive. Feasible mitigation options do exist for larger scale multi residential development. Industry leaders do assess and if required, mitigate vibration.</p>	<p>like, a best approach is recommended as follows:</p> <ul style="list-style-type: none"> Enforce a buffer distance of 50m to a new noise sensitive building. Development within this distance can only occur with approval from DWER. Any lot with a notification on title due to railway impacts shall include “noise and vibration” in the wording. 	<p>Refer to Section 7.1.4.</p>
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<p>A1</p>	<p>The Noise Exposure Forecast Worksheet and Step-by-Step Guide:</p> <table border="1" data-bbox="215 443 1323 1114"> <tr> <td data-bbox="215 443 696 595"> <p>Step 1: Identify the relevant noise source (road or rail) from SPP 5.4 policy mapping and list in the Noise Exposure Forecast worksheet. If subject site is near multiple mapped corridors, all need to be included in the worksheet.</p> <p>For road vehicle per day data and % heavy vehicle mix information, visit the Main Roads Western Australia Traffic Map website: https://www.mainroads.wa.gov.au/TrafficMap</p> <p>Locate the nearest site for which there is monitoring data and use the most recent vehicle per day and heavy vehicle mix information available. Round up to the nearest vehicle per day line or heavy vehicle mix line to the Noise Exposure Forecast.</p> </td> <td colspan="3" data-bbox="696 443 1323 715"> <p>Site description and summary of proposal</p> </td> </tr> <tr> <td data-bbox="215 595 696 754"> <p>Step 2: Measure the distance from relevant noise source(s) to receptor. The distance is defined as the three dimensional distance between the edge of the nearest road cartage-way at the centreline of the nearest rail track to either:</p> <ul style="list-style-type: none"> • if the position and extent of the noise sensitive building position can be reasonably determined, use meter outside the nearest external facade or opening to a normally occupied space; or • a point which reasonably represents where each future noise-sensitive development could be constructed nearest the transport asset and is within three (3) metres of the lot boundary. <p>Insert measured distances into the Noise Exposure Forecast table.</p> </td> <td data-bbox="696 715 909 842"> <p>1) lot road / rail corridor (as mapped) and VPD/Heavy vehicle mix</p> </td> <td data-bbox="909 715 1122 842"> <p>2) for each corridor, measure the distance to subject site/development</p> </td> <td data-bbox="1122 715 1323 842"> <p>3) Noise Exposure Forecast noise level (dB)/ Exposure category</p> </td> </tr> <tr> <td data-bbox="215 754 696 842"> <p>Step 3: Locate the closest scenario in the Noise Exposure Forecast table (rounding up or down to the closest VPD/Heavy vehicle mix). Identify the forecast noise level (dB) and corresponding exposure category in the Noise Exposure Forecast table (rounding to the nearest noise level (dB) where measured distance is between intervals) and put this into the worksheet.</p> </td> <td colspan="3"></td> </tr> <tr> <td data-bbox="215 842 696 954"> <p>Step 4: If the subject site is impacted upon by multiple noise sources, use the formula in table to arrive at a single noise level. Use Noise Exposure Forecast table to identify a single relevant noise exposure category and corresponding policy requirements (Noise Management Plan required, quiet hours requirements or no further measures).</p> </td> <td colspan="3" data-bbox="696 842 1323 954"> <p>4) Where there are multiple road/rail noise sources (4) Add correction if the two highest values in highlighted column (1) above are:</p> <p>all equal or within 1dB of each other = + 3dB;</p> <p>different by 2 or 3dB = + 2dB;</p> <p>different by 4, 5dB = + 1dB</p> </td> </tr> <tr> <td data-bbox="215 954 696 1002"> <p>Step 5: For scenarios with multiple noise sources, add the highest noise source value (column 1) to the correction.</p> </td> <td colspan="3" data-bbox="696 954 1323 1002"> <p>5) Sum of the maximum LAeq value from column (1) and the above correction</p> </td> </tr> <tr> <td data-bbox="215 1002 696 1066"> <p>Step 6: If there is existing development between the subject site and the road or rail corridor (as defined), describe this in the worksheet. It is permissible to drop Adb (approximately one noise exposure category) to account for screening effects.</p> </td> <td colspan="3" data-bbox="696 1002 1323 1066"> <p>6) Screening development? Drop Adb (one Exposure Category if desired)</p> </td> </tr> <tr> <td data-bbox="215 1066 696 1114"> <p>Step 7: Determine final noise level/exposure category and corresponding policy requirements in the Noise Exposure Forecast worksheet, which is to accompany your planning or development application.</p> </td> <td colspan="3" data-bbox="696 1066 1323 1114"> <p>7) Final noise level and Exposure Category</p> </td> </tr> </table>	<p>Step 1: Identify the relevant noise source (road or rail) from SPP 5.4 policy mapping and list in the Noise Exposure Forecast worksheet. If subject site is near multiple mapped corridors, all need to be included in the worksheet.</p> <p>For road vehicle per day data and % heavy vehicle mix information, visit the Main Roads Western Australia Traffic Map website: https://www.mainroads.wa.gov.au/TrafficMap</p> <p>Locate the nearest site for which there is monitoring data and use the most recent vehicle per day and heavy vehicle mix information available. Round up to the nearest vehicle per day line or heavy vehicle mix line to the Noise Exposure Forecast.</p>	<p>Site description and summary of proposal</p>			<p>Step 2: Measure the distance from relevant noise source(s) to receptor. The distance is defined as the three dimensional distance between the edge of the nearest road cartage-way at the centreline of the nearest rail track to either:</p> <ul style="list-style-type: none"> • if the position and extent of the noise sensitive building position can be reasonably determined, use meter outside the nearest external facade or opening to a normally occupied space; or • a point which reasonably represents where each future noise-sensitive development could be constructed nearest the transport asset and is within three (3) metres of the lot boundary. <p>Insert measured distances into the Noise Exposure Forecast table.</p>	<p>1) lot road / rail corridor (as mapped) and VPD/Heavy vehicle mix</p>	<p>2) for each corridor, measure the distance to subject site/development</p>	<p>3) Noise Exposure Forecast noise level (dB)/ Exposure category</p>	<p>Step 3: Locate the closest scenario in the Noise Exposure Forecast table (rounding up or down to the closest VPD/Heavy vehicle mix). Identify the forecast noise level (dB) and corresponding exposure category in the Noise Exposure Forecast table (rounding to the nearest noise level (dB) where measured distance is between intervals) and put this into the worksheet.</p>				<p>Step 4: If the subject site is impacted upon by multiple noise sources, use the formula in table to arrive at a single noise level. Use Noise Exposure Forecast table to identify a single relevant noise exposure category and corresponding policy requirements (Noise Management Plan required, quiet hours requirements or no further measures).</p>	<p>4) Where there are multiple road/rail noise sources (4) Add correction if the two highest values in highlighted column (1) above are:</p> <p>all equal or within 1dB of each other = + 3dB;</p> <p>different by 2 or 3dB = + 2dB;</p> <p>different by 4, 5dB = + 1dB</p>			<p>Step 5: For scenarios with multiple noise sources, add the highest noise source value (column 1) to the correction.</p>	<p>5) Sum of the maximum LAeq value from column (1) and the above correction</p>			<p>Step 6: If there is existing development between the subject site and the road or rail corridor (as defined), describe this in the worksheet. It is permissible to drop Adb (approximately one noise exposure category) to account for screening effects.</p>	<p>6) Screening development? 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<p>Step 1: Identify the relevant noise source (road or rail) from SPP 5.4 policy mapping and list in the Noise Exposure Forecast worksheet. If subject site is near multiple mapped corridors, all need to be included in the worksheet.</p> <p>For road vehicle per day data and % heavy vehicle mix information, visit the Main Roads Western Australia Traffic Map website: https://www.mainroads.wa.gov.au/TrafficMap</p> <p>Locate the nearest site for which there is monitoring data and use the most recent vehicle per day and heavy vehicle mix information available. Round up to the nearest vehicle per day line or heavy vehicle mix line to the Noise Exposure Forecast.</p>	<p>Site description and summary of proposal</p>																														
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<p>A2</p>	<p>Example of a Noise Exposure Forecast Worksheet:</p> <div style="border: 1px solid black; padding: 5px;"> <p>A new residential development is proposed near the intersection of Marmion Avenue and Burns Beach Road. Being residential, it is noise-sensitive. Both roads are secondary roads (Category 2).</p>  <p>The closest carriageway edges of Marmion Avenue is approximately 44 metres, and approximately 80 metres for Burns Beach Road.</p> <p>According to most recent traffic volume data, Marmion Avenue carries 46,393 vehicles a day, and Burns Beach Road carries 27,249 vehicles a day.</p> <p>From the Noise Exposure Forecast table, the contribution from Burns Beach Road (secondary road, 25,000 vehicles, 80 metres distant) is estimated as $L_{Aeq,25hr}$ 58dB. The Marmion Avenue contribution (secondary road, more than 35,000 vehicles per day, 44 metres distant) is estimated as $L_{Aeq,25hr}$ 62dB. These two values are 4dB different, so a cumulative correction of +1dB is added. Therefore the highest value of 62dB + 1dB in corrections is $L_{Aeq,25hr}$ 63dB.</p> <p>In this scenario, there is a single residential house which qualifies as screening development. If desired, a -4dB reduction (one exposure category) can be applied. After applying this reduction, the final noise level is 60dB and exposure category B.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">1) list road/rail corridors (as mapped) and VPD/ heavy vehicle mix</th> <th style="width: 33%;">2) for each corridor, measure the distance to subject site/development</th> <th style="width: 33%;">3) Noise Exposure Forecast noise level (dB)/ Exposure category</th> </tr> </thead> <tbody> <tr> <td>Marmion Avenue 46,393 8%</td> <td>45 metres</td> <td>62dB Exposure Category B</td> </tr> <tr> <td>Burns Beach Road 27,249 8%</td> <td>80 metres</td> <td>58 Exposure category B</td> </tr> <tr> <td colspan="2">4) Where there are multiple roads/rail noise sources: (4) Add correction if the two highest values in highlighted column (3) above are: - dB equal or within 1dB of each other = +3dB; - different by 2 or 3dB = +2dB, - different by 4-7dB = +1dB</td> <td>+1dB</td> </tr> <tr> <td colspan="2">5) Sum of the maximum LAeq value from column 3) and the above correction</td> <td>63dB Exposure Category C</td> </tr> <tr> <td colspan="2">6) Screening development? Drop 4dB (one Exposure Category if desired)</td> <td>Residential house -4dB</td> </tr> <tr> <td colspan="2">7) Final noise level and Exposure Category</td> <td>59 dB Exposure Category B</td> </tr> </tbody> </table> </div>	1) list road/rail corridors (as mapped) and VPD/ heavy vehicle mix	2) for each corridor, measure the distance to subject site/development	3) Noise Exposure Forecast noise level (dB)/ Exposure category	Marmion Avenue 46,393 8%	45 metres	62dB Exposure Category B	Burns Beach Road 27,249 8%	80 metres	58 Exposure category B	4) Where there are multiple roads/rail noise sources: (4) Add correction if the two highest values in highlighted column (3) above are: - dB equal or within 1dB of each other = +3dB; - different by 2 or 3dB = +2dB, - different by 4-7dB = +1dB		+1dB	5) Sum of the maximum LAeq value from column 3) and the above correction		63dB Exposure Category C	6) Screening development? Drop 4dB (one Exposure Category if desired)		Residential house -4dB	7) Final noise level and Exposure Category		59 dB Exposure Category B		
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<p>A3</p>	<p>Guidelines for Measurements and On-Site Verification: Measurements and/or on-site verification may be required as part of any Noise Management Plan. Generally, these should be undertaken in accordance with relevant standards and the associated reporting must document:</p> <ul style="list-style-type: none"> ▪ equipment/instruments used ▪ measurement duration ▪ measurement locations ▪ equipment settings ▪ calibration details ▪ ambient/background activities/ measurements (if indicated) ▪ relevant weather conditions (wind speed and direction) ▪ uncertainty of measurement ▪ operational conditions of noise source(s) ▪ adjustments made to measured levels <p>(e.g. facade correction if free field) Several of these aspects are discussed in the following table.</p>																							
<p>A3.ED</p>	<p>Equipment Details: Noise measurements should follow the procedures set by <i>Australian Standard 2702-1984 and Australian Standard 2377-2002</i> (Appendix 7). Variations to these standards may be acceptable, provided that: they are grounded by professional experience; are reasonably justified; and that any implications are addressed in the measurement report.</p> <p>Sound-level meters need to be of the ‘integrating averaging’ type to measure the LAeq values for comparison with the Policy’s criteria. The meter must have a Class 1 or Class 2 level of precision, in accordance with <i>AS IEC 61672</i> (usually marked on the body of the instrument). Sound-level meters must be checked for accuracy in the field using a calibrator. This provides a known sound level for reference. The calibrator must be compliant with <i>AS IEC 60942</i> for Class 1 and Class 2 calibrators. The meter must be checked before and after each measurement period, with a drift in sensitivity not to exceed + or - 0.5dB.</p> <p>Instruments must be calibrated by a NATA-accredited laboratory within the previous two years.</p> <p>Attended measurements are always preferable; however traffic volumes change on a daily and weekly basis. In such situations, unattended noise data loggers, or noise monitors, are often used with post-measurement analysis of the data</p>																							



	<p>used to verify the noise results.</p> <p>Where a competent person considers that a recorded value from an unattended noise logger has been influenced by a noise source other than traffic, they are to exercise their professional judgment and adjust or omit the abnormal measurement value.</p>		
A3.GP	<p>General Procedures:</p> <p>Where a noise-sensitive building exists, for example, an existing residence adjoining a major transport corridor where a new major road or railway is proposed, the microphone is to be located one metre from the outside of the most exposed, habitable facade of that building.</p> <p>The microphone shall be at least one metre from any corner of the building, and 1.4 metres (+/-0.2 metres) above ground floor level.</p> <p>The microphone shall not be located in front of any door or window that can be opened, or, where this is not practicable, the door or window shall not be opened during the measurement period.</p> <p>Where no building exists, the microphone shall be located at least 3.5 metres from a reflecting surface (other than the ground plane) and a +2.5dB correction should be added to the measured noise levels to account for facade reflection.</p> <p>Where transport noise measurements are taken indoors, the microphone should be placed at least one metre from any window, door or wall surface and ideally in the centre of the room. All windows and doors must be closed during the measurement period. Indoor transport noise levels should be measured only in habitable spaces.</p> <p>A photograph should be taken to show the location of measurement location for future, repeat measurements.</p> <p>The monitoring equipment shall be capable of recording at least the LAeq parameter. It may also be useful for the equipment to be capable of measuring LAm_{ax}, LA1, LA10 and LA90 parameters.</p> <p>The monitoring equipment should be set to record using the slow time weighting.</p> <p>The number of measurement locations is to be determined on a project-by-project basis by a competent person. Refer to Austroads <i>Modelling, Measuring and Mitigating Road Traffic Noise</i> for guidance on the minimum number of noise monitoring locations including:</p> <ul style="list-style-type: none"> -- Sparsely settled rural areas: About 20% of the residence within 500m of the alignment. --Rural townships: About 10% of the residences nearest the alignment. --Built-up areas: At least one site at each major crossroad and at least one site between crossroads. 	-	-
A3.MD	<p>Measurement Duration:</p> <ul style="list-style-type: none"> ▪ The duration of the measurement needs to account for the likely change in noise levels in various time periods each week. Consider the possible change in peak hour traffic to evening periods, freight route schedules, and changes in patterns between weekdays and weekends or public holidays. A deployment period of one week is generally sufficient, so that if weather or other environmental behaviour affects the result, at least three representative measurements are usually obtained in each time period. ▪ The measurement period should not be less than 15 minutes and not more than one hour, to minimise data loss due to short-term noise events while capturing representative periods of transport activity. ▪ For major roads, a minimum of three ‘valid’ 24-hour weekday periods must be obtained for unattended measurements. This may require the monitoring equipment to be left for longer periods, depending on conditions. For railways, the measurement period should cover a sufficient number of train passes to obtain an acceptable level of repeatability. ▪ Noise measurements during school holidays, public holidays or weekends are generally not to be used for road and passenger rail traffic (freight rail may not change during these periods). Similarly, monitoring should be discarded during times of abnormal traffic flow (for example, during construction works). 	<p>Third dot point requires a sufficient number of train passes. Appendix 6 calls for 60 train pass-bys. The latter may not be practicable in all instances for low usage railways. It is recommended that an approach of minimum 1-week of monitoring or minimum 60 train pass-bys be adopted.</p> <p>A methodology, in particular for freight trains which vary significantly in noise level, should be detailed to avoid inconsistencies between consultants. For instance, a data set measured in Bibra Lake can be analysed in 5 different ways and provide a 6 dB variation in the deemed noise level. We would recommend a 90th percentile value be used. Refer LG Acoustics report Reference: 17104170-01 for greater detail)</p>	-
A3.WC	<p>Weather Conditions:</p> <p>The validity of data is mainly dependent on weather conditions. Acceptable weather conditions are defined by Main Roads WA and have been adopted for the purpose of this guidance. They are as follows:</p>	-	-



