Noise from Metro Tunnel work

Noise is covered under various ‘rules’

- State government EPA act
  - Predominantly EPA Publication 1254 Noise Control Guidelines
- Metro Tunnel Environmental Management Framework (EMF)
  - Predominantly
    - NV6
    - NV21
    - Residential Impact mitigation guide (RIMG)
- Construction Noise and Vibration Management Plan (CNVMP)

EPA 1254

- Applies at all times

Work requirements

Noise reduction measures should be developed through initial project planning, tenders for equipment and subcontracts. Larger projects should develop a noise management plan (potentially part of a broader environmental management plan) and may require advice from an acoustic specialist, particularly if works are proposed outside of normal working hours.

The following measures apply:

- Where work is conducted in a residential area or other noise-sensitive location, use the lowest-noise work practices and equipment that meet the requirements of the job.
- Site buildings, access roads and plant should be positioned such that the minimum disturbance occurs to the locality. Barriers such as hoardings or temporary enclosures should be used. The site should be planned to minimise the need for reversing of vehicles.
- All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.
- Fit all pneumatic tools operated near a residential area with an effective silencer on their air exhaust port.
- Install less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed.
- Turn off plant when not being used.
- All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the relevant authority.
- Where possible, no truck associated with the work should be left standing with its engine operating in a street adjacent to a residential area.
- Special assessment of vibration risks may be needed, such as for pile-driving or works structurally connected to sensitive premises.

The Botanica interpretations

- The EPA have these rules for all construction sites
- They are clearly saying – these ‘expected / best practice’ measures
- The following measures must be adhered to
  - Lowest noise work practices
  - Use barriers
  - Minimise need for reversing
  - Mechanical plant silencing
  - Install less noisy beepers (ie squawkers)
  - Turn off plant if not being used
  - Vehicles to/from site only during ‘working hours’
  - No idling trucks
  - Assess vibration risks
- None of these measures are specifically for Metro Tunnel

Noise is categorized as follows…

- Weekdays and Saturday mornings
- Saturday afternoon, Sunday and evening work
- Nightworks or

- Unavoidable works…lets start with that type

1. Unavoidable works - definition

- EPA 1254 Definition

Unavoidable works are works that cannot practicably meet the schedule requirements because the work involves continuous work – such as a concrete pour – or would otherwise pose an unacceptable risk to life or property, or risk a major traffic hazard. Affected premises should be notified of the intended work, its duration and times of occurrence. The relevant authority must be contacted and any necessary approvals sought.

EPR NV21 Sect J Definition

J. Unavoidable Work

J1. The following Unavoidable Works may need to be undertaken outside of Normal Working Hours:

i. The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads

ii. Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm

iii. Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours

iv. Tunnelling works including mined excavation elements and the activities that are required to support tunnelling works (i.e. spoil treatment facilities)

v. Rail occupations or works that would cause a major traffic hazard

vi. Works where a proponent demonstrates and justifies a need to operate outside normal working hours such as work that once started cannot practically be stopped until completed such as a concrete pour or construction of diaphragm walls.

J2. Prior approval must be obtained for the above work to be undertaken outside of Normal Working Hours (except for item ii). In all cases management actions would need to be applied as per the Residential Impact Mitigation Guidelines and practicable mitigation measures employed to reduce the impact of the noise. All other works must comply with the Guideline Noise Levels in EPR NV6.

J3. For unavoidable work:

i. Approval for planned unavoidable works can only be granted by the Independent Environmental Auditor

ii. Details of unavoidable works including the type of work, equipment to be used and duration of works must be made publicly available

iii. For emergency unavoidable work, the proponent must provide a rationale to the satisfaction of the Independent Environmental Auditor as soon as practicable.

1. Unavoidable works…more

- EPA 1254 also notes

This guideline affirms the minimum expectation that noise from these sites must not be audible within a habitable room of any residential premises between 10 pm and 7 am. This is considered unreasonable noise under the EP Act. However, provision is made for circumstances of unavoidable works or low-noise or managed-impact works.

