

Review of regulation of railway systems activities

Cost-Benefit Analysis

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Please send us your comments

You are invited to provide a submission on the draft Protection of the Environment Operations Legislation Amendment (Scheduled Activities) Regulation 2016. Your feedback on any specific issues relating to the proposed changes in the draft Regulation is welcome.

The draft Regulation, along with this Cost-Benefit Analysis for the proposed changes to the regulation of rail activities is available at: www.epa.nsw.gov.au/licensing/scheduled-activities-amend-exhibition.htm.

Please provide your comments to the EPA by:

- emailing ScheduledActivitiesAmendment@epa.nsw.gov.au, or
- posting your submission to: Scheduled Activities Amendment Regulation Review, Reform and Compliance Branch, Environment Protection Authority, PO Box A290, Sydney South NSW 1232.

Submissions close at **5pm on 16 June 2016**.

1 Introduction

The NSW Environment Protection Authority (EPA) has reviewed the current regulatory framework for the construction and operation of the NSW rail sector to determine if there is an alternative regulatory framework that would more effectively manage the environmental impacts of rail activities on the NSW environment and community.

As part of this review, the EPA consulted with Transport for NSW (TfNSW) and the railway system operators Sydney Trains, the Australian Rail Track Corporation (ARTC) and John Holland Rail on a range of options to address the environmental impacts of operational rail and rail construction activities. Following this consultation, the EPA released a position paper¹ in September 2014, which proposed changes to the environmental licensing framework for the NSW rail network under the *Protection of the Environment Operations Act 1997* (POEO Act). These changes are intended to improve the effectiveness of the environmental regulation of all aspects of the rail sector.

The position paper considered the main issues identified by the EPA concerning environmental regulation of the rail sector and outlined a range of potential options to address these issues. The paper also identified a preferred option based on qualitative assessments of each of the potential options.

This cost-benefit analysis describes the four most viable options presented in the position paper, including the base case and the EPA's preferred option. It then goes on to assess the costs and benefits of those options.

1.1 Purpose and content of the cost-benefit analysis

This document is a cost-benefit analysis (CBA) prepared for the Protection of the Environment Operations Legislation Amendment (Scheduled Activities) Regulation 2015 (the Amendment Regulation). This CBA has been prepared in accordance with the *Subordinate Legislation Act 1989*, which requires NSW agencies to assess the economic and social costs and benefits of a range of regulatory options to achieve a given objective. The CBA must provide justification for the proposed Amendment Regulation by showing it provides the greatest net benefit or least cost to the community compared with its alternatives. It must also conform to the NSW Government's 'better regulation principles'.

1.2 Consultation

The EPA consulted extensively during its review of rail regulation² by:

- preparing and exhibiting a position paper
- informing key stakeholders about the position paper via a targeted mail out to rail industry organisations, environmental groups, community groups and government agencies
- posting a media release about the position paper
- hosting a forum with rail industry stakeholders
- publishing notices seeking submissions on the position paper in the *NSW Government Gazette*, the *Sydney Morning Herald* and *The Daily Telegraph*
- establishing a dedicated webpage on the EPA website
- hosting meetings with stakeholders upon request to discuss their issues and concerns.

Forty six submissions were received in response to the Position Paper. Of these, 21 indicated support for the paper's preferred option. In addition, three voiced concerns that the preferred

¹ See www.epa.nsw.gov.au/resources/epa/14657railpospap.pdf

² See www.epa.nsw.gov.au/licensing/railindustry.htm

option may not resolve the issues identified with the current framework and deliver the anticipated benefits.

The issues raised during consultation did not require significant amendment of the EPA's preferred option. A summary of these issues, and the EPA's responses, are provided in the Submissions Report.³

³ See <http://www.epa.nsw.gov.au/resources/epa/rail-regulatory-review-submissions-report.pdf>

2 Regulation of rail activities

2.1 The NSW operational rail industry

The NSW rail network consists of approximately 6400 kilometres of operational rail track. This network is operated by three railway system operators:

- Sydney Trains (metropolitan areas)
- ARTC (interstate rail network, metropolitan freight network and the Hunter Valley network)
- John Holland Rail Pty Ltd (country regional network on behalf of TfNSW).

Sections of the Victorian rail network also extend into NSW under the *Border Railways Act 1922*. As a result, V/Line also holds an environment protection licence (EPL) for 'railway systems activities' for the railway lines it operates that extend into NSW to Tocumwal, Moulamein and Deniliquin.

There are also a number of small, privately-operated railway systems and railway systems operated for heritage-related purposes.

The railway system operators grant rolling stock operators access to their networks under contractual network access agreements. There are currently 29 rolling stock operators holding access agreements with the four railway system operators in NSW.

The rolling stock operators range from large corporations with several hundred locomotives to small operators with less than ten locomotives, and comprise of a mix of state-owned and private corporations.

2.2 Current environmental regulation of operational rail in NSW

There is no national legislation for environmental performance of the rail industry. Regulation is undertaken at State Government level and in NSW this is via the POEO Act.

Currently, only the railway system operators (Sydney Trains, ARTC, John Holland Rail Pty Ltd and V/Line) are required to hold EPLs for the operational elements of the scheduled activity 'railway systems activities'; i.e. rolling stock operators are currently not required to hold a licence.

Under the current licensing framework, the railway system operators are responsible for the environmental performance and impacts of the rolling stock operating on their railway systems, regardless of the nature of the management or control they have over that rolling stock. This responsibility is allocated on the basis that the railway system operators can pass on their EPL obligations to third party rolling stock operators through network access agreements granted to each rolling stock operator. However, this regulatory framework has been found to be inefficient and it has not been achieving the required environmental or community benefits.

3 Objectives to be addressed

3.1 Issues with the current regulatory framework

The current regulatory framework has several limitations. These include disputes between rail system operators and the EPA over whether railway system operators can impose the environmental obligations under their EPLs onto rolling stock operators through their network access contractual arrangements. Rail system operators argue that:

- only general obligations can be passed onto third party rolling stock operators, not regulatory or criminal liabilities
- rolling stock operators are not contracted to them or undertaking work for them, but are using the rail lines with the permission of the rail system operators.

As a result, the current regulatory framework has not achieved the level of on-the-ground benefits for the environment and the community that were intended, and has created a range of administrative inefficiencies and concerns regarding liability.

As only railway system operators hold EPLs, rolling stock operators are not directly accountable to the EPA for their environmental performance. Many environmental impacts associated with the operational rail network, such as noise issues, arise from issues that are fully or partly the responsibility of rolling stock operators, for example locomotive engine performance, the interaction of rolling stock on rail tracks (such as wheel-squeal) and driver behaviour (such as unnecessary shunting noise).

This indirect regulation model has made the railway system operators' EPLs very complex to administer for the EPA. It presents fundamental challenges for the enforcement of environmental responsibilities and achievement of acceptable environmental performance by the rail industry, especially when the impact is associated with the actions of rolling stock operators. Environmental issues and community concerns associated with railway systems are often difficult to resolve. This has resulted in increased community concern, particularly regarding noise and air emissions from rolling stock.

Railway system operators have argued they should not be liable for the performance of rolling stock operators because they do not have direct control over rolling stock or the ability and power to direct and enforce the actions of rolling stock operators. For example, they are not in a position to ensure that rolling stock is properly maintained to minimise noise and air emissions. They have argued they should only be held accountable for the rolling stock they have direct control over and impacts associated with the network itself.