	<ul style="list-style-type: none"> ▪ Road or rail surface is to be dry. ▪ Source-receiver distance up to 20 metres: <ul style="list-style-type: none"> -- variable wind during a 24-hour period up to 19 kilometres per hour; or calm conditions, or continuous positive wind up to 19 kilometres per hour. ▪ Source-receiver distance greater than 20 metres: <ul style="list-style-type: none"> -- variable wind during a 24-hour period up to 19 kilometres per hour; or calm conditions, or continuous positive wind up to 11 kilometres per hour. ▪ Unacceptable weather conditions will not necessarily invalidate the measurements but will require comment. ▪ Where adjustments are made to hourly measured data, based on professional judgment, this must be highlighted. A reasonable estimate of an affected one-hour period can normally be obtained by taking the average of the hourly values on either side. ▪ Hourly and averaged data, where tabulated, can be shown to one decimal place (up to three significant figures); however, values for comparison with criteria are to be rounded to the nearest whole number. 		
A4	<p>Noise Assessment Methodology: The methodology for the assessment and stated assumptions must be reported as part of a Noise Management Plan.</p>	-	-
A4.MMP	<p>Measurement and Modelling Prediction: Noise Management Plans are typically based on either noise measurement or noise modelling prediction. The level of transport noise at a particular point in relation to the noise source can be determined through a combination of field measurement and modelling prediction.</p> <p>Noise measurements are required if the transport corridor already exists, as they are more representative of conditions specific to the site. Some corrections will still be needed to forecast future noise levels or assess the performance of any scheduled measures.</p> <p>Noise prediction models are appropriate where transport corridors are not yet operating at their forecast capacity; for proposed new or upgraded road or railway infrastructure; or to predict noise levels across a proposed development area.</p> <p>The Noise Management Plan must include details on:</p> <ul style="list-style-type: none"> ▪ current traffic volumes and type of vehicles (that is, the percentage of heavy vehicles or locomotive class); ▪ forecasted changes; ▪ traffic speeds; and ▪ road surface/track configuration and condition. <p>The Noise Management Plan must clearly state what assumptions are being used for the modelling predictions and outline any verification procedures or model calibration.</p> <p>In relation to noise-sensitive land use and/or developments, noise predictions can delineate the areas likely to exceed the Policy’s noise criteria, and evaluate various noise-mitigation options separately.</p>	-	As highlighted in Sections 6 and 7 of this report, the practical implementation of the current and draft policies fails through a reliance on the proponent obtaining current and forecast traffic volumes to inform noise management plans.
A4.AM	<p>Acceptable Methodologies: The general acceptable methodologies for noise prediction models are as follows:</p> <ul style="list-style-type: none"> ▪ Predicted traffic noise levels should be reported only to the nearest whole number. ▪ Various industry traffic noise prediction models produce overall single-number noise emission results, however where indoor noise levels are to be predicted, assessment should include octave band analysis of noise sources, diffraction/shielding effects and the varying sound reduction through building elements. ▪ Cadastral and topographical data inputs to a predictive noise model can be obtained from the Landgate website: www.landgate.wa.gov.au/ ▪ Future traffic levels can be based upon a logarithmic relationship which assumes incoherent addition of sound pressures, that is $\text{Change (dB)} = 10 \log_{10}(\text{future traffic}/\text{existing})$ or suitable modelling appropriate to Austroads traffic engineering guidelines. ▪ The cumulative impact from existing road and railway noise sources should be included in the assessment for new noise-sensitive land use and/or development, but not for new transport infrastructure. ▪ Under the Policy, the noise criteria for new and upgraded road or railway infrastructure proposals apply to first two floors; however for informative purposes, Noise Management Plans can include analysis for receivers at all anticipated floor levels. ▪ For the purpose of assessing freight trains only, day and night noise levels must be assessed on the basis of each period having a minimum of one train per hour or the actual number of train movements per day, whichever is the higher. ▪ Estimates of LAeq(night) values may be made on the basis of a maximum train pass-by noise level (LAMaxS) or 	In relation to forecasting noise from freight trains it is recommended an allowance of 1 train movement per hour be assumed or a 2 dB increase, whichever is the greater. This will provide greater protection for freight railway corridors where existing movements are already close to 1 train per hour.	-



	<p>average sound exposure level (LAeq). The following table specific acceptable methodologies.</p>		
<p>A4.NC</p>	<p>Numerical Codes: Road traffic may be assessed using the UK Calculation of Road Traffic Noise (CoRTN) algorithm which yields LA10,18hour values, provided a suitable conversions to Australian conditions are made to obtain the appropriate LAeq,Day (LAeq,16hour) or LAeq,Night (LAeq,8hour) values as specified in the Policy.</p> <p>It is preferable to undertake direct noise measurements of the roadway being investigated to determine the existing differences between relevant noise parameters. Where this is not possible, reference should be made to the DEFRA publication <i>Method for Converting the UK Road Traffic Noise Index LA10,18 hour to the EU Noise Indices for Road Noise Mapping</i>, which provides conversion formulae.</p> <p>Also, where traffic noise measurement data are unavailable and the road traffic noise model cannot be calibrated against existing noise conditions, it is standard practice to apply a further correction of -1.7 dB.</p> <p>Rail traffic may be modelled using the <i>Nordic Rail Prediction Method (Kilde 130-1984)</i> algorithms with appropriate corrections for train class, speeds and local conditions. The algorithms have LAeq,24hour noise prediction outputs, and they can be readily converted to an LAeq,16hour or LAeq,8hour noise level using a logarithmic relationship.</p> <p>ISO9613-2, suitably corrected Harmonoise or Nord2000 algorithms may be used exclusively with neutral wind and stable temperature conditions for environmental attenuation effects for source to receiver distances up to 100 metres.</p> <p>Beyond this distance or alternatively, variance due to environmental meteorological effects should be considered. Reference may be made to guidance on noise modelling provided by the Department of Water and Environmental Regulation.</p>	<p>A comment should be provided to allow alternative algorithms if deemed appropriate by a suitably qualified acoustical consultant.</p> <p>There should be consistency throughout the documents. Preferred is LAeq(Day) and LAeq(Night). Within these same documents it is sometimes written as LAeq,day and LAeq,night or LAeq,16hour and LAeq,8hour.</p>	<p>-</p>
<p>A4.SHRL</p>	<p>Source Heights and Receiver Locations: Unless otherwise determined by a competent person for specific situations, the noise source heights should be as follows2:</p> <ul style="list-style-type: none"> ▪ Passenger vehicles (Austroads Class 1 and 2) +0.5m ▪ Heavy vehicles (Austroads Class 3 and up) – Engine +1.5m ▪ Heavy vehicles (Austroads Class 3 and up) – Exhaust +3.6m ▪ Passenger rail 0 m ▪ Freight rail locomotive +4.0m ▪ Freight rail wagons +0.8m <p>Receiver heights for predictions should be 1.4 metres above floor level.</p> <p>For new or upgrade of road and railway infrastructure proposals, at the most exposed habitable façade3 of existing noise-sensitive premises, ground floor level only.</p> <p>For new noise-sensitive land use and/or development proposals, at the most exposed habitable facade of the proposed buildings, at heights of 1.4 metres above all proposed floor levels.</p>	<p>States that for new of upgrade road/railway, ground floor only requires assessment which whilst preferred, does not align with Table 2 of the Policy.</p>	<p>-</p>
<p>A4.SC</p>	<p>Source Corrections: For rail surface discontinuities or tight curves, the following corrections may be applied to segment exposure (LAe) or maximum LAmxS levels:</p> <ul style="list-style-type: none"> ▪ Mechanical/uneven joint +3dB ▪ Curve radius less than 600m +3dB ▪ Turnout +6dB ▪ Curve radius less than 300m +8dB ▪ Diamond crossing +10dB <p>The above is a basic guide and other corrections for effects such as bridges, brake noise, car bunching, blowers, air compressors and wheel-rail components should be stated.</p> <p>Accepted corrections for various road surfaces are:</p> <ul style="list-style-type: none"> ▪ 14mm chip seal +3.5dB ▪ 10mm chip seal +2.5dB 	<p>-</p>	<p>-</p>

- 5mm chip seal +1.5dB
- Dense graded asphalt 0.0dB
- Novachip -0.2dB
- Stone mastic asphalt -1.5dB
- Open graded asphalt -2.5dB

For the CoRTN algorithms, it is recommended to apply the 'three strings' approach, that is, use three road strings of different heights to represent traffic from passenger vehicles, heavy vehicle engines and exhausts.

For the passenger vehicle, the noise emissions are determined in accordance with the CoRTN algorithms.

For heavy vehicles, noise level corrections of -0.8dB and -8dB are recommended to be applied to the string of engines and exhausts respectively, relative to the source sound power level of heavy vehicles. As such, the noise model can reasonably reflect the difference of noise emissions from heavy vehicle engines and exhausts, and the overall noise emissions from the heavy vehicles in accordance with the CoRTN algorithms remain unchanged.

A4.RC Receiver Conditions:
When predicting transport noise levels immediately outside a facade, a +2.5dB façade correction is to be applied for both road and rail to account for the increase in noise caused by reflections from the facade. Similarly, for internal noise predictions based on a measurement immediately outside a facade, 2.5dB should first be deducted.

A5 Road Traffic Noise Modelling Checklist:

Checklist item	Action	Checklist item	Action	Checklist item	Action
Road traffic input data		Road noise barriers		Noise prediction corrections	
Road name	[insert road name]	Noise barriers	Have noise barriers been modelled as being fully reflective? Y/N	Train noise emissions	Has the assessment described how the following have been calibrated in the rail noise calculations?
	16-hr daytime road traffic volume		If noise barriers have not been modelled as being fully reflective, have absorptive barrier designs been considered? Y/N		The various train classes in use on the rail line
	Percentage of heavy vehicles (daytime)				Train speed km/h
	8-hr night-time road traffic volume				Train length m
	Percentage of heavy vehicles (night-time)				
Road pavement	[insert road pavement surface type]	Environmental inputs		Track features	
Road traffic heights	Have the road emissions sources been modelled at the following heights?	Receivers	Were receiver heights modelled at 1.4 m above floor level? Y/N	Based on the localised track features have the following noise emission corrections been appropriately considered?	
	Light and heavy vehicle tyre-road height at +0.5 m Y/N		Have noise levels been predicted at the most affected facade(s)? Y/N	Mechanical/uneven joints	+3 dB Y/N
	Heavy vehicle engine height at +1.5 m Y/N			Curve radius less than 600 m	+3 dB Y/N
	Heavy vehicle exhaust height at +3.6 m Y/N			Turnout	+6 dB Y/N
Traffic speed	What is the modelled road traffic speed? km/h	Road traffic noise predictions	Have noise levels been predicted at all floors of the development? Y/N	Curve radius less than 300 m	+8 dB Y/N
			Have the noise predictions considered the 20-year planning horizon? Y/N	Diamond crossing	+10 dB Y/N
Noise prediction corrections		Rail traffic input data			If appropriate has the assessment described how other noise sources such as bridges, brake noise, car bunching, blowers and air compressors been accounted for? Y/N
Traffic emission	If using the Calculation of Road Traffic Noise algorithms, have the following corrections been applied?	Rail line name	[insert rail line name]	Receptor facade	Has a +2.5 dB building facade correction been applied? Y/N
	-0.8 dB correction to heavy vehicle engine emission? Y/N		16-hr daytime passenger rail movements	Rail noise barriers	
	-0.8 dB correction to the heavy vehicle exhaust emission? Y/N		16-hr daytime freight rail movements	Noise barriers	Have noise barriers been modelled as being fully reflective? Y/N
Road pavement	Has one of the following road pavement corrections been applied to the tyre/road emission? Y/N		8-hr daytime passenger rail movements		If noise barriers have not been modelled as being fully reflective, have absorptive barrier designs been considered? Y/N
	14 mm chip seal +3.5 dB Y/N	Rail traffic heights	8-hr daytime freight rail movements	Environmental inputs	
	10 mm chip seal +2.5 dB Y/N		Have the rail noise sources been modelled at the following heights? Y/N	Receivers	Were receiver heights modelled at 1.4 m above floor level? Y/N
	5 mm chip seal +1.5 dB Y/N		Passenger and freight trains at 0.5 m above rail height? Y/N		Have noise levels been predicted at the most affected facade(s)? Y/N
	Dense graded asphalt 0.0 dB Y/N		Freight train locomotives at 4.0 m above rail height? Y/N	Rail noise predictions	
	Novachip -0.2 dB Y/N	Rail line speed	What is the modelled rail traffic speed? km/h	Predicted noise levels	Have noise levels been predicted at all floors of the development? Y/N
	Stone mastic asphalt -1.5 dB Y/N				Have the noise predictions considered the 20-year planning horizon? Y/N
	Open graded asphalt -2.5 dB Y/N				
Australian traffic	Has a -1.7 dB Australian Road Research Board study been applied? Y/N				
Receptor facade	Has a +2.5 dB building facade correction been applied? Y/N				

The heading of Appendix 5 should also make reference to rail traffic noise modelling.

A6 Noise Management Plan Content:
This is a guide for the preparation and/or assessment of Noise Management Plans. It is not intended to be a complete list of all issues that should be covered in a Noise Management Plan, as no guide can anticipate all issues that may be relevant to individual proposals.

Noise Management Plan Table of Contents:

A6.1 Executive Summary:

- Scope of work
- Criteria used in the assessment



	<ul style="list-style-type: none"> Statement about compliance Recommended noise mitigation measures (if required) Other recommendations (e.g. further assessment) 		
A6.2	Introduction	-	-
A6.3	Project Description: <ul style="list-style-type: none"> Background history or relevant previous studies Noise issues addressed and commissioned scope of work 	-	-
A6.4	Site Details: <ul style="list-style-type: none"> Location of major transport corridor(s) Noise receiver locations (i.e. existing and proposed future residential areas) Site information including natural and constructed, existing development and surrounding land uses that may affect noise propagation Measurement or prediction locations Maps with site details including north point and scale 	-	-
A6.5	Noise Criteria: <ul style="list-style-type: none"> Outdoor noise criteria (Table 1) - for proposed new or upgraded road and rail infrastructure or for outdoor living areas in proposed noise-sensitive land use and/ or developments Indoor noise criteria (Table 1) - for noise-sensitive land use and/or development proposals (Reference AS/ NZS 2107:2000 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors for non-residential developments) 	-	-
A6.6	<p>Methodology:</p> <p>Acoustic assessments are typically based on either <i>noise measurement</i> or <i>noise modelling prediction</i>. The assessment must include details on all noise modelling input parameters (see below checklists) including the following transport factors:</p> <ul style="list-style-type: none"> Current traffic volumes and type of vehicles (i.e. for road noise, percentage of heavy vehicles of locomotive class; for rail noise, rail car series type (currently A or B series for Perth passenger trains)) Forecast traffic volumes (and basis for estimating future traffic volumes) Horizon year for traffic projections Traffic speeds Road surface/ track configuration and condition (if relevant) <p>Methodology for noise measurement Direct noise measurement is appropriate if the transport corridor already exists, as it is generally more representative of conditions specific to the site. Also for some cases, noise modelling prediction requires on-site verification based on measurements. The noise measurement methodology should detail:</p> <ul style="list-style-type: none"> Equipment/instruments used Measurement duration Measurement locations Equipment settings Calibration details Ambient/background activities/measurements (if indicated) Relevant weather conditions (wind speed and direction, rainfalls) Operational conditions of noise source(s) Adjustments made to measured levels (e.g. façade correction if free field) <p>Methodology for noise modelling prediction:</p> <p>Noise modelling prediction is appropriate where transport corridors are not yet operating at their forecast capacity; for proposed new major road or rail infrastructure; for proposed major redevelopment of major road or rail infrastructure; or to predict noise levels across a proposed development area. The noise prediction methodology should detail:</p> <ul style="list-style-type: none"> Type of computer noise modelling software used (e.g. SoundPlan, CadnaA, etc) Industry recognized prediction codes used (e.g. CoRTN for road noise, Nordic (Kilde Rep 130) for rail noise, etc) Model inputs in relation to noise emissions – number of trains, length, speed, passby noise exposure level (SEL or LAE) at a specific distance (usually 15 metres from track centerline) Noise source heights and locations (where different from standards) Topographical settings Meteorological conditions - a ‘worst case’ scenario based on suitable historical weather observations for the time periods of interest, or the following default conditions: 	<p>Listing the weather conditions in fine, but it should be noted that not all algorithms allow for this input. Perhaps some words to this effect could be added.</p>	<p>As highlighted in Sections 6 and 7 of this report, the practical implementation of the current and draft policies fails through a reliance on the proponent obtaining current and forecast traffic volumes to inform noise management plans.</p>



Parameter	Day	Night	Comments
Wind speed, m/s	4.0	3.0	General direction is from source to receiver
Temperature gradient / inversion lapse rate, °C/100m	Nil	2.0	Implementation dependent on specific software packages
Pasquill Stability Criterion	E	F	
Temperature, °C	20	15	-
Relative humidity, %	50	50	-

- Receiver locations
 - Any other relevant modelling parameters/assumptions (ground absorptions, for example)
 - Details of adjustments made to predicted levels (façade correction, NAASRA correction, conversion from LA10,18hour to LAeq)
 - Outline of any verification procedure or model calibration

A6.7	<p>Analysis/Research: The traffic noise level results should be displayed clearly (normally in tabulated format for individual point calculations and/or noise contour format for grid point calculations) and should incorporate details of the following:</p> <p>Results for noise measurement:</p> <ul style="list-style-type: none"> Measurement duration, date, time Distance from the noise source and operating conditions, as relevant Ensure at least 3 full days of road traffic, or 60 train pass-bys unaffected by weather or school holidays is reported. For road traffic noise, the Screening Assessment Tool estimates may be used in lieu of field data only. Uncertainty of the measurement <p>Results for noise modelling prediction:</p> <ul style="list-style-type: none"> Individual receivers (point calculations) or contour maps (grid calculations) for modelling scenarios indicated Uncertainty of the modelling predictions 	<p>Refer previous comment in relation to the 60 train pass-bys.</p>	-
A6.8	<p>Discussion, recommendations and conclusions: The discussion compares the relevant noise criteria with the measured/predicted results and carries out assessment for compliance. The following should also be addressed in the discussion:</p> <ul style="list-style-type: none"> Assessment of compliance. Assessment should be made in terms of both LAeq,day and LAeq,night. For road traffic, LAeq,night may be assumed to be 5 dB below the LAeq,day value. Comparison of existing versus predicted future noise levels (if relevant) Comparison of predicted future noise levels versus a predicted no-build scenario (if relevant) Noise mitigation options to achieve compliance (noise control measures) Reasonable and practicable considerations relevant to the noise mitigation measures Predicted noise levels with/without reasonable and practicable noise mitigation measures in place Recommendations in sufficient detail to be turned into conditions of development <p>Overall, a suitable noise management strategy is to be clearly identified.</p>	<p>The comment for road traffic, LAeq,Night may be assumed to be 5 dB below the LAeq,day value should be deleted. This is not always true.</p>	-
A6.9	<p>Noise Mitigation:</p> <ul style="list-style-type: none"> Recommended mitigation and control measures and relevant benefits Mitigation measures to be adopted Identification of the responsibilities of each party for construction and ongoing maintenance Timeframes for implementation of commitments made Other management measures to be included, such as post-construction monitoring and complaint response procedure for example 	<p>Community stakeholder consultations would normally form part of a community liaison consultant and not part of the NMP.</p>	-