This guideline does not limit the general ability of a local government or police officer to assess the unreasonableness of noise at any time. For example, if unavoidable works were done in an unnecessarily noisy way, this may be considered to be unreasonable. General noise at any time during the day might still be considered unreasonable, taking into account the work practices and circumstances of the noise. As specified in s48A(4) of the EP Act, assessment must consider the attributes of the noise and the time, place and circumstances in which it is emitted.

1. Unavoidable works…how noisy?

- Effectively no noise limits are set
- EPA 1254 still applies
- RIMG offers protection (copy near end of this document)
  - Section c mandates acoustic treatment if exceedance of 40 days in 6 months
  - Section d mandates alternative accommodation if exceedance of 10 days in 15 or 40 days in 6 months.

The Botanica comment

- We are protected by the restrictions on the making a piece of work ‘unavoidable’
  - Definition
  - Independent audit approval
- To date and going forward, it is a reasonable expectation that the noisiest piece of this work should occur in the most favourable window. Eg Highest noise early in night
- Lack of measures of pre-existing noise levels cause a major issue
  - One set of triggers is noise above pre-existing noise levels
- Major issue has been caused by lack of transparency around
  - Pieces of work deemed unavoidable
  - Number of days counted
  - Noise modelling

How many unavoidable days?

- Process is somewhat flawed
  - Does the count of days apply to
    - Entire project?
    - Precinct?
    - Building?
    - Individual apartment?
  - Assume practically it must be by precinct

How many unavoidable days?

- To date
  - Toorak Rd Tram works June 2017 11 days

St Kilda Road and Toorak Road West preliminary works (Stage One – Part A)

Monday 5 June to Sunday 25 June

- 6am – 10pm
- 10pm – 6am
  (over a maximum of eight nights with no more than two consecutive nights)

Works on Toorak Road West (Stage One – Part B) Tram pole installation, rail unloading and welding, and road crossing conduit trenching

Tuesday 23 May to Thursday 15 June

- 7am – 5pm, Monday to Sunday

Wednesday 7 June to Friday 9 June (near corner of Toorak Road West and Millswyn Street)

- 9pm – 5am

How many unavoidable days?

- To date
  - Park St Tram works
    - November 2017 — 4 days
    - December 2017 — 9 days + 5 days

Night works

Night Works will be required to minimise the impact to traffic due to roadside installation work and will take place between 7pm – 5am, from 11 - 21 December, with the exclusion of Friday 15 December and Saturday 16 December.

Stage Three	Park Street preliminary
Activity	**Approximate timing**
• Track and overhead works • Construction of tram platform stop • Change traffic signalling in Palmerston Crescent and Wells Street intersection • Concreting and asphalting works	24/7 works from 10pm, 2 February - 5am, 7 February 2018

Service investigations - Night

- There will be some medium-high level noise associated with these works, particularly during saw-cutting and NDD, however we will endeavour to keep noise to a minimum wherever possible
- Roads will remain open and traffic management will be in place.
- Impacts from noise, dust and vibration will be managed in accordance with the Metro Tunnel Project's Environmental Performance Requirements (EPRs).
- The works areas will be reinstated at the conclusion of works.

When

Day Works

- 7am - 3pm, Wednesday 8 November to Saturday 11 November 2017

Night Works

- 10pm - 5am, Wednesday 8 November to Saturday 11 November 2017

How many unavoidable days?

- To date
  - St Kilda Rd Tram prep 12-16 Feb 18 5 days

2. Weekdays and Saturday Morning works

- 7am – 6pm Monday to Friday
- 7am – 1pm Saturday

A. Airborne Noise Management Levels during Normal Working Hours

A1. The CVNMP must adopt daytime Management Levels for airborne noise at residences during Normal Working Hours (as defined in EPR NV6) in accordance with Table NV21-A. The Management Level in Table NV21-A is not a noise limit or target, but represents noise levels above which community reaction may be adverse and which should trigger management actions to minimize the noise impact.

