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Review of Noise & Vibration Effects during Construction**

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Introduction

Styles Group has been engaged by the Auckland Council, (the Council) to undertake a review of the noise and vibration effects likely to arise from the works and activities that will be authorised by the Designations sought by Auckland Transport for the Notices of Requirement (NoR) comprising the City Rail Link (CRL) proposal.

The CRL project comprises a 3.4km rail line that will link Britomart Station with the North Auckland Line (NAL) at approximately the Mt Eden Station. Most of the project is underground, with the majority of the construction comprising bored tunnel along with limited cut and cover sections and some above ground rail around the integration with the NAL. There are three stations along the route, being Aotea, Karangahape & Newton, all of which require above-ground works. The construction period is expected to last 5-6 years with activities staggered over the various construction sites. The main construction yard is at the NAL end of the project.

This report comprises a review of only the construction-related noise and vibration effects of the CRL. The review of operational effects has been provided to the Council in a separate review report.

The principal document referred to in this review is the report entitled *City Rail Link, Noise & Vibration Assessment – Report No.: 001R07 2012068A* (Marshall Day Acoustics 13th August 2012) – the MDA Report;

Additional documents that are referred to herein include the substantive Assessment of Environmental Effects, (AEE) the Built Heritage Report and the Structural Report.

For a full understanding of the project and to avoid any misunderstanding or ambiguity, the reports noted above must be referred to in-full along with the NoR documentation and full plans. These documents provide a full description of the proposal and its effects.

I note that the noise and vibration assessments that have been prepared for Auckland Transport are very comprehensive. The methods and predictions are thorough and I consider that the work that has been undertaken is generally to a very high standard. The comments presented herein are generally restricted to the most important issues where it is critical to record agreement with Auckland Transport and to those areas of disagreement.

The lapse period sought by Auckland Transport is 20 years. A lapse period of this duration presents considerable challenges for the assessment of potential effects at this stage because the receiving environment could change significantly in that timeframe, or indeed 10 years. To some extent I consider that this moderates the level of detail required in the assessments for each individual receiver of noise or vibration. Assessing the nature and magnitude of the

effects along with determining the best methods to avoid, remedy or mitigate them whether works start next year or in 20 years (in a different receiving environment) is important.

Scope of Work

The scope of our involvement is described in the scope of services required by the Council as follows:

Contributing to the preparation of the “officer’s report” for the Council Hearing including:

- a) Providing specialist input into the report (in the form of a comprehensive report) on noise and vibration matters.*
- b) Review of submissions to identify key noise and vibration issues.*
- c) Assisting with the development of noise and vibration designation conditions (as required).*
- d) Meetings with Council (as required).*
- e) Meetings with the Applicant and Submitters (as required).*
- f) Attendance at the Council Hearing (as required)*
- g) Assistance with drafting the Hearing Panel’s recommendation report and conditions (as required).*

The scope of this report is essentially limited to satisfying items (a) and (b).

Statutory Context

The potential noise and vibration effects of the project are to be assessed primarily in terms of s16 of the Resource Management Act, (the Act). Subsection (1) states:

Every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level.

This section introduces the duty that requires requiring authorities (and indeed all occupiers of land) to ensure that the Best Practicable Option (BPO) is adopted such that the levels of noise and vibration generated by the construction and operation of the rail link are no greater than *reasonable*.

With particular reference to noise and vibration effects, the requirement of s(5)(2)(c) of the Act is also very relevant, requiring the adverse effects of activities to be adequately avoided, remedied or mitigated.

This review will focus on whether the noise and vibration effects associated with the works and activities that will be authorised by the confirmation of the Designations will be practicably able to be adequately avoided, remedied or mitigated to the extent that the noise and vibration levels will remain *reasonable* with reference to appropriate criteria and limits.

Noise Performance Criterion

Construction Noise

Section 6.2.1 of the MDA Report sets out an analysis of the relevant construction noise limits and it refers to its Appendix A for a more comprehensive review of relevant criteria. Section A8 of Appendix A provides the rationale for the selection of the final construction noise criteria and Table A8 sets out the final recommended criteria.

I have read and generally agree with the reasoning for the selection of the final criteria. However I disagree with the changes proposed to the standard noise limits prescribed by NZS6803 to allow for higher noise levels during the day on Sunday and Public Holidays.