	<ul style="list-style-type: none"> Results of community stakeholder consultations (if relevant) 		
A6.10	<p>Summary: The summary of the plan may be presented as a brief version of the executive summary, outlining the projected level of compliance with applicable criteria.</p>	-	-
A6.11	<p>Appendices (as required): Documents or data often referred to in the text of the plan including:</p> <ul style="list-style-type: none"> Photographs of measurement sites Details of measurement site conditions Detailed charts and data from noise measurements Wind and meteorological data Ambient noise data Noise level contour maps preferably using policy criteria for the categories mapped 	-	-
A7	<p>Recommended Wording for Notifications on Title: Notifications on title advise prospective purchasers of the potential for noise impacts from major transport corridors and help with managing expectations. A notification on title should be required as a condition of subdivision (including strata subdivision) or development approval for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development to advise that the site is located in a noise-affected area.</p> <p>For subdivision approvals, use of notifications on title is guided by the WAPC's <i>Planning Bulletin 3 – Record of Information (Memorials) on Title and the Model Subdivision Conditions Schedule</i>.</p> <p>The condition (including the Notification itself) should be worded as follows:</p> <p>“A Notification, pursuant to Section 165 of the <i>Planning and Development Act 2005</i> is to be placed on the Certificate(s) of Title of the proposed lot(s) / subject lot(s) [DELETE AS APPLICABLE]. Notice of this Notification is to be included on the diagram or plan of survey (Deposited Plan). The Notification is to state as follows:</p> <p><i>‘This lot is in the vicinity of a transport corridor and is affected, or may in the future be affected, by road and rail transport noise. Road and rail transport noise levels may rise or fall over time depending on the type and volume of traffic.’</i> (Western Australian Planning Commission)</p> <p>For development approvals, local governments use Section 70A of the <i>Transfer of Land Act 1893</i>.</p> <p>It is strongly encouraged that proponents make prospective purchasers aware of the existence of the Notifications on Title on affected lots, such as through Contracts of Sale.</p> <p>Prospective purchasers of land/lots/dwellings located within the area to which the Policy applies may wish to contact the relevant local government for further advice.</p>	Again, it is recommended that where the noise source is from trains, “vibration” be included in the notification.	-
A8	<p>Model Special Control Area Provisions for Local Planning Schemes: Provisions relating to Special Control Areas are included in Part 5 of Schedule 1 of the <i>Planning and Development (Local Planning Schemes) Regulations 2015</i> (the model provisions for Local Planning Schemes). The following is a model Special Control Area for land in the vicinity of a transport corridor:</p> <p>Special Control Area – Road and Railway Noise: X.X SCA X – Land affected by road and rail noise X.X.1 Purpose The purpose of Special Control Area X is to ensure that the requirements of <i>State Planning Policy 5.4 – Road and Rail Noise</i> (SPP 5.4) are satisfied by all proposed development and land use.</p> <p>X.X.2 Objectives The objectives of Special Control Area X are to: a) Delineate land within which SPP 5.4 applies; b) Ensure that SPP 5.4 is properly considered and implemented where development or a change of use is proposed on land within which SPP 5.4 applies.</p> <p>X.X.3 Planning Approval a) Notwithstanding any other provisions in this Scheme, planning approval is required for any development or change of</p>	-	As per Section 7.1.8 the FLCWA recommends the introduction of deemed provisions within the <i>Planning and Development (Local Planning Scheme) Regulation 2015</i> for special control areas.



	<p>use proposed for land within Special Control Area X.</p> <p>b) In considering an application lodged pursuant to Section X.X.3(a), the local government will have due regard to SPP 5.4.</p> <p>c) Approval of an application lodged pursuant to Section X.X.3(a) will only be forthcoming where the local government is satisfied that any applicable requirements of SPP 5.4 have been met, or can be met through the satisfaction of a condition of approval.</p> <p>d) In considering an application lodged pursuant to Section X.X.3(a), the local government may seek technical advice from the Department of Planning, Lands and Heritage and Department of Water and Environmental Regulation, as appropriate, and will have due regard to that advice when making its decision.</p>		
DRAFT STATE PLANNING POLICY 5.4: ROAD AND RAIL NOISE: FREQUENTLY ASKED QUESTIONS			
No.	Clause	Lloyd George Acoustics	SITE planning + design
1	<p>How do I find out if SPP 5.4 applies to my proposal?</p> <p>Refer to section 4 of the Policy. If your development proposal is within the trigger distance (as set out in Table 1 of the Policy) from any specified major road or rail corridor; and relates to a noise-sensitive land use/development, new or major upgrades to major roads and railways, then the Policy applies.</p>	-	-
2	<p>Where do I find out to which major road and rail the Policy applies?</p> <p>Existing major roads and rail to which the Policy applies is identified on spatial maps in the Implementation Guidelines (Appendix 9 of the Guidelines). The major roads and rail, along with approximate trigger distances, can also be viewed on the Department of Planning, Lands and Heritage public map viewer at www.dplh.wa.gov.au.</p>	-	-
3	<p>Does SPP 5.4 apply to existing developments?</p> <p>No. SPP 5.4 does not retrospectively impose noise mitigation measures over existing transport infrastructure or existing developments, however, home owners are encouraged to consider voluntary upgrades to their home to assist in managing noise where it may be beneficial to do so.</p>	-	-
4	<p>What are the key changes that have been made to the Policy?</p> <p>The policy review has focused on:</p> <ul style="list-style-type: none"> • Improving implementation through the provision of clearer policy measures and guidance. • Simplifying the noise criteria/assessment (refer to question 6 and 8 below). • Enhancing deemed to comply options through quiet house design (refer to section 4.5 of the Guidelines). • Providing standardised templates for Noise Management Plans, local planning scheme provisions and notification on title wording (Appendix 4 to 6 of the Guidelines). 	<p>Given that the limit still remains for road and rail upgrades, the attempt to simplify has not necessarily been achieved and having both the limit and target seemed like a clearer approach.</p> <p>The deemed to comply options have not been enhanced. Packages A, B & C are identical to the current packages but have just been applied to different noise levels for no known reason.</p>	-
5	<p>What is a notification on title?</p> <p>A notification on title is to advise prospective purchasers of the potential for noise impacts from major transport corridors. It's generally required as a condition of development and/or subdivision for when estimated and forecasted noise levels exceed the policy's outdoor noise criteria, following implementation of any noise mitigation measures. The WAPC's Planning Bulletin 3 – Notifications on Title provides further guidance when such a measure may be imposed.</p>	-	-
6	<p>What are the key changes to the screening assessment?</p> <p>The Screening Noise Assessment table, now called the Noise Exposure Forecast table (Table 2 of the Guidelines), has been revised following comprehensive case testing of noise levels by an acoustic consultant. The Table has introduced noise exposure categories that correspond with quiet house design requirements.</p>	Table A.1 of the previous guidelines did the same so this is not new.	-
7	<p>What is quiet house design?</p> <p>Quiet house design aims to ensure that that houses are built to ensure expected standards of living are upheld for development proposals that have predicted or measured outdoor noise levels that exceed the Policy's noise criteria. This is achieved through the design and internal layout of rooms, provision for at least one protected outdoor area, and use of specified materials for glazing and insulation. Refer to section 4.5 and Table 3 of the Guidelines.</p>	-	-
8	<p>What are the key changes to the noise criteria?</p> <p>The dual target and limit noise criteria has been simplified into a single value for compliance and a new 'concession' to account for developments which occur behind existing screening and barriers such as housing, noise walls or bunding.</p>	By changing to a single value for compliance has made the requirements substantially more stringent. Whilst there is a concession in the screening assessment of 4 dB, there is no concession equivalent to the previous 'acceptable margin for compliance'.	-
9	<p>Can alternative noise metrics such as LAmax be used?</p> <p>The adoption of LAmax metric was considered in the policy review but not recommended due to the likely significant implications for both developers and/or operators, including more stringent and costly building treatments, noise walls</p>	Reviewing the SLR report it appears LAmax was recommended by the PRG.	Refer to Section 7.1.2.



	and larger physical separation distances. Short term noise events, which are well-captured by the LAmax metric are more effectively controlled 'at source'.	<p>The objectives of the Policy are to protect residents and transport corridors against encroachment, so the implications listed are irrelevant.</p> <p>If increasing the height of noise walls, buffer distances etc was really a concern, then the limit should remain as before rather than only providing the noise criteria and requiring upper floor assessments.</p> <p>The reason for not including LAmax therefore does not make sense.</p>	
10	<p>What level of consultation has been undertaken in drafting SPP 5.4?</p> <p>The policy review has been overseen by the Western Australian Planning Commission and supported by a government/industry technical working group comprising wide representation of relevant stakeholders. A technical acoustic analysis has been undertaken by a team of specialist consultants.</p>	<p>This may be true, although reviewing the SLR report, the recommendations of the PRG have not necessarily been adopted (e.g. not supporting upper floor assessments, endorsing inclusion of LAmax and vibration).</p>	-
11	<p>Does SPP 5.4 address ground borne vibration?</p> <p>No. As part of the policy review, technical investigations were undertaken to consider vibration. The findings were that vibration is best and most cost effectively addressed 'at source' through measures like track design, track grinding, wheel maintenance or speed restrictions in built-up areas. Addressing vibration would add significant additional complexity and be challenging to model and mitigate, adding to time constraints and cost to proponents without a guarantee for success.</p>	<p>Because it is 'too hard' doesn't mean it should be ignored. If vibration is best treated at the source, then it should be a requirement for rail proponents to install vibration isolation where necessary. The proposed Policy does not require them to consider vibration.</p> <p>Understood that vibration isolation of a single dwelling may not be practicable. However, ignoring it means that people can build in areas subject to excessive vibration leading to complaints, amenity impacts and not protecting the corridor. Notifications should be included as a minimum with buffer distance preferred unless proved otherwise.</p> <p>Timing concerns does not seem an appropriate reason to not include vibration.</p>	Refer to Section 7.1.4.
12	<p>Who is responsible for assessing and determining noise impacts?</p> <p>The management of road and railway transport noise is a responsibility shared among various stakeholders. The Department of Planning, Lands and Heritage is the lead agency for ensuring that Noise Level Contour Maps, Noise Management Plans and Noise Exposure Forecasts are consistent with the policy, with technical assistance provided by the Department of Water and Environmental Regulation. Refer to section 2 of the Guidelines for full implementation responsibilities.</p>	-	-



APPENDIX 2

2. LLOYD GEORGE ACOUSTICS SPP 5.4 REPORT



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Review of Proposed (September 2017) SPP 5.4 & Guidelines for FLCWA

Reference: 17104170-01.docx

Report: 17104170-01.docx

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This report has been prepared in accordance with the scope of services described in the contract or agreement between Lloyd George Acoustics Pty Ltd and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client, and Lloyd George Acoustics Pty Ltd accepts no responsibility for its use by other parties.

Date:	Rev	Description	Prepared By	Verified
14/11/2017	0	Issued for Comment	Terry George	-

Table of Contents

1	INTRODUCTION	1
2	POLICY REVIEW	2
2.1	Policy Application (Section 4)	2
2.1.1	Freight Handling Facilities	2
2.1.2	Trigger Distance	2
2.1.3	Railway Upgrade Definition	2
2.1.4	Planning Horizon	3
2.2	Policy Measures (Section 6)	3
2.2.1	New Residential Development	3
2.2.2	New Railways	4
2.2.3	Railway Upgrades	5
2.2.4	Noise Exposure Forecast & Management Plan	5
3	GUIDELINE REVIEW	6
3.1	Introduction	7
3.1.1	Mapping (Section 1.3)	7
3.2	Policy Application (Section 2)	7
3.2.1	Schemes and Amendments (Section 2.2)	7
3.3	Assessing Noise (Section 3)	7
3.3.1	Understanding Noise (Section 3.1)	7
3.3.2	Exceeding the Noise Criteria (Section 3.2.1)	7
3.3.3	Noise Level Contour Map (Section 3.3)	8
3.4	Techniques for Noise Mitigation (Section 4)	11
3.4.1	Quiet House Requirements (Table 3)	11
3.5	Other Considerations (Section 5)	12
3.5.1	Vibration (Section 5.3)	12
3.6	Appendix 3	12
3.7	Appendix 4	14
3.8	Appendix 7	14

4	REVIEW OF SLR REPORTS	14
4.1	Comments on SLR 1	14
4.1.1	Executive Summary	14
4.1.2	Use of Target and Limit (Table 5)	15
4.1.3	National Context (Section 4.1.2)	15
4.1.4	Internal Noise Criteria	15
4.1.5	Review Outcomes Summary (Table 10)	16
5	SUMMARY OF DOCUMENT REVIEW	16
6	CONCLUSION	18

List of Tables

Table 3-1	Comparison of Current and Proposed Freight Train Noise Levels, dB $L_{Aeq(Night)}$	8
Table 3-2	Comparisons of Exposure Categories	10
Table 3-3	Comparisons of Data Analysis Methodologies	13




List of Figures

Figure 3-1	Summary of Measured Noise Levels from Cockburn Project	9
Figure 3-2	Measured Train Noise, Bibra Lake	13

1 INTRODUCTION

Western Australian Planning Commission (WAPC) has released an updated version of State Planning Policy 5.4 (*State Planning Policy No. 5.4 Road and Rail Noise*; September 2017) to supersede the previous version (*State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning*).

In addition, the Guidelines associated with the Policy have also been updated. The Guidelines originally associated with the 2009 Policy (*Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning*; May 2009) were updated (*Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning*; December 2014) and have now again been updated (*State Planning Policy 5.4 Road and Rail Noise Implementation Guidelines*; September 2017) in line with the current Policy.

		
<p style="text-align: center;">2009</p>	<p style="text-align: center;">2014</p>	<p style="text-align: center;">2017</p>

This document has been prepared to review the 2017 Policy and Implementation Guidelines and comment on potential implications generally and in comparison to the 2009 version in relation to freight trains in particular.

2 POLICY REVIEW

2.1 Policy Application (Section 4)

The application of the Policy essentially remains as before being:

- Proposed noise-sensitive land use within the Policy's trigger distance of a transport corridor as specified in Table 1; and
- Proposed new railways or upgrades of existing railways or any other works that increase capacity for rail vehicle storage or movement.

2.1.1 Freight Handling Facilities

The Policy does not make the same reference to freight handling facilities that it did in the earlier version by both removing this in the title name and the various sections of the Policy.

LG Comment 2 – We support the removal of this aspect as in the 2009 version, it essentially said that the outdoor noise criteria in the Policy do not apply and that some aspects of freight handling facilities would be required to comply with the *Environmental Protection (Noise) Regulations 1997* and other aspects should be discussed with the state environmental agency. As such, the mention of these in the Policy was confusing and unnecessary.

2.1.2 Trigger Distance

Table 1 of the Policy provides a trigger distance of 300 metres from the centreline of the closest track as being appropriate for freight railways in the above scenarios.

LG Comment – Table 2 of the Guidelines shows that at a distance of 300 metres, the outdoor noise criteria (50 dB $L_{Aeq(Night)}$) for either new noise sensitive development or new freight railways will be exceeded with a provided noise level of 52 dB $L_{Aeq(Night)}$. It was originally thought this did not align with the trigger distance of 300 metres as to achieve 50 dB $L_{Aeq(Night)}$ would require a separation distance of around 400 metres. However, the values in Table 2 of the Guidelines have been increased to account for future growth. That is, the assumption is that if measurements were undertaken at 300 metres, the result now would actually be 50 dB $L_{Aeq(Night)}$, however in the future, this would increase to 52 dB $L_{Aeq(Night)}$. The purpose of this was to simplify the process for users of the screening assessment to avoid having to obtain forecast volumes.

2.1.3 Railway Upgrade Definition

An upgrade of a railway is defined as:

- a) A proposed realignment, either inside or outside the existing corridor;
- b) A rail track duplication; or
- c) Works such as the installation of switches / turnouts, signalling systems, spurs or passing loops, the modification to the track support structure, crossovers, refuges, relief lines, straightening of curves, or re-sleepering.

Previously, the minor redevelopments were defined as crossovers, sidings, turnouts, yards, loops, refuges, relief lines, straightening of curves, re-sleepering or the installation of track signalling devices.

LG Comment – There is some rewording for minor redevelopments and for the reasons outlined in *Section 2.2.3*, FLCWA should be comfortable with the items listed and whether there is a need to trigger a study for the minor modifications listed.

2.1.4 Planning Horizon

The proposed Policy puts forward a 20 year horizon, whereas the current policy uses a 15-20 year horizon.

For freight trains (as opposed to road traffic) this is understandably more difficult to estimate, since freight train usage can be governed by political changes (e.g. more freight on rail) and is project specific and such projects may be unknown.

LG Comment – Both the current and proposed Guidelines are the same for freight trains where either one train movement per hour is to be assumed or the actual train movements per day, whichever is the greater. The implications of this are:

- An existing track may have 20 movements per day, meaning that the ‘future’ noise modelling scenario would allow for 24 movements per day. In terms of noise, this only represents a 0.8 dB increase.
- An existing track may carry 24 movements per day, meaning that the ‘future’ noise modelling scenario would allow for the same, thereby assuming no growth.

An alternative approach may be to assume either 1 train movement per hour or a 2 dB increase, whichever is the maximum. With this alternative, there would always be an allowance for some growth on the freight railway. It must be remembered by FLCWA that this approach works for them when there is residential development near a railway but would also apply for new railways and upgrades.

2.2 Policy Measures (Section 6)

2.2.1 New Residential Development

The noise criteria for new development within 300 metres of a freight railway are:

- Outdoor:
 - 55 dB $L_{Aeq(Day)}$
 - 50 dB $L_{Aeq(Night)}$
 - The above apply at 1-metre from a habitable room.
 - The above apply at all floors.
 - Where the above is not reasonable and/or practicable then one outdoor living area satisfying the above must be provided.

- Indoor
 - 40 dB L_{Aeq} in living and work areas; and
 - 35 dB L_{Aeq} in bedrooms
 - The above apply at all floors.

