

B-Line Additional Mitigation Policy (BAMP) for Construction Airborne Noise

1. Introduction

The objective of this B-Line Additional Mitigation Policy (BAMP) is to provide guidance on when and how to implement feasible and reasonable mitigation for construction noise impacts associated with the Northern Beaches B-Line Program (B-Line). This policy supports the Roads & Maritime Services (RMS) Construction Noise and Vibration Guideline (CNVG, April 2016) and is intended to provide a clear process for implementing the CNVG additional mitigation measures for residential receivers affected by the construction phase of the B-Line.

2. Key Terms and Definitions – Interpretation

References: ICNG – NSW EPA Interim Construction Noise Guideline, 2009; CNVG – Roads & Maritime Services (RMS) Construction Noise and Vibration Guideline, 2016

Term	
General terms	
Planned activity	For the purposes of this policy, this refers to the full suite of construction works to be carried out at a particular project site for a defined period.
Rating Background Level (RBL)	The Rating Background Level (RBL) is the overall background noise level that represents the day-time, evening and night-time periods at a particular location.
Noise Management Level (NML)	The Noise Management Level (NML) is 5dB above the RBL for out of hours (OOH) works (any works conducted outside the hours of 7am to 6pm Monday to Friday, or 8am to 1pm Saturday), which pertains to the majority of B-Line activities. Where construction noise levels exceed the NML, receivers are considered to be noise-affected. The extent to which the construction noise exceeds the NML dictates which additional mitigation measures (AMM) are to be considered.
Consider	In the context of this policy, “consider” means to fully investigate whether a mitigation option is feasible and reasonable.
Feasible	Capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements. If the mitigation measure is not feasible (possible) then no further consideration is warranted.
Reasonable	Selecting reasonable measures involves making a judgment to determine whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure. The definition of “reasonable” is discretionary and should be applied consistently across receiver catchments in a project.
Worst affected receiver	The residential receivers predicted to experience the most significant noise impacts, based on Verification (V) measurements. Generally the front row of residential properties facing the work site is the worst affected receiver.
Additional Mitigation Approaches	
Additional Mitigation Measures (AMM)	Additional mitigation measures are defined in the CNVG as a list of steps that should be considered if predicted construction noise levels exceed triggers set in the CNVG, even after the application of all feasible and reasonable standard mitigation proposed for the works. AMM relevant to the B-Line are detailed in Appendix C of the CNVG.
Verification (V)	Where OOH Period 2 (10pm – 7am any day and Sunday / Public Holiday Evenings 6-10pm) works noise exceeds the RBL by 10dB, regardless of duration of works, Verification noise measurements should be undertaken in accordance with the following: <ol style="list-style-type: none"> 1. Measure the construction source noise level (LAeq measured in

	<p>15minute intervals at 7m or 10m, and 50m from the site boundary, if accessible for measurements)</p> <ol style="list-style-type: none"> a. Verify source levels by measuring at the first location where these works that are predicted to trigger Verification. For the first location, Verification of source levels takes place during the first night of each type of work activity. If source levels are within 2dB of the levels provided in the B-Line noise assessments (or if not available, CNVG (Appendix F)), then use the noise assessment levels for the remainder of the construction route. If the difference is 3dB or greater, use the measured levels to predict construction noise for this type of work along the remainder of the route. b. Use the measured site source levels for all prediction models along the remainder of the construction route, i.e. if the source noise levels differ from the assumed level, then adjust the predictions. <p>2. Measure the background and ambient levels at the receiver in the absence of construction noise to confirm RBL and NML, including the 6am to 7am shoulder period. Also, take observations of the local residential receivers (orientation, construction, etc.). <i>Note: The B-Line project areas have been subject to construction noise assessments and the background and ambient noise levels for receiver catchments along the route have already been verified. The B-Line noise assessments should be consulted to determine the applicable NMLs along the route.</i></p> <p>Compare the verified predictions against RBLs / NMLs to determine when AMM should apply at different receiver catchments (refer to CNVG Table C.1) Verification is also required for works carried out during Standard hours and Period 1, if noise levels are predicted to exceed the RBL by 20dB or more.</p>
Notification (N)	Letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of five working days prior to the start of works. Detailed noise predictions are to be made for all receivers in the catchment area, and Notification is to be delivered in accordance with the AMMM (Tables C.1 to C.3 of the CNVG).
Specific Notification (SN)	Letterbox drop (or equivalent) providing additional information about proposed works to highly affected receivers, no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives.
Phone Calls (PC)	Where possible, phone calls (or alternative personal engagement) detailing relevant information made to worst affected receivers within seven calendar days of proposed works. Phone calls provide affected stakeholders with personalized contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs.
Individual briefings (IB)	Individual briefings (meetings or alternative personal engagement) or door knockings to inform worst affected receivers, conducted at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalized contact and tailored advice, with the opportunity to comment on the project.
Respite Period 1 (R1)	Construction noise 6pm to 10pm (any day) and Saturday (7am-8am and 1-6pm) and Sunday / Public Holiday 8am – 6pm) shall be limited to no more than three consecutive evenings per week where the Period 1 RBL is exceeded by 10dB or more, except where there is a Duration Respite (DR). Works in these periods shall be not less than one week apart and no more than 6 evenings per calendar month.
Respite Period 2 (R2)	Night time (10pm – 7am any day) and Sunday / Public Holiday Evenings (6-10pm) construction noise shall be limited to two consecutive nights per week