3.2 Objectives to be addressed

An alternative regulatory framework is required to better regulate the environmental impacts of the operational rail network and to address:

- the need for more on-the-ground improvements for the environment and the community
- administrative inefficiencies
- concerns regarding liability resulting from only licensing railway operators.

Key objectives for an alternative and more effective NSW rail regulatory framework include to:

- prevent unacceptable and avoidable environmental impacts associated with the rail system
- provide a consistent approach across the industry
- provide reasonable assurance to the community that issues are appropriately managed
- provide flexible, effective, fit-for-purpose regulatory tools for the EPA to manage all parts of the rail industry
- end the current impasse about the respective responsibilities of different operators within the rail industry.

4 Addressing air emissions from the rail industry

Within the Cost-benefit analysis section of this document (Section 7), the expected benefit of air emission reductions have not been quantified for the options considered. This is because adequate data is not currently available to support estimates of emission reductions resulting from any of the options.

Australia currently does not have national standards for exhaust emission limits for new or re-manufactured locomotives. To address this issue, the EPA recently released its *Diesel and Marine Emissions Management Strategy*,⁴ which aims to progressively control and reduce diesel emissions from priority sectors, including locomotives. Current actions under this strategy include investigating the feasibility and supporting adoption of new emissions control technology for locomotives, as well as updating the NSW regulatory framework to ensure accountability of diesel locomotive operators for improved emissions performance.

The EPA is committed to implementing this strategy, regardless of the regulatory framework in place for the rail industry. However, the delivery could be via different enforcement mechanisms. For example, if there was no change to the existing rail regulatory framework, the initiatives may be implemented via amendment of the POEO (Clean Air) Regulation 2010, or via a new regulation. Under the proposed amended regulatory framework, the mechanisms could be implemented via a licensing approach.

A range of potential emission reduction measures for locomotives were identified following a review of standards, policies and programs in the United States of America (US), European Union (EU) and Canada. Based on a qualitative assessment of the emission reduction benefits and practicability of various options, the key actions that may potentially be implemented include:

- requiring new locomotives to meet US emission standards
- applying remanufacture emission standards (e.g. Tier 0+ for some locomotives) when existing locomotives undergo a major scheduled engine rebuild.

The EPA has initiated a pilot project with partners in the rail industry to validate the emissions reductions that could be achieved by using Tier 0+ emissions kits.⁵ Results of this project are expected in the fourth quarter of 2015, and will inform any future actions to support wider uptake of emission upgrade technology across the locomotive fleet and assist with accurately quantifying emission reductions that could result from locomotive upgrades.

⁴ See www.epa.nsw.gov.au/air/150038DieselStrategy.htm

⁵ See EPA's *Diesel and Marine Emissions Management Strategy* for details (www.epa.nsw.gov.au/air/150038DieselStrategy.htm)

5 Regulatory options for the NSW operational rail sector

5.1 Options considered and analysed for the cost-benefit analysis

The EPA considered ten potential regulatory frameworks to improve regulation of the rail sector, including the option of not changing the current framework (the base case). These ten options were set out in Appendix B of the position paper (EPA 2014). The four options considered by the EPA to be the most viable are discussed below, including an analysis of their costs and benefits. The remaining six options were considered the least effective of the original ten options. They are not included in this document, and their costs and benefits have not been assessed. Refer to Appendix B of the position paper for details about these options. The position paper's option numbering has been maintained for consistency.

5.2 Option 1: Base case

Under the base case (no change), the current framework under the POEO Act would continue, where only railway system operators are licensed.

The EPA considers the need for more on-the-ground improvements for the environment and the community, administrative inefficiencies and concerns regarding liability resulting from this current regulatory framework to be unacceptable.

Administering railway system operators' EPLs is complex and presents a range of challenges to enforcing environmental responsibilities and achieving acceptable environmental performance by the rail industry. The EPA would continue to incur high regulatory costs from difficulties with administering licences and conflated enforcement actions. The EPA is currently unable to adequately address noise and air emissions from the operational rail sector in NSW. In addition, transparency about the environmental regulation of the industry is limited, as is the community's ability to access information.

5.3 Option 2: Strengthen network access agreements

This regulatory option would retain the existing framework of regulating railway system operators through EPLs but would involve assisting or encouraging rail system operators to strengthen contractual network access agreements (e.g. by including a range of specific environmental obligations and penalties for non-compliance) to enable them to pass on their environmental obligations. This may indirectly strengthen the EPA's ability to enforce environmental requirements on rolling stock operators. However, the obligation would still rest with the licensee: the railway system operator.

This approach would not give the EPA any additional regulatory control over rolling stock operators and would continue to assign environmental enforcement roles to railway system operators. The environmental and community benefits of this model are likely to be similar to those under the existing regulatory framework, because railway system operators would still be required to control the environmental performance of rolling stock operators without the statutory powers that are available to the EPA to undertake such a task. This option would not improve transparency about environmental regulation of the industry, nor would it improve the community's ability to access information.

5.4 Option 4: Develop a new regulation under the POEO Act

Option 4 would involve developing a new regulation under the POEO Act to regulate the operation of the rail industry in NSW. The regulation would aim to include clear requirements that apply to the whole rail industry, differentiated by the type of activity being conducted where possible. Licences would not be issued to any rail industry proponents under this option.

A regulation might require railway system operators (network and rolling stock) to:

- address specific issues, such as wheel squeal and noise from shunting
- keep records of complaints and provide the EPA with records of compliance with air emission standards and any other requirements of the Regulation.

A Regulation could also make the EPA the appropriate regulatory authority for specific activities that occur on the rail network.

This approach has the potential to result in better outcomes for the environment and the community than the current approach, as it recognises that both rolling stock operators and railway system operators have environmental responsibilities. It would also improve transparency about how the rail industry is being regulated. However, a regulation is less flexible than licensing for both the EPA and operators. A licence can be tailored to the specific operation and performance history of the licensee, as well as addressing premises-specific matters.

Developing a standalone regulation and determining the arrangements for an agreed set of emission standards, noise goals and compliance requirements with industry could take two to three years to implement. This would mean that the measures under this option would be delayed until mid-2018, as would the benefits to the environment and the community and the associated costs.

This approach would also be inconsistent with how other industries are regulated in NSW. Pollution from the operation of the rail network is not substantially different to pollution from other activities regulated by the EPA, in terms of environmental risk, that it warrants a separate and unique regulation.

5.5 Option 10: Licence railway system and rolling stock operators

This option would involve issuing EPLs to:

- railway system operators for issues such as the operation, repair, maintenance and upgrading of a railway system
- rolling stock operators for the operation of rolling stock.

Using a licensing framework to achieve locomotive emission reductions and address premises, including mobile-plant (rolling stock), and specific noise issues, would enable the regulatory changes to be delivered quickly, directly and efficiently for government and industry and allow the environmental and community benefits to be brought forward, when compared with the other options considered.