LG Comment: The current Policy provided similar requirements, although there are some subtle differences, which is unknown if these are intentional as follows:

- Outdoor:
 - Previously the outdoor noise criteria were a limit of 60 dB $L_{Aeq(Day)}$ & 55 dB $L_{Aeq(Night)}$ with a target of 55 dB $L_{Aeq(Day)}$ & 50 dB $L_{Aeq(Night)}$. These applied at 1-metre from habitable rooms and at each floor and at least one outdoor living area.
 - For either new residential or new freight railway, it was considered to be practicable to achieve noise levels within the margin (between the limit and target).
 - The proposed Policy removes the upper limit and thereby has a stronger emphasis on achieving what is currently referred to as the target. Previously it was common for developments to be designed to achieve the limit in outdoor areas, however this is likely to have more impacts on planning than FLCWA.
- Indoor:
 - The wording was previously clearer in that living and work areas were to achieve 40 dB $L_{Aeq(Day)}$ and bedrooms 35 dB $L_{Aeq(Night)}$.
 - The current wording implies 40 dB $L_{Aeq(Night)}$ and 40 dB $L_{Aeq(Day)}$ are required in living and work areas and 35 dB $L_{Aeq(Night)}$ and 35 dB $L_{Aeq(Day)}$ are required in bedrooms.
 - The previous wording is assumed to be the intention and should be clarified, but is not of relevance to FLCWA.

So with regards to the above, there is unlikely to be any significant change with respect to FLCWA.

2.2.2 New Railways

The noise criteria for new railways within 300 metres of noise sensitive development are:

- Outdoor:
 - 55 dB $L_{Aeq(Day)}$
 - 50 dB $L_{Aeq(Night)}$
 - The above apply at 1-metre from a habitable room.
 - The above apply at ground floor, first floor and more if practicable.

LG Comment: The proposed criteria are more stringent for new railways. Previously, noise mitigation was to achieve the limit (60 dB $L_{Aeq(Day)}$ & 55 dB $L_{Aeq(Night)}$) at ground floor only. The proposed Policy requires 5 dB lower noise level and at ground and upper floors. Previously, consideration was to be given to achieve the target (55 dB $L_{Aeq(Day)}$ & 50 dB $L_{Aeq(Night)}$) but only where reasonable and practicable.

Is there an expectation that noise walls will be stepped to accommodate double storey houses or is it expected that the road/rail builder undertakes architectural upgrades to the upper floor of existing dwellings?

2.2.3 Railway Upgrades

The noise criteria for railway upgrades/modifications within 300 metres of noise sensitive development are:

- Outdoor:
 - 60 dB $L_{Aeq(Day)}$
 - 55 dB $L_{Aeq(Night)}$
 - The above apply at 1-metre from a habitable room.
 - The above apply at ground floor, first floor and more if practicable.

LG Comment: The proposed criteria are more stringent for railway upgrades/modifications. Previously, the noise criteria were not applied but rather a reasonable and practicable approach taken having regard to:

- The existing transport noise levels;
- The likely changes in noise emissions resulting from the proposal; and
- The nature and scale of the works and the potential for noise amelioration.

The proposed Policy mandates criteria and applies it at both ground and first floors, so is therefore more stringent on applying a criteria and applying it at upper floors. To achieve the proposed noise criteria may simply be impracticable in many circumstances.

As with the new railway, what is the expectation to treat noise levels to upper floors (stepped noise walls and/or architectural upgrades to upper floors).

2.2.4 Noise Exposure Forecast & Management Plan

Essentially this provides a process to determine if a subject development or site will be noise affected and if it is, then will require a noise management plan. This initial screening process is really for planners and the like as once it shows it is noise affected, then an acoustic consultant will most likely go and measure the actual noise on site.

With regards to the management plan, Section 6.4, Part (e) is unclear. This section states the following:

Noise Management Plans are required where:

- c) a new noise sensitive land use and/or development is located adjacent to a specified primary road or railway, ... which is not yet planned for construction but is anticipated within the Policy's planning horizon; and
- d) a new or major upgrade of a primary road or railway construction proposal is located adjacent to undeveloped land zoned with the potential to accommodate noise-sensitive land use and/or development.

- e) For (c) and (d) the Noise Management Plan should include treatments which meet the indoor noise criteria, and outdoor noise criteria 10 dB greater than the noise criteria, as outlined in Table 2.

LG Comment: For new noise sensitive development, where the freight rail is planned but does not yet exist, is Part (e) saying it is permissible for:

- Outdoor noise criteria to be 65 dB $L_{Aeq(Day)}$ and 60 dB $L_{Aeq(Night)}$; and
 - Indoor noise criteria to be 50 dB L_{Aeq} in living and work areas and 45 dB L_{Aeq} in bedrooms;
- or
- Outdoor noise criteria to be 65 dB $L_{Aeq(Day)}$ and 60 dB $L_{Aeq(Night)}$; and
 - Indoor noise criteria to be 40 dB L_{Aeq} in living and work areas and 35 dB L_{Aeq} in bedrooms; these are to be developed to achieve the indoor noise criteria.

For new or major upgrades of a railway, where residences are planned but do not yet exist, is Part (e) saying it is permissible for:

- Outdoor noise criteria to be 65 dB $L_{Aeq(Day)}$ and 60 dB $L_{Aeq(Night)}$ for new railways; and
- Outdoor noise criteria to be 70 dB $L_{Aeq(Day)}$ and 65 dB $L_{Aeq(Night)}$ for railway upgrades.
- It is assumed the indoor criteria are not relevant for this scenario.

The intention for the above is where certain aspects are unknown, to still give consideration to noise impacts. However, in some scenarios, this could result in noise control expenditure that becomes unnecessary. For instance, let's say the adjoining land to a new railway is zoned future residential and to comply with the outdoor criteria (presumably at ground floor only) requires the construction of a 3-metre high noise wall. When the land is actually developed, it may require significant changes to earthwork levels, which may result in the noise wall as not performing adequately (e.g. land is constructed on fill). Another scenario may be that the adjoining land is used for public open space so that the wall was unnecessary.

It is recommended that in this scenario, some engineering of the design levels have been completed, otherwise, the recommendations may be incorrect. Also, it is recommended that Part (e) be reworded and provided in table form to align with Table 2 for clarity.

3 GUIDELINE REVIEW

The Guidelines for the most part are aimed more at planners and the like rather than acoustical consultants. That is, the outcome of a planner or local authority using the Guidelines will necessitate the development of a Noise Management Plan, at which point, an acoustical consultant would normally be engaged.

3.1 Introduction

3.1.1 Mapping (Section 1.3)

LG Comment: The final paragraph indicates discretion should be used and appears to indicate that because of the seasonality of grain trains, these railways or the consideration of peak train movements may not need to be assessed by the Policy. Unless quantitative values can be placed on when and when not the Policy would apply, it is recommended that such railways be considered in the Policy and not be discretionary.

3.2 Policy Application (Section 2)

3.2.1 Schemes and Amendments (Section 2.2)

The final paragraph relates to railways and refers to Special Control Areas (SCAs). It also states that these SCA's should not define alternative noise metrics.

LG Comment: We are aware of Herring Storer Acoustics using an $L_{Aeq,passby}$ for assessments as well as LG Acoustics using L_{Amax} for assessments. The Implementation Guidelines would not permit the use of anything other than $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$. Use of an L_{Amax} parameter had support from the PRG however has not been adopted.

Note that reference is made to Appendix 7, however this should refer to Appendix 8.

3.3 Assessing Noise (Section 3)

3.3.1 Understanding Noise (Section 3.1)

LG Comment: The final paragraph makes a specific note that a singular loud event may result in a higher degree of annoyance than the overall L_{Aeq} value may indicate. If this is acknowledged, then shouldn't L_{Amax} be given some consideration?

3.3.2 Exceeding the Noise Criteria (Section 3.2.1)

This section provides advice on projects where it is not considered reasonable and/or practicable to meet the noise criteria.

LG Comment: The main issue with this is relying on this approach and explaining it to the community. For example, we were recently involved with a local government on the upgrade (duplication and realignment) of one of their roads, which the community did not support. Under the current Policy, a road upgrade did not have a specific criteria to be met. As such, it could be explained to the residents that a best practice approach was being used and that noise levels would initially be less and then increase over time to existing levels. However, these existing noise levels were above the outdoor criteria (both target and limit). Under the proposed Policy, the community will simply interpret such a project as having to achieve the outdoor noise criteria, which in many circumstances won't be reasonable or practicable. Whilst the proposed Policy and Guidelines still allow for this, it is unlikely to be interpreted this way by the community.

3.3.3 Noise Level Contour Map (Section 3.3)

This section describes two options whereby such a map can be developed using provided noise levels (Table 2 of the Guidelines) or developed by an acoustical consultant.

LG Comment: With regards to Table 2 of the Guidelines and in relation to freight trains, we herewith advise:

- Table 2 should be titled “Noise Exposure Forecast” for consistency as it is referred to this elsewhere and abbreviated to NEF elsewhere.
- Some of the colour coding is incorrect:
 - Primary roads – 30,000 vpd: 56 dB $L_{Aeq(Day)}$ not coloured green
 - Regional freight road – more than 10,000 vpd: 59 dB $L_{Aeq(Day)}$ coloured green but should be yellow.
- The colour coding for freight railways is correct, however the fact this is referring to $L_{Aeq(Night)}$ values is unclear. The roads and passenger rail have the $L_{Aeq(Day)}$ parameter nominated in a row above the values. It is recommended a consistent approach in the table be used and insert a row above the freight train values.
- Under the assumptions notes it states railway noise levels are based on current traffic volumes and mixes with adjustments included for future traffic growth based on historical trends. It is unclear what this adjustment amounts to, although it is understood from email correspondence it aligns with 2 movements per hour for a typical mix. *Table 3-1* below compares the values provided in the current guidelines to those in the proposed guidelines.

Table 3-1 Comparison of Current and Proposed Freight Train Noise Levels, dB $L_{Aeq(Night)}$

Version	Distance from Nearest Rail Centreline (m)																				
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300
Current	68	64	62	61	60					56							52				49
Proposed	70	66	64	62	61	60	59	59	58	58	57	57	56	56	55	55	54	53	53	52	52
Increase	2	2	2	1	1					2							2				3

The values put forward are higher than those in the current Guidelines and therefore more conservative from an initial screening perspective. This is likely because the current Guidelines assume ‘existing’ train movements whereas the proposed Guidelines assume some growth over time.

- To further consider the noise levels put forward in the Guidelines, we have reviewed three previous projects being Lakes Revitalisation for City of Cockburn, Eliza Ponds for Developer and Satterley’s Upper Swan development undertaken by Herring Storer.

- o Lakes Revitalisation

For this project, noise measurements were undertaken at 12 residences over around a 1-week period. In the earlier monitoring sessions, the average movements were 14-15 during the day and 6-7 at night. During the later monitoring sessions, these increased to around 20 during the day and 8 at night. The analysis used a train noise level of the “average + 1 Standard Deviation”, which typically represented the 90th percentile. Note that the Policy would not take this approach but would be closer to the average, which may represent a 4-5 dB difference so the Cockburn Study was reasonably conservative. However, with train movements close to 1 per hour, no adjustments were made for future growth.

The chart below provides a summary of the analysis and also plots the noise levels provided in the proposed SPP Guidelines.

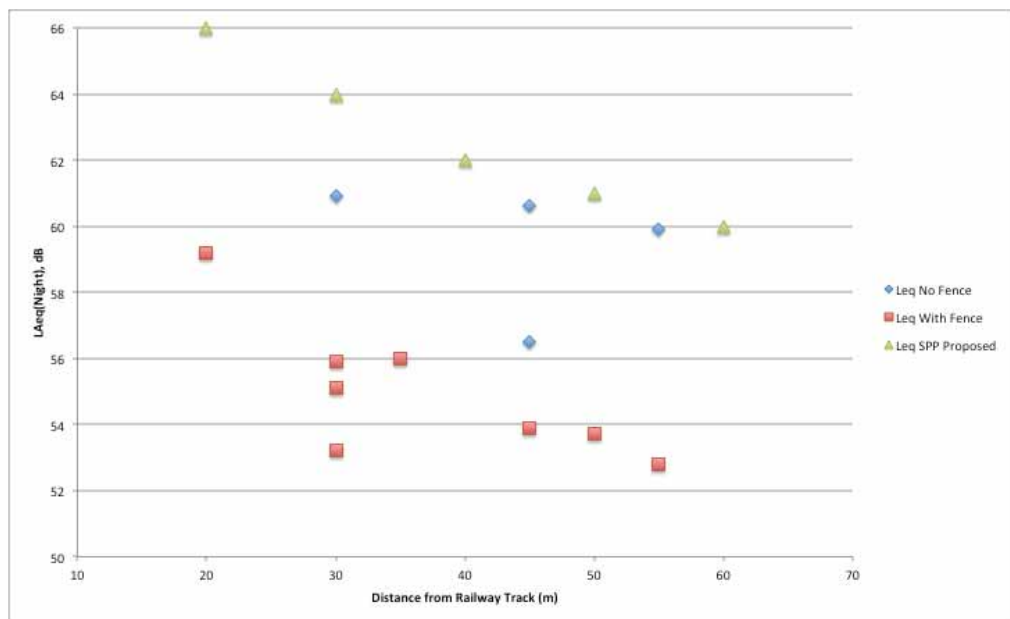


Figure 3-1 Summary of Measured Noise Levels from Cockburn Project

It can be seen that the noise levels in the proposed Guidelines appear reasonable given that the analysis used “average + 1 SD” for train noise and SPP used 2 trains per hour, which would approximately offset each other.

- o Eliza Ponds – Analysis using daily average noise levels showed 50 dB $L_{Aeq(Night)}$ was achieved at a distance of around 50 metres. This is significantly less than those in the Cockburn study.
- o Upper Swan – Analysis using daily average noise levels showed 63 dB $L_{Aeq(Night)}$ at 40 metres, being 1 dB higher than that in the proposed SPP Guideline.

From the above, the train noise levels may be adequate for a screening assessment and defining buffers/trigger distances. However, in comparison to the Cockburn Study, which is based on existing train movements of approximately 1 per hour, the noise levels in the Guidelines do not reflect the noise levels for 2 trains per hour, which would be 3 dB higher than those in the Cockburn Study. Similarly the Herring Storer Acoustics Study based on 1 train movement per hour results in a marginally higher noise level than that in the Guidelines. It should be noted by FLCWA that these values would rarely be used, as any residential development within 300 metres of a railway would end up requiring a noise management plan in any case and in these circumstances, a consultant would be engaged to measure the noise.

- Exposure Categories Table (adjoining Table 2):
 - The current Guidelines provide 3 exposure categories A, B & C, whereas the proposed provides for D & E also. With regards to the common categories, the application of these has shifted and is compared below.

Table 3-2 Comparisons of Exposure Categories

Category	Outdoor Noise Level, dB $L_{Aeq(Day)}$	
	2009	2017
A	56 to 60	56 to 58
B	61 to 63	59 to 62
C	64 to 65	63 to 66

This appears to stem from SLR work (refer *Section 4.1.3*) where they are aligning it to Guidelines used in South Australia, which are thought to better align with a potential national approach. It is not clear that this change is justified or correct and whether or not any calculations have been undertaken to support this change.

- The table also only refers to a forecast noise level of $L_{Aeq(Day)}$. Freight trains however will likely be dictated by $L_{Aeq(Night)}$ and therefore an additional column or similar should be added to this Exposure Category table for clarity showing that Exposure Category A applies to 56 to 58 dB $L_{Aeq(Day)}$ and 51 to 53 dB $L_{Aeq(Night)}$ etc.
- Whilst Exposure Categories D & E specify development is not recommended and strongly discouraged respectively, it still permits this by way of a Noise Management Plan. This may be an issue for freight trains in terms of vibration in particular, as provided the noise can be managed, it can allow residences to be constructed very close to a railway. Similarly, a new railway could be constructed close to existing residences without requiring vibration isolation.

For instance, it may be that at 20 metres from a railway, where the noise levels are shown to be 66 dB $L_{Aeq(Night)}$, construction of a 4 metre high noise wall and incorporating Quiet House C treatments permits such a development. In most circumstances, a distance of 20 metres from a track will still result in perceptible and potentially annoying levels of vibration.

A possible approach may be that for any residential development adjoining an existing freight line, there are to be no noise sensitive buildings within a particular distance (e.g. 50 metres). The only time this distance could be encroached would be where a site specific vibration study demonstrates vibration levels are acceptable at a lesser distance or can be appropriately mitigated. Similarly any new railway is constructed, vibration should be assessed. If WAPC do not want to nominate what the acceptable vibration level is, this could be discussed with Department of Water & Environment Regulation (DWER).

3.4 Techniques for Noise Mitigation (Section 4)

3.4.1 Quiet House Requirements (Table 3)

As discussed in *Section 3.3.3*, the Quiet House Packages apply at slightly different noise levels. It is understood this is to align with South Australian guidelines however, this may or may not be appropriate or justified.

It is also noted that there is no change in the package requirements whether the noise source is freight trains or other type of transport. It is queried whether or not any testing of the packages was undertaken to take into account the spectral content of different noise sources and the effectiveness of the packages.

A study undertaken by LG Acoustics for FLCWA (*Freight Train Noise Assessments*; Reference: 14113026-02, 14 September 2015), indicated that particularly with freight trains, the roof/ceiling construction is a significant acoustic weakness. Because of this issue, this report demonstrated that by adopting Quiet House B with steel sheet roofing, internal noise levels may be above the indoor criteria of 35 dB $L_{Aeq(Night)}$ and therefore non-compliant. Whilst the focus of the September 2015 report was on the potential use of an L_{Amax} criteria, it showed that adopting terracotta roof tiles would assist in controlling low frequency noise, the L_{Aeq} indoor noise criteria as well as reducing the L_{Amax} . To achieve the L_{Amax} criteria adopted in the September 2015 report, also required some modifications to window performance.

LG Comment: As a minimum, it is recommended that where the noise source is from freight trains, metal sheet roof not be permitted as a deemed to satisfy construction for Quiet House B & C but limit this to only concrete or terracotta tiles as being acceptable, unless supported by a report from a suitably qualified acoustical consultant.