Table NV21-A Airborne Noise Management Levels during Normal Working Hours

Construction noise level	How to apply
Background noise level +10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\,(15\,min)}$, due to construction noise from the Melbourne Metro project, is greater than the noise affected level, the proponent should apply all practicable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where construction noise from the Melbourne Metro project is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

2. Weekdays and Saturday Morning works …how noisy?

- Effectively no noise limits are set
- EPA 1254 still applies
- RIMG offers protection
  - Table 8 indicates best offer is ear plugs!

The Botanica comment

- This is when most of the noisy work will occur
- Need to tightly manage times
- Need to tightly watch EPA 1254
  - Idling trucks
  - No reversing beepers
  - Lowest noise work practices
  - etc

3. Saturday afternoon, Sunday and Evening work

- 1pm – 10pm Saturday
- 7am – 10pm Sunday
- 6pm – 10pm Monday to Friday

NV6 **Airborne Construction Noise Guideline Targets (External)**

1. Implement management actions if construction noise is predicted to or does exceed the Guideline Noise Levels at residential locations as specified in EPA Publication 1254.

Time Period	Applicable Hours	Guideline Noise Levels, L_{Aeq}	
		Up to 18 months after project commencement	18 months or more after project commencement
Normal Working Hours	7am to 6pm Monday to Friday 7am to 1pm Saturday	No specified Guideline Noise Levels are provided in EPA 1254 – Refer to EPR NV21 for the noise management levels (see note 1)	
Weekend / Evening work	6pm to 10pm Monday to Friday 1pm to 10pm Saturday 7am to 10pm Sunday and Public Holidays	Noise level at any residential premises not to exceed background noise by 10 dB(A) or more.	Noise level at any residential premises not to exceed background noise (L_{A90}) by 5 dB(A) or more.
Night	10pm to 7am Monday to Sunday	Noise is to be inaudible within a habitable room of any residential premises.	

3. Saturday afternoon, Sunday and Evening work …how noisy?

- Not to exceed background by 5 dB(A)
- EPA 1254 still applies
- RIMG offers protection
  - Table 8 indicates best offer is respite accom

4. Nightworks

- 10pm – 7am Monday to Sunday

- NV6 and NV1254 both state

Night	10pm to 7am Monday to Sunday	Noise is to be inaudible within a habitable room of any residential premises.

4. Nightworks…how noisy?

- Very tight – inaudible !!
- Can’t see much happening in this category
  - Maybe station fitout once all built?

RIMG applies at all times (1)

4.1 Airborne noise

a. Overview

Based on the predicted (or measured) airborne noise level and the relevant time period, contractors must take the following measures with respect to residents affected by airborne noise where appropriate:

1. engagement with residents and respite in relation to acoustic impacts. The criteria and measures for engagement and respite are described Part 4.1(b);
2. acoustic treatment for residences. The criteria for considering acoustic treatment are described in Part 4.1(c); and
3. alternative accommodation. The criteria for considering offers of alternative accommodation are described in Part 4.1(d).

b. Engagement with residents and respite in relation to airborne noise

The noise management levels for residential land uses adopt the guideline noise levels in EPR NV6 (for evening/weekends and night time) and EPR NV21 (for weekdays and Saturday mornings). The contractors must comply with the EPRs, which require all practicable work practices to be applied to meet the guideline noise levels.

At locations where the predicted (or measured) residual construction noise levels exceed the noise guideline levels, the engagement measures and mitigation measures specified in Table 8 shall apply.

