



REGULATORY IMPACT STATEMENT

ENVIRONMENT PROTECTION (RESIDENTIAL NOISE) REGULATIONS 2008



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ENVIRONMENT PROTECTION (RESIDENTIAL NOISE) REGULATIONS 2008 – REGULATORY IMPACT STATEMENT

This Regulatory Impact Statement (RIS) has been prepared to fulfil the requirements of the *Subordinate Legislation Act 1994* and to facilitate public consultation on the proposed Environment Protection (Residential Noise) Regulations 2008. A copy of the proposed regulations is provided as an attachment to this RIS.

Public comments and submissions are invited on the proposed Regulations, in response to information provided in this RIS. All submissions will be treated as public documents. Written comments and submissions should be forwarded no later than 1 August to:

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EXECUTIVE SUMMARY

There is a well-established literature that demonstrates that noise can have adverse psychological and physiological impacts on those affected. The severity of the impact can differ depending on the type of noise, its volume, pitch and duration, and the time of day, as well as the attributes and perspectives of the person exposed to noise. Noise that disturbs sleep can have the greatest impact on people.

The proposed Regulations deem the times when it is unreasonable to use certain types of equipment, such as stereos, power tools, lawn mowers and air conditioners, if that equipment can be heard in a neighbour's house. The prescribed times cover evening, nights and early morning when noise is known to have the greatest impact on those affected.

The proposed Regulations are restricted to covering items that generate residential noise. That is they do not cover noise from non-residential sources, such as nightclubs, industrial/commercial premises or non-residential buildings. Nor can they cover noise that is not generated by an item, such as people's voices or noisy pets.

The role of the proposed Regulations is to clarify what is deemed to be unreasonable. It is section 48A of the *Environment Protection Act 1970* that provides the substantive legislative controls. Also, Part III of the *Health Act 1958* is used separately by local government to address residential noise.

The problem of residential noise

Australian and international studies show that residential noise is prevalent, has significant impacts on those affected and those impacts have important health consequences.

- 770,000 Victorians are moderately to extremely affected by noise from their neighbours annually¹.
- 410,000 are moderately to extremely affected by construction noise (primarily residential construction)².
- Residential noise affects people's ability to sleep, read, relax and engage in other quiet activities, spend time outdoors at home and listen to TV and music (Strahan 2007, p. 44).
- When people are strongly annoyed by such noise their risk of major health problems increases. (Meimann and Maschke 2004)

In addition to the evidence that residential noise affects people's health and wellbeing, there are several characteristics of residential noise that make this type of noise particularly damaging to noise sufferers. The actual volume (decibel level) of noise explains only 10 to 25 per cent of the impact of the noise on noise sufferers (EnHealth Council 2004, p. 20). Other psychological impacts, such as the sufferer's perceived control over the noise, potentially have a more significant influence on the noise's overall affect. (Hatfield et al 2001a, p. 818)

Evidence indicates that lifestyle changes, and changes in urban activity, mean that the problems being addressed through the proposed Regulations are becoming more, rather than less, prevalent, as is the potential for people to be annoyed by this noise. Thus, the need for regulation is reinforced, rather than decreasing.

Overall, without intervention there would be more noise problems and more noise at times when it causes the greatest detriment, the physiological and psychological impacts of noise would be more common and disputes between neighbours would increase.

The options

EPA Victoria consulted extensively prior to preparing this RIS. It sought views on the strengths and weaknesses of the 1997 Regulations and whether alternative approaches to managing residential noise would be more effective. This consultation, analysis of the regulatory approaches in other jurisdictions and an assessment of whether it would be possible to use non-regulatory, or more market based, approaches to manage residential noise, identified a large number of policy options which were considered in preparing this Regulatory Impact Statement. Broadly these options fell into three categories.

1 Estimates derived using data from Strahan Research 2007, *Report to EPA Victoria on Community Response to Environmental Noise*, p. 14, and population data from the Department of Planning and Community Development (DPCD 2007, p. 3). DPCD reported the estimated population for Victoria at June 2006 as 5 128 310.

2 Estimates derived using the same data sources as in footnote 1.

Categories of options

Option	Description
Category A	
Not remaking the 1997 Regulations	This option would mean that unreasonable noise would be governed by the general provisions of section 48A of the EP Act and, separately, the nuisance provisions in the Health Act. This is the base case against which other options are assessed.
Category B	
Non-regulatory alternatives	This category of options considers whether guidelines could be used as an effective alternative to regulations.
Category C	
Remaking or amending 1997 Regulations	This category considers options that would involve regulation of residential noise, and considers a range of regulatory alternatives.
C1: Remaking the 1997 Regulations	Regulating residential noise in the same way as currently occurs through the 1997 Regulations, with minor change.
C2: General amendments	Considers general changes to the 1997 Regulations, such as changing the sources of noise covered, the hours prescribed and processes and approach to determining when noise is unreasonable.
C3: Construction industry	These Options consider ways of amending the 1997 Regulations to allow for: <ul style="list-style-type: none"> • early concrete pours • earlier start times on Saturday morning for domestic and residential construction³, or sectors of the construction industry (such as large-scale residential construction and fringe residential subdivisions) • facilitation of work the needs to be done outside of hours.
C4: Music on Friday and Saturday nights	This option considers whether the time when music is deemed to be unreasonable should be later on Friday and Saturday nights.
C5: Air conditioners	Considers options for establishing conditions under which air conditioners could be exempt from the proposed Regulations.

EPA Victoria reviewed each of these options to identify which should be subject to more detailed analysis of its costs and benefits. Each option was assessed against four criteria.

1. EPA Victoria has the appropriate head of power to implement the option;
2. The option would not result in an increase in unreasonable noise and, therefore, is not contrary to the EP Act;
3. The option is practicable and could be implemented and enforced effectively; and
4. On the face of the initial analysis it is reasonable to expect that the benefits of the option could be greater than its costs.

Options that met all of these criteria were subject to a more detailed analysis of their costs and benefits. These options included remaking the 1997 Regulations and other options for amending how these regulations apply to residential and domestic construction.

Remaking the 1997 Regulations

Option 1 involves remaking the 1997 Regulations with one minor amendment to explicitly reference greywater and rainwater pumps as prescribed items with prohibited times of use after 10 pm. This option recognises that, generally, the 1997 Regulations are positively accepted and referred to by enforcement agencies and the community and are

³ Domestic construction covers the construction of single dwellings or attached dwellings separated by a fire resistant wall. Residential construction is the construction of blocks of units or similar multi occupancy dwellings.

generally well understood. The proposed amendment is considered in the impacts section of the RIS and, because it is administrative in nature and has limited impact, is not costed separately.

Consultation with the construction industry, however, identified some areas where industry felt that there would be significant benefits from additional flexibility. Through that consultation, those areas where the costs to industry of lack of flexibility are greatest were identified. After subjecting various options to the preliminary analysis, EPA Victoria concluded that three options warranted further investigation.

Construction option 1: Providing an exemption from the standard 9 am start time for all construction⁴, allowing such projects to commence at 7 am on Saturdays.

This option would involve a blanket change to the proposed Regulations covering all domestic and residential construction activity from small renovations in a residential area, to large residential projects and infrastructure work on fringe residential subdivisions (it excludes commercial construction such as building business premises and office blocks). Because the same noisy items are used by professional builders, owner builders (32 per cent of domestic building permits are issued to owner builders) and private individuals using building equipment for other purposes, the change would need to cover all these activities.

Construction option 2: Providing an exemption from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering.

Changing the start time for the land and infrastructure preparation components of fringe residential subdivisions (with appropriate buffering from residences and restrictions on equipment to be used) would provide flexibility for an earlier Saturday start time for subdivision works. It would also bring parity with other non-residential subdivision works, which are generally allowed to start at 7am.

This change would be limited to the land preparation stage of residential subdivision and recognises that the scale of work undertaken in the early infrastructure components of preparing residential land for building means that lack of flexibility is a particular problem. The impact of this option is less wide-spread than changes covering the whole industry, but the increased noise would still occur at a time when the community is more sensitive to noise.

Construction option 3: Providing an exemption from the standard 9 am start time for residential developments four storeys or above constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays.

Today, many residential developments are undertaken at a large 'commercial scale' and mixed commercial/residential use development is increasingly common. It is therefore appropriate to consider how the 1997 Regulations worked for larger residential development in mixed use zones and the consistency between the treatment of commercial and residential building in these areas. The general hours applied to larger residential construction are more restrictive than applied to similar scale commercial projects in EPA guidelines, as they do not allow for variation in hours and have later Saturday start times. However, there are more conditions on the operation of commercial projects in the evenings on weekends, Saturday afternoons and on Sunday.

This option, therefore, involves exempting multi-storey residential developments from the proposed Regulations, if those developments are being constructed in a non-residential zone. These developments would then be subject to work hours from EPA guidelines and local government bylaws. The general unreasonable noise provisions of section 48A of the EP Act would also still apply. It is intended that regulatory changes would be accompanied by improved guidance.

Preferred option

The preferred option that emerged from the analysis in this RIS involves remaking the 1997 Regulations with the inclusion of rainwater and greywater pumps, and amending those Regulations to provide exemptions for certain residential construction activities:

1. from the standard 9 am Saturday start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering
2. for residential developments four storeys or above constructed in non-residential zones, permitting such projects to commence at 7 am on Saturdays.

⁴ Throughout this RIS, unless otherwise stated, the term construction or construction industry refers to both domestic and residential construction, but excludes commercial construction.

Remaking the 1997 Regulations would mean that the proposed Regulations prescribe items in five Groups, which can be broadly summarised as follows:

1. motor vehicles (but not when moving in or out of premises), lawn cutting devices and appliances with an internal combustion engine
2. electric power tools, chain saws, compressors and impacting and grinding equipment
3. domestic air conditioners, swimming pool pumps, most water pumps, heating equipment and domestic vacuum cleaners
4. musical equipment, amplified sound, stereos, radio and televisions
5. any other electrical equipment.

The inclusion of more types of pump in Group 3 above reflects the more common use of rain/grey water in urban environments. Previously all water pumps would have been caught under the general provisions of either Group 1 or 5, depending on their power source. Items from Groups 1 and 5 cannot be used after 8 pm. Reflecting that rain/grey water is now used in connection with core functions of the house such as toilet flushing, washing machines or garden-watering, pumps for these processes are proposed to be allowed later use. People should be encouraged to use alternative water sources, and changing the times for water pumps would align with summer dusk watering times and bring parity with times for other devices linked to normal awake-activities such as air-conditioners and heaters. Note that the intent of this change is not to stop people flushing their toilets after 10 pm. With proper installation and noise attenuation, pumps for this purpose can be used without being audible in a neighbour's house.

In addition, EPA Victoria's consideration of a range of construction industry options analysed the trade-offs between the benefits to industry of increased flexibility and the costs to neighbours of increased noise. These costs and benefits vary between sectors of the construction industry and, therefore, the preferred option uses target exemptions from the proposed Regulations to give flexibility to large-scale projects (which value flexibility most) in locations where fewer people hear the noise and/or when the construction firms involved adopt practices, such as buffering, which reduce the impact of noise (reducing the cost associated with the noise).

Following this analysis the RIS identified the two substantive amendments to the proposed Regulations outlined in the preferred option above. The first amendment recognises that infrastructure development in fringe residential subdivisions is one area of the construction industry that involves almost entirely large-scale complex projects that would benefit from the flexibility of being able to work additional hours on Saturday morning.

The impact on neighbours of this amendment is reduced by restricting the exemption to fringe subdivisions that are, by nature, located in less densely populated areas. The impact is further decreased because this activity is usually of limited duration (between 16 and 20 weeks) and the amendments provide for additional protection through noise buffers:

- the construction activity must be 200 metres from the boundary of the nearest residence before there are no restrictions on the types of equipment that can be used
- if the construction activity is between 35 metres and 200 meters from the boundary of the nearest residential residence, the equipment that can be used is limited and work cannot involve earthmoving machinery that uses loud impacting, vibrating or rotating implements.

The second amendment recognises that construction of large-scale residential projects located in non-residential areas also has the potential to benefit significantly for greater flexibility to commence at 7 am on Saturday morning (the time normally allowed for commercial/industrial construction projects under local laws) without creating an unreasonable impact in that area.

The impact on neighbours of this option is reduced because land use in these areas is spread over a range of activities so fewer people are likely to live close to the construction activity and in these types of areas there is a greater expectation that noise will occur outside standard hours. Because of these expectations, people who choose to live in such zones are likely to be more noise tolerant, or to have already have taken action, such as sound proofing their homes, to reduce the impact of noise. In summary, the accepted test of 'reasonable' is different in these zones than in a normal residential area.

Overall, EPA Victoria considers that the preferred option presented above provides the clarity needed for policy relating to residential noise to be clear, encourage compliance and enforceable, while recognising issues specific to certain industry sectors and providing the flexibility necessary to deal with those issues.

Ongoing consultation

EPA Victoria is interested in feedback on the conclusions, arguments and analysis in this RIS. Stakeholders should feel free to comment on any issues relevant to EPA consideration of the issues identified in this document. EPA Victoria would also be interested in people's views on:

- the practicality of the construction options discussed below, including those that have not been identified as part of the preferred option
- whether there is a feasible approach to increasing flexibility in the use of air conditioners, taking account of the costs and practical issues identified in the relevant discussion in this RIS
- whether there are any other suggested amendments to the items and times in the proposed Regulations, including reasons why those changes are needed.

1. BACKGROUND

Key points

- Residential noise is regulated by section 48A of the *Environment Protection Act 1970* and the *Environment Protection (Residential Noise) Regulations*. Separately, Part III of the *Health Act 1958* can address residential noise.
- The Environment Protection Act's residential noise provisions cover all noise emitted from a residence, but not from other sites such as nightclubs, industrial/commercial premises, or non-residential building sites.
- The proposed Regulations only cover noise from 'prescribed items', which is equipment such as stereos, power tools, lawn mowers and air conditioners. They do not, and cannot, given the current legislation, cover peoples' voices or noise from pets.
- The Environment Protection Act restricts the emission of noise. The proposed Regulations simply clarify some types of noise that would be considered unreasonable.

1.1 What is residential noise?

The *Environment Protection Act 1970* (EP Act) defines residential premises and creates the offence of emitting unreasonable noise from residential premises. Residential premises are defined broadly to cover private houses and flats, including those under construction, and any land or other buildings used in connection with residential premises.

The EP Act's residential noise provisions cover all noise emitted from a residence, but not from other sites such as nightclubs, industrial/commercial premises, or non-residential building sites.

1.2 When is noise unreasonable?

Section 48A of the EP Act makes it an offence to emit unreasonable noise from a residential premises. Residential noise may be taken to be unreasonable at any time of day, depending on its volume, intensity, duration, and the time, place and other circumstances in which it is emitted.

Under section 48A, noise that is audible from prescribed items during prescribed prohibited times is deemed to be unreasonable noise and, therefore, an offence. The *Environment Protection (Residential Noise) Regulations 1997* (the 1997 Regulations) and the proposed *Environment Protection (Residential Noise) Regulations 2008* (the proposed Regulations) prescribe these items and prohibited times. The proposed Regulations reflect the intent of the Act, which recognises that what is unreasonable depends on the circumstances in which the noise is emitted. The proposed Regulations are, therefore, focussed on reducing noise during the early morning, evening and night when people are more sensitive to noise, including times when noise can have the greatest impacts on peoples' health and wellbeing because it disturbs sleep. For example, the proposed Regulations deem that it would be unreasonable for someone to play their stereo at a volume that could be heard inside their neighbour's house on a weeknight after 10pm. It would not necessarily be unreasonable if the stereo could be heard at 10am, when people are usually awake.

Details of the 1997 Regulations are set out in section 4.

1.3 The role of the Regulations

This Regulatory Impact Statement (RIS) analyses the costs and benefits of the Regulations and the alternatives to these Regulations. To understand the costs and benefits of these options, however, it is also important to understand the broader regulatory environment within which the proposed Regulations operate.

Residential noise related problems are regulated by a combination of section 48A of the EP Act and the Regulations. Also, Part III of the *Health Act 1958* (Health Act) is used separately by local government to address nuisances including residential noise.

The proposed Regulations only cover noise from prescribed *items*, which is equipment such as stereos, power tools, lawn mowers and air conditioners. They do not, and cannot, given the current legislation, cover peoples' voices or noise from pets.

1.3.1 The *Environment Protection Act 1970*

Section 48A of the EP Act makes it an offence to emit unreasonable noise from a residential premises:

'(3) A person who emits or causes or suffers to be emitted unreasonable noise from any residential premises is guilty of an offence.

- (4) *For the purposes of subsection (3), noise is to be taken to be unreasonable if it is unreasonable having regard to—*
- (a) *its volume, intensity or duration; and*
 - (b) *the time, place and other circumstances in which it is emitted.'*

Section 48A covers any noise emitted from a residential premises. It also includes the scope to prescribe items and set times when noise from those items would be deemed automatically unreasonable.

- '(5) *Without limiting the generality of subsection (3), any noise from a prescribed item which—*
- (a) *is emitted from residential premises at any time which is prescribed as a prohibited time in respect of that prescribed item; and*
 - (b) *can be heard in a habitable room in any other residential premises, regardless of whether any door or window giving access to that room is open—*
- is deemed to be unreasonable noise unless it is emitted in the case of an emergency.'*

The prescribed items, and the times when noise from those items must meet the conditions above are set out in the proposed Regulations. It is the EP Act, therefore, that restricts the emission of noise. The proposed Regulations clarify what would be considered unreasonable (box 1).

There are no other EPA Victoria statutory policies concerning noise emitted from a residential premises.

Box 1: Noise measurement

Setting benchmarks for unreasonable noise is not straightforward as assessing noise can be difficult. Noise assessment may be subjectively done by a person listening to the noise and considering its character and the circumstances in which it is emitted, or through objective measurement, using specialised equipment that measures the intensity of noise on the decibel (dB) scale.

The way that noise is perceived is complex and is affected by the type of noise, other noises in the local environment, and physiological and psychological factors, which affect how people respond to the noise they hear. In many cases, objective noise assessment needs to be complex and technical to adequately reflect such factors.

Subjective assessment of noise can also be difficult, as the person assessing the noise needs to consider the type of noise as well as its potential impacts on people. A subjective test of audibility does, however, provide a simple and reasonably consistent test for determining the acceptability of noise. By specifying such a test, the EP Act avoids potentially complex technical assessments.

1.3.2 The Health Act 1958

Action can also be taken to reduce or abate residential noise under the Health Act. Part III of the Health Act makes it an offence to cause a nuisance, including nuisance from noise. Section 42 states:

A person must not—

- (a) *cause a nuisance; or*
- (b) *knowingly allow or suffer a nuisance to exist on or emanate from any land owned or occupied by or in the charge of that person.*

Penalty: 100 penalty units.

Nuisance includes noise being emitted from or emanating from any land or a building and, therefore, includes residential noise. It could also include noise from non-residential buildings and other forms of nuisance, such as odours, vermin and rubbish.

To be a nuisance the noise must be dangerous to health or offensive or be liable to be dangerous to health or offensive. Offensive means annoying or injurious to personal comfort (section 40). In determining whether noise is a nuisance, regard must not be had of the number of people affected, but the degree of offensiveness may be considered.

Rantino and Paech (2004, p. 4) from the legal firm Maddocks noted that what is considered reasonable under the Health Act again depends on the circumstances of each situation.

What are reasonable standards must be determined by common sense, taking into account relevant factors, including what the Court considers to be the ideas of reasonable people, the general nature of the neighbourhood

and the nature of the location at which the alleged nuisance has taken place, and the character, duration and time of occurrence of any noise emitted, and the effect of the noise. (Oldham v Lawson (No. 1)[1975] VR 654)

Unlike the EP Act and the proposed Regulations, the Health Act does not further define circumstances in which noise would automatically constitute a nuisance.

1.4 Implementation and enforcement

EPA Victoria administers the EP Act and any accompanying Regulations and provides guidance on residential noise. The Health Act is administered by the Department of Human Services with the nuisance provisions (including noise) of the Act being the responsibility of municipal councils.

EPA Victoria does not have an enforcement role under section 48A of the EP Act, as complaint resolution and enforcement powers under this section are given to police and local government. A council's powers under the nuisance provisions of the Health Act may be delegated to its authorised officers.

In the case of the Health Act, the processes for responding to complaints are mandated in the legislation. If a person complains to their local council about a possible nuisance, including noise, the council must investigate that complaint. If the investigation shows that a nuisance exists, the council must take action to abate the nuisance or, if the council believes the matter could be better settled privately, advise the person who raised the matter of their options for private settlement. The council may serve an abatement notice on the person causing the nuisance. If that person fails to comply with the notice, the council can take the matter to the Magistrates' Court and the Court can order compliance and impose a fine if a nuisance is proven.

If the council does not investigate the complaint within a reasonable time the complainant can take the issue to the Magistrates' Court.

The EP Act provides that a member of the police force or a council officer can direct a person to take action to abate the noise and prevent it from recurring. Directions remain in force for 12 hours. It is an offence to contravene a direction and a penalty infringement notice can be issued for such a breach. Court action against unreasonable residential noise can also be taken by a person directly affected by the noise, a member of the police force or a council officer.

2. WHAT IS THE ISSUE/PROBLEM TO BE ADDRESSED?

Key points

- Australian and international studies show that residential noise is prevalent, can have significant impacts on those affected and those impacts can have significant health consequences.
- Noise has many of features of a classic economic externality. While social pressure may help constrain noise, such constraints are far from perfect.
- Without intervention there would be more noise problems and more noise at times when it causes the greatest detriment, the physiological and psychological impact of noise would be more prevalent, and disputes between neighbours would increase.
- The problems being addressed through the proposed Regulations are becoming more, rather than less, common. Therefore, the need for regulation is reinforced.

2.1 Problems caused by noise

There is a well-established literature that demonstrates that noise can have adverse psychological and physiological impacts on those affected. The severity of the impact can differ depending on the type of noise, its volume, pitch and duration, and the time of day, as well as the attributes and perspectives of the person exposed to noise. Noise that disturbs sleep can have the greatest impact on people.

Noise can affect people in the workplace, home and community environments. The World Health Organisation (WHO) defines community noise as noise emitted from all sources except noise at the industrial workplace. Box 2 illustrates some of the impacts of community noise identified by the WHO.

Box 2: World Health Organisation Impacts of Community Noise

The WHO guidelines for community noise consider a range of impacts noise can have on those affected. Noise can interfere with speech, disturb sleep, affect psychological function, accelerate or intensify mental illness, reduce cognitive performance and have social and behavioural effects. Hearing impairment, while an important consequence of occupational noise, was considered less of an issue for community noise in developed countries. In summary, the WHO made the following comments about the impacts of noise.

Noise can affect people's capacity to hear and mask other important acoustic signals, such as doorbells, telephones, alarm clocks, warning signals and music. Normal speech is about 50 dB(A), but in a small room sound of 35 dB(A)⁵ can interfere with conversation. Vulnerable groups, such as the elderly, children learning language or reading, or people unfamiliar with the language being spoken, can have difficulty understanding conversations with noise levels less than 35 dB(A). Noise that masks speech can cause personal problems and behavioural change, and affect children's learning.

Sleep disturbance is a major effect of environmental noise. The WHO noted that uninterrupted sleep is a prerequisite for good physiological and mental functioning and that noise disturbance can make it hard for people to fall asleep, wake them up, or alter the depth or stages of sleep. These effects can increase blood pressure, heart rate, vasoconstriction, change respiration, cause cardiac arrhythmia and increase body movement during sleep. The secondary effects of sleep loss due to noise include reduced perceived sleep quality, increased fatigue, depressed mood or wellbeing, and decreased performance. Sleep can be affected if background noise is above 30 dB(A) or individual noise events are greater than 45 dB(A).

Noise also has temporary and permanent effects on psychological function. Prolonged exposure can result in susceptible individuals developing hypertension and ischaemic heart disease. Unfamiliar or sudden noise can trigger reflex responses. While environmental noise does not appear to cause mental illness it may accelerate and intensify latent mental disorders.

In addition, cognitive function is affected by noise, particularly in children and those undertaking complex tasks. Reading, attention, problem solving and memorisation are the tasks most affected.

Finally, as well as annoyance, noise can produce complex, subtle and indirect social and behavioural responses. Such responses are not only influenced by the auditory characteristics of the noise but also non-auditory variables. Equal levels of noise can create different magnitudes of annoyance, depending on social, psychological and economic factors.

Source: WHO 1999a, *Guidelines for Community Noise: Executive Summary*, <http://www.who.int/docstore/peh/noise/ComnoiseExec.htm>, accessed 12 March 2008

⁵ By way of illustration, a dishwasher is about 60 dB(A), a vacuum cleaner about 70 dB(A) and a lawn mower 90 dB(A).

In the Australian context, the EnHealth Council⁶ concluded that there is sufficient evidence of the impact of noise on the community for the Australian government to take action.

'The World Health Organization, European Community members and numerous other countries have determined there is 'sufficient evidence' linking noise with annoyance, school children's performance, sleep disturbance, ischaemic heart disease and hypertension. Currently, there appears sufficient information to merit public health action in Australia to reduce these health effects. Cardiovascular health and mental health (two national health priority areas for Australia) have been weakly linked with noise exposure, although the link between environmental noise and high blood pressure (hypertension) and ischaemic heart disease is by no means conclusive.' (EnHealth Council 2004, p. x)

'While environmental noise may have previously been largely viewed as an amenity issue and not associated with significant public health consequences, this report indicates that this is unlikely to be the case. Indeed, it would now appear prudent to view environmental noise as a growing public health problem, and one that deserves more attention than it currently receives.' (EnHealth Council 2004, p. 51)

2.2 The problem of residential noise

Community noise affecting residents can originate from a range of sources:

- road air or rail traffic
- factories
- recreational facilities, such as speedways
- nightclubs or bars
- local street activities such as garbage collection or street cleaning
- construction or building noise
- noise generated by residential neighbours.

The proposed Regulations assessed in this RIS cover noise from a residential premises and land used in connection with a residential premises. They also include noise generated from renovations or construction of residences. The proposed Regulations cover the use of items such as motor vehicles (unless they are being driven into or out of the premises), lawn mowers, electric power tools and similar equipment, air conditioners, pool pumps, vacuum cleaners and heating equipment, musical instruments and amplified sound from radios, televisions and stereos, and in general any other equipment powered by electricity or an internal combustion engine. Other types of noise from a residential property include voices and noisy animals. The EP Act covers any unreasonable noise from a residential premises, but limits the scope of the proposed Regulations to *items*, which cannot include noise from people or animals.

While residential noise is one of the least studied areas of noise, and there are no studies that quantify the costs residential noise imposes on noise sufferers⁷, there is compelling evidence that the problem of residential noise is significant. First, Australian and international studies have shown that residential noise is prevalent, it has significant impacts on those affected and those impacts have important health consequences. Second, residential noise has a range of characteristics, which increase the impact of noise on noise sufferers. In many cases, studies in other areas of noise support the conclusion that these characteristics are significant.

2.2.1 Size and impact of residential noise

In 2007 EPA Victoria commissioned a Social Survey to report on community responses to noise heard in the home in metropolitan and regional Victoria (Strahan Research 2007)⁸. Estimates of the incidence of residential noise derived from that survey are presented in Table 1.

6 The EnHealth Council was a subcommittee of the National Public Health Partnership, which brought together Federal and State/Territory Environmental Health officials with representatives of the Australian Institute of Environmental Health, the environment and public health sectors, the Indigenous community and the wider community. The Council provided national leadership, implemented the National Environmental Health Strategy, forged partnerships with key players, and developed and coordinated national advice on environmental health matters.

7 In this RIS noise sufferers is used to refer to people who hear noise and are adversely affected by that noise. Noise makers are people who generate noise that affects noise sufferers.

8 See appendix 1 for a discussion of the methodology used in the Strahan Research report.

Table 1: Incidence of residential noise in the previous 12 months

Impact	Percentage of people affected	Estimated number of Victorians affected
Residential noise		
People who hear residential noise	57	2,920,000
People who are slightly to extremely annoyed by residential noise	30	1,540,000
People who are moderately to extremely annoyed by residential noise	15	770,000
People who are very to extremely annoyed by residential noise	8	410,000
Construction noise		
People who hear construction noise	34	1,760,000
People who are slightly to extremely annoyed by construction noise	17	880,000
People who are moderately to extremely annoyed by construction noise	8	410,000
People who are very to extremely annoyed by construction noise	3	150,000

Source: Strahan Research 2007, Report to EPA Victoria on Community Response to Environment Noise, p. 14, and Department of Planning and Community Development (DPCD) 2007, *Victorian Population Bulletin: Special Edition 2007*, p. 3

This Social Survey showed that 57 per cent of Victorians hear residential noise in their homes and 15 per cent of Victorians are moderately to extremely affected by residential noise. Moderately to extremely affected was ranked by participants using a scale that included 'not at all', 'slightly', 'moderately', 'very' and 'extremely'. Those who said they were moderately to extremely affected roughly coincided with the proportion who ranked the extent to which they were annoyed by noise as six or above out of ten.