The MDA report suggests that the higher noise limits on Sundays and Public Holidays should apply project-wide primarily on the basis that it will allow works to be undertaken faster to reduce the overall construction duration and to reduce disruption where it is necessary to close major roads or intersections whilst works are carried out. I question however, the appropriateness of allowing higher levels on these days, and also the extension of the day time period to 11pm on all days.

Given the long duration of works for many areas of the project and having regard to the number of potentially affected residential or noise-sensitive receivers, it is my view that allowing works to occur on Sundays and Public Holidays to lessen the overall duration of construction noise may not be desirable in this instance. I accept that in many cases, allowing works on all days to lessen the overall duration is beneficial, (particularly for example where those works require major roads to be closed) but in this instance the significant duration of works means that there could be little respite for the residents for a long period of time. Where there are no residents proximate to the works, 7 day operation would generally be fine.

There are numerous arguments for and against allowing works to be undertaken on Sundays and Public Holidays, and often times the best outcome depends on the expectations of the proximate receivers of noise balanced against the operational requirements of the constructor. I note that higher noise limits for works on Sundays and Public Holidays have been considered

in great depth on other large projects, and the outcomes consistently reflect that for residential or noise-sensitive receivers these days are treated as deserving a higher degree of amenity than Monday to Saturday and this may only be compromised where other constraints necessitate works being undertaken on those days.

There are a number of receivers that would likely benefit from a restriction of noisy works on Sundays and Public Holidays along the entire route including hotels, apartments churches and restaurants, but in reality it is likely that for much of the route, 24x7 works will be necessary, particularly around the cut and cover sections of the route where works require major road closures. Therefore, I consider that the best approach would be to adopt a slightly lower noise limit for the late evening on all days and a limit for Sundays and Public Holidays that is more closely aligned with the ambient noise levels for the majority of the project. I suggest a level of L_{Aeq} 60dB as was adopted for the sectors of the Waterview project that are near the existing SH16.

Also, Table 6.2.1 provides for a noise limit of L_{Aeq} 60dB outside bedrooms during the night, or L_{Aeq} 35dB inside the bedroom – the Table does not state which limit takes precedence. I agree with the internal noise limit of L_{Aeq} 35dB for bedrooms. Appendix A8 also states that whilst a level of L_{Aeq} 60dB at night would be suitable for dwellings where mechanical ventilation is provided and windows are normally closed at night, it also acknowledges that many existing dwellings will require passive ventilation through open windows, particularly during the summer and therefore that windows may not always be closed. This means that where windows are required to be open for ventilation, a noise limit of L_{Aeq} 60dB on the facade will result in a **considerable** likelihood for sleep disturbance. Table 2 of the MDA response bears out these concerns, as the level of L_{Aeq} 60dB outside still results in annoyance and sleep disturbance for most noise-sensitive receivers, as shown in the bottom-right cell of the table.

I note that a level of L_{Aeq} 60dBA is sufficiently high to allow a lot of construction works to be undertaken without risk of noncompliance, especially where the plant is screened from the receiver by the ground, unoccupied / commercial buildings or by purpose-built acoustic screening around the site or yard.

The problem with having only an internal noise limit is that it must be measured inside the bedroom, displacing or disturbing the occupier. The application of external noise limits where the receiver is inside a building is always a proxy and should be based on achieving a reasonable level inside. Table 6.2.1 provides a proxy limit for buildings with windows that are normally closed but not for those that are normally open; the latter often giving rise to problems because of the variance in attenuation of noise levels that can be expected through an open window. However, if a value of 15dB is used for the attenuation of sound through an open window then an outdoor proxy noise limit can readily be adopted, resulting in an indoor level of approximately L_{Aeq} 35dB. The value of 15dB for open windows is adopted in the MDA response also.