This framework would be expected to result in significantly better environmental and community outcomes than the current framework, as it recognises that both rolling stock operators and railway system operators contribute to pollution impacts and therefore should be held directly accountable for their own environmental performance. This option would achieve better outcomes by licensing the entity that has management and control over the operation of the rail network and/or rolling stock. This framework would also provide an effective mechanism for addressing environmental and community issues that require joint management from railway system operators and rolling stock. The EPLs would recognise where there is a shared responsibility for environmental performance (such as wheel squeal and impacts from idling) and manage those issues accordingly. This could be done, for example, through joint monitoring programs or other collaborative pollution reduction programs imposed on both types of licence (system operator licences and rolling stock operator licences) where necessary. This option would also result in greater transparency about how the sector is regulated and better access to information for the community.

An administrative fee of 50 fee units (currently \$5950) is proposed for both railway system operations and rolling stock operations licences. This is consistent with the fee currently applicable for railway systems activities licences, although it does not adequately reflect the costs associated with regulating the operational rail network. It also doesn't distinguish

between the scale of operations being licensed, for example a large rolling stock operator compared with a small operator. As a result, the administrative fee for these activities may warrant further investigation, but any necessary amendments would be made under another regulatory reform process that considered the administration fees applied to all environment protection licensees.

6 Cost-benefit analysis

In accordance with Schedule 2 of the *Subordinate Legislation Act 1989*, this section quantifies the costs and benefits of the four options considered, including the 'do nothing' option.

6.1 Economic and financial costs

Before assessing the costs and benefits of each option, it is useful to distinguish between 'financial' and 'economic' costs. Economic costs are incurred by individuals and businesses when they use resources to achieve a given outcome, e.g. the use of fuel to move a locomotive, or a worker's time to investigate a complaint. In contrast, financial costs and benefits occur whenever money physically changes hands, e.g. paying a parking fine, and need not reflect the use of any economic resources.

An example of an economic cost would be the resources used by railway system operators to monitor noise levels of passing rolling stock. These economic costs are incurred by railway system operators, irrespective of whether they seek to recoup these costs from rolling stock operators through access agreements.

An example of a financial cost would be an administrative fee charged by the EPA to the rail industry. The fee would be a financial cost to industry, and a financial benefit to the Government, but it does not necessarily reflect the actual use of economic resources. The relevant economic cost in this case would be the resources the EPA uses to regulate the rail industry. Irrespective of whether the EPA seeks to recover these costs from industry by collecting fees, the EPA still incurs the economic cost.

The primary focus of a cost-benefit analyses is economic costs and benefits. The incidence of financial costs are normally assessed separately as a secondary consideration. The following analysis will focus on economic costs and benefits. The financial costs that relevant stakeholders incur will be addressed in a separate distributional analysis (section 6.7).

6.2 Option 1: Base case

The base case (or 'do nothing' option) would involve continuing with the current framework under the POEO Act, where the EPA only licenses railway system operators. Administering railway system operator EPLs is complex and enforcing environmental responsibilities and achieving acceptable environmental performance by the rail industry presents a range of challenges for the EPA. Under the base case, the EPA would continue to incur high regulatory costs from indirectly regulating rolling stock and pursuing complex enforcement actions. Under Option 1, the EPA would continue to be unable to adequately address noise and air emissions from the entire operational rail sector in NSW.

Overall, Option 1 would involve costs to industry and the EPA of around \$3.2 million (present value over 5 years). This comprises costs of approximately \$1.4 million to the EPA and \$1.8 million to industry over the next 5 years. The current economic impacts from rail noise would be expected to continue over the short-term, with improvements delivered from around mid-2018 at the earliest, as existing programs to reduce wheel squeal, shunting and idling are phased in (see Appendix 2). The benefit from air emission reductions has not been quantified at this time because data to support these estimates is not yet available (see Section 4.2). However, under the base case, any emission reduction mechanisms required by the EPA would not be implemented quickly or easily due to the complexities of the existing regulatory framework.

The EPA currently incurs resource costs from regulating the NSW rail industry, estimated at around \$337,000 per annum.⁶ A significant part of this total includes the resources the EPA needs to manage community complaints and incidents related to the NSW rail industry. The EPA resources involved in receiving, investigating and following-up on complaints, and dealing with incidents reported by industry, are estimated to cost the EPA the equivalent of \$71,000 per annum.⁷ This highlights the inefficiency of the current regulatory model, as around 20% of the EPA's economic costs are incurred from handling complaints and incidents.

The NSW Government supports the 'polluter-pays principle', where those who generate pollution and waste should bear the cost of containment, avoidance or abatement.⁸ The NSW Government's stated commitment to implementing the polluter pays principle extends to the recovery of administrative costs from polluters. Given the EPA currently recoups only \$23,800 per annum from operational components of railway system activities (i.e. not including rail construction licences) in the form of administration fees, the base case reflects a situation where the NSW public (via the EPA) are subsidising regulation of the rail industry by around \$313,000 each year.⁹

The EPA's regulation of the rail industry imposes compliance costs on railway system operators in the form of noise monitoring, administrative and reporting costs. Total compliance costs to railway system operators was estimated at \$399,000 per annum, while the total compliance cost for rolling stock operators was estimated at \$20,000 per annum. The total compliance costs to the rail industry are estimated at \$419,000 per annum.

Railway system operators are expected to incur resource costs from monitoring rail noise in the order of \$325,000 per annum.¹⁰ The EPA has been informed that railway system operators currently do not pass these costs on to rolling stock operators through access agreements for rail networks. However, it is understood that railway system operators would pass on these costs if the programs persisted into the future, which would be the intention if the current regulatory framework continued. Irrespective of whether rolling stock operators incur the future financial cost of noise monitoring, the economic (or resource) costs will continue to be incurred by railway system operators.

Both railway system operators and rolling stock operators are expected to incur administrative costs from following up on community complaints. Although the EPA investigates all complaints received from the community, it does not license rolling stock, and so EPA staff must relay their investigations through railway system operators. For this reason, railway system operators are expected to incur higher administration costs than rolling stock operators. If the number of complaints about the rail industry remains similar to that in the past, railway system operators as a whole could be expected to incur administrative costs from

⁶ The EPA was estimated to allocate the following labour resources to regulating railway system operators: Environment Officer Class 5 (1 FTE), Class 8 (0.5 FTE), Class 12 (0.3 FTE), Class 13 (0.2), and Class 12 (technical noise support) (0.15 FTE), Class 12 (technical air quality support) (0.1 FTE); plus 26% salary on-costs and 31% overheads; equivalent to \$337,000 per annum.

⁷ The EPA received more than 1100 rail-related complaints over the 4 years from 2010-13, an average of 279 each year. The EPA investigates each complaint it receives from the community. The EPA estimated that it allocates on average 0.6 FTE to receive, investigate and follow-up on community complaints each year (including incidents that are self-reported by licensees). Based on this resource allocation, spread across an average of 279 complaints per annum, the average complaint was expected to take an EPA officer 3.9 hours to resolve. EPA labour costs are estimated at \$47.96 per hour (equivalent to an Environment Officer Grade 5, plus 26% labour on-costs and 31% overheads). Total EPA resource costs are estimated as 279 (complaints received by the EPA environment line about the railway industry) x 3.9 hours x \$64.91 (labour costs, on-costs and overheads) = \$71,000 per annum.

⁸ *Protection of the Environment Administration Act 1991*. Section 6(2)(d)(i)

⁹ Under the base case, only four railway system operators are licensed, paying the current administrative fee of \$5950 per annum. This means the EPA is only able to recoup \$23,800 to offset the cost of regulating the industry (\$337,000).