3.5 Other Considerations (Section 5)

3.5.1 Vibration (Section 5.3)

It is acknowledged that vibration may be a potential impact on residents and states that feasible mitigation options exist for larger scale multi residential development.

LG Comment: The final sentence “Industry leaders do assess and if required, mitigate vibration” is unclear. Also, if it can be addressed in larger scale developments then the Policy should require this to be implemented. By essentially be silent on the issue can result in residential development being very close to railways and experiencing potentially annoying vibration levels. If the issue is considered too difficult, the following could still be considered:

- Enforce a buffer distance of minimum 50 metres from freight railways. Where development is to be within this distance, then a vibration assessment would need to be undertaken.
- Any lot with a notification on title for freight train noise is to modify the wording to include “noise and vibration”.
- Require large scale apartments (which could be defined in the Policy) to undertake vibration assessments and mitigate vibration to acceptable standards defined by DWER.

3.6 Appendix 3

Under Measurement Duration, the requirement is to “cover a sufficient number of train passes to obtain an acceptable level of repeatability.” However, Appendix 6 under Results for noise measurement requires 60 train pass-bys.

LG Comment: With regards to freight trains, the range in measured noise levels can be significant so that an “acceptable level of repeatability” may not be achieved. Also, there would be some sections of track where there may be only 2 movements a day so that 60 train pass-bys is not practicable. A better approach may be to say capture a minimum of 60 train pass-bys or undertake one-week of noise monitoring.

The analysis of train noise varies from consultant to consultant. We have seen the following approaches used:

1. Calculate the $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$ values for each day and then take the arithmetic average of each of these. Depending on the number of existing movements, this is then extrapolated to 1 per hour. This aligns with the road traffic methodology.
2. Determine the arithmetic average noise level of each train pass-by and assume that 1 per hour exists.
3. Determine the logarithmic average noise level of each train pass-by and assume that 1 per hour exists.
4. As per 2 above, however use the average + 1 Standard Deviation. This generally approximates the 80th percentile.
5. Determine the 95th percentile of the train noise levels and assume that 1 per hour exists. Where this has been used, it is noted events with train horns have been excluded. It should be noted that the analysed data set may contain train horns.

Due to the variation in freight train noise levels, each of these approaches can result in significantly different values and therefore different noise mitigation. This has been examined in a data set (refer *Figure 3-2*) for measurements undertaken in Bibra Lake (refer *Table 3-3*). At this location, over a 7-day period, 137 trains were measured, so just below 1 per hour with averages of 13.5 trains during the day and 6 trains during the night.

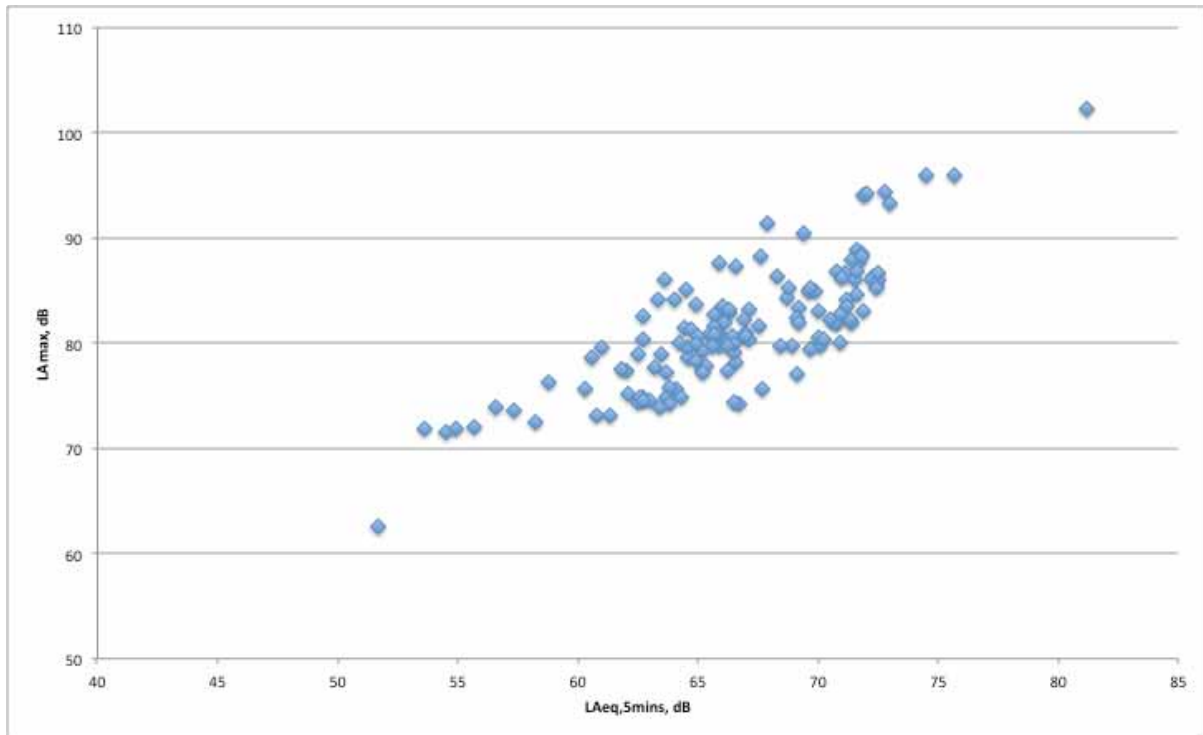


Figure 3-2 Measured Train Noise, Bibra Lake

Table 3-3 Comparisons of Data Analysis Methodologies

Description	Method				
	1	2	3	4	5
Result Existing					
Average Train, $L_{Aeq,5min}$, dB	-	66.6	68.9	66.6	72.4
Std Dev $L_{Aeq,5min}$, dB		-	-	4.7	-
$L_{Aeq(Day)}$, dB	58.5	55.1	57.4	59.8	59.7
$L_{Aeq(Night)}$, dB	55.8	54.6	56.9	59.3	59.2
Result Future (1 train per hour)					
$L_{Aeq(Day)}$, dB	59.3	55.8	58.1	60.5	61.6
$L_{Aeq(Night)}$, dB	57.1	55.8	58.1	60.5	61.6

As can be seen, there can be a 6 dB difference depending on how the data is analysed. Therefore, depending on the consultant undertaking the work, the client can obtain significantly different answers. This is an issue for freight rail in particular due to the variability of individual pass-by noise levels and as such, a consistent methodology should be specified in the Guidelines.

3.7 Appendix 4

Under the section Source Heights and Receiver Locations it states that “For new or upgrade of road and railway infrastructure proposals, at the most exposed habitable façade of existing noise sensitive premises, **ground floor level only.**”

LG Comment: This does not align with Table 2 of the Policy, which requires assessment at “Outdoor first two floors (more if practicable).”

3.8 Appendix 7

LG Comment: It is recommended that where a noise sensitive development requires a notification due to a freight railway, the wording be changed to include vibration (e.g. This lot is in the vicinity of a transport corridor and is affected, or may in the future be affected, by rail transport noise and vibration.”).

4 REVIEW OF SLR REPORTS

SLR were engaged by Department of Transport to assist in undertaking a review of the current SPP 5.4 by providing technical input into the review process. Two reports have been provided by Department of Planning, Lands and Heritage, although one has been reviewed in detail:

1. Technical Considerations for the Review of SPP5.4; Report Number 675.10910R2, 20 December 2015 (**SLR 1**); and

Outlined below is our comments in relation to this report.

4.1 Comments on SLR 1

4.1.1 Executive Summary

- The removal of the Noise Limit was a recommendation of the SLR report in order to reduce complexity. The trigger level (Noise Target) indicates the point at which an assessment of feasible and reasonable noise mitigation measures should be undertaken.

LG Comment: This is no different to the current Policy as the Noise Target has always been the trigger level. However it has implications for residential development adjoining transport corridors. It was common to design a noise wall to achieve the limit at a residential Lot and then incorporate Package A treatments, since noise levels within the margin (between Target and Limit) were considered a ‘reasonable’ amenity. A similar approach could still be taken but would force rear facing lots to provide an additional outdoor living space where the target is achieved.

- It states that the screening assessment procedure incorporates forecast traffic volumes by providing noise levels at their ultimate capacity.

LG Comment: It is understood the Table 2 Guideline noise levels are based on 2 trains per hour so FLCWA would need to be comfortable this reflects 'ultimate capacity'.

- SLR put forward that an L_{Amax} trigger level be included. An internal level of 42 dB L_{Amax} would represent an aspirational target with 60 dB L_{Amax} as something that is reasonably achievable.

LG Comment: No L_{Amax} criteria has been adopted.

- SLR recommend that the Policy include Trigger levels for ground vibration and ground borne noise.

LG Comment: No vibration criteria has been included in the Policy.

- SLR put forward that transport infrastructure providers contribute to the insulation of affected properties similar to Sydney and Adelaide Aircraft Noise Insulation Programmes and NSW Freight Noise Attenuation Programme.

LG Comment: There is no mention of this directly in the Policy or Guidelines.

4.1.2 Use of Target and Limit (Table 5)

The Study recommended to remove the limit and just provide one trigger level, with an acceptable margin for acceptance to align with the current Policy.

LG Comment: For new roads/railways and new development adjacent existing roads/railways, there is no acceptable margin.

4.1.3 National Context (Section 4.1.2)

The SLR Study noted that every state treats road and rail noise differently and recommended that the Guidelines include a consistent approach with other states to allow for future harmonisation should the ABCB adopt their approach drafted some years ago.

LG Comment: The Packages within the proposed Implementation Guidelines are unchanged from the current Guidelines, except the point at which they apply, as explained in *Table 3-2*.

4.1.4 Internal Noise Criteria

The SLR Study notes that other states do not apply an internal L_{Amax} criteria, although it is noted other states do have an external L_{Amax} criteria. This section also discusses AS2021 which prescribes maximum allowable internal noise levels in relation to aircraft noise, the WHO Guidelines and the work undertaken by LG Acoustics for FLCWA.

LG Comment: Use of AS2021 may be too stringent (50 dB L_{Amax} in bedrooms), as the number of aircraft movements can be significantly higher than those of freight trains. The WHO Guidelines of 42 dB L_{Amax} would simply not be practicable. As other states provide an external noise level of 80 dB L_{Amax} (NSW, Victoria & SA), this effectively does provide an internal noise criteria. Using the 20 dB differential between outside and inside discussed in the SLR report (for closed windows), this would relate to an internal maximum noise level of 60 dB L_{Amax} , being the value we put forward in the FLCWA.

4.1.5 Review Outcomes Summary (Table 10)

We note the SLR review outcome stated:

- In line with PRG feedback, the addition of vibration considerations is considered important to achieving the objectives of the Policy.

LG Comment: Vibration has not been included in the Policy/Guidelines, which is not in line with the outcome.

- Consideration was given to applying the noise criteria at all floors of existing development however was stated that this “cannot be integrated within current Policy at this time. Serious concerns were raised over areas of insurance and legal responsibility” (with regards to treatment of buildings).

LG Comment: Despite this comment, the Policy does require assessment at ground and first floors for both new and upgraded road/rail, which is not in line with the outcome.

- There was support for the inclusion of an external L_{Amax} noise criteria to be included for new or upgraded railways.

LG Comment: No L_{Amax} criteria has been included, which is not in line with the review outcome.

- Aspect 14 states that the current Policy has no differentiation between the criteria that apply to upgrades of existing infrastructure and new infrastructure and therefore proposed a 5 dB relaxation for upgrades compared to new road/rail.

LG Comment: We believe this is incorrect. The current Policy does not require any criteria for road/rail upgrades but rather best practice noise mitigation depending on the existing noise level, change in noise level and scale of the project. The proposed criteria of 5 dB higher than the trigger is actually more stringent than the current Policy.

5 SUMMARY OF DOCUMENT REVIEW

The main findings from the document review are summarised below:

- FLCWA to provide comment to WAPC whether the listed minor redevelopments should be included in that they will not generate a noise level increase.
- For freight trains, the same methodology is to be assumed in that whichever is there greater (existing train movements or 1 train movement per hour) is to be assumed for the future scenario, unless more detailed information is available. This may not be conservative enough and as such an alternative methodology put forward is either 1 train movement per hour or a 2 dB L_{Aeq} increase in the future, whichever is the greater.
- The proposed criteria for new railways are more stringent in that:
 - The criteria is 55 dB $L_{Aeq(Day)}$ and 50 dB $L_{Aeq(Night)}$, effectively 5 dB less than current; and
 - The criteria applies at ground and first floors (and more if practicable) whereas previously it only applied to ground floors. This is not in line with the review outcomes of the PRG and will require either large stepped noise walls or for the rail provider to undertake architectural treatments to existing dwellings.

- The proposed criteria for railway upgrades are more stringent in that:
 - A criteria is provided of 60 dB $L_{Aeq(Day)}$ and 55 dB $L_{Aeq(Night)}$ whereas previously a best practice approach was provided with consideration to existing noise levels, the change in noise levels and the scale of the project. Therefore if noise levels already exceed the criteria, it may not be practicable to be achieved
 - As for new railways, the criteria also applies at upper floors.
- Clarify the intention of Section 6.4 Part (e) of the Policy.
- *Section 3.3.3* of this report indicate that the Guideline noise levels, supposedly based on 2 train movements per hour may not be conservative enough. This is also stated as being representative of ultimate capacity. FLCWA should demonstrate where this may not represent ultimate capacity. Perhaps rather than providing only one row of noise levels for freight trains, separate lines could be provided for 1 per hour (for low use tracks) and then up to an ultimate capacity scenario?
- Whilst Exposure Categories D & E specify development is not recommended and strongly discouraged respectively, it still permits this by way of a Noise Management Plan. This may be an issue for freight trains in terms of vibration in particular, as provided the noise can be managed, it can allow residences to be constructed very close to a railway. Similarly, a new railway could be constructed close to existing residences without requiring vibration isolation. Introducing a vibration criteria would control this and such a criteria was supported by the PRG (“In line with PRG feedback, the addition of vibration considerations is considered important to achieving the objectives of the Policy”). As a minimum, the following is recommended:
 - Enforce a minimum buffer distance of 50 metres from freight railways. Where development is to be within this distance, then a vibration assessment is to be undertaken, with the appropriate criteria agreed upon with DWER. Where practicable (e.g. large scale apartments), vibration isolation is to be incorporated. Smaller developments (e.g. single houses) that exceed the criteria may not be permitted.
 - Any lot with a modification on title for freight train noise is to modify the wording to include “noise and vibration”.
- The architectural treatment packages are the same irrespective of the noise source. Freight trains are unique in that there can be significant low frequency noise. There was generally not support from the PRG to assess low frequency noise, however a simple approach would be that where the transport is freight trains and a residence is within Exposure Category B and above, only concrete or terracotta tiles be accepted as the deemed to satisfy roof structure.
- Methodology of freight train noise/vibration assessment varies significantly from consultant to consultant and should be standardised (refer *Section 3.6* of this report).
- The PRG supported the introduction of an L_{Amax} outdoor criteria in relation to freight railways, however this has not been adopted.

6 CONCLUSION

The Policy Objectives 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.

The Objectives are effectively unchanged from the current Policy, however updating the Policy provides the opportunity to further enhance these objectives.

With regards to new noise sensitive premises, the Policy:

- Removes the noise limit and provides a criteria equivalent to the current noise target. We see this varying the approach by developers by:
 - Constructing larger noise walls in order to achieve the noise criteria, as opposed to previously constructing noise walls to achieve limit. Depending on whether or not the higher wall is practicable, the outcome will reduce the L_{Aeq} and L_{Amax} noise levels at a residence, but will not change the potential for vibration impacts.
 - Construct noise walls as per current practice, but forcing the home builder to incorporate an alcove/courtyard type arrangement in order to provide one outdoor living area that complies with the noise criteria. This will add costs to the home builder and will not change the internal noise levels compared to the current Policy approach. That is, compliance would be achieved with the indoor noise level L_{Aeq} criteria but does not minimise L_{Amax} noise levels any more than the current Policy or consider vibration.
 - Create subdivisions where the houses now front the rail corridor so that one outdoor area will be provided at the rear of the property. This will not change the internal noise levels compared to the current Policy approach. That is, compliance would be achieved with the indoor noise level L_{Aeq} criteria but does not minimise L_{Amax} noise levels any more than the current Policy or consider vibration.

For new freight railways, the Policy:

- Requires the current noise target be achieved at existing residences. This is considered more stringent than the current Policy as this requires a new railway to incorporate mitigation to achieve the noise limit as a minimum and implement further noise management where practicable, in an attempt to meet the noise target. This may require significant noise mitigation or significant reasonable and/or practicable arguments to be made.
- Requires the current noise target to be achieved at ground and first floors of existing residences (and higher floors if practicable). Adopting this requirement was not in line with the review outcomes of the PRG. This is more stringent than the current Policy, which only assesses noise at ground floor level. This may require significant noise mitigation by way of

increased barrier heights to accommodate the first floor or architectural treatments to existing dwellings or significant reasonable and/or practicable arguments to be made.

For freight railway upgrades, the Policy:

- Requires the current noise limit to be achieved. This is considered more stringent as under the current Policy, a best practice approach is required taking into account existing noise levels, the change in noise levels and the scale of the Project. This may require significant noise mitigation or significant reasonable and/or practicable arguments to be made.
- Requires the current noise limit to be achieved at ground and first floors of existing residences (and higher floors if practicable). Adopting this requirement was not in line with the review outcomes of the PRG. This may require significant noise mitigation by way of increased barrier heights to accommodate the first floor or architectural treatments to existing dwellings or significant reasonable and/or practicable arguments to be made.

So from the above, the Policy has become more stringent in some ways, however may simply be more reliant on proponents arguing what is reasonable and/or practicable. Where this becomes difficult is explaining this to a community who will simply believe that a criteria has not been met.

The Policy may still not be considered to be fulfilling its Objectives and for either scenario, vibration, regenerated noise, low frequency noise or maximum noise level events do not require any consideration. The update to the Policy is a time where these should be considered and with regards to vibration and maximum noise from railways, the review outcome of the PRG recommended these be incorporated.

Reviewing the FAQ's, it is stated that an L_{Amax} criteria was not adopted due to:

- More stringent and costly building treatments, noise walls and larger physical separation distances.