Taking these matters into account I suggest the following set of noise limits:

Receiver type	Monday to Saturday 0700 – 2200	Sundays and Public Holidays 0700 – 2200	At all other times 2200 - 0700
Commercial and Industrial Buildings	L _{Aeq} 75dB	L _{Aeq} 75dB	L _{Aeq} 80dB
Noise Sensitive Activity where windows need not be open for ventilation	L _{Aeq} 75dB	L _{Aeq} 60dB	L _{Aeq} 60dB
Noise Sensitive Activity where windows are required to be open for ventilation	L _{Aeq} 75dB	L _{Aeq} 60dB	L _{Aeq} 50dB

Noise limits applying between 0700 and 2200 may be relaxed by 5 dB for 1 period of up to 2 consecutive weeks in any 2 months

Noise limits applying between 2200 and 0700 may be relaxed by 5 dB for 1 period of up to 2 consecutive nights in any 10 days

Noise limits applying between 2200 and 0700 are a proxy for an internal limit of L_{Aeq} 35dB.

This would be the default set of limits that would apply to all aspects of construction. I suggest that these are supplemented with those proposed by MDA in Table A8 but only as a secondary set of limits where it is necessary to complete certain sections of work quickly, (for example where roads or intersections are closed). These would be dealt with by Site Specific Noise Management Plans.

There is also no reference in the MDA assessment to the effects on childcare centres proximate to the route. I note that there are two centres, (Bear Park, 32 Akiraho St & Kindercare, 29 Customs St) close to the route. Childcare centres are particularly sensitive to noise from external noise sources and relatively low levels must be maintained to provide for an adequate learning and resting environment. The Auckland Regional Public Health Service (ARPHS) recommend noise levels of L_{Aeq} 55dB for play areas and L_{Aeq} 35dB for sleeping / rest areas. The most sensitive times for childcare centres is typically through the middle of the day when construction activities will be well underway. I consider that the Construction Noise & Vibration Management Plan (CNVMP) should set out a method for the control of noise to childcare centres, involving mitigation such as screening, building treatments and consultation to achieve these levels or a suitable alternative outcome.

Construction Vibration

Section 6.2.2 of the MDA report sets out the relevant construction vibration limits both for the control of damage to structures and also for annoyance of building occupants.

To preface the following comments, I note that the prediction and measurement of the response of a multi-storey building to ground-borne vibration is highly complex. Only with full structural engineering data for each building can very accurate assessments be undertaken. Given the large number of potentially affected buildings along the route, and considering that the detail necessary for a full analysis would be available for few if any, it is not possible to undertake a detailed analysis for each receiving building. Accordingly, the assessment of vibration and determination of appropriate limits and monitoring methods must necessarily be generic in nature and somewhat conservative to ensure that the most-sensitive buildings are adequately protected. It stands to reason then that there will be numerous buildings along the route that will be capable of withstanding much higher levels of vibration. If this is to be taken advantage of, it must be done on a case by case basis.

Human Response

Normally the only vibration limits for construction projects are for the prevention of structural damage and there is no protection from annoyance. This is because the effects are typically short term and like higher levels of construction noise, the community will tolerate higher levels of vibration provided they are informed about the source of the movement and the duration that it is likely to endure for. In this case however, the duration of works is so long that some consideration must be given to the potential for annoyance to building occupants, in particular offices and other work places, and there is also the potential for vibration to be felt in residential dwellings at night due to construction activities both underground and on the surface. The MDA report suggests that the provisions of BS5228-2:2009 may be applied with a guideline value of 1.0mms^{-1} for workplaces. The MDA report does not discuss the applicability of a vibration limit for construction activities at night where sleep disturbance might be an issue. Given that there will likely be 24x7 works being undertaken underground and at some surface locations involving heavy machinery and tunnel boring machines, it is foreseeable that night time vibration could disturb sleep over the course of the project. Table 6.2.2.2 of the MDA Report sets out a range of vibration levels and the typical response they will evoke. I note that a level of 0.3mms^{-1} has been adopted as a guideline value for night time vibration (as it affects sleep) on other major projects. It is typically used as a trigger for further investigation or additional monitoring, rather than as an absolute limit. For many people, continuous or intermittent exposure through the night to vibration levels exceeding 0.3mms^{-1} would likely preclude sleep.

Accordingly, I recommend that a limit of 0.3mms^{-1} be imposed for vibration generated by construction activities between the hours of 2200 – 0700 on all days. The limit should be considered a trigger for further investigation and monitoring, and if the level is to be exceeded

for more than 1 night or by more than 50% the works shall be required to be managed by a Site Specific Construction Vibration Management Plan (see J11.2 of the draft CNVMP). It is possible that compliance with the limit could be investigated only where there are complaints or concerns.