Using the data from the Social Survey, it is estimated that about 770,000 Victorians are moderately to extremely affected by noise from their neighbours. The Social Survey also showed significant impacts from the separate category construction noise (primarily residential construction), which has moderate to extreme affects about 410,000 Victorians. These figures indicate that the cumulative impact of small costs from domestic noise can be large.⁹

The results of the Victorian survey are consistent with other studies, for example in the UK, which also recognise the significant number of people exposed to residential noise and that residential noise is second only to road traffic noise in its breadth of impact (for example see MORI 2003, p. 19)

The Social Survey also demonstrated the ways residential noise can disturb home life (Table 2).

Table 2: The interference of neighbours' noise with home life¹⁰

Activity at home disturbed	Estimate of the number of Victorians affected
Sleeping	774,000
Reading, relaxing or other quiet activities	667,000
Spending time outdoors at home	492,000
Listening to TV, radio, music	415,000
Concentrating or studying	338,000
Entertaining	303,000
Having a conversation (including on the telephone)	287,000

Source: Strahan Research 2007, Report to EPA Victoria on Community Response to Environment Noise, p. 44, and Department of Planning and Community Development (DPCD) 2007, *Victorian Population Bulletin: Special Edition 2007*, p. 3

⁹ Estimates derived using the percentage data from Strahan Research 2007, *Report to EPA Victoria on Community Response to Environmental Noise*, p. 14, and population data from the Department of Planning and Community Development (DPCD 2007, p. 3). DPCD reported the estimated population for Victoria at June 2006 as 5,128,310.

¹⁰ Includes all people affected by noise (slightly to extremely annoyed), not just those moderately to extremely annoyed. Multiple responses allowed.

In human terms, the disruption to home life caused by residential noise can, in its most extreme cases, have an enormous impact on the individuals affected. To better understand these potential impacts and their causes, EPA Victoria ran focus groups in mid 2007, where people were invited to tell their stories about how residential noise affects them.¹¹ Many of these stories demonstrate just how disruptive noise can be.

'But it was horrendous, just never slept. Just constantly on edge. In the end I had to get prescription to get relaxants and stuff just to even sleep, because it's a constant thing and a constant fear too. ... I just need this thumping to stop, so we can sleep for an eight hour stretch.'

'I replaced my windows with double glazed windows - didn't help. I put up with it for nearly a year, and my other neighbours were saying, "how can you stand it?" - "The noise was there as soon as I moved in five years ago. Drums with like big amplifiers. They would have maybe up to four two-hour sessions a day. It was so loud that my house shook, and it's a brick house, and it shook. I could not have a conversation with anyone in my lounge room. I could not have my television on and hear it. People would visit me and go again because they couldn't stay.'

'Basically, I walk in the door at seven o'clock at night. I can't read, I can't work on the computer. Some nights I can't even sleep ... some nights I'm just, "why go home?" because you know you're not going to get anything done.'

Another indicator of the concern about residential noise is the number of complaints about such noise. Complaints data is, however, unreliable and grossly underestimates concern about residential noise. Reported complaints statistics are incomplete and exclude those who raise issues directly with their noisy neighbours and those who do not complain at all (Box 3).

Box 3: Complaint statistics

Data on police call outs is the most readily available. In 2006 the police in metropolitan Melbourne had over 35 000 call outs for public noise nuisance, about 27 500 of these were at night. It is estimated that about 68 per cent of call outs were for residential noise,¹² such that police received about 23 500 call outs about noise from neighbours.

Local government is another significant recipient of complaints, but local councils do not keep consistent, accessible records on noise complaints and, therefore, data on complaints is not available from local government. Problems in collecting and amalgamating this data arise because councils have different customer management systems, and have different ways of recording repeat complaints and recording issues where several complainants have raised the same problem. Thus, data from different local government is not comparable. It is possible, however, to use EPA Victoria's Social Survey to estimate the number of complaints received by local government. Based on the number of people who reported they lodged a complaint with local government, compared with those who said they lodged a complaint with the police, it is estimated that councils in metropolitan Melbourne received about 8,000 complaints in 2006.

In addition, those concerned about noise often complain to, or attempt to resolve the dispute directly with, the people causing the noise, rather than a third party. It is difficult, however, to get accurate information about the proportion of noise problems that are raised directly between the noise maker and the noise sufferer. Several studies have indicated that about 60 per cent of complaints are raised directly with the noise maker. For example, an Ipsos study of dispute resolution in Victoria, indicated that 56 per cent of people with a dispute with their neighbours¹³ resolved that dispute directly, without taking the issue to a third party (Ipsos 2007, p. 4). A NSW study on neighbourhood noise similarly indicated that 56 per cent of those who complain preferred to approach their neighbour directly (DEC 2004, p. 25) and a UK study also estimated that over 60 per cent complain directly to their neighbour (EnCams 2005, p. 311). The results of the EPA Victoria Social Survey are broadly consistent with these other studies, when the results of the questions on who people complained to and what other action they have taken to resolve disputes are combined (Strahan Research 2007, pp. 106-109).

Finally, there is evidence that people are reluctant to complain and often do not raise their concerns, even with their neighbours. Both Victorian and NSW research indicates that about 80 per cent of people do not complain at all (Strahan Research 2007, p. 105 and DEC 2004, p. 24). The reluctance that people can have to complain was further illustrated in the stories collected from individuals during EPA Victoria's focus groups on the effects of residential noise.

'...But the sad part was, out of all the people that were affected, there was only me that complained and I think that's sad, and that's what I was saying about the fear. Because I used to be scared to go out and I was scared to stay in.'

'They were just too scared to do anything, and because it was only us that were flying the flag, the Council are less likely to do something because they want more than one complainant. But everyone was too scared to do it, and I thought, "I'm not going to be intimidated by some little punk.'

'My neighbours, one of my neighbours is very old. The other one is Vietnamese, they don't want to get involved at all, because they don't want a rock through their window, but I'm defiant that I need to get this problem fixed.'

¹¹ See www.epa.vic.gov.au/noise/residential/regsreview.asp for further information on the story gathering sessions

¹² Estimate based on data from the Social Survey about the types of noise people complain about to police (Strahan Research 2007, p. 106)

¹³ This included disputes about trees, fences, pets and parking, as well as disputes about noise.

The responses to the Social Survey and people’s personal stories show the significant impact of residential noise on sleep and other aspects of people’s lives. A study prepared for the World Health Organisation has also shown that neighbourhood noise can have a significant impact on people and their ability to sleep,¹⁴ and increase their risk of major health problems (Table 3).

Table 3: Impact of neighbourhood noise on health

Affected group	Moderate annoyance increases the risk of:	Strong annoyance increases the risk of:	Noise disturbed sleep increases the risk of:
Adult	Allergy Arthritic symptoms Cardio-vascular symptoms Hypertension	Allergy Arthritic symptoms Bronchitis Cardio-vascular symptoms Depression Hypertension Migraine Respiratory symptoms Trend of depression	Allergy Arthritic symptoms Bronchitis Cardio-vascular symptoms Depression Hypertension Migraine Respiratory symptoms Trend of depression Arthrosis Asthma Gastric ulcer
Older people	Data not reported	Arthritic symptoms Depression Gastric ulcer Stroke	Arthritic symptoms Asthma Gastric ulcer Migraine Trend of depression
Children	Respiratory symptoms Skin disease	Bronchitis Respiratory symptoms Migraine Trend of depression Skin disease	Bronchitis Respiratory symptoms Migraine Trend of depression Arthritic symptoms

Source: Neimann and Maschke 2004, *Noise effects and morbidity*

2.2.2 The characteristics of residential noise

In addition to the evidence that residential noise affects people’s health and wellbeing, there are several characteristics of residential noise that make this type of noise particularly damaging to noise sufferers.

1. Residential noise can be unpredictable, as it is difficult to judge when it will occur and how intrusive it will be if it does occur. Unpredictable noise is more obvious and intrusive because it is unexpected, it is more difficult for people to plan and prepare for such noise, and it exacerbates the problems associated with intermittent noise that does not blend into the background;
2. People’s response to residential noise is affected by their attitudes to the noise source and their perceived control over the noise. People are likely to be more annoyed and are affected more by noise if they believe the people causing that noise are inconsiderate and selfish.

¹⁴ The sleep impacts include residential and traffic noise.

3. The stress and conflict that often accompanies residential noise can affect people's behaviour and breakdown in neighbourhood relationships. Because residential noise is generated by individuals and the individuals responsible are usually known to those affected, the impact on social cohesion can be magnified.

The actual volume (decibel level) of noise explains only 10 to 25 per cent of the impact of the noise on noise sufferers (EnHealth Council 2004, p. 20). Other psychological impacts, such as the sufferer's perceived control over the noise, potentially have a more significant influence on the noise's overall affect (Hatfield et al 2001a, p. 818). These issues are discussed in more detail in appendix 2.

2.3 Why is government intervention needed?

In assessing the costs and benefits of regulating residential noise it is useful to consider whether government intervention is needed at all. This section, therefore, discusses briefly whether market or other community processes would resolve the problems associated with residential noise without the regulatory framework outlined in section 1 (the EP Act, the Residential Noise Regulations and, separately, the Health Act).

Noise has many of the characteristics of a classic economic externality. That is, there are no market mechanisms to ensure that those who make noise take into account the cost that noise imposes on others. Furthermore, the noise addressed in the proposed Regulations is often a consequence of normal residential activities, but frequently people do not factor that noise into decisions about those activities. For example, it is commonly recognised that people do not consider the noise products generate when they decide which product to buy. (EnHealth Council 2004, p. 36)

Given the external costs associate with noise, in the absence of government intervention, there is likely to be more noise overall and more noise at times when it has a greater impact on neighbours, such as during the night.¹⁵

If the market cannot regulate the appropriate level of noise, the next question is whether social pressure would ensure that neighbours, who often want to behave in a way that maintains harmony and complies with community standards, would reduce the amount of noise they make without government intervention. While social pressure may help constrain noise makers, there are two key reasons why such constraints are far from perfect.

First, there may not be a strong feeling of community among neighbours. There are many neighbourhoods where community links are weak and this reduces the pressure on neighbours to consider and reduce the impact of their noise has on others.

Second, social pressure will not minimise unreasonable noise unless all neighbours have a shared understanding of the appropriate standards. If individuals' interpretations of what is appropriate differ, problems will arise even if people are complying with what they think is acceptable behaviour. This is likely to be a common problem, and most prevalent in neighbourhoods that are socially or culturally diverse, changing, where people work and have recreation at different times of day, or where communication between neighbours is ineffective. Stories of noise sufferers collected by EPA Victoria illustrated how people's perceptions of what is acceptable noise can differ, for example:

'His words were, "I have a right to play my music" and I said, "Well, I have a right to peace and quiet". I said, "I don't need to listen to techno.'

There is evidence from UK studies on residential noise that people are often unaware that the noise they make disturbs their neighbours. About half the noise makers in one study said they were unaware that they were disturbing others (MORI 2003, p 9). Also noise makers consistently underestimate the impact their noise has on noise sufferers (EnCams 2005, p. 304). The proposed Regulations, and accompanying publicity such as the EPA booklet *Annoyed by noise?* (2007a), help overcome these problems by clarifying what are acceptable community standards.

Overall, the risks of non-intervention include:

1. more noise problems than would occur otherwise, and more noise problems at times when noise has a greater impact on those affected
2. physiological and psychological impacts as a result of noise, including feelings of annoyance, stress and anxiety
3. More disputes between neighbours than would occur otherwise.

The role of the proposed Regulations in addressing these problems is analysed in the later comparison of the costs and benefits of the proposed Regulations compared with retaining just the EP Act and the Health Act. Overall, by clarifying what is unreasonable noise, the proposed Regulations:

- reduce the impact of noise on noise sufferers as a result of greater compliance from more effective enforcement and dispute resolution and more voluntary compliance

From an economic efficiency perspective, an appropriate level of noise occurs where the costs imposed on those affected by the noise are not greater than the benefits to those who make the noise. From a social perspective, it is also important that people's basic right to quiet enjoyment of their property is maintained in a way that the cost of individuals exercising that right does not make the right ineffectual.

- make the time and level of noise more predictable by clearly establishing community expectations. The proposed Regulations focus on reducing noise during the evening/night and early morning, which are the times the EPA Victoria Social Survey indicated Victorians are most annoyed by noise (Strahan Research 2007, p. 46)
- reduce long-term disputes, as greater certainty makes it easier for parties to reconcile problems and reduces the debate and uncertainty about what is an acceptable level of noise. This has benefits for the individuals involved and the broader community by improving social cohesion.

2.4 Is government intervention still needed?

The proposed Regulations will replace the Environment Protection (Residential Noise) Regulations 1997. There has been no substantial change to the basic functions of these regulations since 1975. It is, therefore, necessary to consider whether the problems associated with residential noise have changed, and whether these changes warrant a change in the approach to regulation.

Evidence indicates that lifestyle changes, and changes in urban activity, mean that the problems being addressed through these proposed Regulations are becoming more, rather than less, prevalent.

UK studies have documented the impact of lifestyle changes, such as safety concerns leading to children playing more in doors or closer to home, a more '24-hour society' meaning that young people often socialise until early morning, and sophisticated home entertainment systems becoming more common and people being more likely to play this equipment at high volume (EnCams 2005, pp. 11-12). Comparing the EPA Victoria's Social Survey, conducted in late 2006, with the results of the 1986 National Noise Survey shows a growth in TV, music or radio noise impacts across the state. These sources of noise are now the most commonly nominated as annoying neighbour noise. They have overtaken barking dogs as the most prevalent residential noise source.¹⁶

Urban infill, interest in home renovation and overall growth in home construction are also increasing people's exposure to construction noise. EPA Victoria's social survey identified, under the separate category of construction noise, noise from neighbours building or renovating their homes as the main noise source that respondents found annoying. Comparison to the 1986 study shows that construction noise has increased significantly in the past 20 years, with 34 per cent of people hearing it now compared with just five per cent in 1986, and seven per cent significantly annoyed, up from two per cent in the previous study. (EPA Victoria 2007b, p. 8)

Such changes mean that the amount of noise generated and the proximity of that noise to neighbours is increasing. Despite this, the basic community standard that people have a right to quiet enjoyment of their property, and to rest or have a full night's sleep without being disturbed by others, has not changed. This means that there is reinforced need for regulation.

Although the general need for intervention is evident, consultation did, however, identify some areas where there may be a need to modify the regulations. These issues are discussed below in the assessment of the options for change.

¹⁶ While some of the categories in the two surveys differ, for example, the 1986 survey did not have an overall category for neighbour noise, the 1986 survey did identify individual domestic noise sources and conclude that combined domestic noise sources caused the greatest disturbance to the greatest number of people (EPA Victoria 2007b, p. 7). The compatibility of results between the two surveys was considered by the consultant, Strahan Research, in the development of the 2007 survey. The results are, therefore, broadly comparable.

3. OBJECTIVES OF GOVERNMENT INTERVENTION

Key points

- The primary objective of the proposed Regulations is to prescribe items and the times during which noise resulting from their use is deemed to be unreasonable.

3.1 Objectives of the proposed Regulations

The objective of the proposed 2008 Regulations is to:

Prescribe items and the times during which noise resulting from their use is deemed to be unreasonable noise for the purposes of section 48A(5) of the *Environment Protection Act 1970* and in certain circumstances exempt premises from the application of those prescriptions.

In prescribing these items the primary objective of the proposed Regulations is to specify items and the times during which noise resulting from their use is deemed to be unreasonable. It is anticipated that, in achieving this objective, the proposed Regulations would generate a range of benefits including:

- protecting residents' sleep from being disrupted by unreasonable noise from residential neighbours
- protecting other sensitive periods of the day, such as evenings and early morning
- helping community members who desire to go about normal domestic activities by clarifying the (non-prohibited) periods in the day when these activities are accepted, if carried out in a normal fashion
- improving compliance by clearly establishing community expectations about unreasonable noise and, therefore, increasing voluntary compliance among those that want to be good neighbours and comply with community standards
- assisting people to exercise their rights by making it easier for those affected by noise to determine when noise is unreasonable and take action if they are affected by unreasonable noise
- simplifying enforcement and dispute resolution by setting clear standards up front, so these processes can focus on whether the standards have been met and do not need to also establish for each dispute what the appropriate standard should be.

Clear standards are particularly important in an area like residential noise where there is a natural tension between the right to use one's home and equipment for normal activities and the rights of others to peaceful enjoyment of the home and sleep.

The secondary objective of the proposed Regulations is to exempt premises from the application of the prescribed items and times in certain circumstances. This objective recognises that, in some circumstances, the restraints placed by the times in the proposed Regulations are disproportionate to the restrictions they place on certain noise makers. Whilst maintaining the benefits above, the targeted exemptions result in the following additional benefits:

- Noise making activities with recognised constraints in the times and circumstances in which they are conducted are distinguished from general domestic activities, which are largely discretionary in nature.
- Greater clarity is given to government and industry on how to address different scales of construction noise.
- Current examples of regulatory inefficiency are addressed whilst ensuring that unreasonable noise is not enabled through these changes.

The objectives of the proposed Regulations are consistent with the Victorian Government's policy *Our Environment, Our Future*, which commits the Government to reducing our everyday environmental impacts and to striving for liveable cities.

4. OPTIONS TO ACHIEVE THE OBJECTIVES

Key points

- The options identified include not remaking the 1997 Regulations (the base case), non-regulatory alternatives to the Regulations, and remaking or amending the Regulations.
- The options were identified by considering feedback from consultations, the regulatory approaches in other jurisdictions and whether it is possible to identify non-regulatory or more market based approaches to managing residential noise.
- Each option has been assessed against four criteria. Options that meet all of the criteria are subject to more detailed cost benefits analysis in the following chapter.

As discussed in section 10, EPA Victoria consulted extensively prior to preparing this RIS. It sought views on the strengths and weaknesses of the 1997 Regulations and whether alternative approaches to managing residential noise would be more effective. This chapter outlines a range of options that were identified after considering the results of that consultation, the regulatory approaches in other jurisdictions and whether it would be possible to use non-regulatory or more market based approaches to manage residential noise. Three categories of options have been identified and these are outlined in Table 4.

Table 4: Categories of options

Option	Description
Category A	
Not remaking the 1997 Regulations	This option would mean that unreasonable noise would be governed by the general provisions of section 48A of the EP Act and, separately, the nuisance provisions in the Health Act. This is the base case against which other options are assessed.
Category B	
Non-regulatory alternatives	This category of options considers whether guidelines could be used as an effective alternative to regulation.
Category C	
Remaking or amending the 1997 Regulations	This category considers options that would involve regulation of residential noise, and considers a range of regulatory alternatives.
C1: Remaking the 1997 Regulations	Regulating residential noise in the same way as currently occurs through the 1997 Regulations with a minor change to include certain water pumps.
C2: General amendments	Considers general changes to the 1997 Regulations, such as changing the sources of noise covered, the hours prescribed and processes and approach to determining when noise is unreasonable.
C3: Construction industry	These Options consider ways of amending the 1997 Regulations to allow for: <ul style="list-style-type: none"> • early concrete pours • earlier start times on Saturday morning for domestic and residential construction,¹⁷ or sectors of the domestic construction industry (such as large-scale residential construction and fringe residential subdivisions) • facilitation of work the needs to be done outside of hours.
C4: Music on Friday and Saturday nights	Considers whether the time when music is deemed to be unreasonable should be later on Friday and Saturday nights.
C5: Air conditioners	Considers options for establishing conditions under which air conditioners could be exempt from the proposed Regulations.

¹⁷ Domestic construction covers the construction of single dwellings or attached dwellings separated by a fire resistant wall. Residential construction is the construction of blocks of units or similar multi-occupancy dwellings.

This chapter outlines the scope of each option and considers whether that option should be subject to a more detailed analysis of its costs and benefits. Options that fail against any of the following assessment criteria are rejected in this initial assessment and are not subject to more detailed analysis in chapter 5. The assessment criteria are:

1. EPA Victoria has the appropriate head of power to implement the option
2. the option would not result in an increase in unreasonable noise and, therefore, is not contrary to the EP Act
3. the option is practicable and could be implemented and enforced effectively
4. on the face of the initial analysis it is reasonable to expect that the benefits of the option could be greater than its costs.

Options that meet all of these criteria are taken through to chapter 5 and their costs and benefits are analysed more fully.

Category A options

4.1 Not remaking the 1997 Regulations

If the 1997 Regulations were not remade unreasonable noise would be governed by the general provisions of section 48A of the EP Act and, separately, the nuisance provisions in the Health Act.

As noted in chapter 1, Section 48A specifies that it is an offence to emit unreasonable noise from any residential premise and that unreasonableness would be judged based on the volume, intensity, duration of the noise, and the time, place and other circumstances in which the noise is emitted. It does not give any guidance, however, on rules that could be used to judge what is an unreasonable volume, time etc.

In addition, the Health Act obliges local government to remedy as far as reasonably possible, all nuisances in its municipal district (section 41), which includes noise that is dangerous to health or offensive. Offensive means noxious, annoying or injurious to personal comfort. Currently, during the day, when the proposed Regulations do not apply, local governments tend to rely equally on the EP Act and the Health Act to deal with noise issues.¹⁸

These Acts include processes for police and council officers to investigate noise and require those making noise to abate that noise and prevent it from reoccurring. There are also different remedies and fines available under each Act.

This is the base case against which other options are assessed. Although the requirements of both the EP and Health Acts form the base case, the policy discussion in the comparison of options focuses on the policy details of the EP Act, and not those of the Health Act.

Base case: Not remaking the 1997 Regulations is used in chapter 5 as the benchmark for assessing the costs and benefits of remaking the regulations.

Category B options

4.2 Not remaking the regulations and relying solely on guidelines to clarify the obligations in the Environment Protection Act

EPA Victoria has considered the role guidelines could have in relation to the EP Act and the Regulations.

Guidelines can take a range of forms and serve a range of purposes. At one end of the spectrum is general guidance material used to improve noise investigation and enforcement processes, and raise government and community understanding of noise. At the other end of the spectrum are guidelines, which suggest or recommend definite criteria or circumstances when noise could be considered unreasonable.

Local government and police consultation has shown that there is currently a need for EPA Victoria to improve its general guidance on the implementation of Section 48A of the EP Act and the proposed Regulations – for example, providing instructions to local government officers on how to investigate complaints and how to assess the audibility of noise as it relates to the proposed Regulations. EPA Victoria will be amending and improving its guidance material in this area (see chapter 8).

Such general guidance would supplement, but is not an alternative to the proposed Regulations. Accordingly, general guidance material should be distinguished from guidelines used to replace the function of the Regulations (and the associated subsection of the EP Act).

¹⁸ The results of a local government survey carried out by EPA Victoria July 2007.

In considering options to remaking the 1997 Regulations EPA Victoria also considered whether guidelines could replace the role of the Regulations. That analysis concluded that guidelines would not be an appropriate alternative to Regulations because:

1. A key role of the proposed Regulations is to clearly establish community expectations. Guidelines, being advisory in nature, could not fulfil this role. Even if they set times when being able to hear certain items is suggested to be unreasonable, they would not carry the force of law. This is especially important in a residential context, as noise can be part of difficult disputes between individuals where the certainty of clear rules is needed to resolve an issue.
2. Consultation with police and local government, who implement and enforce the 1997 Regulations, revealed that specificity in the Regulations greatly improves their capacity to manage unreasonable noise. Less certain guidelines would not be seen by these groups as serving the same purpose as the proposed Regulations.

Guidelines that are prescriptive enough to achieve the above objectives would have to be essentially the same in content as the current proposed Regulations. The only substantive differences would be, therefore, that guidelines are easier to change than Regulations because amendments are not subject to the same formal statutory processes. And guidelines are not legally binding unless they are referenced in the legislation or Regulations.

The proposed Regulations reflect community and legal standards about what is unreasonable noise, and such standards are relatively stable. EPA Victoria considers that the flexibility of being able to amend residential noise principles established through guidelines is not necessary and could reduce voluntary compliance.

Guidelines that are not legally binding would make current enforcement processes more difficult. The 1997 Regulations provide benchmarks that can be easily and cheaply enforced through well recognised processes for investigating complaints, dialogue and using fines, where necessary, to secure compliance. There is evidence that the speed and simplicity of enforcement is critical to the community having confidence in residential noise regulation (see for example DEC 2004, p.40).

Finally, prescriptive guidelines, particularly those that are given the force of law by being incorporated in legislation or Regulations, are in effect de facto regulations, but would not be subject to the same ongoing transparency and scrutiny as the proposed Regulations. In the case of rules that affect people's rights in their home, EPA Victoria considers that the protections offered by the regulation making process, the tabling of Regulations and the ability to disallow the Regulations are important.

EPA Victoria, therefore, considers that guidelines are not a viable alternative to the proposed Regulations as they fail against two of the assessment criteria. Using guidelines to replace the proposed Regulations would substantially reduce the effectiveness of enforcement processes and its minor benefits (flexibility) would not outweigh its costs (loss of transparency and a reduction in compliance).

This option is not analysed further in this RIS.

Category C options

4.3 Remaking or amending the Regulations

A range of options were considered around remaking or amending the 1997 Regulations, following consultation with stakeholders. The discussion below is divided into five areas:

- C.1. Remaking the 1997 Regulations with a minor amendment to explicitly cover rainwater and greywater pumps.
- C.2. Options for general amendments to the regulations.
- C.3. Options for amending provisions that apply to the construction industry.
- C.4. Options for amending provisions that apply to music on Friday and Saturday nights.
- C.5. Options for amending the provisions that apply to air conditioners.

C.1 Remake the 1997 Regulations

The prescribed items and times in the 1997 Regulations are set out in Table 5.

Table 5: Prescribed Items and prescribe prohibited times in 1997 Regulations

Group	Prescribed items	Prohibited times
1	A motor vehicle (except a vehicle moving in or out of premises), lawn mower or other grass cutting device and any equipment or appliance not falling within Group 2 having an internal combustion engine.	Monday to Friday: before 7 am and after 8 pm. Weekends and public holidays: before 9 am and after 8 pm.
2	An electric power tool, chain or circular saw, gas or air compressor, pneumatic power tool, hammer and any other impacting tool, grinding equipment.	Monday to Friday: before 7 am and after 8 pm. Weekends and public holidays: before 9 am and after 8 pm.
3	A domestic air conditioner, swimming pool pump, spa pump, water pump other than a pump being used to fill a header tank*, domestic heating equipment (including central heating and hot water systems) and a domestic vacuum cleaner.	Monday to Friday: before 7 am and after 10 pm. Weekends and public holidays: before 9 am and after 10 pm.
4	A musical instrument and any electrical amplified sound reproducing equipment including a stereo*, radio, television and public address system.	Monday to Thursday: before 7 am and after 10pm. Friday: before 7 am and after 11 pm. Saturday and public holidays: before 9 am and after 11 pm. Sunday: before 9 am and after 10 pm.
5	Any electric equipment or appliance not falling within Group 2, Group 3, or Group 4, including electric gardening equipment.	Monday to Friday: before 7 am and after 8 pm. Weekends and public holidays: before 9 am and after 8 pm.

* Proposed minor amendments to the 1997 Regulations. The rationale for explicitly mentioning water pumps is discussed in section C.2.2 below.

As the 1997 Regulations have been operating for some time, their compliance and enforcement arrangements are well established (these processes are outlined in chapter 8). It is, therefore, clear that this option could be effectively implemented and enforced.

Although generally positively accepted and referred to by enforcement agencies and the community, there are some particular circumstances in which expectations around unreasonable noise may differ from that set out in the 1997 Regulations. This RIS considers below whether the Regulations should be changed to reflect such views.

Remaking the 1997 Regulations appears to meet all of the assessment criteria and, therefore, its costs and benefits are analysed in more detail in chapter 5.