¹⁰ Estimate based on actual cost of current programs: \$0.125m (cost to Sydney Trains from angle of attack monitoring at Beecroft) + \$0.2m (cost to ARTC from noise monitoring at Metford) = \$0.325m

investigating complaints of around \$66,000 per annum, while rolling stock operators could be expected to incur admin costs totalling \$20,000 per annum.¹¹

In addition, the four licensed railway system operators are expected to incur reporting costs totalling around \$8000 per annum from lodging annual returns and testing Pollution Incident Response Management Plans (PIRMPs).¹² Because rolling stock operators are not currently licensed, they do not incur any reporting costs.

Rail-based activities generate noise pollution that has the potential to negatively impact on people who live, work or study near train lines. This analysis estimated the economic value of rail noise impacts by using house prices as a proxy for the dis-amenity caused by rail-based noise (see Appendix 2). The value of properties affected by rail noise in NSW was estimated at \$4.6 billion per annum. It is reasonable to expect that these values would be large, however, they hold little meaning on their own. What is more important is the relative difference in these values for each option. The difference shows the relative benefits of controlling rail noise.

A summary of the estimated costs to stakeholders under Option 1 are shown in Table 1 (below).

Table 1: Estimated costs & benefits (\$m) Option 1 – Base case

	2015	2016	2017	2018	2019	5-year total*
Industry compliance costs	-0.419	-0.429	-0.440	-0.451	-0.462	-1.798
EPA regulatory costs	-0.337	-0.345	-0.354	-0.363	-0.372	-1.447
Value of rail affected properties **	4,614.0	4,620.6	4,627.2	4,634.3	4,640.9	18,969.5
Total	4,613.2	4,619.8	4,626.4	4,633.5	4,640.1	18,966.2

* Future economic values are discounted to 'present values' using a 7% discount rate to account for people's preference for having money now, rather than the promise of money at some future point; as well as the return they could have earned if the money was paid today and invested elsewhere.

** These values reflect an approximation of the rental returns from all properties affected by rail noise in NSW.

6.3 Option 2: Strengthen network access agreements

Option 2 would retain the existing framework of regulating railway system operators through EPLs, but would aim to strengthen the network operators' ability to stipulate environmental requirements on rolling stock operators by strengthening contractual network access agreements. This approach would not give the EPA any additional regulatory control over rolling stock operators and would continue to assign environmental enforcement roles to railway system operators.

Overall, Option 2 would involve costs to the rail industry and the EPA of around \$3.4 million over 5 years (present value). This comprises a cost of approximately \$1.4 million to the EPA and \$1.9 million to industry over this period. The economic impact of rail noise under this

¹¹ The cost of handling community complaints are detailed in Appendix 1. Estimates are based on the average number of complaints received per annum about the rail industry (279 p.a.); labour costs for an Environmental Manager in the rail industry (\$150,000 per annum; Kelly Australia 2012); administrative overheads (9.2% of labour costs; Sapere 2013). Complaints that relate solely to the activities of railway system operators are assumed to make-up 10% of the total, and are expected to involve an allocation of an FTE for 3 hours per complaint. The other 90% of complaints are assumed to involve a joint effort between railway system operators and rolling stock, and are expected to involve 3 hours of effort per complaint for track owners and 1 hour of effort for rolling stock.

¹² Each of the four track owners are estimated to take an average of 2 hours to check, obtain sign-off and lodge annual returns to the EPA, with similar industry labour costs and overheads as detailed above in footnote 8. Each track owner was estimated to allocate the equivalent of an FTE for 2 days to test Pollution Incident Response Management Plans, with materials costing \$750 per annum (PIRMP testing was assumed to add an extra 15 minutes onto existing HSE training for around 70 staff per annum, with an additional 5 additional pages per training manual @ \$3 per page).

option would be expected to mirror that of the base case, since there would be no change to the existing regulatory framework. The benefits from air emission reductions have not been quantified at this time because data to support these estimates is not yet available (see Section 4.2). However, under this option, any emission reduction mechanisms required by the EPA would not be implemented quickly or easily due to the persistence of the existing regulatory framework.

The EPA would not be expected to change the amount of resources it allocates to regulating the rail industry under Option 2. The EPA would not be responsible for monitoring and enforcing strengthened network access agreements, as this responsibility would fall on railway systems operators. The EPA's resource costs would remain unchanged from the base case, estimated at around \$337,000 per annum. Part of these costs would include the costs of receiving, investigating and following-up on community complaints and incidents related to the NSW rail industry, which would also be expected to remain unchanged at around \$71,000 per annum.

Given the EPA would face similar costs from regulating the rail industry under Option 2 and would continue to recoup only \$23,800 per annum in admin fees, the NSW public (via the EPA) would continue to subsidise regulation of the NSW rail industry by around \$313,000 each year.

The total ongoing costs to the rail industry are estimated to remain similar to the base case at around \$419,000 per annum. The ongoing compliance costs to railway system operators as a whole under Option 2 are estimated at around \$399,000 per annum, while ongoing compliance costs to all rolling stock operators are estimated at around \$20,000 per annum.

However, strengthening network access agreements under Option 2 would be expected to involve a one-off cost to railway system operators from amending contracts. This is assumed to cost around \$30,000 for each of the four railway system operators' licence; the equivalent of a one-off cost of \$120,000 in 2015. Otherwise, railway system operators and rolling stock operators are expected to incur similar costs under Option 2 as they do now. Overall, compliance costs to the rail industry are estimated to remain unchanged at around \$419,000 per annum, plus the additional setup cost to railway system operators of \$120,000 in 2015.

The environmental outcomes of Option 2 would be expected to be similar to those under the current regulatory framework (Option 1). This is because Option 2 would continue to rely on railway system operators to control the environmental performance of rolling stock operators, without giving them the appropriate powers or charter to undertake such a task. Given there would be no change in environmental outcomes under Option 2, the economic impacts from rail noise are expected to remain unchanged.

A summary of the estimated costs to various stakeholders under Option 2 are shown below in Table 2.

Table 2: Estimated costs & benefits (\$m) under Option 2 – Strengthen access agreements

	2015	2016	2017	2018	2019	5-year total *
Industry compliance costs	-0.539	-0.429	-0.440	-0.451	-0.462	-1.910
EPA regulatory costs	-0.337	-0.345	-0.354	-0.363	-0.372	-1.447
Value of rail affected properties	4,614.0	4,620.6	4,627.2	4,634.3	4,640.9	18,969.5
Total	4,613.1	4,619.8	4,626.4	4,633.5	4,640.1	18,966.1

* Present value using a 7% discount rate.

6.4 Option 4: Develop a new regulation under the POEO Act

Option 4 would involve developing a new regulation under the POEO Act to regulate the operation of the rail industry in NSW. The regulation would set out clear requirements that apply to the whole rail industry, including standard environmental performance requirements such as limits on specific types of noise. The introduction of a Regulation under Option 4 would remove the need for licences for all operational rail activities.

This approach would be expected to result in better environmental outcomes than the current approach, as it would recognise that both rolling stock operators and railway system operators have environmental responsibilities. However, a standalone regulation would be less flexible than a licensing regime for both the EPA and operators, as licences can be tailored to the specific operation and performance history of licensees. In addition, the approach under Option 4 would be inconsistent with how other industries are regulated in NSW, as the environmental risk from rail network pollution is not substantially different to pollution from other activities that are regulated by the EPA.