Structural Damage

I agree entirely with the suggested criteria for structural damage as set out in the MDA Report. I note that the DIN4150 provisions have been adopted on a very large number of significant projects around New Zealand and its' use is generally successful. It is important that the guideline limits (as presented in Table 6.2.2.1 of the MDA Report) are treated as guidelines only, as they are very conservative.

The conditions should allow the levels to be exceeded provided that Auckland Transport have demonstrated adequately that the subject structure is capable of withstanding higher levels of vibration without sustaining damage, or where they have reached agreement with the owner for other limits to apply. It is likely that this will involve pre and post-construction surveys of the subject building and a careful evaluation by a suitably qualified structural engineer. Both of these scenarios must be to the Councils satisfaction. This is important as there will likely be situations where compliance may not be possible, and if the conditions require compliance rigidly, significant delays and costs could be incurred in changing methods or plant when the building is likely to be capable of withstanding much higher levels of movement.

I agree with the use of the DIN4150-3 provisions for the management of vibration effects on infrastructure also.

Overall, and subject to my comments on the draft conditions, I consider that the selection of limits for the management of ground vibration is appropriate.

Assessment of Construction Noise Effects

The detailed assessment of construction noise effects for this project is a complicated and large undertaking that has been dealt with well in the MDA report and the MDA response. It is important to note that the complexity of the built environment along the route, along with the large variety of potentially noise-sensitive activities means that a detailed analysis for each receiver is not practicable to undertake either for Auckland Transport or the reviewer. The assessment of individual receivers is best dealt with by reference to submissions and at the hearing stage. For these reasons I consider it appropriate to focus on the likely overall effects of the project, as well as an evaluation of the effects on the most exposed receivers of noise adjacent to large or noisy work areas. It is also appropriate that the Designation conditions are designed to deal with the multitude of different situations that are possible.

Although significant design work has been undertaken by Auckland Transport, the construction methods, plant requirements, works program and construction yard requirements are still very uncertain, and will not likely become clearer until such times as the project is fully funded and a contract for the construction has been awarded. This makes the assessment of construction noise effects somewhat uncertain because the noise level predictions cannot be accurately informed at this time.

I note that there will be significant effects on some of the receivers, and this is acknowledged by the MDA Report and the MDA Response. Auckland Transport's preferred method for dealing with such effects is through consultation with those affected via an Environmental Management Plan and CNVMP. It is my view that this is the appropriate method once works have begun, but that the nature and magnitude of the effects along with the methods available to mitigate them must be assessed as part of the decision making process under the Act.

Whilst the foremost duty for Auckland Transport is to adopt the BPO to ensure that noise levels are reasonable, there will almost certainly be circumstances where noise levels cannot practicably be kept at a reasonable level. This is where relocation of occupants and property acquisitions may be necessary, and the mitigation really becomes the avoidance of effects on certain receivers. Such measures to avoid the effects cannot simply be carried out by Auckland Transport, as it will require potentially significant levels of consultation and negotiation. The effect on the TV3 studios for both the construction and operational phases (noise and vibration effects) is an example where avoidance by relocation or acquisition may indeed be necessary, and I observe the potentially significant costs to Auckland Transport of doing so.

Section 7.1.2 of the MDA Report sets out the source data used for the noise level predictions used in the assessment. The source levels are generally concurrent with those we have derived from measurements on numerous other projects, acknowledging the differences normally occurring between different types of the same plant. Table 7.1.2.2 sets out the noise levels likely to arise from the use of several items of plant at the same time to perform a process, such as secant piling and general excavation. I agree with the methodology and the results of the predictions are within a reasonable range. Table 7.1.3.1 takes these predictions and derives safe distances beyond which compliance with the relevant noise limits will be achieved.

Sections 7.1.3 to 7.1.7 of the MDA Report discusses the computer noise modelling outputs derived from the source data discussed above. I agree with the methodology used to depict the noise levels on the main work sites and the use of the ISO9613-2 calculation algorithm. As discussed in the MDA Report, the modelling outputs represent only a short period of time with a lot of plant operating at one time. The reality of large civil infrastructure construction sites is that there are often long periods where comparatively low levels of noise are generated. The modelling outputs should not therefore be considered indicative of the noise generated for those sites for the entire works program. The modelling outputs in conjunction with Tables 7.1.8.1 and

7.1.8.2, allow the noise levels inside the nearest receiving buildings to be derived. The results will be approximate only but are sufficiently accurate as to allow an assessment of effects.