With regards to vibration, the FAQ states:

- Addressing vibration would add significant additional complexity and be challenging to model and mitigate, adding time constraints and cost to proponents without a guarantee for success.

The Guidelines however acknowledge that the risk of short-term noise / vibration impacts have historically been the cause of various complaints in Western Australia. Since it is acknowledged that such events can cause complaints and therefore be affecting health and amenity, it is not appropriate to ignore it due to potentially increased costs and time constraints.

An alternative approach rather than ignoring these aspects would be:

- Notifications on title should include the word "vibration" where the noise source is freight railway. At least with this included, a resident would be aware of the potential for vibration;
- The Quiet House packages can be changed to only allow the use of concrete or terracotta tiles for roof construction. This assists in the control of low frequency noise and maximum noise level events, typically dominated by the locomotive;

- Enforce a minimum separation distance of say 50 metres, between a freight railway and new residences. This assists in the control of vibration. This distance could be varied subject to a site specific study at vibration levels deemed appropriate by DWER. This may show that single residences can be closer due to site specific conditions or a large scale development may be able to cost effectively incorporate vibration mitigation (since this is unlikely to be cost effective for single residences).



APPENDIX 3

3. FLCWA CONSULTATION SCHEDULE



FLCWA CONSULTATION SCHEDULE

The following table outlines the formal meetings undertaken by the FLCWA with the broader industry and Government, but it should be noted that the preceding submission is informed by numerous formal and informal discussions with a wide range of stakeholders across the freight and logistics industry and Government.

DATE	ORGANISATION	CONSULTED WITH
29.11.2017	LandCorp	Dean Mudford - Chief Operations Officer Suzanne Woolhouse - Planning and Strategy Manager
30.11.2017	WA Local Government Association (WALGA)	Chris Hossen - Senior Planner, People and Place
30.11.2017	Eastern Metropolitan Regional Council (EMRC)	Wendy Harris - Director Regional Services
4.12.2017	Urban Development Institute of Australia (UDIA)	Chris Green - Director Policy and Research
4.12.2017	Planning Institute of Australia (PIA)	Emma de Jager - Executive Officer
6.12.2017	Minister Tinley's Office	Simon Ward - Chief of Staff Kay Hammer - Principal Policy Advisor
7.12.2017	Department of Premier and Cabinet	Lance Glare - Director Infrastructure Policy Liliana Pelle
4.12.2017	Minister Saffioti's Office	Amy Lomas - Chief of Staff Richard Farrell - Principal Policy Advisor David McFerran - Principal Policy Advisor Leigh Boucher - Policy Advisor Public Transport Dale Sanderson - Policy Advisor Planning
8.12.2017	South West Group	Mick McCarthy - Director



APPENDIX 4

4.DRAFT ANKETELL NORTH LOCAL STRUCTURE PLAN MODIFICATION

ANKETELL NORTH STRUCTURE PLAN

PLAN 1

DATE: 20/08/2012
DRAWN BY: [Name]
CHECKED BY: [Name]
DATE: 20/08/2012

- LEGEND**
- LOCAL SCHEME**
- LOCAL SCHEME RESERVES**
- Park Recreation & Drainage
- PUBLIC PURPOSES**
- CF Community Facility
 - PS Educational/Institutional PS Primary School
- ZONES**
- Commercial
 - Residential - R10
 - Residential - R25
 - Residential - R30
 - Residential - R40
 - Residential - R60
 - Residential - R80
- OTHER**
- District Distributor Integrator A
 - District Distributor Integrator B
 - Neighbourhood Connector A
 - Neighbourhood Connector B
 - Access Street B
 - Structure Plan Boundary
 - Western Power Easement

The portion of the LSP area which is most likely to be affected by noise is excluded from the operative LSP until matters raised by the WAPC have been addressed to the satisfaction of the WAPC in an LSP amendment including addressing the requirements of the SPP 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning, inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan.





APPENDIX 5

5. PACKHAM NORTH - ENTRANCE ROAD (ELIZA PONDS) LOCAL STRUCTURE PLAN



**CITY OF COCKBURN
STRUCTURE PLAN**

This Structure Plan was adopted by Council on 13 / 10 / 11

Signed _____
A DIRECTOR OF PLANNING & DEVELOPMENT

File No: sm/n/058

This Structure Plan was endorsed by the Western Australian
Planning Commission on 26 / 5 / 12

Signed _____
A DIRECTOR OF PLANNING & DEVELOPMENT

NOTE

- Road and lane reserves and carriageways are indicative only and subject to detailed engineering design.
- The development of habitable buildings is not permitted within locations which are deemed to be above the noise limits prescribed by Table 1 of the Western Australian Planning Commission's State Planning Policy No. 5.4 (Road And Rail Transport Noise and Freight Considerations in Land Use Planning).



APPENDIX 6

6.FLCWA BULLETIN # 7 FREIGHT RAIL NOISE POLICY AND PRACTICE

Introduction

Bulletin No. 7 from the Freight and Logistics Council of Western Australia discusses recent research by the Council into freight rail noise impacts. It provides additional information on freight rail noise to help inform land use planning and the appraisal of appropriate noise levels in new development proposed along freight rail corridors.

Bulletin No. 5 looked generally at the standards and procedures of the Western Australian Planning Commission's (WAPC) *State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning* (SPP 5.4) and related guidelines.

Bulletin No. 7 looks specifically at new research that explains how freight rail noise has important differences to road and passenger rail noise and why a clear understanding of freight rail noise is important for effective land use planning along rail freight corridors.

The new research includes additional technical standards on the distinctive characteristics of freight rail noise to more fully inform land use planning along freight rail lines. This includes treatment packages for residential development along freight rail lines that will maintain an adequate level of amenity within adjacent residential buildings.

Bulletin No 7 makes the FLCWA research available to assist with land use planning along freight rail lines and to inform the current review of SPP 5.4. The Bulletin is for information purposes and does not replace any requirements or criteria in SPP 5.4.

Freight Rail Noise Policy and Practice

Sound and Noise

Noise is described as “unwanted sound” that can cause annoyance, speech interference and sleep disruption.

Sound comprises waves, and is described by two parameters – frequency and loudness. Frequencies are perceived by people differently. For example, the lower frequency sounds produced by drums compared with those produced by a whistle.

In terms of loudness, the decibel scale matches the way our ear and brain “auditory system” interprets sound pressures:

- In a normal environment, a 3 dB change is generally the threshold of perceptibility. A 3-dB increase represents doubling the sound energy.
- A change of 6 dB is clearly perceptible. A 6-dB increase requires four times the sound energy.
- A change of 10 dB is required before the sound seems twice as loud. A 10-dB increase requires ten times the sound energy.

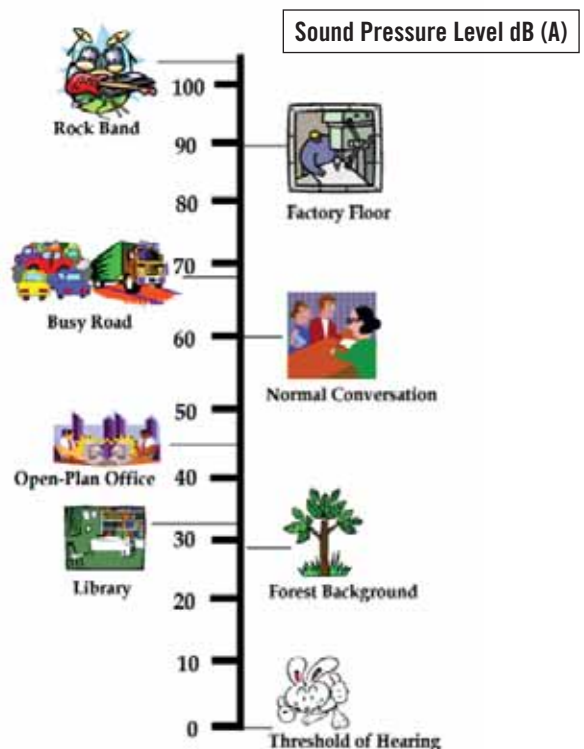


Figure 1: Typical noise levels db(A)

The decibel is a complex quantity based on sound pressure. It can be measured by a range of methods that express sound levels differently for distinctive purposes.

Two common noise measurement methods used for the measurement and expression of transport noise are L_{Aeq} and L_{Amax} . These methods are discussed next in relation to road and rail freight noise.

SPP 5.4 Noise Criteria

SPP 5.4. adopts the L_{Aeq} noise measurement method and establishes outdoor and indoor noise criteria as follows:

Outdoor Noise Criteria

Outdoor noise criteria at a noise-sensitive land use such as a house or apartment are shown in *Table 1*. These criteria apply at any point one metre from a habitable façade of a noise sensitive premises and in one outdoor living area. Compliance with these criteria are to give regard to a 15-20 year transport horizon.

Time of Day	Noise Target	Noise Limit
Day (6am– 10 pm L_{Aeq} (Day))	55dB	60dB
Night (10 pm– 6 am L_{Aeq} (Night))	50dB	55dB

Note: The 5 dB difference between the target and the limit is referred to as the margin.

Table 1: SPP 5.4 Outdoor Noise Criteria

Indoor Noise Criteria

SPP 5.4 indoor standards are shown in *Table 2*.

Time of Day	Acceptable Noise Level	
	Living and work areas	Bedrooms
Day (6am– 10 pm L_{Aeq} (Day))	40dB	n/a
Night (10 pm– 6 am L_{Aeq} (Night))	n/a	35dB

Table 2: SPP 5.4 Indoor Noise Criteria

L_{Aeq} and L_{Amax} transport noise measurement methods compared

The L_{Aeq} noise measurement used in SPP 5.4 describes the average noise during a measurement period. The measurement is well suited to the large number and constant movements typical of road traffic. It is also reasonably suited to the regular and frequent movements of passenger rail.

The potential (maximum) noise impacts from road and passenger rail are therefore considered to be reasonably represented in the L_{Aeq} noise criteria set out in SPP5.4.

Freight rail is different from road noise as it is characterised by a low number of irregular movements, which results in significant noise fluctuation from a very low level to a very high level as freight trains pass.

The problem arises that a low track use may still have a significant acoustic impact on noise-sensitive neighbours because although infrequent, individual freight trains have a high maximum noise level.

Applying the SPP 5.4 L_{Aeq} noise measurement method to freight rail may result in low noise level values due to the averaging effect for a low number of movements. This may not therefore reflect the acceptable or apparent indoor noise levels in a noise-sensitive development such as a residential apartment. In particular, concerns arise from the potential for residents to be woken up several times during an evening despite SPP 5.4 L_{Aeq} (Night) noise criteria of 35dB(A) having been met.

Rail Freight Noise Criteria

An alternative method more suited to the assessment of noise from intermittent sources with high noise levels such as aircraft and freight trains is L_{Amax} which is the maximum level measured over a period event i.e. a train pass-by.

Time of Day	Noise Target	Noise Limit
Day + Night (L_{Amax})	75dB	80dB

Table 3: Recommended Outdoor Criteria for Freight Rail Noise

Time of Day	Living Room	Bedroom
Day + Night (L_{Amax})	60dB	60dB

Table 4: Recommended Indoor Criteria for Freight Rail Noise

As a guide, a generally acceptable level which was previously included in the 2005 draft version of the SPP 5.4 is the outdoor criteria of a 75 dB L_{Amax} target and 80 dB L_{Amax} limit. An internal level equivalent is considered to be 60 dB L_{Amax} applicable to bedrooms and living rooms. This level is consistent with the L_{Amax} approach taken for aircraft.

Freight train noise is not continuous and the Australian Standard for aircraft noise considers sensitivity of the L_{Amax} measurement to the frequency of pass-by events. Similarly, for rail freight, some lines will be busier than others. The 60 dB L_{Amax} guideline level can be adjusted slightly up where freight trains are less frequent, or adjusted slightly down where freight trains are more frequent.

Road and Rail Noise Compared

Figure 2 compares diagrammatically how the L_{Aeq} and L_{Amax} measurements function for road and rail noise.¹ In terms of the L_{Aeq} noise measurement, road traffic noise oscillates in a consistent way as volumes gradually build from night to morning peak hour, reasonably consistent during the day to afternoon peak hour and then fall away again at night. The levels shown for road traffic are 66 dB L_{Aeq} (Day) and 60 dB L_{Aeq} (Night). In terms of the L_{Amax} noise measurement, as each freight trains pass the noise generated fluctuates significantly into sharp peaks as indicated in the diagram with the other noise representing background noise from wind, wildlife, distant traffic etc.

¹ Measurements were taken at 25 metres from the road and freight rail line edge

Freight Rail vs Road Traffic - Typical Daily Time History

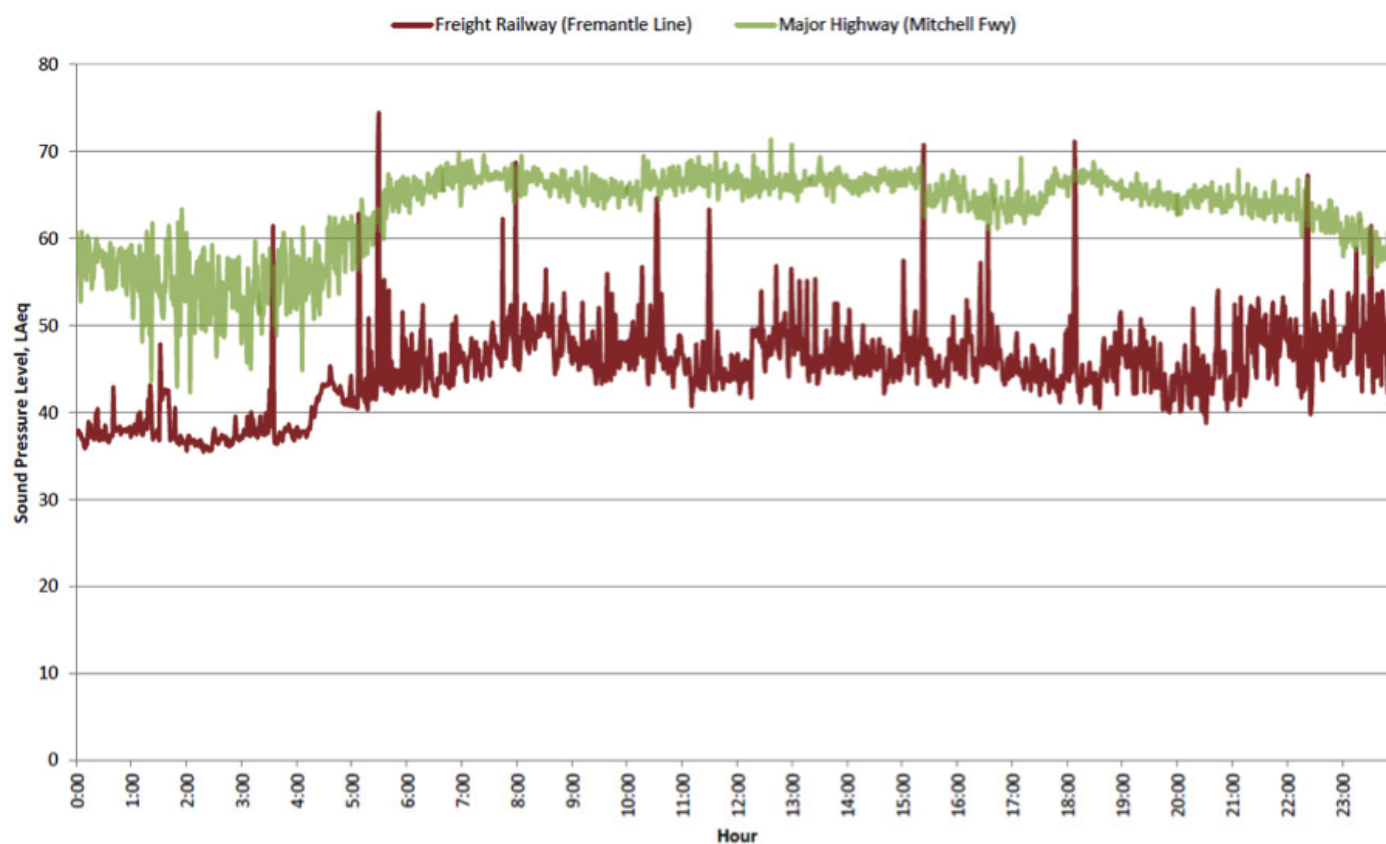


Figure 2: Road and Rail Noise Compared – Daily Time History

Low frequency noise can be a disturbance to sensitive people in their homes. Freight rail has a significant low frequency component as compared to road traffic as indicated on Figure 3 which shows that freight rail has louder external and internal low frequency noise than road traffic.

Conventional building construction and glazing in particular is relatively poor at moderating low frequency noise. Increasing building mass is the most effective counter to low frequency noise with useful materials including masonry walls (instead of stud walls) and clay tiles (instead of steel roofing).