	except for where there is a Duration Respite. Works in these periods shall not be less than one week apart and no more than six nights per calendar month. Where possible, high noise generating works shall be completed before midnight.
Respite Offers (RO)	A minimum respite of one hour between three-hour blocks of high noise work should be considered only where this does not increase the number of nights during which the works would occur. This additional mitigation measure will generally not apply to the B-Line for works conducted during evening and night-time blocks with duration restricted to two consecutive nights, but should be considered for longer duration B-Line works such as weekend shut downs.
Duration Respite (DR)	In circumstances where there is strong justification and community support, it may be beneficial to by-pass Respite Period 1 and Respite Period 2, and complete works in a shorter timeframe. This may result in increased intensity of noise impacts for a shorter duration. The project team should engage with residents where OOH noise levels are expected to exceed the RBL by 10dB or more to demonstrate support for DR. Where there are “few receivers” (refer to Section 2 of the CNVG for definition) each of these receivers should be visited to discuss the project to gain support of DR.
Alternative Accommodation (AA)	Alternative accommodation options for the B-Line may be offered to residents that are likely to experience construction noise levels exceeding the RBL by more than 30dB during Period 2 hours for greater than two consecutive nights. Further considerations will apply before offering AA to any resident to determine whether the offer is “reasonable” in the context of the B-Line.

3. Standard mitigation

In reference to the CNVG, prior to the application of additional mitigation, all feasible and reasonable standard measures to mitigate construction noise and vibration impacts must be implemented. Appendix B of the CNVG provides a comprehensive list of standard mitigation measures that should be applied on all construction projects, however the following provides a checklist of key source control measures that should be investigated prior to consideration of AMM on the B-Line project.