Option 1: Making regulations with only minor changes from the 1997 Regulations is analysed further in chapter 5

C.2 Options for general amendments to the Regulations

EPA Victoria considered whether the broad approach in the Regulations should be changed, taking into account the approaches taken in other jurisdictions. A range of options were considered:

- adding new items or deleting existing sources of noise in the Regulations
- changing the hours when noise is deemed to be unreasonable
- introducing a system in which people could opt out of the Regulations if they obtain the agreement of their neighbours
- changing the basis of the Regulations from looking at the time noise is made to controlling the intensity of noise to specified decibel limits.

Each option is discussed below.

C.2.1 Changing the sources of noise prescribed in the regulation

Experience has shown that all the regulated noise sources are important causes of neighbourhood noise. The terminology may need updating, for example the reference to stereogram¹⁹, but overall the scope of the 1997

¹⁹ Changing 'stereogram' to 'stereo' is part of the minor changes proposed in option 1.

Regulations is appropriate. Removing some noise sources from the Regulations would create regulatory gaps, generating uncertainty and inequity. As all noise, regardless of the source can impact on neighbours similarly, there needs to be clear justification for regulating some differently from others. For a few sources of noise, such as large residential construction, air conditioners and concrete pours, the costs of complying with the Regulations may be such that alternative approaches warrant consideration. Where consultation has identified such cases they are considered separately below.

There are some types of residential noise not covered by the 1997 Regulations; for example, voices and barking dogs. While such noise can affect neighbours and cause neighbourhood disputes, there are other legislative provisions available, including the general provisions of 48A in the EP Act and the Domestic (Feral and Nuisance) Animals Act 1994. In addition, voices and dogs could not be considered an item under the EP Act and, therefore, cannot be covered by the proposed Regulations.²⁰

Therefore, EPA Victoria considers that, apart from the explicit mention of certain water pumps that were previously classified with general electric equipment, the source of noise prescribed in the 1997 Regulations should not be changed. This option fails three of the assessment criteria. Because experience has demonstrated that all sources of noise are significant, there would be significant costs and few benefits from reduced coverage. Regulatory gaps created by reducing coverage would also make administration and enforcement difficult. In addition, EPA Victoria does not have the head of power to include some noise sources in the proposed Regulations, such as voices and barking dogs.

This option is not analysed further in this RIS.

C.2.2 Changing the hours when noise is deemed to be unreasonable

Other jurisdictions' noise regulations were reviewed to consider whether greater national consistency in the hours when noise is deemed unreasonable is appropriate. There is variation in the general hours specified²¹ and, therefore, a uniform approach is impossible. While comparison is difficult because the different ways noise sources are defined, generally Victoria sets similar or less restrictive times. However, its starting time for noise on Saturdays is slightly more restrictive than most.

Allowed times for general noise			
Jurisdiction	Weekdays	Saturday	Sunday
Victoria	7 am – 8 pm	9 am – 8 pm	9 am – 8 pm
New South Wales	7 am – 8 pm	7/8 am – 8 pm	8 am – 8 pm
Queensland (+ other flexibilities)	7 am – 7 pm	7 am – 7 pm	8 am – 7 pm
South Australia (as guidance)	8 am – 8 pm	7/9 am – 8 pm	9 am – 8 pm
Western Australia (+ other flexibilities)	7 am – 7 pm	7 am – 7 pm	9 am – 8 pm
Tasmania	7 am – 6 pm	8/9 am – 6 pm	10 am – 6 pm
ACT	7 am – 8 pm	7 am – 8 pm	8 am – 8 pm
Northern Territory	No regulation		

In considering whether this RIS should assess in detail the costs and benefits of allowing noise to commence earlier on Saturday morning EPA Victoria considered the benefits of consistency and whether there are legitimate reasons why a reasonable time to make noise would vary among jurisdictions.

Generally, national consistency reduces the costs (particularly for businesses operating in several states) of needing to understand and comply with different standards. In the case of residential noise Regulations, the costs of such inconsistency are low. The proposed Regulations mostly affect residents, so the consequences for business costs and interstate trade are limited. Where consultation identified issues that affect business, such as the construction

²⁰ In consultation with local government and police EPA asked about the existing items and if any new items should be added. No new items were suggested that were within the scope of the legislation.

²¹ Hours may vary further for some specific types of noise, such as music/parties on a weekend.

industry, these are considered below. In addition, even if Victoria changed the times it allowed noise on Saturday mornings, significant state variations would remain.

There are also reasons why the times when noisy activities are allowed should differ among jurisdictions. For simplicity, the regulated times are the same all year. But the time of sunrise varies considerably between summer and winter and across the country. It is noteworthy that those states with later start times have the most southern capital cities, where in winter sunrise is latest. In addition, daylight savings affects the time of sunrise in summer. It is also noteworthy that Western Australia and Queensland, have earlier start times on Saturday mornings and these are the states that have not had daylight savings.²²

In looking at consistency within the proposed Regulations, EPA Victoria considered simplifying the Regulations by standardising the times when noise is deemed unreasonable (for example television noise can be heard until 11pm on Saturday but gardening equipment must not be heard after 8pm). While such a change may make it easier to convey people's legal obligations, it does not recognise the different costs and benefits of different noise sources. In consultation with EPA Victoria, local government officers noted that differences in time match social expectation, for example, people are more accepting of music noise later at night than construction activities.

In addition, EPA Victoria considered whether the way certain items are treated within the 1997 Regulations should be changed. One particular issue was identified in relation to rainwater and greywater pumps. EPA has concluded that consideration should be given to moving grey water and water pumping equipment from Group 5 (general electrical equipment) to Group 3, which includes domestic air conditioners and swimming pool pumps. This change reflects that these types of water pumps are becoming more common, so there are benefits in explicitly recognising them in the proposed Regulations, and that the noise from these items and their use is similar to the other equipment in Group 3. Such a change would extend the time when these items can be used from 8pm to 10pm each evening. This change would have a very minor impact on the level of noise and its costs and benefits are therefore considered in conjunction with the option to remake the 1997 Regulations.

Overall, the regulated hours for most noise sources appear to be appropriate, and implementing this option would breach two of the assessment criteria. First, changing the Regulations to encourage national consistency or standardising times across all items would have limited benefits, which would be outweighed by the costs of confusion created by changing what is a relatively well understood regime and a failure to recognise legitimate reasons for differences, such as different hours of daylight in different jurisdictions, or community attitudes to different types of noise.

Second, this option is likely to result in unreasonable noise, which is contrary to the Act. For instance, in June in Melbourne, sunrise is at 7.30am. Regulations that continually allow noisy activity in the Unit or residential block next door at a time close to sunrise on a weekend, are likely to be unreasonable. Similarly, standardising times so that all noisy items (including lawn mowers and power tools for example) could be used until 11pm every Friday and Saturday night is also likely to result in unreasonable noise. EPA Victoria's Social Survey noted that 14 per cent more people are disturbed by early morning noise from their neighbours on the weekend than are disturbed by such noise on a weekday (Strahan research 2007, p. 46). This result is supported by EPA Victoria's noise measurement survey, which found that both Saturday and Sunday mornings are quieter than weekday mornings, so that any additional noise would be more noticeable on the weekend than on weekdays. (EPA Victoria 2007b, p. 4)

This option is not analysed further in this RIS.

C.2.3 Introducing a system where people could opt out of the regulations if they obtain the agreement of their neighbours

Given that those that make noise and those that hear noise live close together, one option for increasing the flexibility of the proposed Regulations would be to allow people to make audible noise during times that are currently prohibited if they have the agreement of their neighbours. To a certain extent, unofficial processes for agreement between neighbours already exist. For example, it is common for neighbours to inform each other about upcoming parties and, as enforcement of the regulations is usually triggered by a complaint, if agreement is reached and no one contacts authorities then there will not be a complaint to resolve. Such informal agreement processes are also discussed in section C.4.1 below.

There would, however, be considerable risks and costs associated with formal regulated agreement processes. To generate efficient outcomes such processes need to allow those affected by noise to give genuine informed consent and to prove whether consent has or has not been given. Therefore, to be enforceable, legally binding agreement processes would need to be relatively structured.

²² While Western Australia recently trialled daylight savings, the Regulations reflect past practice.

Formal requirements for direct negotiation among neighbours are likely to confuse application of the proposed Regulations, increase the need for dispute resolution processes and require further protections to prevent misunderstandings or people being coerced or misled, particularly if those affected are vulnerable or disadvantaged, such as older people or those with limited English skills.

People are often afraid of raising issues about noise with their neighbours. This was illustrated in the focus groups run by EPA Victoria where people were invited to tell their stories about how residential noise affected them. Many stories illustrated how noise sufferers are often afraid to make a complaint about noise makers. Such fear is likely to translate into reluctance to disagree with a request to make noise outside the regulated times, particularly when it is difficult to determine ex ante how intrusive that noise would be.

Businesses, such as construction firms, may be in a better position to manage agreement processes than individual noise makers, but the problems of guaranteeing genuine informed consent remain.

It is noted that this option is not enabled in any other state or territory.

Overall, this option would fail two of the assessment criteria. First, it is likely to be impractical to administer and enforce. Second, its costs would outweigh its benefits, as the safeguards needed to ensure people can give genuine informed consent, with full information and free from coercion, would make the process uncertain, complex, costly and time consuming. While the party seeking agreement would not initiate the process unless the benefits to them outweigh the costs of the consent process, such costs still reduce the net benefit of the option. Also noise makers would not consider the costs to government of administration, education, enforcement and dispute resolution and the cost to noise sufferers taking action if they believe they did not give genuine informed consent.

This option is not analysed further in this RIS.

C.2.4 Changing the basis of the regulation from looking at the time noise is made to controlling the intensity of noise to specified decibel limits

It is possible to regulate noise based on the decibels of sound, not just the time of day. This approach is taken in other countries. South Australia and the Australian Capital Territory also specify the level of decibels in their regulation. The benefit of specifying a precise measure of the noise allowed is that it makes the compliance test objective and measurable, rather than a subjective test based on a person's ability to hear a sound.

However, it would also make the proposed Regulations more technical and individuals would have considerably more difficulty judging whether they, or their neighbours, are in breach of their obligations. It could reduce compliance and increase enforcement costs. In addition, measures based on technical noise level standards require local government and the police to have access to new equipment and be trained to use that equipment.

Studies by the World Health Organisation (1999) indicate that noise level is not necessarily a good predictor of the impact of noise on residents. The impact of noise is also affected by its frequency, variation (for example a pulse compared with a constant noise), its duration, the time of day and other circumstances around the emission of the noise. Therefore, a simple noise level test could not capture the complexity of noise or its impact.

This option is therefore rejected against two of the assessment criteria. The first concerns the intent of Section 48A(5), which prevents the use of domestic items (which are considered discretionary) if they can be heard by neighbours. This simplicity is the intended approach to dealing with domestic noise issues and although it may be technically possible to deviate from this it would be contrary to the intent of the EP Act.

Second, although a decibel test could be used as the basis for exemption from the inaudibility requirements of 48A(5), it is not practicable as it would be excessively complex and uncertain to apply.

This option is not analysed further in this RIS.

C.3 Options for amending provisions that apply to the construction industry²³

The 1997 Regulations apply equally to all domestic activities, domestic and residential construction sites and all parts of the construction process. Therefore, the restrictions for residential subdivisions and high-rise are the same as for building work on individual houses, home renovations or domestic use of power tools.

To better understand the impact the 1997 Regulations have on different types of construction projects, EPA consulted with representatives of the Civil Contractors Federation (CCF), the Housing Industry Association Victoria (HIA), the

²³ Throughout this RIS, unless otherwise stated the term construction or construction industry refers to both domestic and residential construction, but excludes commercial construction.

Master Builders Association (MBA) and other industry groups. Consultation with local government also focused on construction noise issues.

The consultation examined the current regulatory framework and possible alternate approaches. Broadly, concerns were raised that the 1997 Regulations are inflexible and constrain industry, particularly on Saturdays, when residential construction work cannot be started before 9 am.

This concern was raised most commonly in relation to sites of a 'commercial scale' such as large subdivisions or high-rise apartments. Commercial projects of a similar scale can work more flexible hours (typically 7 am start on Saturdays) than equivalent-scale residential projects. Concerns about Saturday start times were also raised by the HIA in relation to individual home construction. Other concerns were also raised on particular aspects of projects, such as concrete pours and one-off crucial events, for example crane set-ups, which may need to be done out of hours to protect public safety or avoid major traffic disruption or major logistical impacts on a project.

In developing policy options to address concerns about weekend morning work hours, it has been considered that the economic impact that a 9 am start time on Saturday has on a construction project will be influenced by the logistical and workplace constraints (e.g., an activity which requires closure of a major road or coordination of a large workforce) that the project faces, with larger projects tending to face greater constraints. At some point of scale, the economic impacts become a significant consideration in the overall manageability and viability of a project.

Given the differences in logistical constraints, what could be considered 'unreasonable noise' may vary between construction projects of different scales.

The inflexible restraint of 'automatically unreasonable' noise at certain times may be a suitable way to manage noise on smaller sites, where the time restraints are not a significant consideration in the management of the project. It may, however, not be appropriate for logistically constrained sites, where there is a need to work within prohibited hours to avoid significant project or public infrastructure impacts, and a capacity to use a greater range of noise management practices to address instances of unreasonable noise.

Also, different projects carry a different likelihood of causing unreasonable noise, because of the location and/or type of works. For example, some residential construction projects now take place in non-traditional residential settings, such as in a commercial land use zone, where amenity expectations can be different and the likelihood of impacting on residents may be less.

Three specific issues have been identified:

1. The way the 1997 Regulations apply to large-scale construction sites and land clearing/infrastructure work on residential subdivisions, is inconsistent with guidance for equivalent commercial construction works and may be unreasonable because of the logistical constraints on large-scale projects.
2. The 1997 Regulations do not allow for early concrete pours on construction sites, which are sometimes necessary for the structural integrity of the concrete.
3. There is lack of flexibility in the 1997 Regulations to allow one off crucial events.

Construction

The 1997 Regulations prohibit audible noise from construction tools on residential premises before 7 am on weekdays and 9 am on weekends and public holidays. EPA guidance for works on commercial construction sites set different criteria, most importantly a 7 am start and 1 pm finish on Saturdays.

Representatives of the housing industry claimed that allowing an earlier starting time on a Saturday would reduce the industry's costs. Major construction and subdivision sectors of the industry have stated that the current working hours on a Saturday (9 am start compared to 7 am for commercial buildings) place unreasonable constraints and substantial economic burden on industry. These sectors highlighted that the works and noise impacts from a major residential and commercial project are essentially the same and having a different set of rules apply to residential projects leads to confusion and inconsistency in application by industry and local government.

Victoria's starting time for construction work on Saturdays is later than most other jurisdictions (mostly 7 am elsewhere), though the finishing time for noise is also later in Victoria than in Queensland, South Australia, Western Australia and on some sites in the ACT.

A number of options are presented to address these issues. In developing options, EPA considered the balance between the flexibility needed by different sectors of the industry and the impact on neighbours, which can vary depending on the scale and duration of the noise as well as the local land use context, which affects the likelihood of being near residents and reasonable noise level expectations for an area. The options considered include:

1. exemptions from standard 9 am start time for all construction

2. exemptions from standard 9 am start time for fringe residential subdivisions
3. exemptions from the prohibited times for all 'large-scale' residential construction
4. exemptions from the prohibited times for 'large-scale' residential construction in non-residential zones.

Other options raised in consultation were also considered by EPA Victoria in the development of this RIS. Two such options were setting alternative prohibited times for large-scale residential developments in non-residential zones, and exempting large-scale residential construction sites and/or residential subdivisions from the prohibited times if they have in place an appropriate noise management plan. Additional information on these options is included in appendix 3.

C.3.1 Exemptions from standard 9am start time for all construction

This option would involve a blanket change to the regulation covering all domestic and residential construction activity from small renovations in a residential area, to large residential projects and infrastructure work on fringe residential subdivisions (it excludes commercial construction such as building business premises and office blocks). Because the same noisy items are used by professional builders, owner builders (32 per cent of domestic building permits are issued to owner builders) and private individuals using building equipment for other purposes, the change would need to cover all these activities.

Therefore, this section of the proposed Regulations might be amended to read:

- | | | |
|---|--|--|
| 2 | An electric power tool, chain or circular saw, gas or air compressor, pneumatic power tool, hammer and any other impacting tool, grinding equipment. | Monday to Saturday: before 7 am and after 8 pm.
Sunday and public holidays: before 9 am and after 8 pm. |
|---|--|--|

Changing the starting time for all residential construction projects from 9am to 7am on Saturdays would result in a wide-scale increase in early morning construction activity, affecting residential amenity across metropolitan and regional Victoria. Early weekend mornings has been recognised as a sensitive time for the Victorian community. But as industry claims that greater flexibility in work hours would have significant benefits, and this option appears to meet the assessment criteria, its costs and the benefits are considered in more detail in chapter 5.

Construction option 1: Providing an exemption from the standard 9 am start time for all construction, allowing such projects to commence at 7 am on Saturdays.

C.3.2 Exemptions from standard 9 am start time for fringe residential subdivisions

Changing the start time for the land and infrastructure preparation components of fringe residential subdivisions (with appropriate buffering from residences and restrictions on equipment to be used) would provide flexibility for an earlier Saturday start time for subdivision works. It would also bring parity with other non-residential subdivision works, which are generally allowed to start at 7am.

This change would be limited to the land preparation stage of residential subdivision and recognises that the scale of work undertaken in the early infrastructure components of preparing residential land for building means that lack of flexibility is a particular problem. The change recognises that the circumstances of subdivision development change as development proceeds.

Usually blocks are developed progressively, so the construction of houses is a different process from the construction of early infrastructure. The work methods and workforce size involved in individual home construction are not as large-scale and, therefore, affected less by the costs of lack of flexibility. For example, in house construction there is not the same critical need for major earthmoving or land sculpting with large machinery, nor the complex interrelation of land clearing, road-laying and finishing equipment. Also there is an increasing risk that individual home construction would impact on residents who have already moved into the new development, or would have a cumulative impact as it follows on from the initial land preparation works.

The impact of this option is less widespread than changes covering the whole industry, but the increased noise would still occur at a time when the community is more sensitive to noise.

While the equipment used for subdivision works can be very noisy, the distance offsets and restrictions on the use of noisiest equipment proposed would manage the noise impact to the lowest practicable. In addition, this is a section of the industry that is characterised by large-scale projects, where the benefits of flexibility are likely to be larger. Given the potentially large benefits of this option and the inclusion of mechanisms to reduce the impact of noise, the costs and benefits of this option are analysed further in chapter 5.

The details of how such an exemption could be drafted are included in the proposed Regulations at attachment 1.

Construction option 2: Providing an exemption from the standard 9am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering.

C.3.3 Exemptions from the prohibited times for all ‘large-scale’ residential construction

This option considers exempting all large-scale residential construction (i.e. residential construction projects with four or more storeys or with two or more basement levels) from the standard prohibited times. Such projects are likely to be large and complex and would, therefore, benefit from increased flexibility.

Although these would be exempted from provisions of 48A(5) (prescribed items and prohibited times), the general unreasonable noise requirements of Section 48A(3) would still apply, as would EPA guidance on commercial construction noise (which recommends works hours and good practise noise management) and any applicable council local laws.

However, these projects are dispersed throughout different types of land use zones in Victoria, including traditional residential areas – and therefore could affect a large number of residents. Also, each project can cover a considerable area and affect more adjoining properties than construction or renovation of a single house. The impact of setting alternative times or exempting such projects from the proposed Regulations would result in a wide scale increase in early morning construction activity at a time when the community is more sensitive to noise.

The potential for improved consistency with commercial construction projects would need to be offset against reduced consistency with small-scale domestic and residential construction projects. While large-scale residential construction has parallels with commercial projects when constructed in non-residential zones, in traditional residential zones its impact on residents is likely to be equal to or greater than smaller scale domestic and residential construction in these areas.

This option is therefore rejected against two of the assessment criteria. First, allowing construction activity early in on a Saturday morning in a residential area, adjacent to residential premises, would result in unreasonable noise that is contrary to the requirements of the EPA Act. Second, because the impact on residents is large and widespread it is expected that the costs of this option would outweigh its benefits.

This option is not analysed further in this RIS.

C.3.4 Exemption from the prohibited times for ‘large-scale’ residential construction in non-residential zones

Today, many residential developments are undertaken at a large ‘commercial scale’ and mixed commercial/residential use development is increasingly common. It is, therefore, appropriate to consider how the 1997 Regulations work for larger residential development in mixed use zones and the consistency between the treatment of commercial and residential building in these areas. The general hours applied to larger residential construction are more restrictive than applied to similar scale commercial projects in EPA guidelines, as they do not allow for variation in hours and have later Saturday start times. However, there are more conditions on the operation of commercial projects in the evenings on weekends, Saturday afternoons and on Sunday.

This option, therefore, involves exempting multi-storey residential developments from the proposed Regulations, if those developments are being constructed in a non-residential zone. These developments would then be subject to work hours from EPA guidelines and local government bylaws. The general unreasonable noise provisions of section 48A of the EP Act would also still apply. It is intended that changed regulation would be accompanied by improved guidance. The details of how such an exemption could be drafted are included in the proposed Regulations at attachment 1.

As noted above, large-scale residential construction is likely to involve complex projects that would benefit from increased flexibility. Constraining the exemption to non-residential zones would have a number of effects. First, the impact on residents would be less wide scale and occur in areas where higher noise levels are already expected. Second, the parallels between large-scale residential and commercial construction are strong in non-residential areas and, therefore, there is more justification for regulating both types of projects more consistently. Due to these potential benefits for large projects, the fact that the location of these projects is likely to reduce the impact of the noise they generate, and the option appears to meet all of the assessment criteria, the costs and benefits of this option are considered further in chapter 5.

Construction option 3: Providing an exemption from the deeming provisions of the proposed Regulations for residential developments four storeys or above, or with two storeys or more below ground constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays in line with commercial projects of a similar scale.

Concrete pours

Local government and industry have raised issues in how the 1997 Regulations apply to concrete pours on residential developments.

On hotter days it may be necessary to start a pour earlier than the times permitted in the 1997 Regulations, avoiding the heat of the day to ensure the structural integrity of the concrete. Other states such as South Australia and Western Australia have incorporated flexibility within their noise legislation and guidance for early morning pours on hot days.

A separate but related factor is that industry may prefer to start concrete pours early to finish a job early, work to the preferences of the concrete supplier or fit more jobs into a day.

The main options for changing the way the proposed Regulations apply to concrete pours are:

1. allowing a blanket exemption for early construction pours
2. affording flexibility to early construction pours on all residential developments when the works are necessary.

C.3.5 Allowing a blanket exemption for early concrete pours

There is limited justification for a blanket extension for concrete pours, which would allow them to occur at any time. Although the proposed Regulations prohibit noise before 7 am (9 am at weekends), they do allow work until 8 pm. This scheduling may not be ideal for the construction industry, but the proposed Regulations do provide sufficient work hours for concrete pours to be completed in normal circumstances.

Construction pours are noisy and there is little justification for treating them differently from other types of noise, except in circumstances when the existing restrictions impose considerable costs. Local government representatives indicated that the noise from the early arrival of a concrete truck and associated preparation/works can annoy neighbouring residents, especially when they are not forewarned. They also suggested that, where works are necessary, the community is largely tolerant of one-off early start concrete pours, provided they are properly notified and the reasons for the work are justified and communicated. This option, however, would result in neither a clear justification for early concrete pours nor a notification process.

This option is rejected against two of the assessment criteria. First, it would allow early concrete pours any day of the week, without a clear justification and therefore is likely to result in unreasonable noise that is contrary to the requirements of the EPA Act. Second, because the impact on residents is large it is expected that the costs of this option would outweigh its benefits.

This option is not analysed further in this RIS.

C.3.6 Affording flexibility to early concrete pours on all residential developments when the works are necessary

This option exempts residential concrete pours from the requirements of the proposed Regulations where the forecast temperature is greater than 35 degrees Celsius and proper notification is given to surrounding neighbours.

The general unreasonable noise provisions of 48A would still apply. To accompany the regulatory change, EPA Victoria would also produce non-statutory guidance on good practise for such necessary events.

The exemption would allow for noise from items associated with a concrete pour to be exempt from the proposed Regulations, providing that:

- their use was integral to and it was used for the concrete pour
- the weather forecast from the Victorian Bureau of Meteorology at any time over the period up to four days before the day of the concrete pour is for a maximum temperature more than 35 °C on the day of the concrete pour
- written notification of the date and time of the proposed concrete pour is given to residents at adjoining properties at least 48 hours before the time of the concrete pour.

The 35 °C criterion was developed in reference to construction guidance in South Australia and in consultation with industry experts. There were no other criteria considered sufficiently restrictive as to necessitate allowance for an early pour on general residential construction sites. However, consultation did recognise that on very large projects there may be need for early starts to allow for a long duration continuous pour in some circumstances. Given the associated scale of such works, and their increased potential for other public impacts (for example, road closures) such issues were considered separately in options C.3.7 and C.3.8.

EPA Victoria considers that the benefits from this option are likely to be minimal. According to Bureau of Meteorology statistics, in Melbourne only about four per cent of days are above 35 °C. If the actual number of working days in the

construction industry is assumed to be 288, this equates to about 12 days a year. This is, however, an overestimate, as the period in December and January when the industry closes down is when many of the hottest days occur.

While the impact on noise sufferers of this option would be small, given that the number of days affected is small and residents would be forewarned that an early concrete pour is expected, the noise would still occur at a time of day when noise sufferers are sensitive to noise. Although accompanying non-statutory guidance would recommend delaying the works as long as is practicable, the exemption does not set an early starting time, as this would be impractical because the appropriate time depends on the weather patterns predicted for that day. As a result, concrete pours could commence relatively early (earlier than the 7am considered in the broader construction amendments).

Finally, the option is expected to be administratively more complex than existing methods of regulating noise. Builders and the concreting industry would need to monitor weather predictions, decide early when an early concrete pour may be needed and provide nearby residents at least 48 hours notice. This is likely to have the greatest impact on small builders managing a number of sites. There could be similar issues for those enforcing noise complaints, as establishing whether the necessary level of notification had been carried out could be difficult.

EPA Victoria, therefore, considers that this option fails against the assessment criteria because it would be too administratively complex, given that any benefits to industry would be very small.

This option is not analysed further in this RIS.

Crucial events that need to be done outside normal hours

There may be a need to offer work hour flexibility for crucial events of a scale where a restriction on hours can lead to other impacts, such as public safety risks, major traffic disruption or significant logistical difficulties. e.g., crane set-up.

In such events, the best solution for working hours will be found by balancing noise impacts against other public safety, traffic or major projects impacts. There are two potential models for giving such flexibility:

1. Exempting prescribed works that need to be done outside of normal hours to avoid public safety, major traffic disruption or major project logistics impacts.
2. Creating an exemption process where the proponent brings their case to a local council, which will assess the need for the works to be done and place appropriate conditions.

C.3.7 Exempting prescribed works that need to be done outside of normal hours to avoid public safety, major traffic disruption or major project logistics impacts

Items used as part of such crucial events could be exempted from the proposed Regulations. Such exemptions would, however, be difficult to define and enforce. There are many activities that could be eligible on the grounds that they are necessary and it would be difficult to define the exemption to cover all possibilities (whilst not allowing works for non-essential reasons such as expediency, supplier preference etc).

Because a blanket exemption for all potentially necessary activities would undermine the proposed Regulations, it would also be necessary for the Regulations to define when such activities are necessary. The benchmark for necessity would be difficult to specify and subject to interpretation.

Overall, such an exemption would substantially increase uncertainty about the proposed Regulation's scope, and a loose interpretation of what is necessary would significantly reduce the proposed Regulation's effectiveness. This option is therefore rejected because, contrary to the assessment criteria, it is neither practicable nor enforceable.

This option is not analysed further in this RIS.

C.3.8 Creating an exemption process where the proponent brings their case to a local council, which will assess the need for the works to be done and place appropriate conditions

This option would exempt items used as part of a necessary event from the prohibited times, provided a permit for that event was issued by a local council and the use is in accordance with the terms of that permit. The general unreasonable noise provisions of 48A would still apply. To accompany the regulatory change, EPA Victoria would also produce non-statutory guidance on the types of events and considerations councils should have in issuing such permits.

Amending the proposed Regulations to exempt necessary events, subject to a permit process, would clarify the regulation of such events and the obligations for those organising and managing necessary events.

It is noted, however, that a reasonable proportion of the sites that may have such crucial events (because of their scale and their impacts on local roads and public space) would be of the type covered by the exemptions considered in the other construction options on large-scale residential projects (Construction option 3).