Overall, Option 4 would involve costs to the EPA and the rail industry of around \$3.3 million over 5 years (present value). This would comprise a cost of approximately \$1.5 million to the EPA and \$1.8 million to the rail industry over the 5-year period. The economic impact of rail noise would be expected to be similar to that under the base case and Option 2, with mechanisms to address rail noise delayed by 2 to 3 years while the new regulation is developed. Again, the benefits of air emission reductions were not quantified at this time because the data to support these estimates is not yet available (see Section 4.2). While a regulatory option would allow for the effective implementation of air emission reduction measures, any benefits would be delayed by up to 3 years while the new regulation was under development, including conducting appropriate consultation with affected stakeholders.

Under Option 4, the EPA would regulate both rolling stock operators and railway system operators through the regulation, and the intermittent use of regulatory instruments such as notices where required. The EPA would be expected to incur a one-off cost from setting-up and implementing a new regulation, estimated at \$176,000.¹³ The process of establishing a new regulation would be expected to be finalised in mid-2018, with similar circumstances to that under the base case persisting until the new regulation was implemented. During this period, the regulatory costs to the EPA would mirror that of the base case: \$337,000 per annum, but with an additional cost from setting-up the Regulation of \$176,000 spread over 3 years. Once the new Regulation was introduced, the EPA would be expected to allocate less resources to monitor and enforce the rail industry compared to the base case, with costs estimated at around \$299,000 in 2018.¹⁴ Part of these costs would include the EPA's costs from receiving, investigating and following-up on community complaints about the NSW rail industry. These admin costs are estimated at \$60,000 per annum, given that the EPA would be expected to incur fewer costs from being able to regulate rolling stock operators directly under Option 4.¹⁵

¹³ The EPA would be expected to allocate the equivalent of 0.1 FTE (a total of 24 days) at a grade of Environment Officer level 12 (EO12), 0.3 of an FTE at an EO11 level, 0.3 of an FTE in legal division to draft the Regulation at the EO9 level, 0.2 of an FTE in Parliamentary Counsel's Office equivalent to an EO12; plus 0.1 of an FTE in total for experts in air and noise policy equivalent to an EO11 level. Adding on-costs of 26% and overheads of 31% yields a cost of \$176,000, assumed to be spread over 3 years.

¹⁴ The EPA is estimated to allocate the following labour resources to regulating railway system operators under Option 4: Environment Officer Class 5 (0.5 FTE), Class 8 (0.5 FTE), Class 12 (0.3 FTE), Class 13 (0.2), and Class 12 (technical noise support) (0.15 FTE), Class 12 (technical air quality support) (0.1 FTE); plus 26% salary on-costs and 31% overheads; equivalent to \$299,000 per annum in 2018.

¹⁵ It was assumed that Option 4 would involve the same number of complaints as at present: averaging 279 each year. Having direct access to rolling stock operators through a regulation, each complaint would be expected to take only 2.5 hours of EPA staff time to resolve. With labour costs of \$54.64 per hour, plus on-costs of 26% and 31% overheads, equating to a total cost to the EPA of around \$60,000 per annum.

Under Option 4 the EPA would no longer collect admin fees as operators in the rail industry would no longer be licensed. This means the EPA would not be able to recoup any of the costs from regulating the rail industry, with the NSW public (via the EPA) effectively subsidising the regulation of the NSW rail industry by \$396,000 per annum.¹⁶ Once the new regulation takes effect in mid-2018, this subsidy (along with EPA costs) would be expected to fall, reaching around \$299,000 per annum in 2018.¹⁷

Until the new regulation is introduced under Option 4, railway system operators and rolling stock operators would be expected to face similar compliance costs to those under the base case, estimated at a total of around \$419,000 per annum. This includes total costs to all four railway system operators of \$399,000 and total costs to all 17 rolling stock operators of \$20,000 (see section 6.2). But when the new Regulation takes effect in mid-2018, the compliance costs to the rail industry as a whole would be expected to rise to around \$466,000 per annum. Railway system operators would be expected to face total costs of \$359,000 from mid-2018 made up of: noise monitoring costs of around \$325,000 per annum;¹⁸ reporting costs of around \$8,000 per annum;¹⁹ and admin costs from handling community complaints of around \$26,000 per annum.²⁰ Option 4 would be expected to impose costs on the 17 rolling stock operators totalling \$73,000 per annum. This is made-up of admin costs from responding to community complaints of around \$39,000 per annum,²¹ and the costs of reporting to the EPA estimated to total around \$34,000 per annum.²²

Option 4 would be expected to result in better environmental outcomes than the base case as it would recognise the environmental responsibilities of both rolling stock operators and railway system operators. It would be reasonable to expect that Option 4 would enable the EPA to regulate the impacts of air emissions from rail more effectively. However, until the current air emissions pilot project between the EPA and the rail industry has concluded (see Section 5), it is not possible to accurately quantify the air emission reductions that might be expected if locomotives were required to be retrofitted with emission kits. Nor is it possible to estimate the avoided damage costs from reducing air pollution. As a result, the costs and benefits of implementing air pollution control measures have not been quantified.

¹⁶ In year 1, the EPA would continue to face the same regulatory costs as under the base case (\$337,000) with an additional cost from setting-up the new regulation (\$176,000 spread over 3 years). Total of \$396,000 = \$337,000 + (\$176,000 / 3)

¹⁷ See footnote 11 for breakdown.

¹⁸ Monitoring costs were estimated based on a continuation of actual costs from previous programs: \$125,000 (cost to Sydney Trains from angle of attack monitoring at Beecroft) + \$200,000 (cost to ARTC from noise monitoring at Metford).

¹⁹ Reporting costs are estimated at around \$2000 per operator, per annum. Although there would be no licensing under Option 4, and so no requirement for industry to lodge annual returns or test PIRMPs, there would undoubtedly be some form of reporting costs from imposing a Regulation on industry. For instance, the EPA may require industry to maintain records and supply them on a regular basis (or by request). However, while reporting costs are largely unknown under Option 4, they are assumed to be broadly similar to those faced at the moment: estimated at around \$2000 per licensee (see footnote 11 for a breakdown). The four track owners would then be estimated to incur total reporting costs of around \$8000 per annum under Option 4.

²⁰ The costs to railway system operators from handling complaints under Option 4 are detailed in Appendix 1. In brief, admin costs to railway system operators are estimated based on an allocation of around 3 hours of staff time for the 10% of complaints (28) that would be expected to relate solely to their own operations, and another 1 hour of staff time for the 90% of complaints (251) that would be expected to involve the joint effort of railway system operators and rolling stock. Labour costs are estimated at \$150,000 p.a. (Kelly Australia 2012) with an additional 9.2% for admin overheads (Sapere 2013).

²¹ The costs to rolling stock operators from handling complaints under Option 4 are detailed in Appendix 1. They are estimated based on an allocation of around 2 hours of staff time for the 90% of complaints (251) that would be expected to relate to the operation of both railway system operators and rolling stock. Labour costs are estimated at \$150,000 p.a. (Kelly Australia 2012) with an additional 9.2% for admin overheads (Sapere 2013).