Comparison of L_{Amax} versus L_{Aeq}

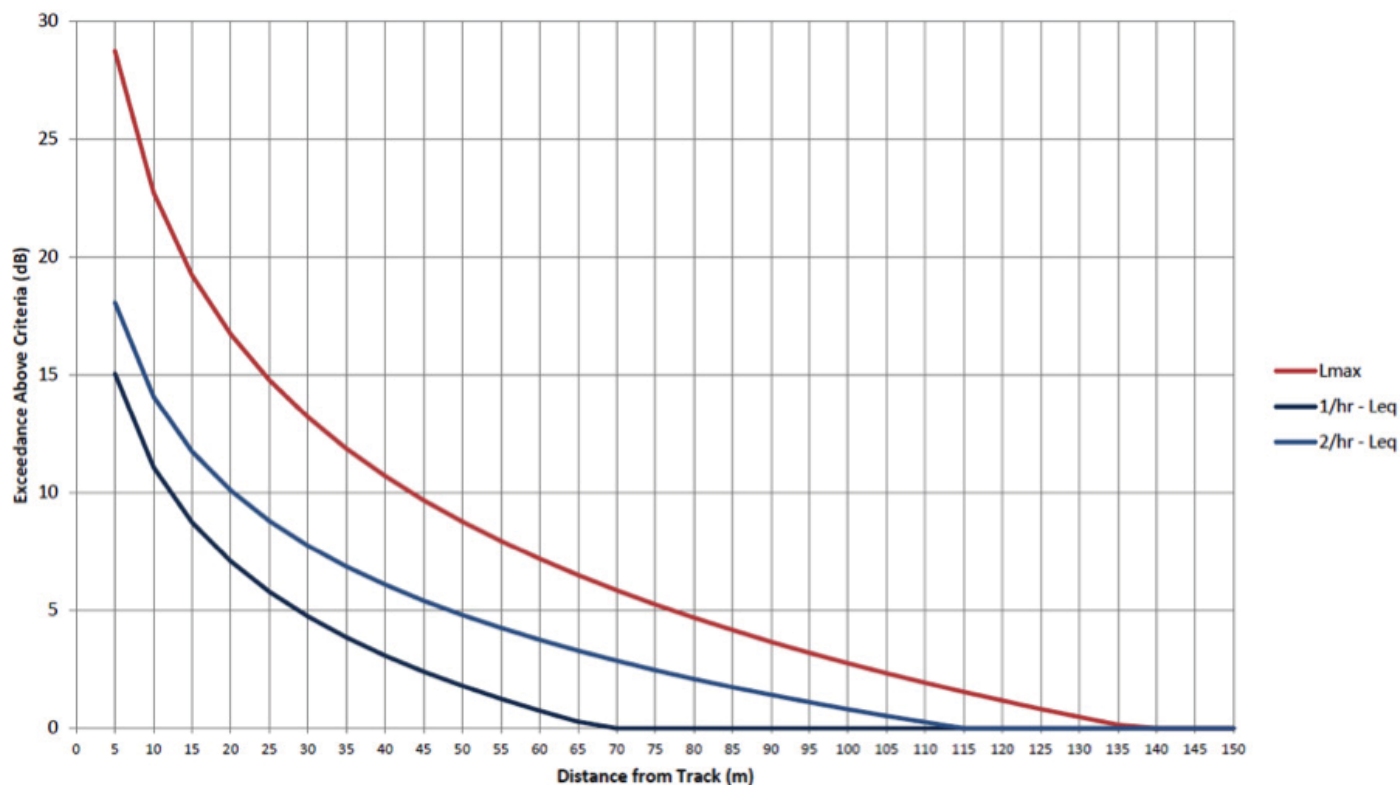


Figure 3: Case Study Chart 1 Comparison of L_{Amax} Versus L_{Aeq} - Measured vs Guidelines

Case Study²

The Freight and Logistics Council of W.A. commissioned a case study by Lloyd George Acoustics to assess the performance for land use planning of the two noise measurement measures of L_{Aeq} and L_{Amax} .

The Fremantle line was selected to test the applicability of the criteria of the Implementation Guidelines for SPP 5.4 – Screening Assessment of one freight rail movement per hour minimum and two per hour. Measurements of freight train noise were collected on the Fremantle line and analysed to compare:

1. Maximum noise level L_{Amax}
2. Average measured noise and L_{Aeq}
3. L_{Aeq} noise forecast - in accordance with the SPP 5.4 Guidelines method of less than 1 train movement per hour assumption for the track.

The Implementation Guidelines for SPP 5.4 prescribe that irrespective of the number of movements on a freight track, a minimum of one train per hour must be assumed in the L_{Aeq} calculation. This may assume a higher number of freight trains than is forecast to occur which has the effect of increasing the L_{Aeq} value, and in turn requiring more stringent noise criteria to be met. By this work-around method, SPP 5.4 attempts to address noise impacts from intermittent events. This was considered a round-about way to assess potential L_{Amax} noise impacts.

A comparison of L_{Amax} with L_{Aeq} for the Fremantle line is shown in Figure 3 above.

The values provided in the SPP 5.4 Guidelines are higher (more conservative) than actual measurements along the Forrestfield - Fremantle Port track. Therefore the relative difference between the L_{Amax} and L_{Aeq} values is not as great when the Guidelines values are applied.

The key points from Figure 3 are summarised below:

- The L_{Aeq} (Night) criteria was satisfied at 70 metres from the track based on the measurements, whereas this is now increased to around 150 metres for the Guidelines values.
- The L_{Amax} criteria is always more critical than the L_{Aeq} (Night) measured values, whereas at a distance of around 105 metres the L_{Amax} becomes less critical than the Guidelines L_{Aeq} (Night).
- At a distance of 25 metres, and assuming 1 train movement per hour, the L_{Aeq} (Night) exceedance is noted as 6 dB for the measured values. Therefore Acceptable Treatment Package B would be applicable to development at this location. Using the Guidelines L_{Aeq} (Night) values, the exceedance would be 10 dB, therefore Package C would be applicable. Whilst the latter is more stringent, it is still insufficient to accommodate the 15 dB L_{Amax} exceedance.

The case study demonstrates that an L_{Amax} assessment will still be critical, in a range of situations, even if the more conservative L_{Aeq} (Night) values set out in Appendix A of the SPP 5.4 Guidelines are applied.

The Case Study did not look at situations where there are more than two freight trains per hour on a line, such as on the Forrestfield Freight Rail line. Specialist noise studies would be required in this circumstance.

² The case study contains further technical information. A copy can be found on the FLCWA web-site

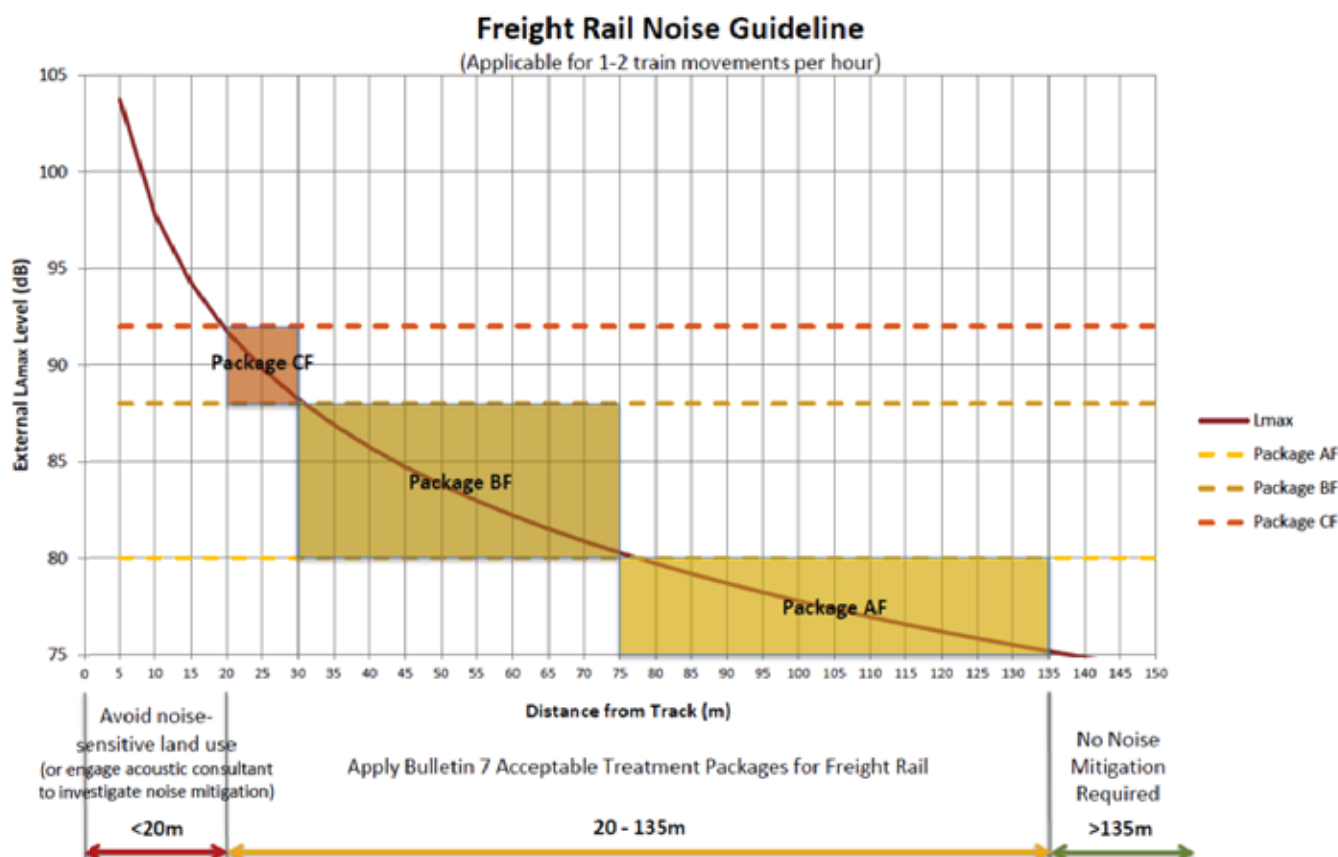


Figure 4: Freight Rail Noise Guideline

Land Use Planning Standards for Development along Freight Rail Lines

Introduction

The FLCWA commissioned case study tested the suitability of the L_{Aeq} and L_{Amax} noise measurement measures for noise sensitive land uses along the Fremantle Freight Rail Line (see box). The study indicated that the L_{Amax} criteria is not adequately addressed for freight rail.

The case study also demonstrates that if a L_{Amax} criteria were introduced, the packages would also be insufficient in achieving reasonable internal noise levels.

FLCWA Bulletin No 7 provides a response to these concerns by setting out a methodology that specifically considers the impacts of freight rail noise along freight rail lines. The approach is based on L_{Amax} for up to two freight rail trains per hour as follows:

1. An alternate table to the SPP 5.4 Screening Assessment Worksheet - *Table 4: Freight Rail Noise Guideline* above; and
2. Targeted treatment packages for residential development along freight rail routes - *Tables 5: Recommended Acceptable Treatment Packages for Freight Rail* and *Table 6: Example Construction for Freight Rail*.

Otherwise, a detailed assessment should be undertaken by a suitably qualified and experienced professional acoustics engineer or consultant where:

1. More than two rail freight trains per hour are forecast; or
2. Development is proposed in the vicinity of a rail freight handling facility; or
3. An alternative to the "Acceptable Treatment" packages is sought.

Freight Rail Noise Guideline

Standards in Table 5 have been developed for the planning and development of sensitive land uses within 135 metres from the edge of a freight rail track³ for up to two freight rail trains per hour as follows:

1. Within 20 metres of a freight rail line edge, the L_{Amax} is above 85 db and the following measures should be instituted:
 - Proposed noise sensitive land use and development should be reviewed for land use compatibility and the earliest stage of the planning process, being at the region or local planning scheme amendment stage;

³ The SPP 5.4 guidelines refer to distances from the rail centreline. The edge of the freight rail track has been used in Bulletin No. 7 to correspond with noise monitoring undertaken by local government and the private sector.

- If a noise sensitive land use or development be progressed, then as per SPP 5.4 Guidelines (Section 4.5):
 - Arrange for notification on each title of property affected.
 - Undertake a detailed noise assessment required by competent professional to the satisfaction of authorities. The assessment must include acceptable treatment provisions.
 - Confirm proponent is committed to implementing the recommendations of the noise assessment or separate noise management plan, and seek evidence of installation as deemed necessary.
2. From 20 to 135 metres of a freight rail line edge, where L_{Amax} is between 75 and 85 db the following measures should be instituted:
- 'Mitigation measures' need to be implemented through Table 5 (Package CF: 20-30 m; Package BF: 30-75 metres; and AF: 75-135 metres), or engage specialist advice.
 - As per SPP 5.4 Guidelines (Section 4.5)
- Arrange for notification on each title of property affected according to SPP Guidelines Section 4.5.
 - Seek evidence of implementation/ compliance as deemed necessary.
3. Compliance will be achieved beyond 135 metres where L_{Amax} is less than 75 dB, and no further measures are required.

Acceptable Treatment Packages for Freight Rail

Roof/ceiling can dramatically increase noise levels. However, the SPP Guidelines do not specify the type of roof materials, so either Colorbond or clay tiles could be used.

From the research, refined packages that include roof/ceiling materials as set out in Table 6 have been developed to help address noise impacts from freight trains. The table is provided as information on appropriate standards that will maintain an adequate level of amenity within residential buildings along freight rail lines.

Alternative treatments offered by proponents may also achieve an acceptable noise level.

Area	Orientation to Road or Rail Corridor	Freight Rail Package CF (up to 92 dB L_{Amax})	Freight Rail Package BF (up to 88 dB L_{Amax})	Freight Rail Package AF (up to 80 dB L_{Amax})
All Habitable Rooms (including Kitchens)	Facing	<ul style="list-style-type: none"> • Walls to $R_w + C_{tr}$ 50 • Windows and external door systems: Minimum $R_w + C_{tr}$ 34 total glazing up to 40% of room floor area. $R_w + C_{tr}$ 37 if 60%. • Roof and ceiling to achieve minimum transmission loss of 22dB at 63 Hz and overall $R_w + C_{tr}$ 35 (e.g. clay roof tiles). • Mechanical ventilation. 	<ul style="list-style-type: none"> • Walls to $R_w + C_{tr}$ 45 • Windows and external door systems: Minimum $R_w + C_{tr}$ 30 total glazing up to 40% of room floor area. $R_w + C_{tr}$ 33 if 60%. • Roof and ceiling to achieve minimum transmission loss of 22dB at 63 Hz and overall $R_w + C_{tr}$ 35 (e.g. clay roof tiles). • Mechanical ventilation. 	<ul style="list-style-type: none"> • Walls to $R_w + C_{tr}$ 45 • Windows and external door systems: Minimum $R_w + C_{tr}$ 28 total glazing up to 40% of room floor area. $R_w + C_{tr}$ 31 if 60%. • Roof and ceiling to $R_w + C_{tr}$ 35. • Mechanical ventilation.
	Side	<ul style="list-style-type: none"> • As above. 	<ul style="list-style-type: none"> • As above. 	<ul style="list-style-type: none"> • As above.
	Opposite	<ul style="list-style-type: none"> • As above, except glazing may be 3dB less, or % increased by 20% (i.e. $R_w + C_{tr}$ 34 for 60%). 	<ul style="list-style-type: none"> • As above, except glazing may be 3dB less, or % increased by 20% (i.e. $R_w + C_{tr}$ 29 for 60%). 	<ul style="list-style-type: none"> • As above, except glazing may be 3dB less, or % increased by 20% (i.e. $R_w + C_{tr}$ 28 for 60% or $R_w + C_{tr}$ 31 for 80%).

Table 5: Recommended Acceptable Treatment Packages for Freight Rail

Table 6 sets out some typical examples of construction materials for freight rail for the recommended range of acceptable treatment packages in Table 5.

Area	Orientation to Road or Rail Corridor	Freight Rail Package CF (up to 92 dB L _{Amax})	Freight Rail Package BF (up to 88 dB L _{Amax})	Freight Rail Package AF (up to 80 dB L _{Amax})
All Habitable Rooms (including Kitchens)	Facing	<ul style="list-style-type: none"> Walls: 2 x 110mm double brick wall with 50mm cavity and 50mm fibreglass insulation within the cavity. Windows: 10.5mm VLam Hush awning windows (up to 40% of room floor area). External Doors: 10mm fully glazed hinged door (up to 20% of room floor area). External doors to bedrooms are not recommended. Roof and ceiling: Clay roof tiles with sarking and 10mm plasterboard ceiling, or, Colorbond roof sheeting with sarking, 4mm fibre cement sheeting fixed to the roof purlins and 2 x 10mm plasterboard ceiling. Mechanical ventilation. 	<ul style="list-style-type: none"> Walls: 2 x 90mm double brick wall with 20mm cavity. Windows: 6mm awning windows (up to 40% of room floor area); or, 10mm awning windows (up to 60% of room floor area). External Doors: 10mm sliding glass doors (up to 20% of room floor area). External doors to bedrooms are not recommended. Roof and ceiling: Clay roof tiles with sarking and 10mm plasterboard ceiling, or, Colorbond roof sheeting with sarking, 4mm fibre cement sheeting fixed to the roof purlins and 2 x 10mm plasterboard ceiling. Mechanical ventilation. 	<ul style="list-style-type: none"> Walls: 2 x 90mm double brick wall with 20mm cavity. Windows: 6mm awning or 10mm sliding windows (up to 40% of room floor area); or, 6mm awning windows (up to 60% of room floor area). External Doors: 6mm sliding glass doors (up to 20% of room floor area). Roof and ceiling: Colorbond roof sheeting with 10mm plasterboard ceiling. Mechanical ventilation.
	Side	<ul style="list-style-type: none"> As above. 	<ul style="list-style-type: none"> As above. 	<ul style="list-style-type: none"> As above.
	Opposite	<ul style="list-style-type: none"> As above, except - Windows: 6mm awning windows (up to 40% of room floor area); or, 10mm awning windows (up to 60% of room floor area). External Doors: 6mm fully glazed hinged door (up to 20% of room floor area). 	<ul style="list-style-type: none"> As above, except - Windows: 6mm awning or 10mm sliding windows (up to 40% of room floor area); or, 6mm awning windows (up to 60% of room floor area). External Doors: 6mm sliding glass doors (up to 20% of room floor area). 	<ul style="list-style-type: none"> As above, except - Windows: 4mm awning or 6mm sliding windows (up to 40% of room floor area); or, 6mm awning or 10mm sliding windows (up to 60% of room floor area).
Outdoor Living Area		<ul style="list-style-type: none"> Where practicable, locate an outdoor living area on the opposite side of the rail corridor or in an alcove on the side of the house. 	<ul style="list-style-type: none"> Where practicable, locate an outdoor living area on the opposite side of the rail corridor or in an alcove on the side of the house. 	<ul style="list-style-type: none"> Where practicable, locate an outdoor living area on the opposite side of the rail corridor or in an alcove on the side of the house.

Table 6: Example Construction for Freight Rail

Conclusion

This Bulletin from the Freight and Logistics Council of Western Australia discusses the measurement of freight rail noise impacts and their treatment based on Council research into the issue. The work will form the basis of a Council submission into a current Government review of related policy and practice.

Terms

The following is an explanation of the terminology used throughout this report.

Decibel (dB)

The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Hertz (Hz)

Hertz is the unit of frequency or pitch of a sound. One hertz equals one cycle per second.