If early morning activity is restricted to necessary events then its overall impact on the community is likely to be relatively small. While regulation that allows necessary early events would mean that noisy activity may occur at times when the noise disturbs neighbours, allowing and appropriately regulating such activities can also benefit affected residents. Necessary events can involve, for example, moving large equipment into and out of building sites. If such movements are attempted during the day, when more people use the area, they can be dangerous. Similarly, such activities can block roads and restrict traffic. Therefore, it would be better for the broader community (and to a degree local residents) if they occur at times when residents do not want to use the roads. In addition, such events are usually one off, so they do not involve ongoing noise.

To ensure the costs to noise sufferers are low, it is necessary to guarantee that the events that are permitted to commence early are truly necessary. To avoid abuse of the system, such judgements rely on there being a process to consider and determine what is necessary. Without a rigorous process for determining necessary events there are risks of significantly expanding the impact on noise sufferers.

The most obvious process, which would be consistent with the way similar issues are managed, would be through a local government based permit system. EPA Victoria sent a brief questionnaire to local governments asking their views on the practicality of a permit system for necessary events. Only a limited number of responses were received, but those that responded generally indicated that many councils do not have an existing permit process they could be easily expanded to cover noise from necessary events. Therefore, new processes and procedures would be needed. Most suggested that such processes would impose additional administration and enforcement costs on local government, mainly because the local law would need modifying. Some also noted that the permit would impose costs on builders, potentially delay projects and may involve additional fees for the new permit.

EPA Victoria, therefore, considers that this option is inconsistent with the assessment criteria as it would be too administratively complex, making it impractical.

This option is not analysed further in this RIS.

C.4 Options for amending provisions that apply to music on Friday and Saturday nights

C.4.1 Extending the time music can be heard on Friday and Saturday nights from 11pm to 12am

Some respondents to EPA's local government and police surveys suggested an extension to the times in the 1997 Regulations for music noise. A later time of 12 am for Fridays and Saturdays was suggested, primarily to accommodate occasional parties.

Research in NSW has looked at the times the community expects noise to cease in the evening for both weekdays and weekends, suggesting that the current time in the Regulations for music of 11pm Fridays and Saturdays may not match contemporary community expectations. The NSW research indicated that 47 per cent of people felt that 12 am or later was appropriate time for noise to cease on a weekend. (DEC 2004, p. 42)

Whether these views on parties warrant reducing the restriction in the proposed Regulations on music depends on two factors:

1. the extent to which the Regulations cover other types of audio equipment use, not just one off parties
2. whether, even with the current prescribed times, the way music noise is addressed by neighbours and the police is already consistent with the Community views expressed in surveys, and that where an occasional party is considered as reasonable beyond 11pm by neighbours, there will not be a breach to enforce.

The proposed Regulation that covers music restricts noise from musical instruments and any electrical amplified sound reproducing equipment including a stereogram, radio, television and public address system. It regulates all forms of music and it would be infeasible to separate one off parties from someone regularly playing loud music on their stereo.

While people can be tolerant of one off parties, particularly if they are forewarned (see for example Encams 2005, p. 69 and MORI 2003, p. 9), this is not the case when loud late night music is common every Friday and Saturday night or when parties are common and not isolated incidents. UK research has shown that loud music (not necessarily associated with a party) bothers about 40 per cent of people who are bothered by noise from neighbours (EnCams 2005, p. 301) and about 50 per cent of the noise from loud music continues for a year or more. While parties are more frequently one off, isolated, incidents (about 30 per cent according to the EnCams research [2005, p. 306]), this is not always the case. Twenty per cent of those who were bothered by noise from parties said that frequent parties had been an ongoing problem for a year or more.

The impact ongoing loud music can have on noise sufferers was illustrated in the stories collected by EPA Victoria.

'We had loud music from morning until night. Sometimes almost 24 hours a day. You couldn't sleep, you couldn't think, you couldn't watch your tele, you couldn't read. I used to go to bed with cushions and things wrapped around my ears, and as you said, you could feel the floor going boom boom, like this.'

Such ongoing late night noise can have a large impact on the increasing number of people who do not work a standard five day week and, therefore, do not experience a traditional weekend on Saturday and Sunday.

Thus, while community attitudes may indicate that it can be appropriate for a one-off party to finish later than 11 pm, this is clearly not the case for music noise in other circumstances subject to this section of the Regulations. Relaxing the proposed Regulations that covers this type of music would potentially have a very large impact on noise sufferers.

There are also risks around relaxing the controls as they apply to one-off parties. Despite research suggesting that the community may be generally tolerant in such cases, they still have the potential to unreasonably impact on people in the time period under concern.

It is common for neighbours to inform each other about upcoming parties. As noted in the previous discussion on option C.2.3, if neighbours have communicated around the event, and the affected neighbours understand the impact it will have and feel that the noise beyond 11pm is reasonable, they would not contact authorities and thus there would be no complaint to resolve.

However, where the music becomes a problem for neighbours because of its impacts (including the extent to which those impacts are affected by neighbour communication), the proposed Regulations provide the basis for resolution.

This option is therefore rejected against two of the assessment criteria. First, it would allow music and entertainment noise to continue until 12pm on Friday and Saturday night on an ongoing basis and it is, therefore, considered that it would generate unreasonable noise, contrary to the EP Act. Second, because of the impact on residents is large it is expected that the costs of this option would outweigh its benefits.

This option is not analysed further in this RIS.

C.5 Options for amending provisions that apply to air conditioners

The proposed Regulations prohibit the use of air conditioners at night if they are audible in a neighbouring residence.

During consultation, some local government officers raised difficulties in enforcing the inaudibility provisions during heatwaves, or if a person has a safety or medical reason for using an air conditioner (such as for the very young or elderly) and it was considered that an inaudibility requirement is unreasonably restrictive in these cases.

As the character of air conditioner noise is relatively steady, predictable and neutral, it is possible for units to operate at a noise level greater than audibility and still not disturb sleep for the majority of people. This is supported by findings of the World Health Organisation that continuous noise has significantly less impact on noise sufferers than intermittent noise

'Night time intermittent noise has worse health effects on sleep than continuous noise covering the same energy over the exposure period.' (WHO 2004, p. 20)

A NSW survey also indicated that noise from air conditioners has a relatively low impact on noise sufferers (DEC 2004, p. 18), though this is clearly not the case with all types of air conditioners installed in all locations.

Although the proposed Regulations provide a simple test of audibility to protect against the use of excessively noisy units that have been poorly installed, it is possible to install and operate an air conditioner to be audible but still carry a low noise impact.

In recognition that the proposed Regulations may be overly stringent in some cases, and given the commonality of air conditioners and the issues raised in consultation, EPA Victoria considered whether there is justification for exempting from the proposed Regulations people with a special need to use air conditioners or whether other general exemptions based on reducing the impact of the noise from air conditioners are appropriate. The options considered include:

Needs-based exemption –

1. exempting air conditioners from the inaudibility requirements of 48A(5) in specific circumstances

General exemptions –

2. exempting air conditioners from the inaudibility requirements of 48A(5), subject to the unit not exceeding a noise requirement
3. exempting units installed to a low noise standard and certified as such.

C.5.1 Exempting air conditioners from the inaudibility requirements of 48A(5) in specific circumstances

This option would involve, for example, exempting air conditioners from the inaudibility requirements of 48A(5) in cases where residents have a high level of need, or during heat waves. Such process are, however, likely to be administratively complex and there would be no simple criteria. Possible criteria related to health and hot weather are discussed below.

Health

Age is not an accurate indicator of medical need and a system of obtaining other forms of proof, such as doctors' certificates, would be costly to administer. Using a doctor's certificates, or similar proof, to justify a long-term exemptions has practical difficulties. It is difficult to determine how long such proof should be valid or whether the exemption should rest with the individual or the residential premises (for example would the exemption apply when the person holding the certificate is not at home). Resting the exemption with the individual would be administratively complex and make enforcement extremely difficult. Resting the exemption with the home would open the system to abuse as the person with the certificate may be at the exempt premises infrequently.

Hotweather

Similar issues arise in determining criteria where overnight use would be considered necessary – owing to the relationships between the number of days of heat, the overnight and day temperature, humidity, building design and individual needs. In addition, during hot weather those affected by noise from air conditions may also have difficulty sleeping, compounding the impact of the noise on neighbours.

These problems would be difficult to resolve and if local government find the scheme complex to administer they may have difficulty enforcing the EP Act.

It may be possible to develop general guidance which establishes one or both of the above principles, and allow for council officers to apply discretion in applying the inaudibility requirements. However, this would require that the proposed Regulations provide for local authorities to exercise a direction, which the EP Act may not allow for.

In addition, local government, police and resident consultation revealed that currently many people in the community, and some enforcement officers, incorrectly assume that where a noise is not specifically prohibited through the Regulations, its use is automatically allowed. (For example people using trail bikes or playing music during all non-prohibited times, regardless of impact). Offering a specific exemption from the proposed Regulations for air conditioners may create a public perception that such equipment is an as of right use, regardless of the general provisions for unreasonable noise. This would reduce compliance with the EP Act and potentially even discourage enforcement activity.

Furthermore, these options provide blanket exemptions that may discourage owners of air conditions from considering ways of reducing the noise impact of their unit, which is determined by a combination of placement, its manufactured noise level, installation and the way it is used.

This option is therefore rejected against two of the assessment criteria. First, it is impracticable to implement and enforce because of the difficulty setting and ensuring compliance with standard. Second, there is a considerable risk that because the option gives no regard to the amount of noise a unit generates that it would result in unreasonable noise, contrary to the EP Act, in some situations.

This option is not analysed further in this RIS.

C.5.2 Exempting air conditioners from the inaudibility requirements of 48A(5), subject to the unit not exceeding a noise requirement

The benefits of allowing those in need to run their air conditioners longer hours could also be achieved, while avoiding the problems noted above, if it were possible to set general provisions that allow low noise air conditioners to be audible, but not loud enough to cause an unreasonable impact. This would give those with an ongoing need to use their air conditioners the option of buying and correctly installing a unit for low noise.

It would be possible to develop decibel standards to permit air conditioner noise levels low enough as to not cause unreasonable noise for most people, yet loud enough to still be audible to neighbours. In this approach, the proposed Regulations would exempt units from the inaudibility requirements of 48A(5) if they do not exceed the specified noise level at neighbouring properties.

This option is based on a noise measurement in situ and would not directly regulate installation and the factory noise level of the unit. However, the known noise level target at neighbouring properties would enable installers or acoustic experts to plan unit design and location.

Such an exemption would be costly to administer and enforce as:

- very few councils or police stations have noise measurement equipment
- authorities are currently not trained in noise measurement
- local government and resident consultation shows inconsistency and lack of understanding in application of existing guidance for air conditioner noise measurement in non-prohibited times

These also create risks of ineffective enforcement, which could lead to the issues outlined above in relation to specified exemptions. Such risks would undermine the Regulation's effectiveness.

This option is therefore rejected because, contrary to the assessment criteria, it is impracticable to implement and enforce, and the costs of establishing new processes to regulate noise in a completely different way for air conditions alone, would mean that the costs of this option would outweigh its benefits.

This option is not analysed further in this RIS.

C.5.3 Exempting units installed to a low noise standard and certified as such

Noise-based installation standards for air conditioners have been developed and are currently published by the Australian Institute of Refrigeration, Air-conditioning and Heating (AIRAH), an industry peak body. These evaluate the desired location for a unit and the location of neighbouring residences to determine the maximum permitted noise level for a unit.

It would be possible to exempt air conditioners from the inaudibility provisions of the proposed Regulations, provided the installer has followed such an installation standard and provided a certificate showing its compliance. Such an approach would offer greater flexibility, drive improvements from the installation industry generally and could strike a better balance than is offered currently. It could also encourage greater consistency in enforcement of the Regulations and Act.

As noted above, a government-based regulatory regime, at this time, is considered complex and costly. There may be benefits, however, if industry were to develop a self-regulatory system. Such a scheme would need to:

- provide appropriate training for installers
- set standards consistent with the current noised based installation standards for air conditioners
- include effective monitoring and enforcement so that appropriate noise standards are maintained.

If such a system were to operate, the impact on noise sufferers would be minimal because air conditioners would only be exempt from the proposed Regulations if they met the noise standards. The general public, including those people who have a medical or health reason for running air conditioners for longer hours would be able to do so. Noise makers may, however, face some additional costs in paying a higher price to have the unit installed by an accredited installer.

In addition, the air conditioning industry would need to design, administer and enforce the self-regulatory scheme. There may also be some competition implications for non-registered installers or those who do not meet the industry standards. The scope and significance of these costs would depend on the nature of the standard and the conditions on non-accredited installers continuing to operate.

It is currently not possible to conduct a comprehensive cost benefit assessment of this option because there is no industry scheme proposed and there is a low level of current industry expertise in this area. Therefore, while it is considered that this option may be consistent with the assessment criteria it is not possible to consider it further at this stage.

This option is not analysed further in this RIS.

5. COSTS AND BENEFITS OF THE OPTIONS

Key points

- This chapter analyses the costs and benefits of remaking the 1997 Regulations and assesses this option against the base case of relying solely on the general provisions in the EP Act and, separately, the nuisance provisions in the Health Act. It is concluded that there is a net benefit from remaking the 1997 Regulations.
- The analysis then considers where there are further benefits from exempting certain construction activities from the proposed Regulations, to provide the construction industry with greater flexibility to work earlier on a Saturday morning.
- The analysis concludes that the costs of a general exemption for all construction activities would outweigh the benefits. However, there would be net benefits in providing the option of an earlier start for fringe residential subdivisions (provided certain operating requirements are met) and for large-scale residential construction in non-residential zones.

This chapter analyses in more detail the costs and benefits of the options that met the assessment criteria outlined at the beginning of chapter 4. The options identified include the following:

- Option 1: remake the 1997 Regulations (with minor amendments).
- Construction option 1: providing an exemption from the standard 9 am start time for all construction, allowing such projects to commence at 7 am on Saturdays.
- Construction option 2: providing an exemption from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering.
- Construction option 3: providing an exemption from the standard 9 am start time for residential developments four storeys or above constructed in non residential zones, allowing such projects to commence at 7 am on Saturdays.

These options are considered in two stages. In stage 1, option 1 is assessed against the base case of not remaking the 1997 Regulations to determine whether there is a net benefit in remaking the Regulations with minor amendments.

The base case of not remaking the 1997 Regulations would mean that unreasonable noise would be governed by the general provisions in the EP Act and, separately, the nuisance provisions in the Health Act. The base case was described in chapter 4.

Because the base case still regulates residential noise it also involves regulatory costs and benefits. Benefits include, for example, a reduction in unreasonable noise and, therefore, reduction in the psychological and physiological impacts of that noise. Costs include the cost to noise makers of being required to reduce noise levels, administration and enforcement costs for police and local government, and dispute resolution costs.

The cost benefit analysis in this chapter, therefore, looks at those costs and benefits generated specifically by the options being considered. These costs and benefits are in addition to those generated by the requirements in the EP and Health Acts.

In stage 2 the construction options are assessed against the base case of remaking the 1997 Regulations to determine whether there are additional net benefits from further changes to the Regulations.

In preparing this RIS, EPA went to considerable effort to obtain the data needed to quantify the costs and benefits of these options. A survey was conducted on the impact of noise on noise sufferers, data available through the Australian Bureau of Statistics and industry sources was reviewed, and industry representatives and local government were contacted to identify other data sources or obtain indicative estimates for the areas where data was not available. Therefore, where possible the following analysis provides quantitative estimates. However, this was not always possible and, therefore, overall comparison of the options has been conducted using multi-criteria analysis, which ranks costs and benefits of the various options on a scale between -10 and +10 across four categories of impacts:

1. impacts on noise sufferers
2. impacts on noise makers
3. impacts on government
4. impacts on the community.

The largest impact across all categories is a given ranking of -10 or +10 (depending on whether the impact is negative or positive). Other impacts are then placed on this scale relative to the largest effect. For example, if the largest impact was positive and, therefore, given a ranking of +10, a negative impact about half that size would be ranked as -

5. Because quantitative data was not available to estimate the various effects, judgements had to be made about the approximate size of impacts relative to each other.

The overall score for each option is obtained by adding the scores in each category. Only options that have a positive score overall (indicating they produce a net benefit) would be considered for inclusion in the preferred option. Where options are alternative ways of achieving the same objective, the option with the highest positive score, and therefore the highest net benefit, would be chosen.

The above approach to ranking options is applied separately to stage one and stage two of the assessment. Therefore, the total score for the assessment of option of remaking the 1997 Regulations is not directly comparable with the total scores for the construction options.

A summary of the costs and benefits across all the options has been included in the discussion of the preferred option in chapter 7.

5.1 Option 1: Remake the 1997 Regulations

Impact on the noise sufferers – As noted below, there is expected to be less noise as a result of greater voluntary compliance and more effective enforcement and dispute resolution. This would reduce the psychological and physiological costs of noise.

Impact on noise makers – Greater compliance may restrict the activities of some noise makers. However, greater clarity in obligations can also reduce the cost of individuals understanding and complying with their obligations.

Noise makers that do not comply with the Regulations may be subject to fines – though this is primarily a transfer from the noise maker to the community and not a cost of the regulation.

Impact on government – The impact on government is expected to be neutral or positive because administration, enforcement and dispute resolution costs are driven by the obligations in the Act and not the proposed Regulations. By clearly stating community expectations the proposed Regulations simplify, and therefore reduce the cost of, administration and enforcement processes.

Broader community impacts – There are likely to be fewer long-term disputes as greater certainty makes it easier for parties to reconcile problems and reduces the debate and uncertainty about what is an acceptable level of noise. This has benefits for the individuals involved and the broader community by improving social cohesion.

5.1.1 Analysis

Impact on noise sufferers

Many people are affected by neighbourhood noise. In the past 12 months in Victoria, 57 per cent of people heard residential noise and 15 per cent of people were moderately to extremely annoyed by residential noise. Thirty per cent are annoyed to at least some degree (that is, slightly to extremely annoyed). Therefore, it can be estimated that 2,920,000 Victorians hear residential noise and about 770,000 are significantly annoyed by that noise.²⁴

Not remaking the 1997 Regulations is expected to further increase the number of people and the extent to which they are annoyed beyond that reflected in the survey. If the regulations were removed it is hard to estimate how widespread additional impacts would be. However, it can be estimated from the EPA Victoria Social Survey that, in total, 1,540,000 people were slightly to extremely annoyed by noise in the past year.²⁵ Consequently, there is considerable potential for the level of annoyance to increase among this group if the magnitude of this noise rose.

This indicates that the potential impact on residents of not remaking the 1997 Regulations is widespread and there is real potential for additional noise to annoy a large number of people. Noise that annoys people can subsequently affect their psychological and physical health. These costs have been documented, but not quantified, in Australia and overseas.

As noted above, the EPA Victoria survey indicated that 15 per cent of people exposed to noise from their neighbours find it moderately to extremely annoying, indicating that the effect of that noise is significant. In addition, seven per cent of those who responded to the survey, which included people affected by all types of noise, have made physical changes to their home or to their habits to reduce or avoid noise. (derived from Strahan Research 2007, pp.108–109)

The results in Victoria are supported by findings elsewhere in Australia and overseas, which indicate the same or greater impacts than those identified in Victoria. In NSW, survey data indicates that 31 per cent of people are moderately to extremely affected by noise from neighbours (DEC 2004, p. 12). There have also been a range of

²⁴ See Table 1, section 2.2.1 for further information on these estimates.

²⁵ See Table 1, section 2.2.1 for further information on these estimates.

international studies that have concluded that a significant number of people are annoyed by neighbourhood noise (see for example Sobotová et al 2006, Muzet 2007, and MORI 2003)

Victoria's noise regulations are primarily targeted at reducing noise that disturbs people's sleep, when the emotional and health costs of noise are highest. Again the EPA Victoria Social Survey indicated that for those affected by noise 55 per cent were concerned about the impact on their sleep. For those very to extremely annoyed by noise 73 per cent were concerned about the impact on their sleep (derived from Strahan Research 2007, pp. 40-44). Again other studies have identified that noise sufferers are most concerned about the impact noise has on their ability to sleep (see for example EnHealth Council 2004, p. 19). Table 3 in section 2 also illustrated findings that loss of sleep, as a result of neighbourhood noise, can have significant consequences for people's health.

The worst of these impacts on individuals is illustrated in case studies reported to EPA Victoria in community focus groups held in October 2007, such as:

'There was one time where it was like 8 days in a row, 8 nights, it just went on and on and on, and poor Susan, we ended up having to take her to the hospital. She ended with high blood pressure, she just got stressed right out, that was it, off to the casualty. It was terrible.'

'Twice I had to ring in sick because I'd had no sleep because they played till 3:00 in the morning!'

Therefore, the proposed Regulations are specifically targeted at reducing noise at a time when it carries the greatest cost for noise sufferers.

If the 1997 Regulations were remade, there would be one minor change to the table of prescribed items. Pumps for greywater or rainwater would be included in Group 3 enabling their use until 10pm. Currently all water pumps are caught under the general provisions of either Group 1 or 5, depending on their power source. Items from Groups 1 and 5 cannot be used after 8pm. The inclusion of more types of pump in Group 3 above, reflects the more common use of rain/grey water in urban environments and the clarity of the regulations requires these items to be explicitly identified. Reflecting that rain/grey water is now used in connection with core functions of the house such as toilet flushing, washing machines or garden watering, pumps for these processes are proposed to be allowed later use. People should be encouraged to use alternative water sources, and changing the times for water pumps will align with summer dusk watering times and bring parity with times for other devices linked to normal awake-activities such as air-conditioners and heaters. Good installation of these pumps should mean they are not audible inside a neighbouring property and can be used at any time, but a cut-off time is needed to protect neighbours from noise impacts and to encourage proper installation.

Importantly, the extra two hours provided for water pumps does not apply to pumps used for filling header tanks. This is because header tanks can easily be filled at a set time. Where greywater or rainwater is being pumped from tank directly to its final use – such as for garden-watering – and provided that pump is installed correctly, use until 10 pm is not deemed unreasonable.

The extra two hours of use of greywater and rainwater pumps is not expected to impact significantly on the level of noise which residents will have to bear. If pumps are installed badly and consequently are very noisy, there is still power for enforcement officers to issue directions to abate noise under the unreasonable noise provisions of the Act before 10 pm.

Impact on noise makers

The proposed Regulations limit individual noise makers from engaging in enjoyable activities that involve making noise during certain times. This may be seen as a cost to noise makers. The extent to which greater compliance imposes additional costs on noise makers will depend on:

- extent to which people want to comply
- whether the regulations make compliance easier or more difficult
- the cost of changing behaviour once people decide to make a change.

For some noise makers greater compliance will impose little additional cost, because people often want to get on with their neighbours and conform to socially acceptable behaviour. Many noise problems arise from a lack of clarity about what is appropriate, or different interpretations of what is acceptable noise. There is evidence that many people do not want to disturb their neighbours, but often do not realise the impact they have (box 4).

In the police survey conducted by EPA Victoria, many police officers noted that noise makers tend to be compliant and are willing to turn music down when asked. This anecdotal evidence is supported by UK studies of noise. It was estimated in one study that 41 per cent of noise makers do not realise they are making noise (MORI 2003, p. 45).

Box 4: UK classification of noise makers

The UK study of noise makers and noise sufferers classified noise makers into five groups:

Tit for Tat: I know I make a noise but so does my neighbour, I'm just trying to get my own back.
(4.7 per cent of noise makers)

What Can I do?: I don't make a noise myself but I know my children/partner or dog does.
(26.7 per cent of noise makers)

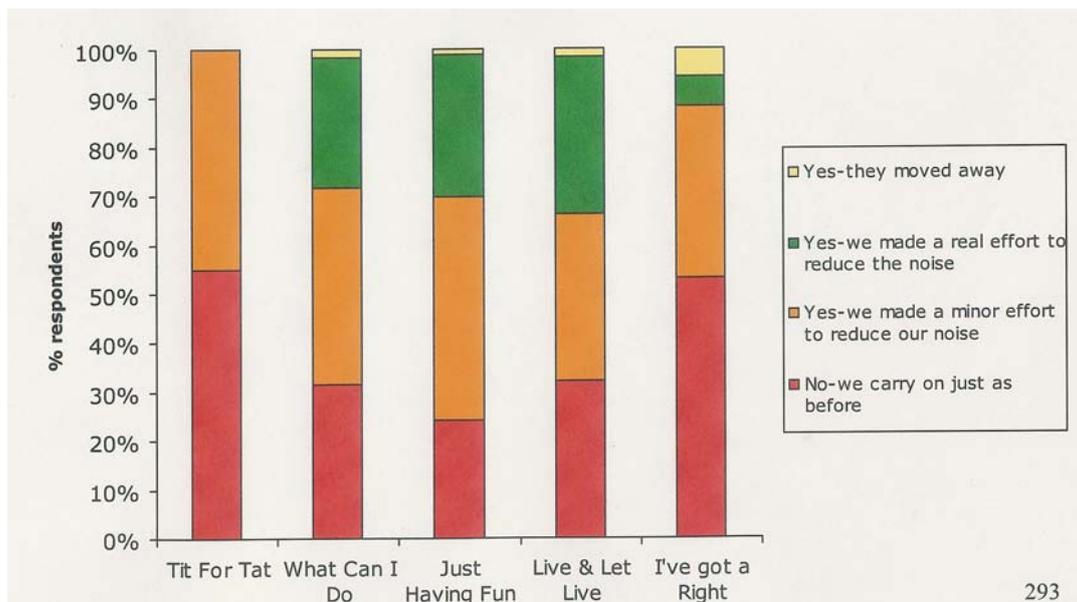
Just Having Fun: When I'm enjoying myself with my friends I forget about the noise I'm making.
(18.6 per cent of noise makers)

Live and Let Live: We make a noise but so do our neighbours. We just live and let live.
(34.1 per cent of noise makers)

I've Got a Right: I've got a right to make noise in my own house. I'm less concerned about the neighbours.
(4.7 per cent of noise makers)

The propensity for people to proactively reduce their noise varied between categories of noise makers. The chart below illustrates whether noise makers actively tried to reduce the noise they made following a complaint about that noise. Most of these complaints were directly from neighbours and did not involve a third party, such as a local council or the police. The UK study indicated that if noise makers are approached about their noise the majority make at least some effort to reduce that noise.

Actions by UK noise makers to reduce noise



Source: EnCams 2005, *Noise Segmentation*, pp. 288-293

The proposed Regulations capitalise on people's desire to conform to community standards, by making those standards clear. People are far more aware of noise regulations that impose time restrictions than those that are based on more subjective standards (such as unreasonable noise and nuisance in the Victorian Acts) (DEC 2004, p. 46).

By clarifying what is appropriate noise, the proposed Regulations make these social standards explicit, easy to follow and avoid differences in interpretation. Thus many will voluntarily comply with little additional personal cost. As observed by NSW in its RIS on noise regulations:

The cost of compliance with this clause [the clause that restricts the times certain articles can be used] is likely to be minimal, as offensive noise from sound systems, air conditioning units, garden power tools or amplified music can be minimised by minor behavioural changes. For instance, individuals can turn down the level of sound or consider the need for the use of appliances such as garden power tools during 'sensitive times'. (DECC 2007, p. 53)

The cost of compliance is further reduced because the proposed Regulations cover evenings, night and early morning, when most people are engaged in quiet activities or are asleep. The proposed Regulations do not apply to the time of day when the majority of people are likely to be engaged in noisy activities.

Overall, remaking the 1997 Regulations is expected to maintain higher levels of compliance than would be the case if noise was regulated solely by the EP and Health Acts. The increased costs to the individuals complying would, however, be less than the increase in compliance, because of the impact clarifying standards has on setting community norms and people's natural tendency to want to conform to those standards and get on with their neighbours.

The group likely to be most affected by the proposed Regulations are those who knowingly make noise that annoys their neighbours and who do not want to change. These groups include the 'tit for tat' group and the 'I've got a right' group identified in the UK survey (Box 3). These groups combined, however, comprise only 9.4 per cent of all noise makers.

Finally, even among the 'tit for tat' and 'I've got a right' groups, making what is acceptable behaviour more explicitly may improve compliance. Without the proposed Regulations, accepted community norms could break down, reducing the pressure on people to consider the impact on others when they make noise.

Construction industry

The proposed Regulations also impose costs on the construction industry, which is restricted in the times it can make noise on domestic and residential construction sites. Generally, the times allowed for construction are relatively broad, a 13-hour span on weekdays from 7 am to 8 pm and an 11-hour span on Saturdays, Sundays and public holidays, from 9 am to 8 pm. Therefore, there are only limited circumstances when businesses are likely to want or need to engage in noisy activities outside these times.