²² Rolling stock would be expected to face similar reporting costs to railway system operators under Option 4, estimated to be around \$2000 per operator. With 17 rolling stock operators, their total reporting costs are estimated at around \$34,000 per annum under Option 4.

There are also difficulties associated with accurately estimating the reduction in rail noise from programs that reduce wheel squeal, shunting and idling (see Appendix 2). To be conservative, Option 4 was assumed to deliver no additional rail-noise benefits compared to the base case.

A summary of the costs and benefits to various stakeholders involved with Option 4 are shown below in Table 3.

Table 3: Estimated costs & benefits (\$m) under Option 4 – EPA regulates all railway activities

	2015	2016	2017	2018	2019	5-year total *
Industry compliance costs	-0.419	-0.429	-0.440	-0.466	-0.478	-1.821
EPA regulatory costs	-0.396	-0.404	-0.414	-0.299	-0.306	-1.507
Value of rail affected properties	4,614.0	4,620.6	4,627.2	4,634.3	4,640.9	18,969.5
TOTAL	4,613.2	4,619.7	4,626.3	4,633.5	4,640.1	18,966.1

* Present value using a 7% discount rate.

6.5 Option 10: License railway system and rolling stock operators

Option 10 would involve the EPA issuing EPLs under the POEO Act to railway system operators and rolling stock operators. This framework would be expected to result in significantly better environmental outcomes than the current framework, as it would recognise that both rolling stock operators and railway system operators contribute to pollution impacts and so need to share the responsibility for improving environmental outcomes. Option 10 would achieve better outcomes by licensing the entity that has management and control over the relevant activity. This framework would also provide an effective mechanism for addressing environmental issues that require joint management from railway system operators and rolling stock.

Overall, Option 10 would involve costs to the rail industry and EPA of around \$3.9 million over 5 years (present value). This comprises a cost of approximately \$2 million to the EPA and \$1.9 million to the rail industry over the 5 year period. Option 10 would also deliver a benefit from reducing rail noise estimated at around \$1.3 million over 5 years, compared to the base case. Note that the benefit of air emission reductions has not been quantified at this time because data to support these estimates is not yet available (see Section 4.2). However, the regulatory structure proposed under Option 10 will enable proposed air emission reduction mechanisms to be implemented quickly via a licensing approach, which should result in air emission reductions sooner than under any of the other proposed options.

Under Option 10, the EPA would be expected to allocate more resources to monitor and enforce the rail industry compared to the base case, as it would need to regulate both rolling stock operators and railway system operators through EPLs. These costs are estimated at around \$460,000 per annum.²³ However, given the EPAs direct regulation of rolling stock operators, Option 10 would be likely to see the EPA incurring fewer indirect costs from receiving, investigating and following-up on community complaints compared to the base case. These costs are estimated at around \$60,000 per annum.²⁴

²³ The EPA would be expected to allocate the following labour resources to regulating railway system operators under Option 10: Environment Officer Class 5 (1 FTE), Class 8 (1 FTE), Class 10 (0.3 FTE), Class 12 (0.3 FTE), Class 13 (0.2), and Class 12 (technical noise support) (0.15 FTE), Class 12 (technical air quality support) (0.1 FTE); plus 26% salary on-costs and 31% overheads; equivalent to \$460,000 per annum.

²⁴ It was assumed that Option 10 would involve the same number of complaints as present: an average of 279 each year. But since the EPA would have direct access to rolling stock operators as licensees, each complaint would be expected to take only 2.5 hours of staff time. With labour costs of \$54.64 per hour, plus on-costs (26%) and overheads (31%), this equates to admin costs to the EPA of around \$60,000 per annum.

Under Option 10, the EPA would collect administrative fees from a wider base as it would licence both railway system operators and rolling stock operators. This would mean that the EPA would be able to recoup more of its costs from regulating the rail industry, estimated at around \$460,000 per annum. If admin fees remained unchanged, the EPA would be able to collect fees of around \$125,000 a year from all 21 licensees. However, the additional costs to the EPA would be more than the increase in the fee base, meaning that the public subsidy to the NSW rail industry would increase to around \$335,000 per annum under Option 10.

Option 10 would be expected to involve compliance costs to railway system operators and rolling stock, totalling around \$453,000 per annum. This includes total costs to the four railway system operators of around \$359,000 per annum, and total costs to the 17 rolling stock operators of around \$94,000 per annum. Railway system operators as a whole would continue to face noise monitoring costs of around \$325,000 per annum,²⁵ with reporting costs of around \$8000 per annum,²⁶ and admin costs from handling community complaints of around \$26,000 per annum.²⁷ Railway system operators do not currently pass noise monitoring costs on to rolling stock operators through access agreements. However, it is understood that railway system operators would pass on these costs if the programs persisted into the future, as is the intention under Option 10. Irrespective of whether rolling stock operators incur the future financial cost of noise monitoring, the economic (or resource) costs will continue to be incurred by railway system operators.

Under Option 10, rolling stock operators would be regulated by the EPA and so would be expected to submit annual returns and introduce (and test) PIRMPs. This would impose annual reporting costs on rolling stock operators (as a whole) of around \$54,000 per annum.²⁸ Rolling stock operators would also be expected to incur admin costs from handling complaints, expected to total around \$40,000 per year.²⁹

Option 10 would have the potential to deliver greater improvements in environmental performance compared to the base case related to air and noise pollution. However, until the conclusion of the current joint EPA-rail industry air emissions pilot project (see Section 5) on feasible control options, it will not be possible to accurately quantify the expected reduction in air emissions from locomotives if they are required to be retrofitted with emission kits. This also means that the avoided damage costs from reducing air pollution remain unquantified in the short-term. The costs and benefits of implementing air pollution control measures were not able to be quantified.

The difficulties with accurately assessing the potential of rail noise reductions (Appendix 2), mean that the benefits from addressing rail noise under Option 10 were estimated using a conservative measure of noise mitigation. This approach was taken so as not to overstate the scale of benefits, and to illustrate that the potential community benefits from reducing rail noise

²⁵ As detailed for the other options.

²⁶ As detailed for the other options.

²⁷ The costs to railway system operators from handling complaints under Option 10 are detailed in Appendix 1. Admin costs to railway system operators were estimated based on the allocation of around 3 hours of staff time for the 10% of complaints (28) that would be expected to relate solely to their own operations, with another 1 hour of staff time for the 90% of complaints (251) that would be expected to involve the joint effort of railway system operators and rolling stock operators. Industry labour costs are estimated at \$150,000 p.a. (Kelly Australia 2012) with an additional 9.2% for admin overheads (Sapere 2013).

²⁸ Each of the 17 rolling stock operators are estimated to take an average of just over 2 hours to check, obtain sign-off and to lodge annual returns to the EPA. Rolling stock operators are also expected to allocate 1 FTE for 8 days to set up a Pollution Incident Response Management Plan, with 1 FTE for an additional 2.2 days each year to test it. Material costs for testing the PIRMP are estimated at \$750 per annum, while industry labour costs are assumed to be \$150,000 p.a. (Kelly Australia 2012) with 9.2% admin overheads (Sapere 2013). See footnote 11 for a breakdown of PIRMP costs.