Table 8 – Guideline noise levels and management measures

Time period	Guideline noise levels	Management Measures
Normal working hours		
Mon-Fri: 7am – 6pm Sat: 7am – 1pm	External construction $L_{Aeq(15\ min)}$ >10dB(A) above the pre-existing ambient noise level, L_{Aeq} or 75dB(A) (whichever is higher)	Works notification Earplugs
Evening/weekend hours and public holidays		
Mon-Fri: 6pm – 10pm Sat: 1pm – 10pm Sun/Pub Hol: 7am – 10pm	External construction $L_{Aeq(15\ min)}$ >5dB(A) above the pre-existing ambient noise level, L_{Aeq}	Works notification Earplugs Individual briefings Phone calls Specific notification Respite offer
Night hours		
Mon-Sun: 10pm – 7am	External construction $L_{Aeq(15\ min)}$ > 5dB(A) above the pre-existing ambient noise level, L_{Aeq}	Works notification Earplugs Individual briefings Phone calls Specific notification Respite offer

RIMG applies at all times (2)

c. Acoustic treatment for residences

This Part of the Guidelines sets out criteria for when offers of acoustic treatment to residences must be considered for Unavoidable Works at night. Offers of acoustic treatment will however only be made where acoustic treatment is deemed to be an effective solution to mitigating airborne noise.

Acoustic treatment for residences will be offered where the total airborne noise level due to Metro Tunnel works (pre-existing ambient, L_{AeqT}, measured over one hour plus airborne noise from Metro Tunnel works) is predicted at a point one metre in front of the most exposed of any windows or doors of a habitable room in any façade of a residence, to exceed whichever is the higher of:

- 55dB(A); or
- 5 dB(A) above the pre-existing ambient LAeq, noise level

between the hours of 10pm and 7am on any day of the week on at least 40 days in any six consecutive months, excluding any night during which an offer of alternative accommodation has been accepted.

Due to the long lead time required to investigate residential buildings, design and then install acoustic treatment, offers of acoustic treatment will be based on pre-construction modelling of airborne noise emissions from construction activities, not measured noise. However, if noise monitoring during construction indicates that the criteria for acoustic treatment will be or have been met (despite not being identified through earlier modelling), consideration will be given to offering acoustic treatment (taking into consideration practicability and timing).

Where a resident does not accept an offer of acoustic treatment, the resident may be offered alternative accommodation in respect of the relevant airborne noise impacts (which may be accepted by the resident before or during the period in which the relevant works are undertaken) even if the alternative accommodation criteria in Part 4.1(d) are not satisfied.

d. Alternative accommodation

Alternative accommodation will be offered where the total airborne noise level due to Unavoidable Works at night (pre-existing ambient, L_{AeqT}, measured over 1 hour plus airborne noise from Metro Tunnel works), measured or predicted at a point one metre in front of the exposed windows and doors in any façade of a residence, exceeds whichever is the higher of:

- 65 dB(A); or
- 10 dB(A) above the pre-existing ambient, LAeq, noise level,

between 10pm and 7am on any day of the week on at least:

- 10 days in any 15 consecutive days; or
- 40 days in any six consecutive months.

e. Notes

- for assessment with respect to the airborne noise criteria, the noise level is to be modelled and measured at a point 1 metre in front of the exposed windows and doors of a habitable room in any façade of the resident's property that is most exposed to construction noise at a height of approximately 1.5 metres above the ground for ground-level dwellings, or 1.5 metres above each floor for multi-storey dwellings. Modelling will be undertaken (in accordance with EPR NV3) to predict noise levels in the same location, and provide the basis for engagement and offering the "off-site" measures described above.
- if a building features a façade that provides a high level of mitigation (including where acoustic treatment has been provided to a residence in accordance with Part 4.1(c) of these Guidelines), and as a result the noise levels predicted within habitable rooms (such as bedrooms and living rooms) inside the building are not considered to adversely impact on amenity, mitigation measures available under these Guidelines will not be offered.