L_{eq}

The L_{eq} level represents the average noise energy during a measurement period.

L_{Aeq} (Day)

the L_{Aeq} (16 hour) for the time period 6 am to 10 pm;

L_{Aeq} (Night)

the L_{Aeq} (8 hour) for the time period 10 pm to 6 am;

L_{max}

The L_{max} level represents the maximum energy during a measurement period.

Noise-sensitive land use

Includes land used for noise-sensitive premises (as defined in the *Environmental Protection (Noise) Regulations 1997*) occupied solely or mainly for residential or accommodation purposes, rural premises and premises used for the purpose of:

- a caravan park or camping ground;
- a hospital;
- a sanatorium, home or institution for the care of persons, a rehabilitation centre, home or institution for persons requiring medical or rehabilitative treatments;
- education (school, college, university, technical institute, academy or other educational centre, lecture hall or other premises used for the purpose of instruction);
- public worship;
- a tavern, hotel, club premises, reception lodge or other premises that provide accommodation for the public;
- aged care;
- child care; and
- prison or detention centre;

R_w

This is the weighted sound reduction index and is similar to the previously used STC (Sound Transmission Class) value. It is a single number rating determined by moving a grading curve in integral steps against the laboratory measured transmission loss until the sum of the deficiencies at each one-third-octave band, between 100 Hz and 3.15 kHz, does not exceed 32 dB. The higher the R_w value, the better the acoustic performance.

Further information:

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<http://freightandlogisticscouncil.wa.gov.au>

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the Spatial Group planning + design and

Lloyd George Acoustics



Published by TPG Town Planning, Urban Design and Heritage





APPENDIX 7

7. LLOYD GEORGE ACOUSTICS “COST OF ARCHITECTURAL PACKAGES” REPORT



To: Freight & Logistics Council **From:** Terry George

Attention: Mark Brownell **Date:** 6 July 2016

Email: Mark.brownell@inet.net.au **Pages:** 5 + Rawlinsons (W.A.) Letter

Our Ref: 14113026-04.docx

Re: Cost of Acoustic Architectural Packages

Mark:

Following our report (*Freight Train Noise Assessments*; Reference: 14113026-02 Final, 14 September 2015), Rawlinsons (W.A.), being quantity surveyors, were engaged to provide indicative costings associated with the various architectural packages including those taken from SPP 5.4 Guidelines and those put forward in our report in relation to noise from freight trains. The pricing was based on a house plan considered 'typical' as shown on the following page. *Table 1* compares the costs with the Rawlinsons information attached. Note that the Total Cost only relates to certain aspects of the house. The builder advertises this house, as a house and land package for approximately \$380,000.

Table 1 – Cost Comparison for Architectural Packages

Package	Total Cost	Cost Above Standard
Standard House	\$72,569	-
SPP Package A	\$76,931	\$4,362
SPP Package B	\$83,271	\$10,703
SPP Package C	\$93,482	\$20,914
Freight Package AF	\$77,563	\$4,994
Freight Package BF	\$87,023	\$14,454
Freight Package CF	\$95,805	\$23,236

The cost increases are associated with the following elements:

- Package A – 100% associated with upgraded glazing, changing from standard glass in sliding windows to thicker, laminated glass in awning windows and acoustic seals fitted to sliding doors;
- Package B – Approximately 60% from upgraded glazing and 40% upgraded external wall construction. Glazing thickness is increased again compared to Package A. The deemed to satisfy construction for Package B walls includes insulation and anti-vibration ties;
- Package C – Approximately 55% from upgraded glazing, 20% from upgraded external wall construction and 25% from upgraded ceiling construction. Glazing thickness is again increased from the other packages as well as the ceiling;

- Package AF – Approximately 95% from upgraded glazing, being much the same as Package A;
- Package BF – Approximately 70% from upgraded glazing and 30% from clay roof tiles. In this package walls have not been upgraded, however in conjunction with window upgrades (slightly above those of Package B), the roof has been changed to clay roof tiles as opposed to *Colorbond*;
- Package CF – Approximately 60% from upgraded glazing, 20% from upgraded external walls and 20% from clay roof tiles. Glazing requirements are slightly higher than Package C, the wall is equivalent to Package C and as per Package BF, the roof is to be clay roof tiles.

The results indicate that the Package AF is essentially the same as Package A. Package BF lies in between the cost of Package B & C and Package CF is the most expensive. Each Package provides a different level of noise reduction so that for instance, Package BF is not comparable to Package B. As such, a way to compare each is to examine the cost per decibel as shown in *Table 2*.

Table 2 – Cost Per dB Comparison for Architectural Packages

Package	Noise Reduction (Outside to Inside)	Additional Noise Reduction Compared to Standard House	Cost per Additional dB
Standard House	15	-	-
SPP Package A	20	5	\$ 872
SPP Package B	23	8	\$1,338
SPP Package C	25	10	\$2,091
Freight Package AF	20	5	\$ 999
Freight Package BF	28	13	\$1,112
Freight Package CF	32	17	\$1,367

When compared on a cost per additional dB relationship, it can be seen that Package BF is more efficient than Package B and Package CF is more efficient than Package C.

Note that in all of the above, any costs associated with mechanical ventilation has not been included. The reason for this is that in most circumstances, mechanical ventilation is achieved by installing air-conditioning. This in turn provides other benefits, other than just allowing a person to close their windows. Rawlinsons state that the cost of air-conditioning is difficult to fix. Also, how a person achieves fresh air to each room, we believe, should not be mandated under the Policy, but only suggested. For instance, a person could satisfy the Building Code requirements by other means such as 'borrowing' from another room or opening windows at times when the room is not in use etc.

Another item to consider is the extent to which the Packages may apply, which is demonstrated in *Figure 2*. This shows the expected maximum noise level with distance compared to the L_{Aeq} noise level provided in the SPP Guidelines, on the basis of 1 train movement per hour.

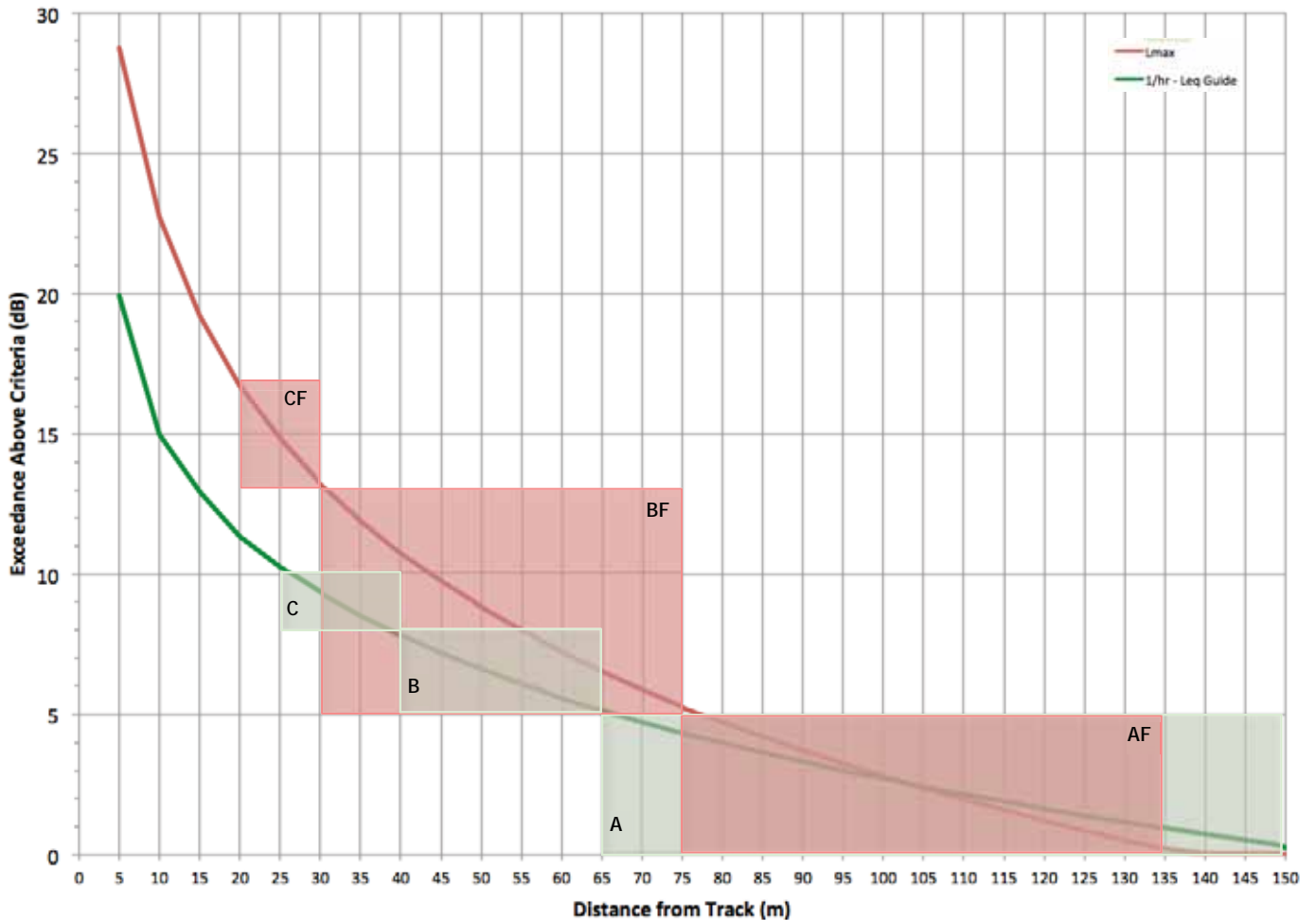


Figure 1 – Areas Where Packages Are Applicable

The above shows the following:

- SPP Packages would apply as follows:
 - 65m to 150m - Package A
 - 40m to 65m – Package B
 - 25m to 40m – Package C
- Freight L_{Amax} Packages would apply as follows:
 - 75m to 135m – Package AF
 - 30m to 75m – Package BF
 - 20m to 30m – Package CF

Recognising that the distances relate to the centreline of the nearest track, the distance to the nearest residence as part of a new subdivision is likely to lie in the 25-40 metre range. If this were the case, the comparisons between the constructions are:

- Between 25m and 30m, Package CF is recommended in place of Package C. Package CF is approximately \$2,300 more than Package C;
- Between 30m and 40m, Package BF is recommended in place of Package C. Package BF is approximately \$6,500 **less** than Package C.

The other aspect that is not possible to put a cost too would be the health benefits. For instance, where the distance is less than 30m to the nearest track centerline, whilst there would be a cost increase of approximately \$2,300 compared to Package C, this would be offset by reducing the internal noise levels to provide a better acoustic amenity, including minimising low frequency noise and sleep disturbance.

It should finally be noted that the packages are deemed to satisfy constructions. It is not uncommon for a builder to engage an acoustical consultant to undertake a house specific assessment in order to deviate from the deemed to satisfy. Where a builder does this, a common outcome is that the extent of treatment can be reduced and therefore the costs may be less than indicated.

If having different deemed to satisfy constructions for freight rail is considered too difficult, an alternative would be to simply adopt the requirement for clay roof tiles where houses adjoin a freight corridor, which will greatly assist in minimising the low frequency content via this noise path.

We trust the above and attached information is adequate for your current requirements.

Regards,

A handwritten signature in black ink, appearing to read 'Terry George', written in a cursive style.

Terry George

PR/rst

June 29, 2016

Mr T George
Lloyd George Acoustics
PO Box 717
HILLARYS WA 6923

Dear Terry,

ACOUSTIC PACKAGES

We attach the completed schedule of estimated costs for Acceptable Treatment Packages for your review and information.

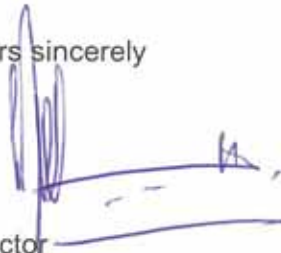
In compiling this schedule we would add the following comments;

1. All prices exclude GST
2. All prices are supply and fix but do not include main contractors overheads and profit, nor an allowance for any particular procurement method.
3. Where as the windows are a measurable and standardised item that can be rated accurately , the final decision on an external door is subjective and open to personal aesthetics that will affect the final cost.
4. The costs for the construction of the walls does not take into account footings/ foundations which for the purpose of this exercise should remain constant.
5. The rates for the roof covering include for the structural support framework
6. The costs for air-conditioning remain the more difficult to fix. The standards guidelines versus occupiers expectations in performance vary and we have found little support for conditioning fresh air alone versus the heating and cooling elements.

Thank you for this opportunity to share our data base and benchmarking with your research and we trust our findings have been of assistance.

Please do not hesitate to contact Paul Roberts at our office if you have any further queries

Yours sincerely



Director
RAWLINSONS (W.A.)



APPENDIX 8

8. FLCWA COMMENTS ON DEPARTMENT OF PLANNING TECHNICAL WORKING GROUP DRAFT SPP 5.4



FREIGHT AND LOGISTICS COUNCIL OF WESTERN AUSTRALIA

Chris Longley
Senior Planning Officer
Department of Planning
140 William Street
Perth WA 6000

Dear Chris

**RE: DRAFT STATE PLANNING POLICY 5.4: ROAD AND RAIL TRANSPORT NOISE (SPP 5.4),
IMPLEMENTATION GUIDELINES AND ASSOCIATED MAPPING**

On behalf of its industry members, the Freight and Logistics Council of WA (FLCWA) is generally supportive of the Department's Draft State Planning Policy 5.4: Road and Rail Transport Noise (SPP 5.4), Implementation Guidelines and associated mapping for its approach to simplifying and clarifying the policy and improving the mechanisms for implementation.

As previously stated, the Council commends the Department for the draft SPP 5.4, implementation guidelines and associated mapping in what is a complex and technical land use and transport planning challenge. However, the FLCWA reiterates its continued desire for SPP 5.4 and associated documents to provide a greater level of protection for future noise sensitive development within close proximity to freight rail lines particularly.

FLCWA maintains that the protection of freight rail, primarily within an urban context (both metropolitan and regional), from urban encroachment is a priority for its members, as it should be for the Government.

Freight rail networks are an essential and invaluable component of the freight and logistics network and in turn for the Western Australian economy. The West Australian freight rail network:

- connects WA to the east coast and carries the majority of consumer goods found on WA supermarket shelves;
- carries primary resources from major extraction projects in regional areas to sea and rail ports across the state, ensuring access to national and global markets;
- carries agricultural produce from regional areas to sea and rail ports across the state, ensuring access to national and global markets; and
- carries containerised freight to and from intermodal rail terminals and Fremantle Inner Harbour, reducing container road freight by approximately 14% (with a State Government target of 30%), thereby reducing congestion on the metropolitan road network and impacts for established urban communities. It should be noted that the Fremantle Port rail services currently carries approximately 1000,000 TEU per annum, which results in the removal of 13 kilometres of trucks from the road network each day.

The value of the role and functions of the freight rail network, as summarised above, cannot be underestimated.

FLCWA equally supports the protection of road and freight rail transport corridors. However, its

interest in the protection of the freight rail network stems from Council research that demonstrates that the current SPP 5.4 is inadequate in predicting the level of disturbance that results from freight rail operations and therefore has and will result in urban encroachment on freight rail corridors to the detriment of both residential amenity (in the short term) and freight efficiency (in the medium to long term).

It should be noted that freight rail operations:

- have a unique noise profile, when compared to passenger rail and road noise;
- have other off-site impacts, including vibration;
- are likely to experience increased movements (particularly at night) as the State Government continues to encourage freight rail as an alternative to congested road networks;
- have long-standing and fixed corridors that cannot be moved without prohibitive costs to Government;
- have irregular, and in some cases, infrequent movements; and
- make a substantial and significant contribution in economic terms.

The draft Policy must recognise the characteristics outlined above and the need to prevent any restrictions on freight rail operation that may result from urban encroachment. Such would result in higher costs and inefficiency for industry, together with reduced community amenity from the increase in heavy vehicles on the road network.

The FLCWA, with the assistance of expert planning and acoustics consultants, has undertaken detailed research into the level of noise generated by freight rail operations (on a section of the metropolitan network at Cockburn Coast) and the adequacy of the current SPP 5.4 and associated guidelines in providing protection to both the continued and uninhibited operation of the freight network and the amenity of neighbouring urban communities.

Enclosed with this correspondence are copies of reports and briefing notes which outline the scope of these studies and the outcomes. The most recent work commissioned by the FLCWA investigates the cost of alternative construction packages as compared to the packages outlined in SPP 5.4.

In addition, the FLCWA has commenced a program of industry engagement to explore on-track options for noise mitigation and minimisation.

The FLCWA remains concerned that the draft SPP 5.4 and associated implementation guidelines have not adopted an alternative approach to the use of the L_{Aeq} metric to determine appropriate land use and building construction standards for land within close proximity to freight rail lines. The FLCWA has previously raised concerns that the use of the L_{Aeq} metric does not adequately reflect the nature and character of freight rail noise and that this has resulted in unsatisfactory outcomes for noise sensitive land uses, primarily those of a residential use.

However, FLCWA is encouraged by recent discussions with the Department of Planning and their willingness to work with the Council to explore options to modify the policy that will lead to a sustainable balance between the needs of industry and the community.

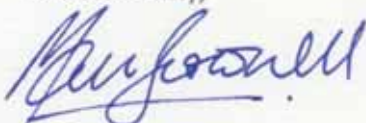
FLCWA looks forward to continuing discussions with the Department, particularly in regard to:

- Modifications to Table 2 within SPP 5.4 to outline alternative noise criteria applicable to freight rail noise;
- The practical implementation of deemed to comply versus performance based criteria;
- Architectural packages; and

- The practical implementation of SPP 5.4 in areas that currently and/or are forecast to be exposed to freight rail train movements greater than 1 train per hour; and
- receiving the Department's feedback following further evaluation of alternative approaches to mitigate the L_{Amax} noise levels, such as the modifications to Table 2 as discussed.

The FLCWA will undertake a detailed review of the draft SPP 5.4 and associated documents in the coming months in preparation for their release for a public comment period and looks forward to providing a detailed response to the documents in due course.

Yours sincerely,



Mark Brownell
Executive Officer
29/08/2016

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