²⁹ The costs to rolling stock operators from handling complaints under Option 10 are detailed in Appendix 1. They are estimated based on the allocation of around 2 hours of staff time for the 90% of complaints (251) that would be expected to relate to the operation of both railway system operators and rolling stock. Industry labour costs are estimated at \$150,000 p.a. (Kelly Australia 2012), with an additional 9.2% for admin overheads (Sapere 2013).

are significant. The benefits to the community from the noise reduction measures under Option 10 are estimated at \$1.3 million over 5 years (present value), compared to the base case.

A summary of the quantified costs and benefits to various stakeholders under Option 10 are detailed below in Table 4.

Table 4: Estimated costs & benefits (\$m) under Option 10 – EPA licences all rail activities

	2015	2016	2017	2018	2019	5-year total*
Industry compliance costs	-0.453	-0.464	-0.476	-0.488	-0.500	-1.945
EPA regulatory costs	-0.460	-0.472	-0.483	-0.496	-0.508	-1.977
Value of rail affected properties	4,614.5	4,621.1	4,627.7	4,634.3	4,640.9	18,970.8
TOTAL	4,613.6	4,620.1	4,626.7	4,633.3	4,639.9	18,966.9

* Present value using a 7% discount rate.

6.6 Summary of costs and benefits

The previous sections identified the costs and benefits of four options to manage the environmental impacts of the rail industry in NSW, including Option 1, the base case 'do nothing' option. Table 5 compares the quantifiable costs and benefits of these four options.

It is apparent that the base case involves the least costs to industry and the EPA, but is also associated with the lowest values for rail-affected properties – i.e. the impacts of rail noise are expected to be largest under Options 1, 2 and 4. The costs to industry and the EPA would be expected to be slightly higher under Option 10, but so too would be the value of rail affected properties in NSW. In addition, this option is likely to have greater environmental and community benefits regarding noise and air emissions than Option 1 and Option 2 and these benefits would be realised faster than under Option 4, due to a more efficient regulatory framework.

It is also apparent from Table 5 that the costs to the EPA and the rail industry under each option do not change by much, especially given that these values are totalled over a 5-year period.

Table 5: Summary of costs & benefits (\$m) all options

Costs & Benefits over 5 years (Present Values)	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.798	-1.910	-1.821	-1.945
EPA regulatory costs	-1.447	-1.447	-1.507	-1.977
Value of rail affected properties	18,969.5	18,969.5	18,969.5	18,970.8
TOTAL costs	18,966.3	18,966.1	18,966.1	18,966.9

Table 6 explores the change in costs and benefits relative to the current situation (the base case). Table 6 shows that adopting Options 2 or 4 would involve small net costs of \$0.1 million compared to the base case (5-year present value). Whereas Option 10 would deliver a modest net social benefit of around \$0.6 million over 5 years (present value).

On this basis, Option 10 should be considered the 'preferred option' for managing the environmental impacts of the NSW rail industry, since it delivers the greatest net benefits of all options, including the base case. Option 10 would involve a modest increase in compliance

costs to industry of around \$0.1 million (over 5 years), a small increase in regulatory costs to the EPA of around \$0.5 million (over 5 years) and additional community benefits from reduced rail noise of around \$1.3 million (over 5 years).

Table 6: Incremental costs & benefits (\$m) compared to the base case (Option 1)

Costs & Benefits over 5 years (Present Values)	Option 2	Option 4	Option 10
Industry compliance costs	-0.112	-0.023	-0.147
EPA regulatory costs	0.000	-0.060	-0.529
Value of rail affected properties	0.000	0.000	1.334
TOTAL costs	-0.112	-0.083	0.658

Note the costs and benefits of reducing air emissions have not been quantified for any of the options, because the specific measures that may be implemented have not yet been identified. The feasibility of any measures to reduce air emissions will need to be proven before they can be implemented, including a thorough testing of the outcomes for air quality, and an assessment of their costs and benefits.

In addition, the costs and benefits of reducing noise emissions remain largely unquantified. The quantified benefits from reducing rail noise are based on a conservative assumption about noise mitigation that was used to illustrate the potential benefits from the EPA being able to directly regulate rolling stock operators. These estimates are expected to significantly underestimate the benefits from addressing rail noise in coming years.

The adoption of any measures to reduce air and noise emissions from the rail industry in the future will depend on a rigorous assessment of the pros and cons of each measure, with input from the industry and the broader community.

6.7 Distributional analysis

This section discusses the change in financial costs (who actually pays) under the preferred option (Option 10), compared to the current situation (the base case). The four broad stakeholder groups considered are railway system operators, rolling stock operators, the EPA and the wider NSW community.

Noise monitoring costs

Based on advice from industry contacts, railway system operators do not currently pass the economic costs of monitoring rail noise on to rolling stock operators through network access agreements. However, the same advice suggests that these costs would be passed on in future years if monitoring requirements are made permanent. So having assumed that railway system operators would begin to pass on these costs in future years under all options, Option 10 would not represent a change in who pays the financial costs of monitoring compared to the base case. Noise monitoring was estimated to cost around \$325,000 in 2014, suggesting that if these costs were shared equally among the 17 rolling stock operators, the cost to each operator would be less than \$20,000 per annum.

The cost of handling complaints

At present, for the EPA to investigate community complaints and self-reported incidents it must liaise with railway system operators, which then contact rolling stock operators. The railway system operators then report back to the EPA and the EPA liaises with the public about the resolution of complaints. This process is currently estimated to cost the EPA around \$71,000 a year, the 4 railway system operators a total of around \$66,000 a year, and the 17 rolling stock operators a total of around \$20,000 a year.

Under the preferred option, the EPA would be able to liaise directly with rolling stock operators to investigate community complaints and self-reported incidents. This is expected to reduce the costs of handling complaints to railway system operators, which would be expected to incur admin costs totalling \$34,000 per annum under Option 10. This reflects a total saving of \$20,000 per annum or around \$5000 per licensee. Option 10 would also be expected to reduce the EPAs annual costs from handling complaints to around \$60,000 per annum, a saving of around \$11,000. However, because Option 10 would involve the EPA dealing directly with rolling stock operators, the costs of handling complaints for the 17 rolling stock operators would be expected to rise to around \$40,000 per annum. This reflects a total increase of \$20,000 per annum, equivalent to less than \$1200 per rolling stock operator.

Reporting costs

At present, only railway system operators are required to report to the EPA by lodging annual returns and preparing and implementing Pollution Incident Response Management Plans (PIRMPs). This is estimated to cost the four railway system operators a total of around \$8000 per annum.

Under the proposed option, the costs to railway system operators would remain unchanged. However, rolling stock operators would also have to both prepare and test PIRMPs, as well as lodge annual returns to the EPA, with total costs to rolling stock operators expected to be an additional \$54,000 per annum, or an average of \$3200 per operator.

The administrative cost of regulating the rail industry

At present, the EPA is estimated to incur costs from regulating the NSW rail industry of around \$337,000 per annum. At the same time, the EPA only collects around \$24,000 in licensing fees. This reflects a situation where the NSW community (via the EPA), currently subsidises the regulation of the NSW rail industry by around \$313,000 per annum.

Under Option 10, the EPA would be expected to face higher annual costs of around \$460,000, and if it applied the same admin fees to all 21 licensees, the EPA could expect to collect fees of around \$125,000 each year from the NSW rail industry. The additional cost to the EPA would be expected to outweigh the increase in the fee base, meaning the public subsidy for the regulation of the NSW rail industry would increase slightly, to around \$335,000 per annum.