The MDA Report predicts that a number of receivers will be subjected to noise levels above the relevant noise limits for a variety of different activities and for varying durations throughout the project. It acknowledges that there will be significant adverse effects at times and these could be difficult to mitigate without relocation of the affected receivers.

If these effects are to be acknowledged, then the Designation Conditions and the supporting EMP and CNVMP must clearly and robustly define the procedures for dealing with such effects.

Overall, I agree with the approach taken in the MDA Report and subject to my comments on the conditions I agree with the overall assessment of effects and the proposed management methods in general.

Assessment of Construction Vibration Effects

As with the assessment of construction noise, the assessment of construction-related vibration for a project of this size is a large and complex undertaking. The large size of the project, diverse nature of construction methods and the complexity of the receiving environment means that a great deal of generalisation is required and that typically it is the situations where the greatest effects are received that dictate the content and form of the Designation conditions.

Section 7.2 of the MDA Report introduces the construction vibration assessment and also the concept of the risk contours that have been developed. I agree with the methodology used to develop the risk contours and I consider also that they are very helpful in describing the likely extent of effects.

The source and attenuation data used are necessarily from other projects and section 7.2.2 acknowledges that the conditions in this case are likely to be different and the rate of attenuation of vibration through the ground is likely to be quite variable. I consider that the 100% safety factor is appropriate for the risk contours and that they should be considered as indicative only.

Fulfilling the recommendation to undertake vibration monitoring once works start to establish site-specific attenuation relationships will be vital to determine whether the contours require any adjustment. Given the conservative nature of the current prediction methods I anticipate that the contours will require adjustment only inwards towards the source. That is, I expect that the attenuation of vibration due to distance is likely to be higher than the relationship assumed in establishing the risk contours.

In terms of the site specific assessments in section 7.2.4 of the MDA Report, I agree that the effects will be significant for some of the receivers and that intensive vibration and condition

monitoring is likely to be required at various stages of the project. With respect to the TV3 studios, it is likely that carrying out the works as proposed whilst maintaining the successful operation of the studio will be impossible. Due to the proximity of the alignment to the studio it is likely that any alternative construction methods that might comply with a suitable vibration limit to allow TV3 to continue operating will be impracticable due to delays and cost. There may be similar issues associated with the Aotea Centre and Roundhead Studios.

Section 7.3 of the MDA Report discusses the options for avoiding, remedying or mitigating adverse construction effects, and places the focus heavily on communication and the investigation and use of alternative methods where practicable. With particular regard to section J13, the draft CNVMP (Appendix J to the MDA Report) does not prescribe any readily-adoptable resolution to the likely conflict between the continuation of the works and the effect on receivers. I acknowledge however that the provision of such resolution is likely impossible at this stage.

The NoRs are in-effect seeking to authorise works that are very unlikely to be able to comply with a reasonable level of noise or vibration at some receivers. I consider that the need to demonstrate that the adverse effects have been adequately avoided, remedied or mitigated has not been completely satisfied by Auckland Transport, even acknowledging that the construction methodology is not finalised and the receiving environment needs to be more accurately defined. Thus, the specific methods used to avoid, mitigate or remedy the effects and/or the weighing of effects needs to be considered at the hearing.

Submissions

I have reviewed the relevant submissions as they relate to construction noise and vibration. It is my opinion that most of the issues raised in submissions are adequately dealt with by the assessment that has been undertaken to-date along with the proposed Designation conditions including the requirement for a CNVMP. I consider that a number of the submitters' issues would be further relieved by my suggested amendments to the proposed noise limits and for the introduction of a night time limit for construction vibration, particularly in relation to the hotels and residential accommodation situated close to the work sites. I consider that the assessment will deal adequately with Heritage buildings or buildings that are otherwise sensitive to ground-borne vibration.

With respect to the potential adverse effects, the submissions generally agree with the assessment in the MDA Report, particularly those described in section 7.2.4 therein, under the headings Key Receivers and Other Notable Receivers.

Construction Noise & Vibration Management Plan

Section 7.4 of the MDA Report sets out the requirements for the proposed CNVMP that will be implemented throughout the project. I consider that the development and proper implementation of the CNVMP will be absolutely critical for the management of adverse noise and vibration effects and to the success of the project.