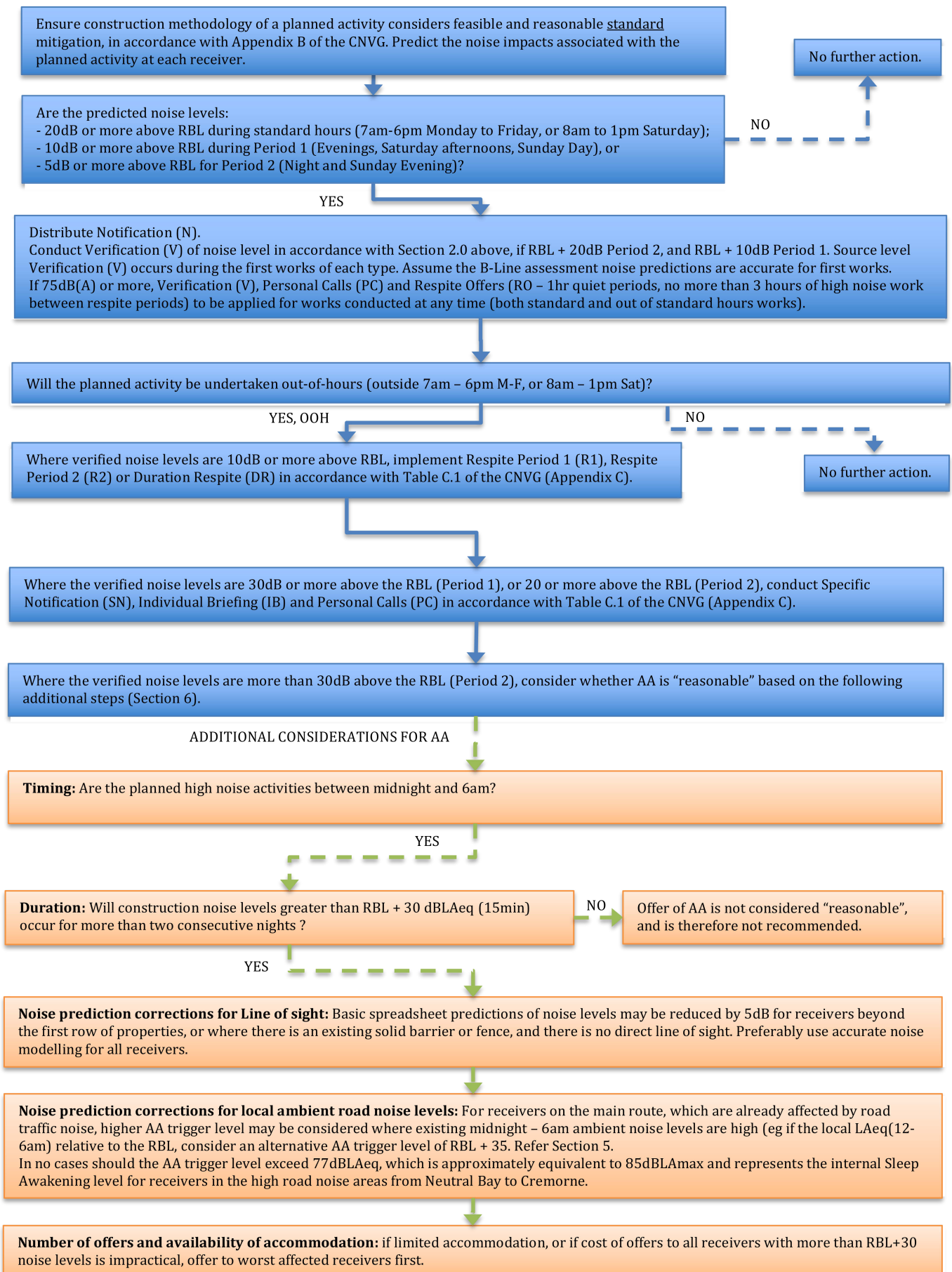
- Construction hours and scheduling – construction should be carried out during standard daytime working hours and high noise generating activities should be scheduled during less sensitive time periods. See below in order of least sensitive to most sensitive:
 - Standard hours (least sensitive)
 - Saturday 1pm to 6pm
 - Weekday 6pm to 10pm
 - Sunday 8am to 6pm
 - Saturday and Sunday 6pm to 10pm
 - 10pm to 12am
 - 12am to 7am (Monday to Friday) or to 8am Saturday and Sunday (most sensitive)
- Equipment selection – use the quietest equipment/technology (e.g. solar powered lighting tower rather than generator powered, electric or hydraulic hand tools rather than petrol-powered) and construction methodologies available (e.g. bored piles rather than impact piles).
- Plant level noise – noise levels of plant and equipment must have operating Sound Power or Sound Pressure levels compliant with Appendix H of the CNVG. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers’ specifications or Appendix H.
- Where possible reduce noise from mobile plant through additional fittings including:
 - Residential grade mufflers
 - Damped hammers such as “City” model rammer hammers
 - Air parking brake engagement silencer

- Manage construction-related traffic and truck noise in residential areas, particularly at night:
 - Limit the speed of vehicles and avoid the use of engine compression brakes
 - Ensure that vehicles are fitted with a maintained original equipment manufacturer exhaust silencer, or a silencer that complies with the National Transport Commission’s “in-service test procedure” and standard.
 - Schedule and route vehicle movements away from sensitive receivers and during less sensitive times
 - Maximise on site storage capacity to reduce the need for truck movements during sensitive times
- Use and siting of plant – implement the following:
 - Maximize offset distance between noisy plant and adjacent sensitive receivers
 - Throttle down or shut down intermittently used plant
 - Direct noise-emitting plant away from sensitive receivers
 - Only operate necessary equipment on site
- Noise barriers and shielding – implement the following:
 - Noise curtains on site fencing between works and sensitive receivers, where possible, and or where indicated as required in the noise assessment
 - Configure works behind existing noise shields (e.g. site sheds, earth mounds)
 - Use larger, unused plant to shield noisy works (e.g. park trucks between works and adjacent receivers)

4. Additional mitigation methods (AMM)

In the application of additional mitigation, where the construction noise and vibration impacts of the planned activity trigger respite and/or alternative accommodation (refer to Tables C.1 to C.3 of the CNVG - Appendix C) for residential receivers, the consideration of all feasible and reasonable measures must be undertaken prior to the commencement of the planned activity. Figure 1 provides a guide to determining the suitability of implementing additional mitigation measures for a scheduled activity, if triggered as per the CNVG.