As discussed in chapter 4, following consultation with local government and the construction industry, EPA Victoria identified times and circumstances when the 1997 Regulations may impose costs on construction. Chapter 4 reviewed each of these options and three possible approaches to increasing the flexibility for construction businesses to work between 7am and 9am on Saturday morning are considered below.

Impact on government

It is not anticipated that the proposed Regulations would increase the amount of administration or enforcement effort needed by local government or the police. Local Government is already obliged to investigate noise complaints under the Health Act, and the EP Act provides for Local Government and the police to investigate complaints.

If anything, the costs of enforcement and dispute resolution would fall if the proposed Regulations are introduced because of greater clarity in the rules. To the extent that the proposed Regulations increase voluntary compliance and make it simpler for neighbours to resolve disputes themselves, the costs of enforcement for government would decrease. In addition, greater clarity in the proposed Regulations makes enforcement processes easier and less costly because:

- warnings are more effective, because a clear message on what is expected can be given with the support of law, reducing the need to elevate enforcement effort to a higher level
- those responsible for enforcement are also clear on what the standards are, which is important for regulation enforced by local government where training staff in complex standards can be costly and there is a risk that if standards are unclear the approach to enforcement could be inconsistent across regions
- objective compliance criteria are available, so that enforcement can concentrate on whether the criteria have been met, rather than first needing to judge the appropriate standard before assessing whether that standard has been reached.

The importance of the proposed Regulations to generating clarity and reducing the cost of enforcement is illustrated by the following:

- In a survey of police and local government conducted by EPA, 21 per cent of police and 42 per cent of local government identified a lack of prohibited times for some types of noise (e.g, trail bikes, which are a daytime use) as a barrier to effective management of residential noise. While it may not be appropriate to regulate some noise sources, such as barking dogs, in the same way other noise is regulated, this response indicates that the proposed Regulations would have significant benefits in the areas covered.
- In the same surveys, 43 per cent of police and 73 per cent of local government identified that there are difficulties in determining what is unreasonable noise during non-prohibited times, a problem that could exist at all times if the proposed Regulations were not in effect.

- The difficulty assessing more subjective criteria has also been raised as an issue by councils in other fora. The City of Melbourne, for example, noted that residents can view council complaints processes as protracted and onerous, a problem which is exacerbated by ‘the subjective element of defining what is and is not a nuisance... The assessment of noise as a nuisance is problematic by its nature.’ (City of Melbourne 2003, p. 13)
- The police and local government stress the importance of guidelines to assist in resolving residential noise issues, again illustrating the importance they place on clarity and certainty.
- Local government, who usually deal with disputes during the day under general provisions in the legislation, estimate that more than half of the disputes take more than a week to resolve. For the police, who mainly respond at night when the 1997 Regulations operate, 87 per cent of disputes are resolved immediately through the initial contact. Even recognising that the complaint management processes of local government are potentially more extensive, the extent of the difference at least suggests that the proposed Regulations would help simplify enforcement processes.

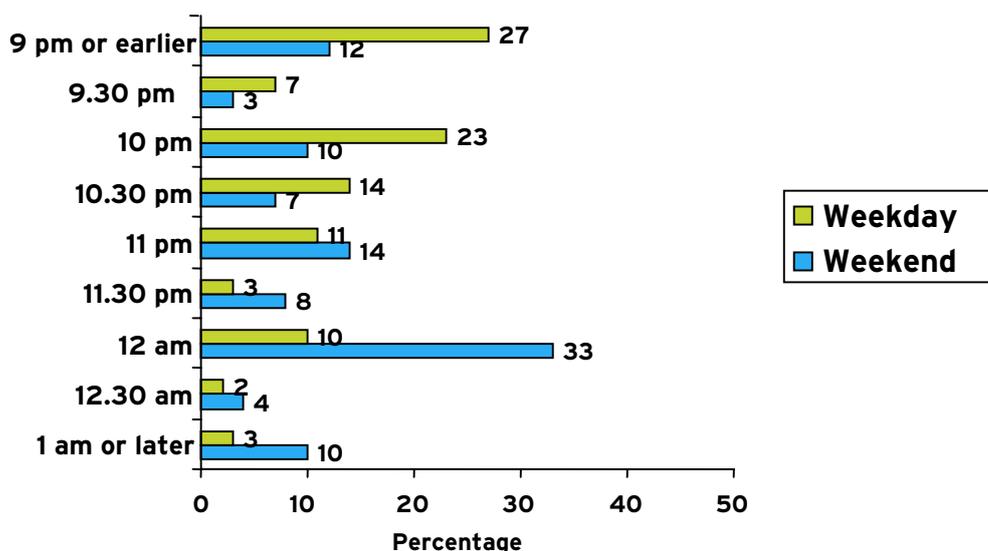
The above examples illustrate that those that enforce the 1997 Regulations consider that enforcement would be more difficult and, presumably more costly and less effective, without Regulations that clearly defined objective standards for unreasonable noise at the time of day when noise is likely to cause most people the greatest concern.

In addition, not remaking the 1997 Regulations is likely to lead to many Local Councils deciding to introduce local laws to regulate noise that was covered by the proposed Regulations. This would involve the one-off costs of developing local laws, and additional uncertainty and inconsistency created by having, potentially, different standards operating in different local government areas. Such uncertainty is likely to affect construction businesses that must comply with local laws. While it may be easier for large construction companies (who already have detailed interaction with Local Councils on their projects) to manage these differences, small businesses, particularly those engaged in small renovation projects in a range of locations, could face considerable additional costs in identifying and complying with a range of local laws. Similarly, for individuals there is likely to be considerably more confusion about the standards applying in their local area.

Broader community impacts

Establishing clear guidelines on when and what level of noise is unreasonable can reduce conflict about what is acceptable behaviour. People’s subjective assessments of what is appropriate noise differ (see MORI 2003, p. 34). This was also illustrated in differing responses to the NSW study on the suitable time for noise to cease at night (Chart 1).

Chart 1: What is a suitable time for noise to cease?



Source: NSW DEC 2004, *Neighbourhood noise survey results*, p. 42

These differing expectations, combined with noise makers not necessarily understanding their full impact on noise sufferers (Ecams 2005, p. 304), can cause conflicts and disputes. Such conflict was illustrated in the stories that emerged from the EPA Victoria focus groups on the effects of residential noise. For example:

'...She's got a fair idea as to how long it takes the police to turn up and how long they're going to be etc, so she can vary her noise to annoy the neighbours, and if one neighbour has a party and annoys her, then a week later she will crank her noise up to annoy those neighbours back again.'

'They told me we were being vexatious and that my complaints weren't warranted. I just went hysterical. I couldn't believe that they didn't believe it.'

The cost of resolving conflict can be significant. While, information on the cost of handling disputes is not specifically available for those issues covered by the proposed Regulations, general data on neighbourhood disputes (including trees fences, noise, pets, parking etc) indicates that on average the cost of resolving severe family, neighbourhood and association disputes is \$2010 (Ipsos 2007, p. 37), which includes money spent and the number of hours applied. In addition, 87 per cent of those involved in family, neighbourhood and association disputes ranked the emotional cost of these disputes as high or very high. (Ipsos 2007, p. 42)

In addition, conflict with neighbours and a lack of community cohesion can increase the amount of disputation and the extent to which people are annoyed by noise. A UK study indicated that double the number of people is annoyed by noise if their relationship with their neighbour is poor; and more complaints are resolved between neighbours, without resorting to complaining to third parties, if neighbour relationships are good. (MORI 2003, p. 32 and 50)

5.1.2 In conclusion

Overall, there is considerable community support for domestic noise regulation that provides clear guidance on when noise is unreasonable. Not only are the times in regulation often the most recognised and understood part of noise legislation (DECC 2007, p. 49), but 96 per cent of people in NSW surveys believe that it is appropriate to regulate the time of day when noise is made (there is no reason to believe that the views of Victorians would be significantly different from those in NSW). (DEC 2004, p. 47)

As noted above, it is difficult to quantify many aspects of the costs and benefits of remaking the 1997 Regulations. They can, however, be summarised as follows.

Category of impact	Nature of impact	Score
Noise sufferers	Under the proposed Regulations there would be less noise and fewer costs from the impact of that noise. This Option would have widespread impact affecting all those who potentially hear noise from neighbours and controlling that noise at the most sensitive times. It is, therefore, concluded from the discussion above that the benefits to noise sufferers of the proposed Regulations is very large.	+10
Noise makers	The proposed Regulations have costs and benefits for noise makers. From the perspective of the construction industry the proposed Regulations impose costs on certain types of construction activities at particular times of day. The impact on the construction industry is considered in more detail in the assessment of the following options. The proposed Regulations would restrict the activities of some individual noise makers, due to greater compliance but, as noted below there are half the number of noise makers to noise sufferers and the regulations control noise at the times when fewer people need to make noise. In addition, noise makers would benefit because the proposed Regulations make it easier for noise makers to understand and comply with noise obligations and reduce the risk of different local laws adding to confusion and compliance costs. Considering the number of noise makers relative to noise sufferers and that the proposed Regulations benefit noise makers as well as imposing costs, it is considered that the cost of the proposed Regulations on noise makers is much less than the benefits to noise sufferers. A large part of this cost is driven by the impact on the construction industry, which is considered in more detail in the options below.	-6
Government	The proposed Regulations would reduce the cost of local government managing and enforcing legislation that applies to residential noise. The proposed regulations would also reduce the need for local councils to make local laws to cover noise at the times covered by the proposed Regulations.	+4
Community	As noted above the broader community would benefit from reduced disputation.	+2
Total score		+10

The key question for the analysis of the costs and benefits of this option is whether the additional cost imposed on noise makers is larger than the benefits across all stakeholder groups.

Considering first the construction industry, construction option 1 below concludes that, for regulations that cover the whole of the construction sector, the costs to the broader community of restricting noise on a Saturday morning outweighs its benefits. This is the time when construction firms claim that the costs of reduced flexibility are greatest. Therefore, it can be concluded that less clear restrictions on construction noise, across the board, are likely to have a greater impact on noise sufferers without commensurate benefits to the industry.

Second, looking that the position of individual noise makers relative to noise sufferers, there are significantly more noise sufferers than noise makers. For each home where noise originates there are usually several surrounding residences. While it is possible to use survey data to estimate the number of people who suffer noise, it is difficult to determine how many people make noise sufficient to annoy their neighbours.

Data in NSW indicated that about twice as many people had complained about noise makers than have had a complaint against them (DEC 2004, p. 20). This, however, does not record noise sufferers who did not complain and noise makers who were not the subject of a complaint. It is possible to use UK data to estimate the percentage of noise makers who make sufficient noise to annoy their neighbours, by adjusting the data on the percentage of people complained against to also reflect under reporting of complaints. Again the results indicate that there are about twice as many noise sufferers as there are noise makers (derived from EnCams 2005).

If the above data is a good indication of the number of noise makers compared with the number of noise sufferers, then, even excluding the other benefits of the proposed Regulation, the cost of the inconvenience and restrictions on individual noise makers would need to be twice the cost noise imposes on individual noise sufferers for the Regulation's costs to outweigh its benefits.

Taking the following factors into account it is concluded that the benefits of remaking the 1997 Regulations outweigh the costs.

1. The main time period of the proposed Regulations applies when people are trying to sleep, this is the time when the impact on noise sufferers is greatest.
2. It is usually possible for most noise makers to comply with the regulations with relatively small changes in their behaviour.
3. The Regulations apply at times when most people are not likely to be engaged in noisy activities.
4. There are considerable additional benefits from the regulations beyond those to noise sufferers.

It is therefore concluded that the costs on noise makers do not outweigh the overall benefits of the proposed Regulations, and this option has a positive net benefit over the base case of not remaking the 1997 Regulations.

5.2 Amending the Regulations

The above analysis assessed remaking the 1997 Regulations, with some minor amendments. The following options consider the case for further amendments to specific areas of the 1997 Regulations and are assessed against the base case of remaking the existing Regulations.

The EP Act already includes the concept of weighing the costs and benefits of noise when considering whether noise is appropriate at different times of the day. The Act makes it an offence to emit *unreasonable* noise. Unreasonableness is judged depending on its volume, intensity, duration of the noise, and the time place and other circumstances in which it is emitted. Therefore the same noise may be judged reasonable or unreasonable depending on related circumstance, including its impact on the needs of the noise maker and its effects on the noise sufferer.

The proposed Regulations deem noise at particular times to be automatically unreasonable and, therefore, in assessing the costs and benefits of making amendments to the proposed Regulations it is important to consider whether such amendments would better reflect what is considered to be reasonable noise.

5.3 Construction option 1: Providing an exemption from the standard 9 am start time for all construction, allowing such projects to commence at 7 am on Saturdays

Impact on noise sufferers – Noise sufferers adjacent to a building or renovation site would be exposed to additional noise on Saturday mornings. In some cases that noise could continue for extended periods (weeks or even months).

Impact on noise makers – Businesses and individuals involved in home building and renovation would have additional hours of work available to them and greater choice of hours.

Impact on government – There would be little, if any, impact on government once the change is made, new guidance is issued to reflect that change, and local laws are updated.

National consistency – While changing the time construction activity can commence on a Saturday morning may appear to bring the Victorian regulation closer in line with other states, in practice this conclusion ignores legitimate reasons why the times when construction activity is allowed should vary between jurisdictions and differences in the approach to regulation in other jurisdictions.

5.3.1 Analysis

Impact on noise sufferers

Again it is difficult to quantify the impact on noise sufferers. However, if it is accepted that noise does have an impact on individuals, then there are some characteristics that make the impact of additional construction noise early on Saturday morning significant.

- The resulting noise is likely to be relatively wide-scale, affecting residential amenity across metropolitan and regional Victoria. About 1,760,000 million Victorians hear construction noise and 410 000 Victorians are moderately to extremely annoyed by the current level of noise.²⁶
- EPA Victoria's Social Survey noted that 14 per cent more people are disturbed by early morning noise from their neighbours on the weekend than are disturbed by such noise on a weekday (Strahan research 2007, p. 46). This result is supported by EPA Victoria's noise measurement survey, which found that both Saturday and Sunday mornings are quieter than weekday mornings, so that any additional noise would be more noticeable on the weekend than on weekdays. (EPA Victoria 2007b, p. 4)
- Construction noise often occurs in outdoor or open areas. It can involve heavy vehicles driving or parking next to neighbours' homes. Construction noise can, therefore, be closer to a neighbour's home, or less baffled by walls and windows than in the case of some other types of neighbourhood noise.
- There are some types of construction equipment such as nail guns, saws and heavy trucks that can create noise that is very disturbing to neighbours.
- Studies of the impact of noise on sleep indicate that one of the times when noise can have a significant impact on people's sleep is the early morning when it prematurely wakes the sleeper. The significance of this in the context of construction noise is demonstrated by the fact that people are most annoyed by construction at the start of the day, particularly during the week, where a 7 am start is currently permitted (Strahan 2007, p. 24) and that people are even more sensitive to noise on Saturday mornings than weekday mornings (Strahan 2007, p. 73). Therefore, the annoyance created by early Saturday morning construction work is potentially higher than that currently experienced during the week.
- Construction noise can be ongoing and, therefore, can have longer term effects on sleep patterns, compared with other more random events like mowing the lawn. According to the HIA, a typical project home takes 10 weeks to construct, and a custom built home takes 14 weeks. A significant number of home building and renovation projects are not built in a continuous period and the time span for construction extends well beyond these timelines.
- Construction noise can already start at 7 am five days a week. Extending Saturday to start at 7 am as well would halve the time people have respite from early morning noise.

Impact on noise makers

Information supplied to EPA Victoria by HIA provided useful data on the construction times for project and customised homes and the potential to reduce the time taken to construct these projects. The HIA argued that there would be significant gains to industry from allowing an earlier start time on Saturdays.

Estimation of the benefits to the construction industry of starting earlier on Saturday is not straight forward. The estimates vary considerably depending on assumptions about which businesses would change their work practices, which would start earlier and finish earlier (allowing workers to increase their leisure time on a Saturday afternoon) and which would work an additional 2 hours a week (reducing project delays). Data is also limited, so it is difficult to disaggregate and analyse different segments of the industry.

Overall, the impact on noise makers in the construction industry would vary between types of building businesses and projects.

²⁶ See Table 1, section 2.2.1 for further information on these estimates.

The 1997 Regulations allow work until 8 pm on Saturday, giving the option of an 11-hour work day. As building businesses would rarely take advantage of the full extent of hours currently allowed, the benefits of being allowed to start earlier can have two potential sources:

- For builders who have flexibility in when they start and finish it can improve their work-life balance by allowing them to finish earlier on a Saturday. This is likely to be the case for most small building businesses.
- For construction businesses with less flexibility, perhaps because they are on large building sites that have greater logistical constraints, the earlier starting time may provide an opportunity to increase the number of hours worked on Saturday.

For construction businesses with flexibility, some would benefit from having the option to work earlier and finish earlier on a Saturday. The size of this benefit depends on:

- the extent to which the value of leisure at different times of the day has not already been factored into people's wage rates and, therefore, whether builders are already compensated for foregoing that leisure
- the number of people that would take advantage of changing their leisure time
- the extent to which people value extending their Saturday afternoon by two hours compared with having an additional two hours in the morning, allowing them to sleep in for example.

EPA has been unable to identify any research that would help quantify these benefits and, therefore, the benefits of shifting leisure time have not been quantified in this RIS. It is noted, however, that the benefits of finishing earlier on a Saturday are likely to be offset considerably because not all employees would change their working hours, some may be required to change by their employer when they would prefer to retain the existing hours, and even for those who prefer the new hours there would still be an offsetting loss of two hours in the morning.

For those builders that have less flexibility and choose to work additional hours as a result of the regulatory change, the impact of the amendment would be to reduce construction delays and allow projects to be completed more quickly.

Again it is not possible to obtain a precise estimate of which areas of building activity would benefit from more flexibility. Whether a business is currently constrained is likely to depend on the size of the projects it undertakes and its employment and business practices. Business size may, however, be a rough proxy for constraints on business flexibility, with larger businesses having more constraints.

If it is assumed that businesses with employment somewhere between five and 20 (includes employees and working proprietors) are most likely to benefit from being able to work additional hours on Saturday, the benefits to the building industry of reduced project delays is estimated to be somewhere between \$26 million and \$49 million (see appendix 4 for details).

National consistency

In chapter 4, the discussion in section C.2.2 considered whether changes should be made to Victoria's noise Regulations, overall, to allow noise earlier on a Saturday morning and make Victoria's Regulations consistent with those in some other jurisdictions. In that section, it was concluded that there are legitimate reasons why the times when noisy items can be used should vary between jurisdictions. For simplicity, the regulated times are the same all year. But the time of sunrise varies considerably between summer and winter and across the country, in more southern capital cities later state times, particularly on weekends, are warranted because the sun rises later in winter. In addition, daylight savings affects the time of sunrise in summer. Western Australia and Queensland, who have earlier start times on Saturday mornings, do not have daylight savings and, in practice, people will tend to start their day earlier across all activities, not just construction.²⁷

In addition, in the case of construction, the differences in the approaches to regulation need to be recognised also.

Firstly, several of the states that allow an earlier start on Saturday limit or put conditions on Sunday work, so that overall Victoria's proposed Regulations are not necessarily more restrictive across the weekend. South Australia, for example, allows Sunday work but only when the builder thinks it is essential, the ACT does not allow Sunday work for projects longer than two weeks and Western Australia and Queensland do not allow construction work on Sundays.

Secondly, NSW's 7 am start time only covers construction activity that does not require a local or state government permit, other activity is managed through guidelines and permit conditions, which restrict Saturday work between 8am and 1pm. Larger residential construction projects, which would be covered by the Regulations in Victoria, are subject to guidelines in NSW.

²⁷ While Western Australia recently trialled daylight savings, its Regulations still reflect past practice.

There are also other differences, which mean that simply comparing start times can be misleading. For example, South Australian guidelines discourage the use of noisy machines before 9 am every day of the week, Tasmania restricts the use of certain types of machines prior to 9 am and Queensland allows local government to override the regulated times so that actual start times can vary.

Therefore, simply changing Victoria's Regulations to allow all construction work to start at 7 am on Saturday would not be a true reflection of the real approach to regulation in other jurisdictions. The differences in the regulatory approach across the country make it virtually impossible to develop a consistent approach. It is considered that the costs of changing a regime that is simple and well understood across the construction sector would impose costs with few benefits.

5.3.2 In conclusion

As noted above, the concept of reasonable noise depends on context. A noise can be unreasonable (and in breach of legislation) on a Saturday morning, when such noise is not unreasonable at the same time during the week because of community norms. The costs and benefits of this option can be summarised as follows.

Category of impact	Nature of impact	Score
Noise sufferers	This option would generate widespread additional noise. The impact on noise sufferers is likely to be significant because of the number of people affected, their sensitivity to noise in the morning (particularly on the weekend) and because construction noise continues for extended periods. People who hear construction noise would only need to be willing to pay \$3.50 a year to avoid that noise on Saturday mornings for that year, for the costs of this option to outweigh its benefits.	-10
Noise makers	This option would generate benefits for large projects from reduced construction delays. The benefits from this change are significant and estimated to be between \$26 million and \$49 million (see appendix 4). Small projects would also benefit from greater flexibility in start and finish times. But, as the option allows workers to shift their leisure time but does not result in an overall increase in leisure, these benefits are expected to be relatively small.	+9
Government	This option would involve some small costs to government developing new guidance.	Negligible cost
Total score		-1

The effect on noise sufferers early on a Saturday morning is particularly high, because the noise would occur at a time many are asleep and the effects would be cumulative for them, having experienced noise throughout the week. There are currently 1,760,000 million Victorians who hear construction noise.²⁸

As noted above, the upper bound of benefit to industry of moving the Saturday prohibited time on a Saturday to 7 am has been estimated at \$49 million in the first year. Averaging this benefit over the number of people who hear construction noise, indicates that a willingness to pay amount of \$3.50 per affected person per year would be all that is needed for the costs to noise sufferers to offset the benefits to industry (see appendix 4 for calculations).

Even if the calculations in this RIS have significantly underestimated the true benefits to the construction industry, for example if it is considered that the additional leisure time benefits to employees on smaller projects is large, it is still likely that the 1,760,000 million people who hear construction noise would need to be willing to pay less than \$10 a year to avoid construction noise on Saturday mornings, for the costs of this option to outweigh its benefits.

Given the above analysis, it is concluded that the costs of changing prohibited times to allow all construction activity to commence at 7 am on a Saturday morning are likely to outweigh the benefits, and this option for amending the proposed Regulations would impose a net cost compared to the base case of implementing option 1 without further amendment. The following two options, therefore, consider whether it is possible to achieve a significant proportion of the potential benefits to industry while imposing substantially less cost on noise sufferers.

²⁸ See Table 1, section 2.2.1 for further information on these estimates.

5.4 Construction option 2: Providing an exemption from the standard 9am start time for fringe residential subdivisions, allowing such projects to commence at 7am on Saturdays with appropriate buffering

Impact on noise sufferers – There would be some increase in noise level but less than that for a general exemption because of the obligations to restrict use of most noisy equipment and operate using noise buffers. This noise would not be considered automatically unreasonable under the current provisions in the Act.

Impact on noise makers – Industry associated with the infrastructure development in fringe residential subdivisions would achieve the benefits discussed above. Some additional project planning may be needed to work around the buffer requirements.

Impact on government – Additional guidance would be developed. Enforcement would involve similar processes to the 1997 Regulations.

5.4.1 Analysis

Impact on noise sufferers

While noise sufferers are likely to experience some additional noise, there are several reasons why the impact would be less than for a general change in the 1997 Regulations covering all construction activity.

- Subdivisions involve a number of blocks of land, often there is already a distance buffer between some of these blocks and the surrounding houses. In many cases there would be more residential blocks subject to construction, compared with occupied neighbouring blocks than for other forms of construction, such as building on individual house blocks.
- The impact of noise would be reduced further by the buffering and equipment limitation requirements and, therefore, even compared with subdivisions under the previous option, the potential impact on noise sufferers would be reduced.
- The amendments specify that within the Melbourne metropolitan area, the exemption would apply to growth areas (i.e. on the metropolitan fringe). Outside of the Melbourne metropolitan area, the exemption would be limited to sites not substantial bound by existing residential properties. Therefore, it would not affect more densely populated areas where noise could affect a greater number of existing residents.
- The amendments apply to the initial processes of subdividing and servicing land. This is a one off process lasting 16 to 20 weeks.

The equipment used in subdivision work can, however, be noisy and, as noted above, Saturday morning is a sensitive time for the community, such that the impact of this amendment on those affected would not be trivial.

Impact on noise makers

Subdivision infrastructure development is one area of the construction industry that is almost entirely large-scale complex projects that are likely to be able to reduce project delays if they could work additional hours on Saturday morning.

To estimate the benefit of allowing early work on Saturday EPA Victoria review data from a range of sources, and consulted the Department of Planning and Community Development and industry representative groups. Due to limits on the data available, the estimates calculated in Appendix 4 are based on indicative numbers provided by the Civil Contractors Federation. Using these indicative numbers it is estimated that the benefit to industry of reducing project delays by allowing subdivision work to start earlier on Saturdays would be about \$6 million.

It is anticipated that there would be some additional project planning needed to ensure work is organised in a way that complies with the noise buffer requirements between 7 am and 9 am Saturday morning. Given that this only involved two hours a week, however, it is anticipated that additional project planning would have a negligible impact.

There may also be an additional benefit for construction companies involved in fringe residential subdivisions, as aligning start times on Saturday between subdivisions and commercial projects may simplify the regulatory requirements.

Impact on government

In addition, it is likely that by clarifying expectations between large residential building sites and commercial projects, compliance would be improved and enforcement reduced.

5.4.2 In conclusion

The anticipated costs and benefits of this option are outlined below.

Category of impact	Nature of impact	Score
Noise sufferers	This option would result in additional noise on Saturday morning from subdivision sites. The additional noise would be at a sensitive time of day but its impact would be reduced by the requirement for noise buffers and limitations on use of noisiest equipment and the number of areas affected is also limited. The costs to noise sufferers are, therefore, considerably less than the costs identified in construction option 1.	-2
Noise makers	The construction industry would benefit from reduced construction delays. The benefits from this change are significant and estimated to be about \$6 million (see appendix 4 for calculations). There may be some minor additional costs in project planning but because the noise buffer requirements only affect 2 hours a week it is anticipated that additional project planning costs would be negligible. There would be additional benefits for these large-scale operators in aligning start times on Saturday between subdivisions and other commercial projects.	+3
Government	This option would involve some small costs to government developing new guidance.	Negligible cost
Total score		+1

Adopting this option would allow a sizeable part of the benefits to the construction industry from starting early on Saturday morning to be achieved in a way that would also reduce the impact on noise sufferers relative to a general change in hours.

This is a sector of the industry which has a large organised workforce and is involved in large-scale projects. Many of the processes used are similar to road building and other civil works.

Given the constraints on this sector of the industry, even though there is potential for some impact on noise sufferers, the benefits of this option would outweigh its costs and the noise generated is reasonable under the circumstances. It is therefore considered that introducing the amendment in construction option 2 would generate a net benefit in addition to the base case of remaking the 1997 Regulations with only minor amendments.

5.5 Construction option 3: Providing an exemption from the standard 9 am start time for residential developments of four storeys or more constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays

Impact on noise sufferers – There would be some increase in noise, but less than that for a general exemption.

Impact on noise makers – The benefits to builders of large residential projects being able to work longer on Saturdays would be realised. There would also be less confusion about inconsistencies in obligations for domestic and commercial projects of a similar size and in similar locations.

Impact on government – Guidance to communicate the change would be developed, but would be part of the cost of communicating the proposed Regulations. Some local laws may also need to be adapted but overall there would be limited additional enforcement costs. Enforcement costs may fall as one aspect of inconsistency between domestic and commercial projects would be removed.

5.5.1 Analysis

Impact on noise sufferers

Not all residential construction takes place in residential zones. There is a substantial number of areas in Victoria that are designated special purpose, business or other uses which permit residential development but encourage other uses such as retail and commerce. People still live in and adjacent to these areas, but there are several reasons why the impact of commencing residential construction noise at 7 am on a Saturday is likely to have less impact on noise sufferers in such areas.

First, because land use in these areas is spread over a range of activities, fewer people live in these non-residential zones and they are more likely to be further away from the noise source, so the impact of the noise is less.