Now for some ‘noise process’ issues

- The EPRs are actually quite prescriptive on noise modelling and measurement

- The following pages are from the EPRs
  - Detail what should have been done
  - Detail what should be continuing to be done

- Availability of the modelling and management information
  - The EPRs do not mandate that the information is to be made public but the EMF framework clearly states an intention to be transparent
  - The EPRs make exhaustive mention of stakeholder consultation, this is not possible without some form of disclosure of this information

- NV21 is very prescriptive on requirements for the CNVMP to be developed in consultation with relevant councils.

Monitoring and modelling

NV3	**Noise and Vibration Modelling – Design** 1. Prior to commencement of shaft construction and prior to commencement of main works, each Works Package contractor must appoint a suitably qualified acoustic and vibration consultant to predict construction noise and vibration (through modelling) and update the modelling to reflect current construction methodology, site conditions and specific equipment noise and vibration levels (this will require noise and vibration measurements). The model is to be used to determine appropriate mitigation to achieve the EPRs. 2. The acoustic and vibration consultant must document the modelling and mitigation investigation in a Construction Noise and Vibration Assessment Report for review by the Independent Environmental Auditor. This report must provide the basis for the development of the construction noise and vibration management plan required under EPR NV21. 3. The model must consider airborne noise to residential and non-residential receivers, ground-borne noise at residences, blasting vibration and ground-borne vibration. (For heritage places see EPR CH24).
NV4	**Noise and Vibration Monitoring - Construction** 1. Prior to commencement of shaft construction and prior to commencement of main works, each Works Package contractor must appoint a suitably qualified acoustic and vibration consultant to undertake noise and vibration monitoring. 2. The acoustic and vibration consultant must undertake noise and vibration monitoring to assess levels with respect to any Guideline Targets specified in the EPRs. Where monitoring indicates exceedances of Guideline Targets, appropriate management actions must be implemented as soon as possible. 3. The model developed during the Design Stage should be updated / calibrated using the results of the noise and vibration monitoring to provide more accurate predictions of the noise and vibration levels associated with ongoing and future construction works. It may be appropriate to adjust management measures as a result of the more accurate predictions. (For heritage places see EPR CH24).
NV5	1. Prior to commencement of project works, each Works Package contractor must prepare and implement a communications plan to liaise with potentially affected community stakeholders and land owners regarding potential noise and vibration impacts. The plan must include procedures for complaint management as per SC3. In developing the plan, consult with relevant local councils, EPA Victoria, the Parkville Precinct Reference Group and RMIT University and other precinct reference groups, as appropriate.

Monitoring and modelling

NV16	**Noise and Vibration Modelling**

1. Design Phase
    a) Appoint a suitably qualified acoustic and vibration consultant to predict and assess operational noise and vibration and determine practicable mitigation measures necessary to achieve the EPRs.
    b) The acoustic and vibration consultant must prepare an Operation Noise and Vibration Report for review by the Independent Environmental Auditor, which documents the predictions and mitigation measures.
2. Commissioning / Operation
    a) Appoint a suitably qualified acoustic and vibration consultant to undertake commissioning noise and vibration measurements to assess levels with respect to the EPRs.

I. Monitoring

I1. Mechanisms to ensure effective monitoring of noise and vibration associated with construction in accordance with EPR NV4, including:

i. Vibration and noise measurement methodologies for monitoring both baseline and construction levels, including details of the parameters to be obtained, the measurement equipment, and relevant standards to be adhered to for the collection and analysis of data

ii. Baseline and construction noise and vibration monitoring locations

iii. The most critical periods, whether determined separating distance or ground conditions, and the duration of monitoring periods

iv. Specific measures, to be determined following consultation with relevant stakeholders, with respect to sensitive equipment and biological resources (which must, where practicable, include continuous monitoring during construction)

v. How the results of monitoring would be recorded, reported, and interpreted.

Who do you call?

- Metro Tunnel 1800 105 105
- EPA 1800 372 842

- Both are 24*7