Figure 1 – Application of AMM



5. B-Line Noise Level Triggers for AA: Noise Catchment Zones

Noise Catchment Zones have been developed for B-Line on the basis of comparable noise environments and background/ambient noise levels (e.g. areas along Military Road between Neutral Bay to Mosman, with consistently elevated background/ambient noise levels due to high traffic volumes).

Accepted acoustic practice is to assume that ambient levels are 5dB above the RBL (refer NSW INP Amenity Levels compared with AS1055 assumed background noise levels for different receiver area types). For some locations along the main B-Line route, such as Neutral Bay and Cremorne, the measured period ambient is consistently 10dB or more above the measured RBLs. The emergence of construction noise above existing ambient is a consideration when determining whether it is reasonable to offer AA. Therefore the RBL+30 trigger for AA has been conservatively raised by up to 5dB for these areas. The exception is off the main road, where measured ambient noise levels are lower due to shielding from road traffic noise by existing buildings.

In the high road traffic noise areas between Neutral Bay and Mosman, the B-Line Alternative Accommodation trigger level has been set to be the lesser of approximately RBL+35 and the Sleep Awakening Level of 77dBAeq(15min). This is approximately equivalent to the internal sleep awakening level assuming the façade road traffic noise reduction required for Neutral Bay / Cremorne / Spit Junction residences. This is because Sleep Awakening is considered to be an important factor in determining eligibility for AA.

Trigger levels may be updated from time to time based on updated noise monitoring results. Refer to the current version of “B-Line Noise Level Triggers for AA: Noise Catchment Zones” for applicable AA trigger levels.

6. “Reasonable” Considerations for Applying AA

“Reasonable” considerations involve determining whether the overall noise benefits of applying AA outweigh the overall adverse social, economic and environmental effects, including the cost of AA. The following “reasonable” considerations should be investigated prior to an AA offer.

1. **Timing** – AA is not considered if the planned activities do not occur between 12am and 6am.
2. **Duration** – AA is not considered reasonable if OOH works do not occur for more than two consecutive nights.
3. **Line of sight** – Where there is no direct line of sight from activities to the receiver (e.g. where the first row of receivers may provide screening) predicted noise levels may be reduced by 5dB for receivers beyond the first row (if applying simple spreadsheet noise predictions). Preferably 3-D noise modelling will determine effects of line of sight for receivers off the main route.
4. **Individual receivers:**
 - Existing screening – Existing screens or barriers such as solid fences (brick, colourbond or overlapping paling) may reduce predicted noise levels by 5dB (assuming the construction site does not already have hoarding. In this case the noise prediction will already include the barrier affect and no further noise reduction can be applied). Note that there are very few residential receivers along the B-Line route with window completely screened by front fences.
 - Building condition and layout – Buildings constructed since 2000 (façade in good condition) with a bedroom at the rear or extra bedroom may reduce predicted internal noise levels by 5dB or more. These considerations can only be accurately applied if detailed surveys of individual buildings have taken place. Otherwise assume no corrections can be made.

5. **Noise prediction corrections for local ambient road noise levels:** – For receivers on the main route, which are already affected by road traffic noise, consider higher AA trigger level may be considered where existing midnight – 6am ambient noise levels are high (ie if the local $L_{Aeq}(12-6am)$ is 0 to 10dB above the $RBL + 30$ trigger, consider an alternative AA trigger level of $RBL + 35$.
In no cases should the AA trigger level exceed 77dBLAeq, which is approximately equivalent to 85dBLAmax and represents the internal Sleep Awakening level for receivers in the high road noise areas from Neutral Bay to Spit Cremorne.
6. **Availability of accommodation** – In circumstances where alternative accommodation is unavailable, application of AA may be impractical. Offer to worst affected receivers first (eg with predicted construction noise levels exceeding $RBL + 35$).