Second, in these types of areas there is a greater expectation that noise will occur outside standard hours. Commercial construction, which is already allowed to commence at 7 am on Saturday, may be occurring already and there is often noise associated with commercial activities in these areas. This creates a different set of reasonable

expectations and a history of more noise. Because of these expectations, people who choose to live in such zones are likely to be more noise tolerant, or to have already taken action, such as sound proofing their homes, to reduce the impact of noise. In summary, the accepted test of 'reasonable' is different in these zones than in a normal residential area.

The community expectation that people buying into an area (including residential areas interfacing with industrial or commercial land) should recognise its characteristics and, therefore, the amenity it offers is well recognised in Victoria. VCAT decisions, for example, have noted that, people should expect different levels of amenity in different locations.

*'I appreciate that there would be a situation of "buyer beware". If the units were built buyers or prospective tenants would be fully aware of the physical juxtaposition with the industrial land and they should be able to have some appreciation of the likely amenity impacts...I acknowledge that no one would be forced to live in the units and there would no doubt be market acceptance at a certain price.'*²⁹

It is noted that in the above decision the residential premises would have been protected from commerce and industrial noise through the EPA *State environment protection policy (Control of Noise from Commerce Industry and Trade) No. N-1*, which calculates noise levels for industry relative to the land zoning. The land use determined outcomes under the SEPP is consistent with the proposed approach, and is also consistent with nuisance law.

It is also recognised, however, that this principle has bounds and that some restrictions are warranted.³⁰

In addition, EPA Victoria anticipates using the amendment in the proposed Regulations as a trigger for developing guidelines on how large residential construction sites can manage their noise and the impact that noise has on neighbours. The 1997 Regulations are limited to regulating working hours (when noise is audible to other residences), which does not address performance or encourage good practice in noise management. To the extent that these guidelines are picked up by industry, they would reduce the impact of noise on noise sufferers at all times of day, not just early on Saturday morning.

Impact on noise makers

This exemption, by definition, is designed to cover only large-scale projects (residential construction projects with four or more storeys above ground or two or more storeys below ground). It is also restricted to projects located in non-residential zones. In defining the scope of the exemption, EPA Victoria considered whether the definition of large-scale residential construction and the location of those projects would target a significant number of large complex projects, which would benefit from the increased flexibility offered by the exemption.

In consultation with local government and industry groups feedback indicated:

- both local government and industry considered that a definition of projects that are four or more storeys above ground was a good way to characterise large residential construction projects, and that two or more storeys below ground would be an appropriate alternate indicator of scale in some cases
- local government also indicated that while such large projects may be a small proportion of total residential construction, across all areas, a large proportion of these projects (between 30 and 100 per cent) are located in non-residential zones.³¹

Therefore, it appears that the definitions in the proposed Regulations are likely to capture a substantial proportion of the benefits of providing greater flexibility to large-scale residential development.

In estimating these benefits EPA Victoria obtained data on the value of building permits for residential construction projects above four storeys. Data was not available, however, on the proportion of these projects located in non-residential zones. As noted above, EPA Victoria sent a brief questionnaire to metropolitan local governments to obtain additional information on the location of large residential construction projects. Because of the limited number of responses, the data from that questionnaire should be treated with caution, but it did indicate that for those Councils that responded, between 30 per cent and 100 per cent of large residential construction is in non-residential zones. EPA Victoria has based its estimates of the benefits of this option on an average of 50 per cent of large-residential construction projects being located in non-residential zones.

Based on these assumptions it is estimated that the benefits to the construction industry of implementing this option would be about \$4 million (see appendix 4 for more detail).

29 JPB Nominees Pty Ltd v Hobsons Bay CC & Ors [2002] VCAT 1322 (30 October 2002), para 73

30 See for example, Lazzcorp Brunswick Pty Ltd v Stonnington CC & Ors [2001] VCAT 1634 (30 July 2001), para 49

31 EPA Victoria sent a brief questionnaire to local governments asking their views on the proportion of large residential developments constructed in non-residential zones. As only a limited number of responses were received the estimates provided should be treated as indicative only.

In addition, the building companies that are involved in large residential construction projects are often also involved in commercial building. The proposed amendment would make the regulation of these large residential projects more consistent with large commercial projects. There would, however, be some increase in inconsistency between large-scale residential construction in different zones.

Impact on government

If large-scale residential development is exempted from the proposed Regulations it may then be subject to local government bylaws. As noted above, it is also intended that changes in the regulation would also be accompanied by improved guidance. Producing such guidance would have a one-off cost to EPA Victoria but it would have long-term benefits in improving overall industry practice, reducing noise levels and making it easier for local government to manage noise in their communities.

5.5.2 In conclusion

Again, when assessing what is reasonable noise and, therefore, striking a balance between the costs and benefits of noise, it is important to consider the circumstances surrounding noise emission. The relevant costs and benefits for the construction of buildings four storeys and above in non-residential zones are listed below.

Category of impact	Nature of impact	Score
Noise sufferers	This option would result in additional noise and greater costs from the impact of that noise. The additional noise would be at a sensitive time of day but its impact would be reduced by the characteristics of non-residential zones and the reasonable expectations of people living close to such areas. The costs to noise sufferers are, therefore, considerably less than the costs identified in construction option 1, and slightly less than construction option 2 (primarily due to expectations in different zones).	-1
Noise makers	The construction industry would benefit from reduced construction delays. The benefits from this change are significant and estimated to be about \$4 million (see appendix 4 for calculations). There would be additional benefits for these large-scale operators in aligning start times on Saturday between large residential and other commercial projects.	+2
Government	This option would involve some small costs to those local governments that decide to implement or modify local laws; for example, a local law for commercial construction that currently excludes all residential sites. There would also be a one-off cost for EPA Victoria consulting on and preparing guidelines to communicate the changes. Given the scope of these guidelines is limited that cost is likely to be small.	Negligible cost
Total score		+1

While it was previously concluded that allowing all construction to commence earlier on a Saturday would have costs that outweigh its benefits, this option is much narrower in scope. By applying the exemption only to large residential developments in non-residential areas, the average cost on noise sufferers would be limited by the expectations of residents in these areas and any strategies they have already implemented to reduce the impact of other types of noise. But the option still provides greater flexibility to a section of the construction industry that is likely to benefit most from that flexibility.

Overall, while the costs and benefits of this option are difficult to quantify, it is concluded that its costs would be substantially less than its benefits from the exemption and given the circumstances of this sector of the industry, it is considered that the noise emitted from large-scale residential construction sites in non-residential zones on Saturday mornings would not be automatically unreasonable under the circumstances. It is, therefore, considered that introducing the amendment in construction option 3 would generate a net benefit in addition to the base case of remaking the 1997 Regulations with only minor amendments.

5.6 Summary of costs and benefits of options

The following table summarises the ratings for the different options examined above. The right-hand column, shaded blue, shows the preferred option. The preferred option's ratings are the sum of the ratings for the three adopted options in the grey-shaded columns.

Category of impact	Remaking the 1997 Regulations	Construction option 1: 7 am Saturday start for all construction	Construction option 2: 7 am Saturday start for subdivisions	Construction option 3: 7 am Saturday start for large-scale residential in non-res zone	Preferred option
Noise sufferers	+10	-10	-2	-1	+7
Noise makers	-6	+9	+3	+2	-1
Government	+4	-	-	-	+4
Community	+2	-	-	-	+2
Total score	+10	-1	+1	+1	+12

5.7 Impact on small business

The proposed Regulations impact primarily on individuals and not business, though there will be some effects on small businesses involved in domestic construction and renovations. It is difficult to get a precise estimate of the number of small businesses involved in domestic and residential construction. The only available ABS data is for 1996-97 and cover all private sector construction, not just the construction of residences. This data indicate that 94 per cent of businesses employ less than five people (including working proprietors) and these businesses account for 48 per cent of industry turnover (ABS 1999, p. 16).

The impacts on small business have been taken into account in the preceding analysis by recognising that:

- the administration costs associated with processes, such as obtaining permits, are likely to have a larger impact on small business than large business and options that involved such costs were rejected in chapter 4
- there are differences in the way regulations affect small and large businesses and these differences have been taken into account in analysing the costs and benefits of the construction options
- uncertainty and inconsistency between local government areas can have a greater impact on small businesses that operate in locations in several local government zones, again this was considered when options that would increase such uncertainty were rejected in chapter 4.

6. ASSESSMENT OF COMPETITION IMPACTS

The preferred option that emerged from the analysis in this RIS involves remaking the 1997 Regulations with the explicit mention of certain water pumps, but amending those Regulations to provide an exemption from the standard 9 am start time for.

1. fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering
2. residential developments four storeys or above constructed in non residential zones, allowing such projects to commence at 7 am on Saturdays.

The proposed Regulations apply primarily to individuals and not business and therefore the bulk of the regulation does not have a competition impact.

In the case of construction activity, the proposed Regulations clarify what is unreasonable noise, rather than setting the requirement that a building sites cannot generate unreasonable noise. The substantive legislative controls are in the EP Act, not the Regulations. In addition, while some parts of the regulation affect construction activity, the regulation imposes obligations on particular projects, rather than types of business. It does not discriminate between types of business and, therefore, does not have a significant impact on the competitive environment. The proposed Regulations also do not involve significant start-up costs or compliance burdens that are likely to generate barriers to entry to new business.

Finally, the proposed regulation is based on the level of noise and not construction methods and, therefore, is unlikely to inhibit innovation as businesses can freely change their production techniques or processes to improve their capacity to operate without breaching noise regulations.

Therefore it is considered that, overall, the proposed residential noise Regulations do not have a significant impact on competition. In fact, by making the benchmarks for regulatory compliance more transparent, through clearly defined objective Regulations, they could even improve competition by making it easier for small business and new entrants to understand and comply with their obligations.

7. THE PREFERRED OPTION

Key points

The preferred option that emerged from the analysis in this RIS involves a continuation of the current items and times, with inclusion of water pumps, but introducing exemptions for certain construction activities:

1. from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering
2. for residential developments four storeys or above constructed in non-residential zones, permitting such projects to commence at 7 am on Saturdays.

This approach provides a mechanism for clarifying the circumstances when using certain items would generate unreasonable noise while recognising the impact noise has on neighbours and the impact restrictions have on those who make noise.

In assessing and selecting its preferred option EPA Victoria sought an approach that clarifies circumstances when using certain items would generate unreasonable noise, taking into account the impact on neighbours who hear that noise and the impact restrictions have on those who make noise. Both issues are relevant to assessing the costs and benefits in the proposed Regulations and determining what is unreasonable, the benchmark set in the EP Act.

The preferred option involves remaking the 1997 Regulations, with the inclusion of water pumps, but amending those Regulations to provide two exemptions:

- a partial exemption for fringe residential subdivisions that would allow construction between 7 am and 9 am on a Saturday morning if the conditions providing for distance buffers between noise and adjoining premises are met
- an exemption for residential construction projects four storeys and above built in non-residential zones.

The proposed Regulations prescribe items in five categories, which can be broadly summarised as follows:

1. motor vehicles (but not when entering or exiting the premises), lawn cutting devices and appliances with an internal combustion engine
2. electric power tools, chain saws, compressors and impacting and grinding equipment
3. domestic air conditioners, swimming pool pumps, water pumps, heating equipment and domestic vacuum cleaners
4. musical equipment, amplified sound, stereos, radio and televisions
5. any other electrical equipment.

The commencement time for all items is 7 am from Monday to Friday and 9 am on a weekend. Most items should not be heard after 8 pm any night, except domestic air conditioners, swimming pool pumps and vacuum cleaners – which can continue until 10 pm – and music, radios and television sets – which can also be heard at 10 pm during the week and 11 pm on Friday and Saturday nights.

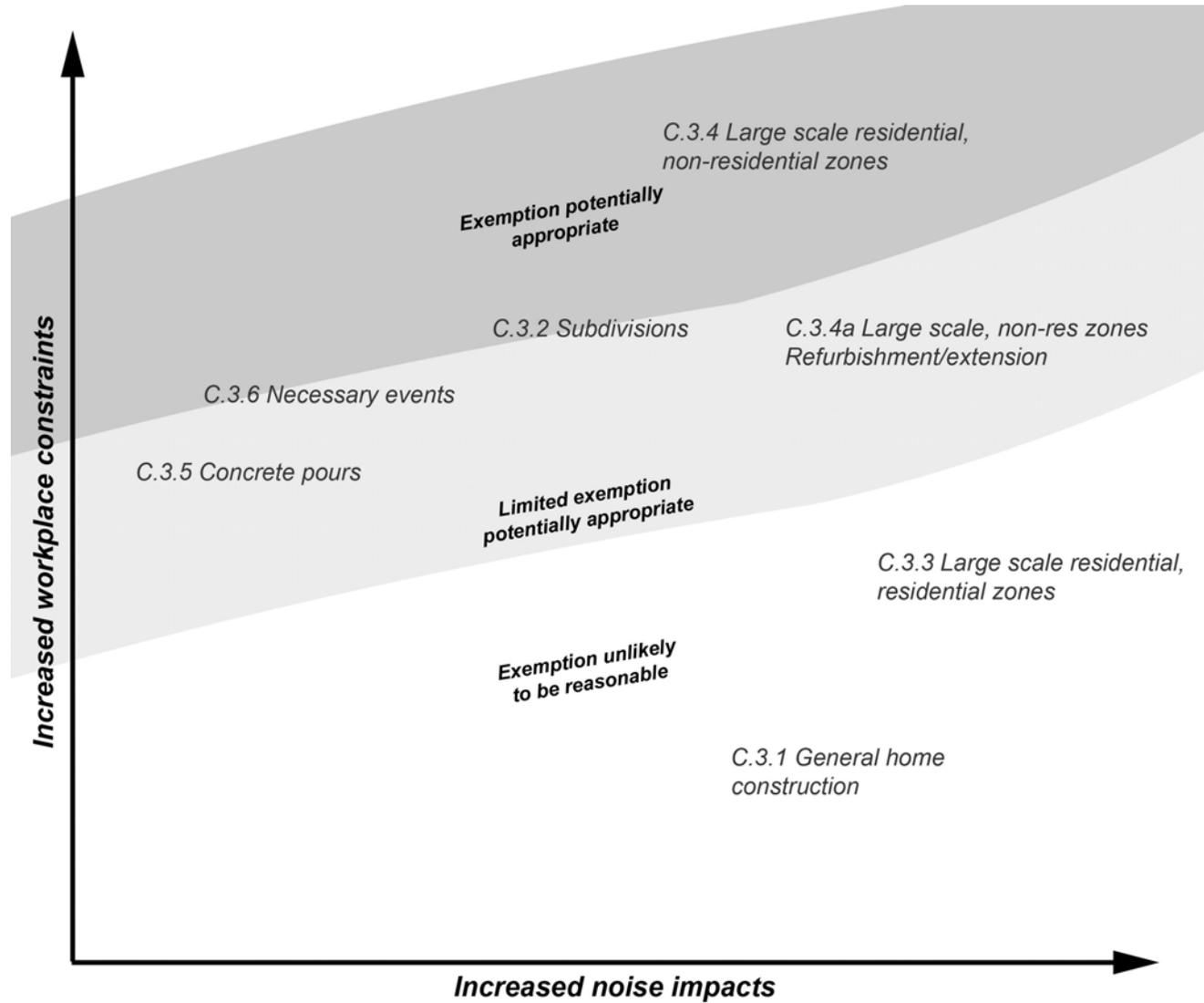
In addition, the cost benefit analysis in chapter 5 considered whether changes to the Regulations are needed to explicitly recognise the needs of the construction industry.

In consultation with EPA Victoria, industry argued that there would be considerable benefits from allowing building sites to commence work earlier on a Saturday morning (7 am instead of 9 am). This would particularly benefit large construction sites, because the increased flexibility offered by an early start time would allow them to complete projects more quickly.

Overall, the assessment of the construction industry options considered the trade-offs between the benefits to industry of increased flexibility and the costs to neighbours of increased noise. These costs and benefits vary between sectors of the construction industry. This variation is illustrated in the graph below. In analysing the options EPA Victoria also considered whether each option was practical to implement and enforce and the level of compliance costs it would impose on industry. Therefore, some options that are ranked as potentially beneficial on this graph below (for example, exemptions for special events) are not preferred because they proved impractical or had high compliance costs.

The costs and benefits of the preferred option can be summarised as follows:

Category of impact	Remaking the 1997 Regulations	Subdivisions 7 am Sat start	Large-scale residential in non-res zones 7 am Sat start	Total
Noise sufferers	+10	-2	-1	+7
Noise makers	-6	+3	+2	-1
Government	+4	-	-	+4
Community	+2	-		+2
Total score	+10	+1	+1	+12





In the graph and analysis, factors influencing reasonable noise have been balanced against factors constraining industry, to determine where an exemption may be potentially appropriate. These factors are:

<p>Factors influencing unreasonable noise</p> <ul style="list-style-type: none"> Likely proximity to existing residences Time of works (e.g., morning/weekend) Reasonable amenity expectations for the area (zone) Duration of impact Degree of communication Degree of management Intensity of noise Recognition of workplace constraints 	<p>Factors constraining industry</p> <ul style="list-style-type: none"> Size of workforce Coordination of concurrent project aspects Public safety/infrastructure impacts Logistical limitations of scale/timing Holding costs Critical path requirements
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Each type of activity under consideration had a number of factors influencing unreasonable noise and the constraints on industry:

Exemption potentially appropriate	Limited exemption potentially appropriate	Exemption unlikely to be reasonable
<p>C.3.4 Large-scale residential, non-residential zones</p> <ul style="list-style-type: none"> Large workforce Medium-long duration Significant project constraints Reduced likelihood of impact Different land use amenity Comparable to commercial works in same area, which have greater flex <p>C.3.6 Necessary events</p> <ul style="list-style-type: none"> Very short duration Project/safety/public impact necessity 	<p>C.3.2 Subdivisions</p> <ul style="list-style-type: none"> Large workforce Short duration (16–20 weeks) A distance offset from houses Existing res or new developed areas Higher noise equipment Comparable to commercial/indus subdivisions, which have greater flex <p>C.3.4a Large-scale, non-residential zones refurbishment/extension</p> <ul style="list-style-type: none"> Large workforce Medium-long duration Different land use amenity If adjoins residences - very high intensity noise (structurally transmitted) <p>C.3.5 Concrete pours</p> <ul style="list-style-type: none"> Very short duration Necessity during heat 	<p>C.3.1 General home construction</p> <ul style="list-style-type: none"> Proximity to homes Residential areas – amenity Smaller workforce Short duration (18–20 weeks) Less complex <p>C.3.3 Large-scale residential, residential zones</p> <ul style="list-style-type: none"> Much in residential zones Abutting residences Medium - long duration Large workforce

The graph and tables show that, while the times are generally appropriate, there are cases where the constraints on the construction industry from inflexible times are disproportionate to the impact that the activity causes and that exemptions are appropriate in some cases.

Taking as an example large-scale residential construction in non-residential zones, while the potential noise levels generated could be high, these zones have a more active land use mix than purely residential areas and there is a lesser likelihood of there being nearby residents. Comparing these types of factors with the difficulties of managing large construction workforces and complex project logistics meant that an exemption was potentially appropriate and the option was progressed for further analysis.

As another example, large-scale residential construction in residential zones again has inherent project management difficulties, but residential zones carry much greater amenity expectations and a greater likelihood of nearby residents, so the impacts on residents make an exemption in this case inappropriate.

The three construction options that were considered in detail were:

Construction option 1: Providing an exemption from the standard 9 am start time for all construction, allowing such projects to commence at 7 am on Saturdays.

Construction option 2: Providing an exemption from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering.

Construction option 3: Providing an exemption for residential developments four storeys or above constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays.

A summary of the costs and benefits of these options is provided below.

Category of impact	Nature of impact	Score
Construction option 1: Providing an exemption from the standard 9 am start time for all construction, allowing such projects to commence at 7 am on Saturdays.		
Noise sufferers	This option would generate widespread additional noise. The impact on noise sufferers is likely to be significant because of the number of people affected, their sensitivity to noise in the morning (particularly on the weekend) and because construction noise continues for extended periods. People who hear construction noise would only need to be willing to pay \$3.50 a year to avoid that noise on Saturday mornings for that year, for the costs of this option to outweigh its benefits.	-10
Noise makers	This option would generate benefits for large projects from reduced construction delays. The benefits from this change are significant and estimated to be between \$26 million and \$49 million (see appendix 4). Small projects would also benefit from greater flexibility in start and finish times. But, as the option allows workers to shift their leisure time but does not result in an overall increase in leisure, these benefits are expected to be relatively small.	+9
Government	This option would involve some small costs to government developing new guidance.	Negligible cost
Total score construction option 1		-1

ENVIRONMENT PROTECTION (RESIDENTIAL NOISE) REGULATIONS 2008 — REGULATORY IMPACT STATEMENT

Category of impact	Nature of impact	Score
Construction option 2: Providing an exemption from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering		
Noise sufferers	This option would result in additional noise on Saturday morning from subdivision sites. The additional noise would be at a sensitive time of day but its impact would be reduced by the requirement for noise buffers and limitations on use of noisiest equipment, and the number of areas affected is also limited. The costs to noise sufferers are, therefore, considerably less than the costs identified in construction option 1.	-2
Noise makers	The construction industry would benefit from reduced construction delays. The benefits from this change are significant and estimated to be about \$6 million (see appendix 4 for calculations). There may be some minor additional costs in project planning but, because the noise buffer requirements only affect two hours a week, it is anticipated that additional project planning costs would be negligible. There would be additional benefits for these large-scale operators in aligning start times on Saturday between subdivisions and other commercial projects.	+3
Government	This option would involve some small costs to government developing new guidance.	Negligible cost
Total score construction option 2		+1

Construction option 3: Providing an exemption from the standard 9 am start time for residential developments four storeys or above constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays		
Noise sufferers	This option would result in additional noise and greater costs from the impact of that noise. The additional noise would be at a sensitive time of day but its impact would be reduced by the characteristics of non-residential zones and the reasonable expectations of people living close to such areas. The costs to noise sufferers are, therefore, considerably less than the costs identified in construction option 1, and slightly less than construction option 2 (primarily due to expectations in different zones).	-1
Noise makers	The construction industry would benefit from reduced construction delays. The benefits from this change are significant and estimated to be about \$4 million (see appendix 4 for calculations). There would be additional benefits for these large-scale operators in aligning start times on Saturday between large residential and other commercial projects.	+2
Government	This option would involve some small costs to those local governments that decide to implement or modify local laws; for example, a local law for commercial construction, which currently excludes all residential sites. There would also be a one-off cost for EPA Victoria consulting on and preparing guidelines to communicate the changes. Given the scope of these guidelines is limited, that cost is likely to be small.	Negligible cost
Total score construction option 3		+1

The analysis of these options concluded that while a general exemption would have benefits to industry it would also have a considerable impact on those living close to construction projects. After estimating the benefits to industry, EPA Victoria calculated what people's willingness to pay to avoid construction noise on a Saturday morning would need to be to offset those benefits. The result was about \$3.50 per year. EPA Victoria considers that this is low enough to conclude that the costs of this option would outweigh its benefits.

Further analysis revealed, however, that it is possible to obtain the benefits of flexibility in those sectors of the construction industry that value it most, with a considerably reduced impact on those who hear construction noise. This could be achieved by targeting exemptions from the proposed Regulation to large-scale projects in locations where fewer people hear the noise and/or when the construction firms involved adopt practices, such as buffering, which reduce the impact of noise.

As a result, the RIS identified the two substantive amendments that would generate net benefits and are, therefore, incorporated into the proposed Regulations that are outlined in the preferred option above.

The first amendment recognises that infrastructure development in fringe residential subdivisions is one area of the construction industry that involves almost entirely large-scale complex projects that would benefit from the flexibility of being able to work additional hours on Saturday morning.

The impact on neighbours of this amendment is reduced by restricting the exemption to fringe subdivisions that are, by nature, located in less densely populated areas. The impact is further decreased because, this activity is usually limited duration (between 16 and 20 weeks) and the amendments provide for additional protection through noise buffers:

- The construction activity must be 200 metres from the boundary of the nearest residence before there are no restrictions on the types of equipment that can be used.
- If the construction activity is between 35 metres and 200 meters from the boundary of the nearest residential residence there are restriction on the equipment that can be used and work cannot involve earth moving machinery that uses noisy impacting, vibrating or rotating implements.

The second amendment recognises that construction of large-scale residential projects located in non-residential areas also have the potential to benefit significantly for greater flexibility to commence at 7 am on Saturday morning.

The impact on neighbours of this option is reduced because land use in these areas is spread over a range of activities so fewer people are likely to live close to the construction activity and in these types of areas there is a greater expectation that noise will occur outside standard hours. Because of these expectations, people who choose to live in such zones are likely to be more noise tolerant, or to have already taken action to try to reduce the impact of noise. In summary, the accepted test of 'reasonable' is different in these zones than in a normal residential area.

Overall EPA Victoria considers that the proposed Regulations provide the clarity needed for policy relating to residential noise, to encourage compliance and be enforceable, while recognising issues specific to certain industry sectors and providing the flexibility necessary to deal with those issues.

7A. CHANGE IN ADMINISTRATIVE BURDEN

The preferred option has three elements:

- remaking the 1997 Regulations with some minor amendments
- amending the 1997 Regulations to provide an exemption from the standard 9 am start time for fringe residential subdivisions, allowing such projects to commence at 7 am on Saturdays with appropriate buffering
- amending the 1997 Regulations to provide an exemption from the standard 9 am start time for residential developments four storeys or above constructed in non-residential zones, allowing such projects to commence at 7 am on Saturdays .

None of these elements require business to engage with government in a way that would generate an administrative burden. There are compliance burdens associated with the proposed Regulations but these were considered in chapter 5 in the analysis of the costs and benefits of the policy options.

8. IMPLEMENTATION AND ENFORCEMENT ISSUES

Given that the preferred option is similar to the 1997 Regulations, the implementation and enforcement processes would also be similar, and would continue to be implemented and enforced through local council officers and the police.

The EP Act provides that a member of the police force or a council officer can direct a person to take action to abate the noise and prevent it from reoccurring. Directions remain in force for 12 hours. It is an offence to contravene a direction and a penalty infringement notice can be issued for such a breach. Court action against unreasonable residential noise can also be taken by a person directly affected by the noise, a member of the police force or a council officer.

For residential subdivisions, the option clearly limits the types of equipment used and the locations in which works can commence before 9am. Industry had shown interest and capacity to adapt to such changes with little implementation cost, other than distribution of the revised Regulations to industry members. Enforcement would be similarly clear.

For large residential in non-residential zones, the general provisions of Section 48A(3) would still apply, so that local government and police would still be able to determine unreasonable noise. EPA guidance for commercial scale construction provides clear benchmarks for acceptable work times that assist in this regard.

Local laws can also be made to set work times. Although in some cases this would carry a once off initial implementation cost, it would not carry any additional ongoing implementation or enforcement costs beyond those currently experienced by local governments who address construction noise issues. Many councils already have local laws that reflect EPA guidance for commercial construction.

In addition to the implementation and enforcement responsibilities outlined above, compliance with the proposed Regulations would also be encouraged, and enforcement facilitated, through EPA guidance. Such guidance clarifies the obligations and responsibilities of residents and the role of police and local government and others involved in handling complaints. Current EPA guidance for residential noise includes the community information booklet *Annoyed by noise?* and a section of EPA's Noise Control Guidelines (TG302/92) concerning noise during non-prohibited times from fixed domestic plant (e.g., domestic air conditioners).

Implementation of the option preferred in this RIS would be further facilitated by additional guidance, as EPA Victoria is improving current guidance on residential noise to enhance community understanding of the impacts of noise, and to improve the way local authorities respond to enquiries and investigate noise. Information on measurement of fixed domestic plant noise will also be reviewed. In all areas where new guidance is being developed or amended, local government, police and community research on residential noise problems would inform these amendments.

Finally, existing guidance for commercial construction site noise will be also revised to reflect the changes in the proposed Regulations.

9. EVALUATION STRATEGY

EPA will measure the performance of the proposed Regulations as part of the broader objective of ensuring the integrity of Victoria's environmental framework.

Key metrics to evaluate performance of the proposed Regulations would include:

- number of noise complaints logged with police
- take-up/downloading of EPA guidance on noise
- community calls to EPA helpdesk about residential noise.

These would not specifically relate to the effectiveness of the proposed Regulations themselves, but to the extent of residential noise issues across the state and the level of public awareness about avenues for information and complaint.