I note that the CNVMP's that have been prepared for other large infrastructure projects recently, (Waterview Connection, Mackays to Peka Peka Expressway) are very detailed and take account of a much greater level of detail than what has been provided in Appendix J to the MDA Report, acknowledging that this CNVMP is a draft. I also acknowledge that preparing a detailed CNVMP at this early stage would be unwise as the receiving environment and construction methods may change considerably by the time works commence. I therefore consider it important that the final CNVMP that is developed prior to works commencing is reviewed and updated to the satisfaction of the Council.

Conclusion

Auckland Transport are seeking subsurface and surface Designations for the construction and operation of the City Rail Link that will permit a range of effects to be generated, including noise and vibration.

This advice comprises a review of the construction noise and vibration assessment prepared to support the Notices of Requirement lodged by Auckland Transport.

I have reviewed the recommended noise limits for construction works and I consider that those proposed in the MDA Report are too liberal for the evening period and for Sundays and Public Holidays. I have recommended an alternative set of noise limits that will afford some respite from high levels of construction noise for the late evenings and Sundays and Public Holidays. It is important to note that the lower limits suggested will still enable construction work to be undertaken at these times, but that for surface works, only relatively low noise generating activities can be undertaken. I have also suggested that particular regard be given to the effects on childcare centres during construction, with limits of L_{Aeq} 55dB in the play areas and L_{Aeq} 35dB for resting / sleep areas to be achieved. I anticipate that this would be managed through the proposed CNVMP.

In terms of construction vibration, I generally agree with the MDA Report in terms of the selection of criteria for the management of building damage and human annoyance / discomfort, and I have also suggested that a limit of 0.3mms^{-1} PPV be imposed as a trigger for further assessment for night time construction vibration where sleep disturbance is an issue. Compliance with this limit would only be investigated as a result of a complaint or where the

issue is ongoing for any particular activity or receiver, and it would only apply between the hours of 2200 – 0700.

Overall, I consider that the MDA Report provides a reasonably general assessment of effects for each area of works and for the substantive tunnelling operations. I agree with the methodology used in the prediction of noise levels, and I note that my own provisional calculations generally agree with the predictions set out in the MDA Report with reference to section 7 in particular. Tables 7.1.8.1 and 7.1.8.2 are very helpful for determining the indoor noise levels for any receiver in conjunction with the noise level predictions contained in the previous section of the MDA Report and the noise contour maps set out in its Appendix G.

Similarly with the assessment of vibration effects, I agree with the methodology used in the MDA Report and also with the 100% safety margin incorporated therein to address the potential uncertainties in the predictions. I consider that with the selection of limits combined with the vibration risk contours, the effects that may be generated by the construction works are (relatively) easily understood for the purpose of protecting the route and for deriving appropriate Designation conditions. I note that it is important that the final Designation conditions relating to vibration apply to all buildings whether they are inside the risk contours or not.

The MDA Report has quite rightly identified that there will be potentially significant adverse noise and vibration effects on a number of receivers during the construction period, and proposes that the CNVMP sets out the appropriate method of avoiding, mitigating or remedying those effects. The draft CNVMP that has been presented however is notably light in such detail to the extent that I do not consider its provisions will be sufficient. In my view, I consider that Auckland Transport must demonstrate how those effects can be adequately dealt with before the Designations can be approved and/or the adverse noise effects are weighed against other effects.

The 20 year lapse period sought by Auckland Transport is significant when considering the nature of the assessments presented. Whilst it is critical to properly understand the potential effects on the current surrounding environment, it is also important to ensure that the assessment properly informs the conditions that will be imposed on the Designation such that the noise and vibration effects will be adequately avoided, mitigated or remedied. As above, I consider that there is currently insufficient detail to allow a full understanding of how the potentially significant adverse effects will be adequately avoided, mitigated or remedied.

Compliance with the noise and vibration limits suggested in the MDA Report (and with the variations and additions to those suggested herein) will result in the levels being reasonable, but there is acknowledgement by Auckland Transport that they cannot be met consistently across the project. I consider that as the proposal has been presented, it is likely that noise and vibration levels arising from the construction works will be unreasonable in terms of s16 of the Act at a number of receivers along the route.