Periodic review of this data will indicate if there is a need for specific consultation such as community or enforcement agency surveys.

EPA will also continue dialogue with the construction industry on the effectiveness of the proposed Regulations and the residential noise framework.

If further consultation around residential noise reveals issues that can only be solved through regulation, there is always the potential to amend the proposed Regulations within their 10-year lifespan.

Detail on evaluation metrics

Number of noise complaints logged with police

As indicated in Box 3: Complaint Data (section 2.2.1), the majority of residential noise issues are not reported to authorities, and data on residential noise complaints to police and councils is limited by record keeping systems.

Records of environmental noise complaints logged with police could, however, indicate trends in the overall quantity of complaints across metropolitan Melbourne.

Community calls to EPA helpdesk about residential noise

EPA receives reports about a range of environmental issues. Many of these reports are recorded and actioned by EPA staff. Others outside of EPA jurisdiction are not logged in detail on EPA's database but a tally is kept of the number of calls per week/month.

Of the calls received and not logged into EPA's database, the majority (estimated at 90 to 95 per cent) concern residential noise. For these calls, EPA officers provide information and direct the matter to local government and police if assistance is required.

Periodic review of this data may indicate changes in the overall magnitude of residential noise issues.

Take-up/downloading of EPA guidance on noise

EPA's *Annoyed by noise?* brochure has 20,000 copies circulated annually and is EPA most popular publication. The noise section of the EPA website is also frequently referenced by the public.

Trends in the uptake of these resources may indicate changes in the overall magnitude of residential noise issues.

10. CONSULTATION

There has already been extensive consultation on the proposed Regulations. These consultations have helped analysis of the nature of the problems caused by residential noise and the costs and benefits of the 1997 Regulations.

Research

- Late 2006: Noise Social Survey of Victorian residents.
- Early to mid 2007: Consultation with building industry representatives.
- June 2007: Online survey to local governments.
- August 2007: Noise workshops with local government.
- August 2007: Online survey to Victoria Police.
- October 2007: Gathering of noise stories from Victorian residents.

Refining policy options

- October 2007 – March 2008: Discussions with construction industry on policy issues.
- November 2007: Working group with local government and police on policy and guidance issues.
- February 2008: Survey to local government and construction industry on policy issues.

Residents

Social Survey

EPA Victoria conducted a community response to environmental noise study (Social Survey) in late 2006 to better understand the impact of noise on the community and assist with future noise management programs.

Road traffic noise and neighbour noise are the most significant noise sources in Victoria. Road traffic noise is heard by 70 per cent of respondents, and annoys or bothers 20 per cent of respondents moderately to extremely.

Neighbour noise is the second most significant source of noise, is heard by 57 per cent of respondents, annoying 15 per cent of them moderately to extremely, with greatest effect at the start of the week-day and at night on weekends.

Comparison to the 1986 National Noise Survey shows a growth in TV, music or radio noise impacts across the state. It is now the most commonly nominated annoying neighbour noise (11 per cent), compared to six per cent in 1986.

Compared with 1986, TV and music noise has overtaken barking dogs as the most prevalent residential noise source.

In terms of impact, construction noise rates equal third with alarm noise, is heard by over a third of respondents (34 per cent) and eight per cent rate annoyance as moderate to extreme. Respondents are annoyed primarily at the start of the day during the week. Noise associated with neighbours building or renovating their homes is identified as the main construction noise that respondents find annoying.

Comparison to the 1986 study shows that construction noise has significantly increased in the past 30 years, with 34 per cent of people hearing it now compared with just five per cent in 1986; and seven per cent significantly annoyed, up from two per cent in the previous study.

Noise stories

To build on the findings of the social survey and to better understand the nature of residential noise issues, a series of story gathering sessions were held in late October 2008 in Melbourne.

The sessions were in Traralgon, St Albans, Cranbourne, Collingwood and Melbourne CBD. In these sessions Victorian residents were invited to share their stories about how residential noise has affected them and how they have dealt with that noise. The sessions focused on noises from stereos, televisions, parties, air conditioners, renovation and residential building activity. EPA Victoria also conducted phone interviews and received written stories from people across Melbourne.

The stories were recorded and after personal details were removed they were discussed with a local government working group and used to identify themes and problems and develop guidance for local government and the community.

The stories provided insight into issues of legislation and enforcement of residential noise.

Local government

In June 2007, the Municipal Association of Victoria distributed the on-line survey on residential noise by email to Victorian local governments. 105 local government officers from 42 councils responded to the survey.

During the last week of August 2007 EPA Victoria hosted workshops in Ballarat and Moonee Ponds, to seek local government views on residential noise. There were a total of 63 attendees between the workshops.

The survey and workshops focused on the Regulations and related guidance needs. Views on the EP Act were also collected.

The survey and workshops identified that the following are the most problematic and common noise sources:

- barking dogs: very common and very difficult to resolve
- air conditioners etc: very common and difficult to resolve
- construction: common and challenging to resolve
- musical instruments: common and challenging to resolve
- vehicles: fairly common, fairly difficult to resolve
- people noise: infrequent but difficult to resolve.

During November 2007, EPA Victoria held two working group sessions with local government and police representatives, during which options for the Regulations and related guidance were discussed.

Police

For two weeks in August 2007, EPA Victoria ran an online survey for Victoria Police members. A total of 402 responses were received. The survey asked questions about noise types, process, legislation and supporting guidance.

The survey identified the following are the most common noise sources for police:

- parties: very common
- people noise (voices, shouting etc): common
- televisions, stereos etc: common
- vehicles (predominately hooning and trail bikes): infrequent to common
- burglar alarms: infrequent to common
- musical instrument practise: infrequent to common
- construction: infrequent to common

Construction industry

During early to mid-2007, EPA Victoria met with representatives of the Civil Contractors Federation (CCF), Multiplex, Master Builders Association (MBA) and Housing Industry Association Victoria (HIA).

As Australia's peak residential building industry association, HIA represents over 47,000 members nationally, with 13,000 members in Victoria. In total HIA members construct over 85 per cent of the nation's new housing stock. Approximately 80 per cent of HIA members are small-medium businesses.

The current regulatory framework and possible alternate approaches were discussed.

EPA Victoria also invited these parties and representatives from Delfin and Australand to attend a working group with local government. Due to insufficient response, no workshop has been held but EPA Victoria liaised with parties individually as options were developed.

EPA Victoria has also contacted the Concrete Cement Aggregate Association, Urban Development Institute of Australia and the Property Council of Australia to advise of the review and to seek input on the policy approach.

In February 2008, EPA Victoria sent a survey to 22 inner Melbourne councils and construction industry contacts. The survey asked about local government regulatory frameworks around construction, definitions relating to construction regulatory options under consideration and the types and location of residential development within local government municipalities. Six responses were received from local governments and two from the construction industry. This consultation helped guide policy progression and analysis.

RIS consultation

Consultation on the RIS and proposed Regulations will be achieved through the following:

- In accordance with Section 11 of the Subordinate Legislation Act 1994, a notice of the RIS will be published in the Government Gazette and daily newspapers circulating throughout Victoria. Public comments or submissions will be invited within such time as specified in the notice. The notice in newspapers will target Victorian residents and will outline:
 - o the consultation program
 - o the key policy topics considered in remaking the 1997 Regulations
 - o the areas of change compared to the 1997 Regulations
 - o where to seek further information and how to comment.
- In addition, a summary document will be prepared for local government and the construction industry. This will be sent directly to Council and construction industry Chief Executives, and will describe:
 - o The consultation program
 - o Issues raised and the policy response to these issues
 - o Where to seek further information and how to comment;
 - o Questions on the details of the preferred option
 - o Contact details for enquiries and further information.
- Direct consultation will be held with Victoria Police and the Municipal Association of Victoria.

The proposed time for comments or submissions is 28 days. This is considered to be sufficient time for comment given the broad and detailed consultation conducted as part of the assessment for the proposed Regulations and the preparation of the RIS.

Given the extensive consultation to date, a public forum is not considered necessary, although a group meeting with councils and/or construction industry will be organised if there is an identified need.

APPENDIX 1: SOCIAL SURVEY METHODOLOGY

In October 2006, Strahan Research conducted a Victorian survey of environmental noise on behalf of EPA Victoria. The objectives of this research were to establish Victorian community experience of, and attitudes to noise in living environments, including:

- identifying the most significant noise sources for the Victorian community
- identifying the proportion of population affected
- estimating the magnitude of the impact of noise sources on the community
- establishing whose lives are disturbed by environmental noise
- identifying the implications of noise in the community for home life, the timing of noise, residents' reporting of noise, actions taken to reduce noise and the effectiveness of these actions.

A1.1 Sample size

A random telephone survey of 1213 residents in metropolitan Melbourne and regional Victoria was used. The random sample was stratified so that the distribution in the sample reflected the population distribution between Melbourne and regional Victoria. The sample size allowed 95 per cent confidence that the survey results are within 3 per cent of the actual values for the Victorian population.

A1.2 Questionnaire design

The questionnaire design conformed to the international standard, ISO/TS 15666:2003 Acoustics - assessment of noise annoyance by means of social and socio-acoustic surveys. By including standardised questions on noise annoyance, which comply with recognised international standards, the results of this study are broadly comparable with those from other studies, including the 1986 Australian study and recent international studies.

A combination of verbal and numerical scaling was used to gauge people's reaction to noise. Strahan research noted that verbal scaling is a very clear method of enabling respondents to describe their feelings of annoyance. The survey first presented questions that allowed for verbal scaling without any numerical reference, using the scaling recommended in ISO/TS15666. Respondents were asked how much a category of environmental noise, for example construction noise, annoyed, bothered or disturbed them, and were asked which one of the following closest describes their response:

- Not at all
- Slightly
- Moderately
- Very
- Extremely.

In accordance with ISO/TS 15666, 11-point numerical scaling was then used to rank the impact of noise (from 0 to 10, where 0 = not at all, and 10 = extremely). The numerical and verbal scaling were both used for each category of noise in the survey. The numerical scaling provided a check on the consistency of respondents' answers and the numerical scale reduces confusion with language. There was considerable consistency between verbal and numerically-based measures.

A1.3 Questions

Data was collected on the types of neighbourhood and dwellings in which respondents live, and on demographics characteristics such as gender and age. In relation to noise from neighbours respondents were asked:

Thinking about the last 12 months or so when you are here at home, how much does noise from neighbours bother, disturb or annoy you?

Thinking about the last 12 months or so, what number from 0-10 best shows how much you are bothered, disturbed or annoyed by noise from neighbours when you are here at home? If you are not at all annoyed choose 0; if you are extremely annoyed choose 10. If you are somewhere between, choose a number between 0 and 10.

Over the last 12 months or so when you are here at home are there any particular types of noise from neighbours that bother, disturb or annoy you?

If noise sources were described as moderately, very or extremely annoying, that response was explored further by the respondent being asked a series of questions to elicit more information on the noise source, as follows:

Does noise from neighbours interfere with any of the following aspects of your home life? – sleeping, reading, relaxing or other quiet activities, spending time outdoors at home, listening to TV, radio, or music, concentrating or studying, entertaining or having a conversation

Does noise from neighbours particularly bother, annoy or disturb you at home, at any of the following times during the week and the weekend? – At the start of the day, day, evening or night

All respondents were asked whether they had complained about noise, if so what noise had they complained about and who had they complained to, whether they had taken action to reduce the noise heard at home (and if so what action was taken), and whether, overall, their actions had solved the problem.

A1.4 Audit processes

To continuously monitor quality, all telephone interviewing was completed under strict supervision. Consistent with Australian Market & Social Research Society practices, 10 per cent of each interviewer's calls were audited in each interview session.

APPENDIX 2: THE CHARACTERISTICS OF RESIDENTIAL NOISE

As noted in the body of this RIS, several characteristics of residential noise can have a significant impact on the affect such noise has on noise sufferers. The key characteristics are the unpredictability of noise, people's attitudes to the source of the noise and their perceived control over the noise, and the impact such noise has on neighbourhood relationships. These characteristics are discussed below.

Unpredictability

Residential noise is often unpredictable, as it is difficult to judge when it will occur and how intrusive it will be if it does occur. Unpredictability has several adverse effects. Firstly, as the noise is unexpected it can be more obvious or intrusive when it occurs (Job 1996, p. 100).

Unpredictability can also carry higher levels of associated stress, as not knowing when the noise will occur or when it will cease may heighten concern or anxiety. The impact of the anxiety that can be associated with unpredictable residential noise is illustrated in the following examples from EPA Victoria's collection of the stories from individuals affected by residential noise.

'I was like that every time I heard thump, and it was like in a second, the blood pressure went, I was tensed up. I used to feel physically ill whenever I was driving back to my house, just going "I'm going to cop it tonight or what's going to happen?" You feel constantly on guard, constantly sick, constantly you're just a mess, it just stuffs you.'

'I suppose too. What really gets you too, it's like tonight, I come home tonight, lovely day, but you're saying, "God, are the motor bikes going to start up?" So even though they're not there, you're on edge because you don't know, and you almost see them coming down the road and you're out in the garden and she's gone to pick them up from school and you think, "Next ten minutes will tell. Is he going to get out on the bike or isn't he?" And you sort of thinking, "What's going on here? And like I say, it's not when the noise is going, you're on edge all the time.'

Secondly, unpredictability makes it difficult for people to plan or prepare for the noise or accommodate it into their routine. For example, if neighbours do not know that concrete will be poured early in the morning on a home building site next door, they will be surprised by the noise and they will not have had an opportunity to go to bed earlier the previous night, to offset the early morning noise impact.

Finally, constant noise that has a consistent volume and pitch, such as background traffic noise, may be less annoying than variable noise, which changes in volume and pitch or occurs intermittently. Many people notice constant noise less, once they are accustomed to its place in the ambient noise environment. Therefore,

'Intermittent, irregular, tonal, pulse or rhythmic noise generates more annoyance than steady noise of the same intensity.' (EnHealth Council 2004, p. 19) (see also WHO 2004, p. 20 and Job 1996, pp. 93-94)

The unpredictability of residential noise can be exacerbated by it also being intermittent, irregular and rhythmic (for example the bass beat in loud music). UK studies on residential noise have noted that one of the main reasons that sufferers do not generate fortitude against residential noise is because the noise is irregular and unpredictable. (MORI 2003, p. 21)

The attitudes of sufferers

Studies have also revealed that the reasons why noise is generated and how people perceive those reasons have a significant impact on how people perceive and respond to the resulting noise. (See for example EnHealth Council 2004, p. 15)

A recent, Sydney-based study investigated whether people's attitude to noise affected their perceptions of the impact of that noise. It looked at areas that would be affected by changes in the configuration of the runway at Sydney airport. The results indicated that people who had a negative attitude to noise, because they expected their future noise exposure to increase were more annoyed by their current exposure to noise and this affected their health.

'Self-reported noise-related physiological/health problems were found to be more prevalent in areas with worse psychological reaction to noise, despite similar noise levels.'

'Residents of areas with currently low noise exposure reported statistically significantly higher scores for general symptoms, substance use, panic, anxiety, anger and depression if their noise exposure was expected to worsen, than if their noise exposure was expected to remain the same.' (Hatfield et al 2001b, p. 8)

The sufferer's attitude to the noise source can be very important. People are likely to be more annoyed and affected more by noise that is a local community concern than noise that is linked to activities that are of financial or social

benefit to the sufferer or the community. Similarly, noise sufferers are likely to be more affected if they believe that those responsible for the noise are not doing enough to mitigate it (EnHealth 2004, p. 20). These issues have been documented in UK studies on residential noise, which noted that a perceived lack of consideration is a critical factor in why people can be highly annoyed by the noise from their neighbours.

'Lack of consideration – neighbour noise is largely seen as a controllable noise, and the fact that it occurs is taken as a lack of respect for other people. This perceived lack of consideration is a key factor in understanding why people become annoyed with neighbour noise; the context behind the noise (in a social sense) can be more significant than the physical characteristics of the noise itself (such as pitch, tone or volume):

"Noise itself can often be controlled, but sometimes lack of consideration by certain sections of the public creates situations which are totally unacceptable." Female, 30+, Thirsk

"When I stay with my girlfriend in Fulham the only plane I actually hear is Concorde. However, the girl downstairs turns her stereo on which is no louder than a normal plane but that really annoys me because it is inconsiderate." Male, 30-50, Banbury (MORI 2003, p. 21)'

In addition, sufferers who believe they have no control over noise can react more strongly to that noise and experience greater levels of annoyance and, potentially, more adverse health effects. (Job 1996, p. 100 and Hatfield et al 2001a)

Breakdowns in neighbourhood relations

Finally, noise can affect people's behaviour and their social interaction. The World Health Organisation highlighted the following problems.

'Noise can produce a number of social and behavioural effects in residents, besides annoyance (for review see Berglund & Lindvall 1995).³² The social and behavioural effects are often complex, subtle and indirect. Many of the effects are assumed to be the result of interactions with a number of non-auditory variables. Social and behavioural effects include changes in overt everyday behaviour patterns (e.g. closing windows, not using balconies, turning TV and radio to louder levels, writing petitions, complaining to authorities); adverse changes in social behaviour (e.g. aggression, unfriendliness, disengagement, non-participation); adverse changes in social indicators (e.g. residential mobility, hospital admissions, drug consumption, accident rates); and changes in mood (e.g. less happy, more depressed).' (WHO 1999b, p. 50)

Because residential noise is generated by individuals and the individuals responsible are usually known to those affected, the impact on social cohesion can be magnified. A UK Study on noise makers and noise sufferers noted that poor neighbour relations can lead to angry confrontations and considerable tension between neighbours (EnCams 2005, p. 109). This conclusion is consistent with reviews of UK noise mediation and dispute resolution services. In one such review, the initiative most commonly suggested by mediation services and clients for improving the effectiveness of mediation was to initiate mediation earlier in the dispute (DEFRA 2006, p. 5), presumably so the problems could be resolved before they escalated. Similarly, another review noted that many noise disputes were complicated by non-noise problems, indicating the strong interaction between noise and other aspects of people's relationship with their neighbours (Grimwood and Ling 1999, p. 4).

The stories of noise sufferers collected by EPA Victoria also show how concerns about residential noise can be closely linked with concerns about neighbourhood relationships.

'[I] persisted with trying the civil approaches, and he got more and more angry and aggressive about it. Threatening, intimidating, yelling abuse and non stop...as he said, he's going to continue to do this until he drives me out of my home...'

'I went round there one night in early 2003, and asked them to stop the noise around about two o'clock in the morning. They were reasonable and said, "yeah, alright", and then half an hour later it was up again and from then on, it's just been an ongoing feud between the two of us...it got to the stage where I had to walk away because I felt abused. And then I called the police and from then on it's just been police, police, police.'

'So we tried the Body Corporate, Body Corporate sort of said, "We'll write a letter", nothing happens. He might go quiet for a week and it starts up again. So one day he got a letter and him and I had this screaming match out the front. He actually came out and confronted me with the letter and said, "How dare you do this? I have a right." His words were, "I have a right to play my music", and I said, "Well, I have a right to peace and quiet!"'

32 Berglund B and Lindvall T (Eds.) 1995 Community Noise. Document prepared for the World Health Organization. Archives of the Center for Sensory Research, 2: 1-195. A reprint of this document with corrections of language and references was published in 1998. The 1995 document can be addressed on the Internet address www.who.int/pehl/, as quoted by WHO 1999.

APPENDIX 3: OTHER CONSTRUCTION OPTIONS RAISED IN CONSULTATION

As noted in chapter 4 EPA Victoria also considered in developing the RIS other construction options that were raised in consultation. Two such options were:

1. setting alternative prohibited times for large-scale residential developments in non-residential zones
2. exempting large-scale residential construction sites and/or residential subdivisions from the standard prohibited times if they have in place an appropriate noise management plan.

Alternate times

On the first of these options, EPA notes that an alternative to exempting large-scale residential construction in non-residential zones is to change the prohibited times to make them more consistent with the times allowed for commercial construction projects.

Such a change would not be straightforward, however. Where current EPA non-statutory guidance (TG302/92) is followed or reflected in council local laws for non-residential construction, a model such as the following typically applies:

- Commercial construction projects would normally work between: 7 am–6 pm weekdays, and 7 am–1 pm on Saturdays (*Normal 'Commercial' Work Hours*). This compares with non-prohibited times under the Regulations of 7 am–8 pm weekdays, and 9 am–8 pm weekends; and
- Industry has capacity to extend these times into evening/Sunday work provided the project obtains a permit from the relevant local council and meets dB performance criteria (sometimes applied as general 'low noise' work practises) (*Extended 'Commercial' Work Hours*).

If this guidance approach were reflected in a similar regime under the proposed Regulations, similar normal work hours could be set, but a permit system would also need to be put in place to:

- give local government ability to exercise some control over works in periods sensitive to the community such as evenings
- ensure the intent of quieter work practises was followed for these extended times.

Moving to the *Normal 'Commercial' Work Hours* allowed for commercial construction would decrease, not extend working hours available to a project, except for two hours between 7 am and 9 am on Saturday morning. Gains would only be made where residential construction businesses gained permits for the *Extended 'Commercial' Work Hours* (and restricted their work practises to low noise types in these times). It is considered that the additional administration costs for business and government in this model would be greater than the potential benefits.

The other approach to this option would be to apply the same work hours to larger projects as are currently allowed for audible residential construction work, but with an extension of hours on a Saturday morning (i.e., 7 am–8 pm weekdays and Saturdays). This option has also been rejected because it would wrongly indicate to the community and industry that any noisy work is allowable on large-scale residential construction throughout the both the *Normal* and *Extended 'Commercial' Work Hours*, and would likely lead to an increase in unreasonable noise.

Management plan-based exemption

Industry sectors proposed a noise management plan system as an alternative to the 1997 Regulations, suggesting that projects that implement such a plan could be exempted from the current times on the basis that the plan produces a reasonable environmental balance. This was considered as an alternate system.

Such an approach would have similar objectives to other options designed to increase flexibility for large-scale construction activity, except the mechanism for achieving the exemption is different.

Projects wishing to extend their construction hours would be required to prepare a noise management plan, which would outline assessment of noise risks, practises to reduce these risks (equipment selection, scheduling, periods of respite, plant location etc), and consultation programs.

Noise management plans could be completed as an extension to existing environmental plans for many projects, but they would still involve additional administration and compliance costs. There are, however, a range of practical difficulties in developing and implementing such plans as a mechanism within the proposed Regulations.

- Benchmark standards would need to be established to ensure appropriate performance.

- A new system for enforcing plans and dealing with complaints would also be needed. There is a range of significant legal questions about how a breach of the plan would affect the projects exemption from the proposed Regulations and how serious such breaches need to be before the exemption is forfeited.
- A system of informing residents and regulators of these plans would be necessary so that those affected are aware of their rights. To the extent that these plans are flexible in the trade-offs they allow between noise times and project performance, a process of consultation with residents would be needed.
- The assessment process and criteria for the plans would need to be designed so they could be managed by local government, not EPA Victoria.

To explore this option EPA consulted with construction industry groups and local government. It was concluded that, some inner city projects aside, neither government nor industry had a broad enough base of experience or administrative capacity to enable such a system to work across the state.

It is noted however that there would be general benefits in improving non-statutory guidance on ways to reduce noise impacts and on noise management plans, to better inform industry and local government of noise management options that can be adopted at an industry or project level.

APPENDIX 4: COST BENEFIT ESTIMATES

A4.1 Valuation of the cost of construction time changes to the building industry over 10 years.

The following analysis estimates the present value to the Victorian domestic and residential building industry³³ of several proposed changes to EPA regulations.

Table A4.1 Estimated present value of proposed changes over the next 10 years^{34 35}

Proposed change	Estimated present value over the next 520 weeks
Construction option 1: Changing the starting time for all residential construction projects from 9 am to 7 am on Saturdays	\$26,430,847 to \$49,085,858
Construction option 2: Providing flexibility for an earlier Saturday start time for residential subdivision works with appropriate buffering	\$6,025,218
Construction option 3: Exempting residential developments above four storeys constructed in non residential zones from the Regulations.	\$3,709,187

The estimated present values to the building industry for options 1 and 3 are based on the value of last year's Victorian building permit applications and exclude capital cost delays associated with the value of land. The estimated value for option 2 is based on an estimate of the current annual value of work done on subdividing land obtained from the Civil Contractors Association. Because the purpose of this evaluation is to estimate the cost to industry of project delays, all estimates use a discount rate based on an estimate of the cost of capital for firms undertaking domestic and residential construction work in Australia. This discount rate is estimated at approximately 10.57 per cent per annum. The calculated values assume that savings occur for 520 weeks.

It should be noted that the estimates of the present value of construction time cost of capital savings are likely to be upper bounds and the true present value of the changes may be significantly lower due to long run substitution between labour and capital.

The calculations for each estimate are shown below, along with input assumptions. In addition, the methodology used to calculate the cost of capital for the domestic and residential building industry is described and additional assumptions are listed at the end of the appendix. The aim of the following calculations is to estimate the saving on invested capital from decreasing the time to complete projects. That is, the calculations estimate the time value of money saving on invested capital from completing the projects earlier.

A3.2 Calculations

Construction option 1: Changing the starting time for all residential construction projects from 9am to 7am on Saturdays

Changing the start time for all construction activities would benefit the domestic and residential construction sectors. The benefits to each sector are calculated separately below and then summed to estimate the total benefit.

³³ Domestic construction covers the construction of single dwellings or attached dwellings separated by a fire resistant wall. Residential construction is the construction of blocks of units or similar multi occupancy dwellings.

³⁴ For simplicity and consistency with an assumption used of 52 weeks in a year, 520 weeks is used in the valuation calculations to approximate 10 years.

³⁵ All calculations were done in a spreadsheet and no rounding was done until the final numbers were rounded to the nearest dollar. For this reason, some of the following page's calculations (if calculated on a calculator) give slightly different answers to the numbers answers in the formula. The difference is entirely due to rounding of the numbers in the equations in this document and does not reflect errors.

Saving on domestic building sites by large firms

It is assumed the average value of domestic projects under way in Victoria at the start of 2008 over the project lives is approximately \$1,899,247,341. This has been calculated as the value of domestic building permits issued in Victoria in 2007, \$9,649,567,642, multiplied by half a year's assumed effective annual growth in invested capital (an assumed growth rate of invested capital of 4.75 per cent per annum effective has been used throughout the calculations), multiplied by the assumed average time to construct domestic housing of 20 weeks divided by 52, then all divided by 2 assuming capital is invested evenly across the project lives.³⁶

The logic for this calculation is that invested capital is continually rolled over from one project to the next (i.e., the value of projects completed in an entire year is in excess of the capital invested in projects at any given point in time during the year if the average project lasts less than a year). Therefore, to get the value of capital invested at one point in time (the start of 2008 in this case) the annual value of building permits must be adjusted for the fact that capital is rolled over. The starting annual figure must also be adjusted to reflect the growth in investment since the most recent available data. In our case, mid 2007 data is adjusted to reflect that the calculation begins at the start of 2008. Each step in the calculation is explained below:

- The starting base figure is the 2007 value of construction permits. This is \$9,649,567,642.
- The base figure is then multiplied by 20/52 to represent the amount of capital that would be invested over one 20 week construction cycle (which it is assumed to be the average construction time for each project prior to the reform). The 2007 total value multiplied by 20/52 is really an estimate of the average amount invested in projects at any given point in time in 2007 (effectively a mid year average).
- Next, an adjustment must be made for the fact that the amount of capital invested in domestic housing construction increases through time. Therefore, to get a value for the start of 2008 the average for 2007 is inflated for the capital invested over the six months from June 2007 to January 2008. The annual growth rate is assumed to equal the long-term growth rate in nominal GDP.³⁷ Therefore, the growth from June 2007 until the start of 2008 is estimated at half the estimated annual long-term nominal growth in GDP.
- Finally, the starting 2008 figure is halved. This reflects that the capital invested across a project increases over the life of the project. At the start of the project no money is invested and at the end, all of the value of construction is invested. For simplicity, it has been assumed that money is invested evenly across project lives implying that the average amount invested across the life of each project is half the total project (or permit) value.

Equation 1 – Estimated average invested capital in domestic building at Jan 1 2008 over the project lives

$$Invested\ Capital_{2008} = \$9,649,567,642 \times \frac{20}{52} \times (1 + 0.0475)^{0.5} \times \frac{1}{2} = \$1,899,247,341$$

It is assumed the time to construct domestic projects will decrease to $46/48+20 = 19.16667$ weeks from 20 weeks currently if option 1 is implemented. This represents a saving on capital investment of 0.93333 weeks.³⁸

Importantly, the percentage of building sites that are labour constrained (i.e. the changes will result in workers working more hours per week and therefore projects being finished earlier) is essential to determining the value to the industry of the proposed changes. For domestic construction, however, not all businesses are likely to be labour constrained and would, therefore, benefit from additional work hours. (See section 5.4 in the body of the RIS for further explanation.) Generally it seems reasonable to assume that large sites are more likely to be labour constrained. The proportion of the industry that is constrained and, therefore, would work additional hours if given the flexibility to do so is calculated using two different assumptions of the proportion of businesses that work on large sites: the first assumes that only businesses with over 20 workers are labour constrained, which represents approximately 28 per cent of building sites by turnover; and the second assumes all businesses with over five workers are labour constrained, approximately 52 per cent of building sites by turnover.³⁹

Given these assumptions, the present value of capital savings on the first building cycle in domestic housing on labour constrained sites can be calculated as shown in equations 2a) and 2b) under the assumptions of 28 per cent and 52 per cent labour constraints respectively.

³⁶ The value of all domestic building permits issued in Victoria in 2007 was obtained from the Building Commission.

³⁷ See the discussion on assumptions below for further explanation.

³⁸ The time saving is based on being able to work an additional two hours each week.

³⁹ Based on the proportion of turnover in the private sector construction industry attributable to businesses with more than 20 and more than five employees, ABS 1999, Private Sector Construction Industry 1996-97, Cat. No. 8772.0

Equation 2a) and 2b) below calculate the capital cost saving from the proposed changes for an initial investment cycle assuming the changes affects 28 per cent and 52 per cent of construction work respectively. Essentially, these calculations take the amount of capital assumed to be invested over the life of the projects (calculated above) and estimate the time value of the saving from shortening the project lives due to the proposed changes, for each assumption on the proportion of constrained projects (28 and 52 per cent).

Equations 3a) and 3b) use the estimated saving from the first building cycle under the alternate constraint assumptions from equations 2a) and 2b) and estimate the saving that would occur over 520 weeks. The assumptions are made that the savings from 2a) and 2b) are repeated every 19.166667 weeks and that the value of the savings (in nominal terms) increases in line with growth in capital invested in the building industry. Equations 3a) and 3b) use a simple growing annuity formula to perform these calculations.

Equation 2a – Savings on first domestic building cycle (at week 20) assuming 28 per cent of building work is labour constrained

$$PV_{(week\ 20)} = \$1,899,247,341 \times 0.28 \times \left((1 + 0.1057)^{\frac{20}{52}} - (1 + 0.1057)^{\frac{19.166667}{52}} \right) = \$889,342$$

Equation 2a – Savings on first domestic building cycle (at week 20) assuming 52 per cent of building work is labour constrained

$$PV_{(week\ 20)} = \$1,899,247,341 \times 0.52 \times \left((1 + 0.1057)^{\frac{20}{52}} - (1 + 0.1057)^{\frac{19.166667}{52}} \right) = \$1,651,635$$

Equation 3a – PV at time zero of savings over 520 weeks on domestic building costs assuming 28 per cent of building work is labour constrained

$$PV = \frac{\$889,342}{(1 + 0.0475)^{\frac{19.166667}{52}}} \times \left(1 - \left(\frac{(1 + 0.1057)^{\frac{19.166667}{52}}}{(1 + 0.0475)^{\frac{19.166667}{52}}} \right)^{-27.087} \right) / \left(\frac{(1 + 0.1057)^{\frac{19.166667}{52}}}{(1 + 0.0475)^{\frac{19.166667}{52}}} - 1 \right) \times \left(\frac{1}{(1 + 0.1057)^{\frac{20-19.166667}{52}}} \right)$$

$$= \$18,088,234$$

Equation 3b – PV at time zero of savings over 520 weeks on domestic building costs assuming 52 per cent of building work is labour constrained

$$PV = \frac{\$1,651,635}{(1 + 0.0475)^{\frac{19.166667}{52}}} \times \left(1 - \left(\frac{(1 + 0.1057)^{\frac{19.166667}{52}}}{(1 + 0.0475)^{\frac{19.166667}{52}}} \right)^{-27.087} \right) / \left(\frac{(1 + 0.1057)^{\frac{19.166667}{52}}}{(1 + 0.0475)^{\frac{19.166667}{52}}} - 1 \right) \times \left(\frac{1}{(1 + 0.1057)^{\frac{20-19.166667}{52}}} \right)$$

$$= \$33,592,435$$

Saving on residential building sites by large firms

It is assumed the average value of residential building projects underway in Victoria at the start of 2008 over the project lives is \$864,979,727. This has been calculated as the value of residential building permits issued in Victoria in 2007, \$1,690,280,995, multiplied by half a years assumed effective annual growth in invested capital, multiplied by the assumed average time to construct residential housing of 52 weeks divided by 52, then all divided by 2 assuming capital is invested evenly across the lives of the building projects.⁴⁰This calculation is shown below in equation 4.

Equation 4, and the logic behind it, is the same as for equation 1 (which is explained in detail above). The only changes from equation 1 are: the value of permits issued in 2007 for Victorian residential building is lower than the value of domestic building permits; and the assumed time to construct residential buildings is higher at 52 weeks, compared with 20 weeks for domestic construction.

Equation 4 – Estimated average invested capital at Jan 1 2008 in residential building over the project lives

$$Invested\ Capital_{2008} = \$1,690,280,995 \times \frac{52}{52} \times (1 + 0.0475)^{0.5} \times \frac{1}{2} = \$864,979,727$$

40 The value of all residential building permits issued in Victoria in 2007 was obtained from the Building Commission.

It is assumed the time to construct labour constrained residential buildings sites will decrease from 52 weeks to $52 \times 46/48 = 49.83333$ weeks if option 1 is implemented, a time saving on invested capital of 2.166667 weeks.

Therefore, the saving for constrained residential building work can be calculated for the first residential building cycle as shown below in equations 5a and 5b. Once again under the alternate assumptions of 28 per cent and 52 per cent of the sector is labour constrained.

The relationships between equations 5a) and 5b) and 6a) and 6b) are identical to the relationships between equations 2a) through 3b), explained in detail above. However, it should be noted that the savings from construction cycle to construction cycle only occurs every 49.8333 weeks, instead of every 19.166667 weeks (as was the case of domestic construction), due to the longer average time assumed for residential construction.

Equation 5a – Saving on first residential building cycle at week 52 assuming 28 per cent of building work is labour constrained

$$PV_{(week\ 52)} = \$864,979,727 \times 0.28 \times \left((1 + 0.1057)^{\frac{52}{52}} - (1 + 0.1057)^{\frac{49.83333}{52}} \right) = \$1,118,823$$

Equation 5b – Saving on first residential building cycle at week 52 assuming 52 per cent of building work is labour constrained

$$PV_{(week\ 52)} = \$864,979,727 \times 0.52 \times \left((1 + 0.1057)^{\frac{52}{52}} - (1 + 0.1057)^{\frac{49.83333}{52}} \right) = \$2,077,815$$

The saving on repeated cycles over 520 weeks can then be calculated as a growing annuity as shown below in equation 6a and 6b under the alternate constraint assumptions.

Equation 6a – PV of saving over 520 weeks on residential building costs assuming 28 per cent of building work is labour constrained

$$PV = \frac{\$1,118,823}{(1 + 0.0475)^{\frac{49.83333}{52}}} \times \left(1 - \frac{(1 + 0.1057)^{\frac{49.83333}{52}}}{(1 + 0.0475)^{\frac{49.83333}{52}}} \right)^{-10.39} \times \left(\frac{(1 + 0.1057)^{\frac{49.83333}{52}}}{(1 + 0.0475)^{\frac{49.83333}{52}}} - 1 \right) \times \left(\frac{1}{(1 + 0.1057)^{\frac{52 - 49.83333}{52}}} \right)$$

= \$8,342,612

Equation 6b – PV of saving over 520 weeks on residential building costs assuming 52 per cent of building work is labour constrained

$$PV = \frac{\$2,077,815}{(1 + 0.0475)^{\frac{49.83333}{52}}} \times \left(1 - \frac{(1 + 0.1057)^{\frac{49.83333}{52}}}{(1 + 0.0475)^{\frac{49.83333}{52}}} \right)^{-10.39} \times \left(\frac{(1 + 0.1057)^{\frac{49.83333}{52}}}{(1 + 0.0475)^{\frac{49.83333}{52}}} - 1 \right) \times \left(\frac{1}{(1 + 0.1057)^{\frac{52 - 49.83333}{52}}} \right)$$

= \$15,493,423

Total estimated cost of capital saving from implementing option 1

Adding the estimates for the present value of capital cost savings on domestic and residential building from option 1 together gives a saving of $\$18,088,234.31 + \$8,342,612.48 = \$26,430,846$ under the assumption 28 per cent of building work is labour constrained. A saving of $\$33,592,435 + \$15,493,423 = \$49,085,858$ is calculated under the assumption 52 per cent of building work is labour constrained.

Estimated cost per person per year who hears early Saturday morning construction noise

To put the benefits to industry into a more meaningful context, the benefit for one year is allocated across all people who hear construction noise. This provides an estimate of how much the average cost of extra noise to those who hear construction noise would need to be to offset the benefits to industry. Based on the EPA social survey 1,760,000 million Victorians hear construction noise (see section 5.3 in the body of the RIS).

The estimated benefit to the building industry in the first year can be estimated by solving for the growing annual annuity payment that gives the total present value of the changes.⁴¹ Once again, this has been estimated under the two alternative assumptions of 28 per cent and 52 per cent labour constrained building sites as shown below in equations 7a) and 7b). This has been estimated assuming the first growing annuity payment occurs at time zero and the appropriate discount rate is the opportunity cost of capital used throughout this document.⁴²

Equation 7a) – first annual annuity payment (up front) assuming 28 per cent labour constrained building work

$$Payment = \frac{\$26,430,847}{\left(1 - \left(\frac{1 + 0.1057}{1 + 0.0475}\right)^{-10}\right)} \times \left(\frac{1 + 0.1057}{1 + 0.0475} - 1\right) \times \frac{1 + 0.0475}{1 + 0.1057} = \$3,330,913$$

∴

Equation 7b) – first annual annuity payment (up front) assuming 52 per cent labour constrained building work

$$Payment = \frac{\$49,085,858}{\left(1 - \left(\frac{1 + 0.1057}{1 + 0.0475}\right)^{-10}\right)} \times \left(\frac{1 + 0.1057}{1 + 0.0475} - 1\right) \times \frac{1 + 0.0475}{1 + 0.1057} = \$6,185,980$$

∴

Once the first annual payment is solved for, the result can then be divided by the 1.8 million people that are assumed to hear construction noise⁴³ each year to give an estimated monetary value (per person for the year). This is shown below in equations 8a) and 8b).

Equation 8a) – value per person of the noise for the first year assuming 28 per cent of building sites are labour constrained.

$$PV_{per\ person} = \frac{\$3,330,913}{1,760,000} = \$1.89$$

Equation 8b) – value per person of the noise for the first year assuming 52 per cent of building sites are labour constrained.

$$PV_{per\ person} = \frac{\$6,185,980}{1,800,000} = \$3.44$$

Construction option 2: Reduce the prohibited times for green fields subdivisions to allow equipment to be operated from 7 am on Saturday, rather than the current 9 am, with suitable noise buffers.

Estimation of the present value of option 4

The estimated value of work done on subdivision land in Victoria is \$900,000,000 annually.⁴⁴ It is assumed that the turnover time on invested capital matches the turnover time for domestic housing and that the \$900,000,000 estimate is valid for 2007 and that the value of work done will increase at the expected growth rate of the GDP. It is also assumed for this analysis that 100 per cent of this construction work will be labour constrained.

41 Subsequent year's non discounted values will increase at 4.75 per cent per annum assuming no growth in the number of people who hear construction noise. However, the present value of subsequent years savings will decrease as the discount rate exceeds the annual growth rate.

42 While an argument might be advanced that a social discount rate could be used to estimate the annuity payments, this would have given a much lower estimated value given this discount rate would have been around 6 per cent. However, given the original cash flows and values were estimated using a capital market opportunity cost of capital, for consistency this discount rate was used to make this estimate.

43 Estimates derived using data from Strahan Research 2007, *Report to EPA Victoria on Community Response to Environmental Noise*, p. 14, and population data from the Department of Planning and Community Development (DPCD 2007, p. 3). DPCD reported the estimated population for Victoria at June 2006 as 5 128 310.

44 This is an estimate obtained from the Civil Contractors Federation.

Given the assumptions above, estimating the delay will involve identical calculations to those undertaken in Equations 2a) and 3a) apart from the starting invested capital and the assumption of the amount of constrained building work. Therefore, the estimate of the present value of being able to operate two hours earlier on Saturdays on subdivision land developments can be calculated as shown below in equation 9. Essentially, the value obtained from equation 3a) of \$18,088,234 is scaled down for the difference between the 900,000,000 value and the 2007 permit value on domestic construction of 9,649,567,642 and this number is then scaled up for the different assumptions about the amount of work constrained (100 per cent versus 28 per cent).

Equation 9 – PV of savings over 520 weeks on land subdivision

$$PV_{subdivision} = \frac{\$900,000,000}{9,649,567,642} \times \$18,088,234 \times \frac{100\%}{28\%} = \$6,025,218$$

Construction option 3: Providing an exemption for four-storey residential buildings in non-residential zones, in effect builders would be permitted to start construction at 7 am on Saturday, rather than the current 9 am

The value of Victorian building permits for 4 storey buildings issued in 2007 was \$420,846,371.⁴⁵

As these buildings are a subset of the residential buildings for which the estimated change value was estimated in Equation 6, the estimated value of increasing working hours for this work over 520 weeks can be calculated as shown in equation 10. This has also been calculated under the assumption that 100 per cent of the building work in this category is labour constrained. Essentially, the value obtained from equation 6a) of \$8,342,612 is scaled down for the difference between the \$420,846,371 value and the 2007 permit value on Victorian residential construction of \$1,690,280,995 and this number is then scaled up for the different assumptions about the amount of work constrained (100 per cent versus 28 per cent).

Equation 10 – PV of savings on residential development 4 storeys or higher

$$PV_{4Storey} = \frac{\$420,846,371}{\$1,690,280,995} \times \$8,342,612 \times \frac{100\%}{28\%} = \$7,418,373$$

It is assumed that half of residential buildings that are four storeys or higher are constructed in non-residential zones and, therefore, the savings on these developments is estimated to be \$3,709,187. The estimate of 50 per cent in non-residential zones is based on information from local government, whose estimates for individual local government areas ranged from 30 to 100 per cent. See section 5.6.1 in the body of the RIS.

Additional assumptions for options A, B and C

- The current working week in the constrained building industry is 46 hours per week⁴⁶. This estimate was obtained from the Housing Industry Association and is assumed to be the base labour availability figure (for a worker for a week) for constrained building sites. The figure seems realistic for building workers working a five-day week and a half a day on Saturday and was the best information available.
- The average time to complete a domestic building project from start to finish is 20 weeks.⁴⁷ This was derived from estimates provided by the Housing Industry Association, which was the only readily available data.
- The time to complete a residential development from start to finish is 52 weeks. No data was readily available to estimate this. Therefore, this is a rough estimate based on an upper bound of around two years to construct high-rise buildings and the fact that the average height of residential development work done in Victoria in 2007 was less than eight storeys. This implies that the average work should take significantly less than two years and one year seems to be a reasonable estimate.
- The time to complete domestic land development is 20 weeks.
- Capital investment in building projects will increase at a nominal rate of 4.75 per cent per annum in line with assumed long-term nominal GDP growth.⁴⁸ Estimated GDP growth is used on the assumption that residential and domestic housing expenditure would be a relatively stable proportion of GDP. In the absence of specific

45 Figure obtained from the Building Commission.

46 Obtained from the Housing Industry Association.

47 Derived from estimates provided by the Housing Industry Association

48 Derived from Australian Government Budget estimates, <http://www.budget.gov.au/2005-06/bpl/html/bst3-06.htm>.

estimates, it is assumed that the growth in the economy is a reasonable proxy for estimating future growth in the construction sector.

- The value of building permits for residential and domestic building in Victoria issued in 2007 provide a reasonable estimate of residential and domestic building work undertaken in Victoria in 2007. While some projects may cost more or less than initially estimated, it is assumed that the total value of permits should approximate total construction.
- For simplicity, it has been assumed that there are exactly 52 weeks in a year. This was a simplifying assumption in the present value calculations and has an insignificant affect on calculated values relative to using the exact value of 52.18 weeks in a year.

Calculation of the cost of capital to use in the present value calculations

Because these calculations estimate the benefits to the building industry of reducing project delays the discount rate used has been estimated from the estimated cost of capital of several firms in this industry. To obtain a discount rate for the NPV calculations above, the ASX listed companies shown in table 2 were used.

Table A4.2: Cost of capital proxy companies

Proxy company	Estimated pre-tax weighted average cost of capital ⁴⁹
Devine Limited	10.58%
AVJennings Limited	10.56%
Simple Average	10.57%

Devine Limited and AVJennings Limited were chosen as proxies to estimate the cost of capital on the basis that they do the majority of their work in the domestic and residential building industry, are listed on the ASX and are actively traded.

The weighted average costs of capital were estimated using a weighted average cost of capital calculation (WACC) and the capital asset pricing model to estimate the cost of equity capital. The following calculations were used:

$$WACC_{Pr e-tax} = \frac{D}{V} \times Kd + \frac{E}{V} \times \frac{Ke}{(1 - Te(1 - gamma))} \quad (11)$$

and

$$Ke = Rf + Beta_{equity} \times [MRP] \quad (12)$$

Where :

Ke = Expected return on equity capital

Kd = Expected return on debt capital

Rf = risk free rate

Beta_{Equity} = firms assumed equity beta

MRP = the market risk premium

Te = Assumed effective tax rate

D = Market Value of debt

E = Market value of equity

V = *D* + *E*

In addition, the following calculations and assumptions were made when estimating the input parameters to equations 11 and 12 above:

⁴⁹ Estimates based on assumptions stated above and should not be relied upon to value these companies.

- Individual firm equity betas were estimated by regressing firm monthly price returns against the monthly returns of the S&P 200 stock index over the last five years up to 31 January 2007. End of month values were used. This gave an estimate of the systematic risk facing the equity shareholders of these firms.
- Individual firm debt to equity ratios were estimated over each of the last five years using estimated market values for interest bearing liabilities from annual reports and the market value of equity. These were then averaged to get an average debt to equity ratio for each firm over the beta estimation period.
- Firms' asset betas were estimated using the Monkhouse formula. The average debt to equity ratio over the beta estimation period was used in this calculation. This estimates the systematic risk of the firm as a whole (both debt capital and equity capital), given the estimate of the systematic risk that faced equity capital over the last five years and the average leverage of each firm over that period. As is usual when applying the CAPM, it was assumed that estimated systematic risk from past observed returns is representative of the future systematic risk perceived by capital markets.
- The firms' asset betas were re-levered to obtain equity betas at the firms' assumed optimal debt to equity ratio using the Monkhouse formula. This measures the systematic risk facing equity capital at the firms' assumed optimal debt to equity ratios and can then be used in the CAPM equation to estimate each firms' cost of equity capital. The cost of equity is combined with the cost of debt to estimate each firms' weighted average cost of capital.
- The risk free rate was estimated as a simple average of the Commonwealth Government bond effective annual yields on securities TB120 and TB122 over the period 6 Feb 2008 to 22 Feb 2008. Data was obtained from the Reserve Bank of Australia.
- The market risk premium was assumed to be six per cent. This is the standard assumption of most, if not all, Australian regulators when calculating the weighted average cost of capital for regulated firms.
- Gamma, the value of imputation credits to shareholders, was assumed to equal 0.5. This is the standard assumption used by most, if not all, Australian regulators when calculating the weighted average cost of capital for regulated firms.
- The optimal debt to equity ratio for each firm was assumed to be the market debt to equity ratio reflected by the debt value in each firms' June 30 2007 annual report and the closing equity share market values as at June 30 2007. This estimate is used as later data was not available. It also assumes that, at that date, these firms were acting optimally to maximise their shareholder value.
- The cost of debt for each firm was assumed to reflect the cost of debt in the June 2007 annual reports plus 1 per cent. One percent reflects the increase in S&P AA rated bond yields from June 29 2007 to Jan 31 2008, as reported by the Reserve Bank of Australia in Bulletin FO3, and is used as an adjustment upwards for the likely increase in debt costs of these firms due to debt market changes over this period. This was the most up-to-date data available from the RBA at the time the firms' WACCs were calculated.
- It was assumed that the firms' effective tax rates equal the statutory corporate tax rate of 30 per cent. Thirty percent was assumed for simplicity and on the assumption that these firms were unlikely to have large opportunities to substantially lower their effective tax rate below the corporate tax rate given the nature of their operations.

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APPENDIX 5: PROPOSED REGULATIONS

Environment Protection (Residential Noise) Regulations

Exposure Draft

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Victoria

Environment Protection (Residential Noise) Regulations

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1 Objectives

These Regulations prescribe items and the times during which noise resulting from their use is deemed to be unreasonable noise for the purposes of section 48A(5) of the **Environment Protection Act 1970** and in certain circumstances exempt certain premises from the application of those prescriptions.

2 Authorising provisions

These Regulations are made under sections 48A(5) and 71 of the **Environment Protection Act 1970**.

3 Commencement

These Regulations come into operation on 26 October 2008.

4 Revocation

The Environment Protection (Residential Noise) Regulations 1997 are **revoked**.

5 Definitions

In these Regulations—

earthmoving machinery means plant used to excavate, load, transport or spread earth, overburden, rubble, spoil, aggregate or similar material but does not include—

- (a) plant to compact earth; or
- (b) a tractor or industrial lift truck or a vehicle designed to be used primarily as a means of transport on public roads;

fringe residential subdivision means—

- (a) any relevant land within a growth area; or
- (b) any relevant land outside the metropolitan municipal district if the land adjoins residential premises along not more than half of its perimeter;

growth area has the same meaning as it has in section 46AO of the **Planning and Environment Act 1987**;

metropolitan municipal district has the same meaning as it has in section 3(1) of the **Public Holidays Act 1993**;

relevant land means land—

- (a) which is the whole of the land on a certified plan of subdivision under the **Subdivision Act 1988**; and
 - (b) part of which is land which is set aside on the certified plan of subdivision as a road; and
-

- (c) in relation to which an engineering plan submitted by the applicant for subdivision includes specifications for works to construct the road or if it is already constructed works to upgrade the road; and
- (d) used for or in connection with any residential premises or upon which a residential premises is under construction;

storey means a space within a building which is situated between one floor level and the floor level next above, or if there is no floor level next above, the ceiling or roof next above, but does not include—

- (a) a space that contains only—
 - (i) a lift, shaft, stairway or meter room; or
 - (ii) a bathroom, shower room, laundry, water closet or other sanitary compartment; or
 - (iii) accommodation intended for not more than 3 vehicles; or
 - (iv) a combination of anything specified in subparagraph (i), (ii) or (iii); or
- (b) a space which is an intermediate floor within a room.

6 Prescribed items and prescribed prohibited times under section 48A(5) of the Act

The following items and prohibited times are prescribed for the purposes of section 48A(5) of the **Environment Protection Act 1970**—

<i>Group</i>	<i>Prescribed Items</i>	<i>Prohibited Times</i>
1	A motor vehicle (except a vehicle moving in or out of premises), lawn mower or other grass cutting device and any equipment or appliance not falling within Group 2 having an internal combustion engine.	Monday to Friday: before 7 a.m. and after 8 p.m. Weekends and public holidays: before 9 a.m. and after 8 p.m.
2	An electric power tool, chain or circular saw, gas or air compressor, pneumatic power tool, hammer and any other impacting tool and grinding equipment.	Monday to Friday: before 7 a.m. and after 8 p.m. Weekends and public holidays: before 9 a.m. and after 8 p.m.
3	A domestic air conditioner, swimming pool pump, spa pump, water pump other than a pump being used to fill a header tank, domestic heating equipment (including central heating and hot water systems) and a domestic vacuum cleaner.	Monday to Friday: before 7 a.m. and after 10 p.m. Weekends and public holidays: before 9 a.m. and after 10 p.m.
4	A musical instrument and any electrical amplified sound reproducing equipment including a stereo, radio, television and public address system.	Monday to Thursday: before 7 a.m. and after 10 p.m. Friday: before 7 a.m. and after 11 p.m.

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<i>Group</i>	<i>Prescribed Items</i>	<i>Prohibited Times</i>
		Saturday and public holidays: before 9 a.m. and after 11 p.m.
		Sunday: before 9 a.m. and after 10 p.m.
5	Any electric equipment or appliance not falling within Group 2, Group 3, or Group 4, including electric gardening equipment.	Monday to Friday: before 7 a.m. and after 8 p.m. Weekends and public holidays: before 9 a.m. and after 8 p.m.

7 Premises on fringe residential subdivisions more than 35 metres from nearest property may be partially exempt from application of section 48A(5) of the Environment Protection Act 1970

- (1) A residential premises is exempt from the application of section 48A(5) of the **Environment Protection Act 1970** to the listed items in subregulation (2) during the prohibited times between 7 a.m. and 9 a.m. on a Saturday if the premises is located—
- (a) on a fringe residential subdivision; and
 - (b) more than 35 metres from the nearest point of the property boundary of the closest other residential premises.
- (2) For the purposes of subregulation (1), the listed items are prescribed items in Group 1 or Group 5 in regulation 6 which are equipment that is or a motor vehicle that is—

- (a) earthmoving machinery not using an impacting, vibrating or rotating implement operated by hydraulic or pneumatic means; or
 - (b) a concrete dispensing truck; or
 - (c) compaction plant being a self-propelled single drum vibrating roller or non-vibrating compaction machinery.
- (3) Subregulation (1) ceases to have effect with respect to a residential premises—
- (a) when 20 weeks has elapsed from the commencement of work on the premises using any listed item in subregulation (2); or
 - (b) when the premises is a lot on the certified plan of subdivision referred to in the definition of *relevant land* and the works referred to in that definition required to construct a road or to upgrade a road have been completed on the section of road that adjoins the lot—

whichever occurs first.

8 Premises on fringe residential subdivisions more than 200 metres from nearest property may be partially exempt from application of section 48A(5) of the Environment Protection Act 1970

- (1) A residential premises is exempt from the application of section 48A(5) of the Act to the listed items in subregulation (2) during the prohibited times between 7 a.m. and 9 a.m. on a Saturday if the premises is located—
- (a) on a fringe residential subdivision; and
 - (b) more than 200 metres from the nearest point of the property boundary of the closest other residential premises.

- (2) For the purposes of subregulation (1), the listed items are prescribed items in Group 1 or Group 2 or Group 5 in regulation 6 which are—
 - (a) equipment that is or a motor vehicle that is—
 - (i) earthmoving machinery using an impacting, vibrating or rotating implement operated by hydraulic or pneumatic means; or
 - (ii) any type of compaction plant; or
 - (iii) any type of motor vehicle or equipment listed in regulation 7(2); or
 - (b) any item from Group 2 in regulation 6 except a pile driver; or
 - (c) any item from Group 5 in regulation 6.
- (3) Subregulation (1) ceases to have effect with respect to a residential premises when the premises is a lot on the certified plan of subdivision referred to in the definition of *relevant land* and the works referred to in that definition required to construct a road or to upgrade a road have been completed on the section of road that adjoins the lot.

9 Premises with large scale residential developments in non-residential zones may be partially exempt from application of section 48A(5) of the Environment Protection Act 1970

If a premises is located on land—

- (a) no part of which is occupied by a person as a residence; and

- (b) upon which a residential premises is under construction; and

Note

A residential premises under construction may include a residential premises being extended or structurally altered or commercial or industrial premises being converted into a residence.

- (c) no part of which is zoned residential under any planning scheme; and

Example

For example, zones R1Z, R2Z, LDRZ, MUZ, TZ or R3Z, which are the residential zones specified in clause 32 of the Victorian Planning Provisions made under section 4A of the **Planning and Environment Act 1987**.

- (d) upon which the residential premises has, or will have when constructed—

(i) 4 or more storeys above ground level;
or

(ii) 2 or more storeys below ground level—

the premises is exempt from the application of section 48A(5) of the **Environment Protection Act 1970** during the prohibited times prescribed for Groups 1, 2 and 5 in regulation 6 to the items prescribed in Groups 1, 2 and 5 in regulation 6.

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ENDNOTES