7 Conclusion

Analysis undertaken within this CBA demonstrates that Option 10 is the preferred option as it has the greatest net benefit, albeit a marginal net benefit, of all options considered. However, Option 10 should also be considered the preferred option because of the additional benefits that would result, but which have not been able to be quantified because the required information is not yet available, e.g. air quality and noise emission data.

An additional important benefit of this option is the expedited timeframe in which improvement measures and their associated benefits could be realised, compared with the other options considered. This would be facilitated by the more efficient and flexible regulatory framework proposed under Option 10.

For example, the EPA is currently exploring a range of measures that could be implemented to improve noise and air emissions from the rail sector (see Section 5). These measures could be implemented for any of the options considered within this CBA, however, the ease of implementation, effectiveness and the amount of time before benefits would be realised would vary across the options. When considering these factors, Option 10 would provide the most effective framework for implementing improvement measures, as it would establish a direct licensing approach and improvement measures could be implemented immediately and their benefits could be realised sooner.

In contrast, the same measures implemented under the other options would likely have longer implementation timeframes, resulting in delayed benefits. For example, any proposed improvement measures would not be implemented for a number of years under Option 4 while a new Regulation was developed, and it would be difficult to successfully implement many measures under Option 2 due to the persistence of the indirect regulation model.

The framework proposed under Option 10 would result in greater accountability from all operators within the rail industry and would also provide greater transparency about the environmental regulation of the industry, due to improved community access to information. It would result in a modest increase in costs for both the EPA and industry, however, it is considered that the benefits quantified within this CBA, as well as the additional benefits described would outweigh these costs across the board.

Appendix 1: Cost-benefit analysis assumptions

Discount rates

Default:	7%
Low:	10%
High:	4%

Source: NSW Treasury (2007)

Expected real economic growth (per annum)	2.5%
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Source: based on point estimate in RBA (Aug 2014) Statement on Monetary Policy, Economic Outlook

Rental rate of return (all of NSW)	4.0%
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Assumed rental rate of return lower than mortgage rate

Forecast inflation (CPI)	3.0%
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Mid-point of RBA range for forecast headline inflation in Aug 2014 statement of Monetary Policy (Table 6.1)

Rail industry stakeholders

Number of track owners licensed in NSW *	4
Total number of rolling stock operators in NSW *	29
Estimated number of rolling stock operators requiring licence for first time **	17

* EPA (2014) Position Paper (p.2)

** EPA pers. comm. (2014)

Admin Fees units

Railway System Activities	50				
Year	2014-15	2015-16	2016-17	2017-18	2018-19
Admin Fee per unit	119	122	125	129	133
Admin Fee - Railway System Activities	\$5,950	\$6,100	\$6,250	\$6,450	\$6,650

Labour costs

Assumed that real wages do not continue to fall, but instead are kept fixed	
EPA labour on-costs *	26%
EPA staff overheads *	31%
EPA Overheads + On-costs	57%
Environment Officer Grade 5 (EP05) - per hour **	\$41.34
Environment Officer Grade 8 (EP08) - per hour **	\$50.85
Environment Officer Grade 9 (EP09) - per hour **	\$54.64
Environment Officer Grade 10 (EP10) - per hour **	\$58.49
Environment Officer Grade 11 (EP11) - per hour **	\$62.48
Environment Officer Grade 12 (EP12) - per hour **	\$66.55
Environment Officer Grade 13 (EP13) - per hour **	\$70.42

Assumed that real wages do not continue to fall, but instead are kept fixed	
Rail industry labour costs p.a. (Environment manager) ***	\$150,000
Rail Industry overheads as a % of labour costs ****	9.2%

* EPA pers. comm. (2015)

** EPA/OEH rates and allowances book

*** Kelly Australia (2012), p.22

**** Sapere (2013), p.12

Growth in the value of housing

Year	2015	2016	2017
Sydney *	6.3%	6.3%	6.3%
Other NSW **	3.2%	3.2%	3.2%

* BIS Shrapnel (2014) Australian Housing Outlook, cited by SMH: "predicted price rise of 19% over next 3 years"

** assume 1/2 growth of metro prices

Community complaints about the rail industry

Average number of complaints per annum *	279	
Estimated number of complaints related solely to track owners	28	(Assumed to be 10%)
Estimated number of complaints to track owners & rolling stock	251	(Assumed to be 90%)
Option 1 & Option 2: EPA has to go through track owners to resolve / investigate complaints		
• Complaints related solely to track owners	28	
○ Average time taken to investigate each complaint	3.0	hours
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour (all 4 track owners)	\$6,580	per annum
• Complaints related to both track owners & rolling stock	251	
○ Average time taken per complaint - track owners	3.0	hours
○ Average time taken per complaint - rolling stock	1.0	hours
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour - (all 4 track owners)	\$59,216	per annum
○ Opportunity cost of labour - (all 17 rolling stock)	\$19,739	per annum
• Total admin costs (all 4 track owners)	\$65,796	per annum
• Total admin costs (all 17 rolling stock)	\$19,739	per annum
Option 4: EPA regulates railway system operators and rolling stock directly		
• Complaints related solely to track owners	28	
○ Average time taken to investigate each complaint	2.0	hours
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour - (all 4 track owners)	\$4,386	per annum
• Complaints related to both track owners & rolling stock	251	
○ Average time taken per complaint - track owners	2.0	hours
○ Average time taken per complaint - rolling stock	2.0	hours

Review of regulation of railway systems activities: Cost-benefit analysis

Average number of complaints per annum *	279	
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour - (all 4 track owners)	\$39,477	per annum
○ Opportunity cost of labour - (all 17 rolling stock)	\$39,477	per annum
• Total admin costs (all 4 track owners)	\$43,864	per annum
• Total admin costs (all 17 rolling stock)	\$39,477	per annum
Option 10: EPA can licence railway system operators and rolling stock directly		
• Complaints solely related to track owners	28	
○ Average time taken to investigate each complaint	3.0	hours
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour - (all 4 track owners)	\$6,580	per annum
• Complaints related to both track owners & rolling stock	251	
○ Average time taken per complaint - track owners	1.0	hours
○ Average time taken per complaint - rolling stock	2.0	hours
○ Labour costs (incl. on-costs)	\$78.54	per hour
○ Opportunity cost of labour - (all 4 track owners)	\$19,739	per annum
○ Opportunity cost of labour - (all 17 rolling stock)	\$39,477	per annum
• Total admin costs (all 4 track owners)	\$26,318	per annum
• Total admin costs (all 17 rolling stock)	\$39,477	per annum

* Average annual number of complaints received by the EPA about the rail industry between 2010 and 2013 (EPA analysis of complaints data)

Appendix 2: Valuing noise impacts

Noise impacts from rail activity

Freight operations are a major source of rail noise. New diesel locomotives generally trade off lower noise for increased power, so any net noise reduction from new locomotives is not realised. Freight rail activity is expected to increase substantially over coming years. In 2013, the NSW Government released the Freight and Ports Strategy, which set out a plan to meet the freight task needed to support strong growth in the State (TfNSW 2013). The expected increase in NSW freight rail activity is reproduced below in Table 7.

Table 7: Estimated and forecast freight volumes (kilotonnes) on key rail corridors

Rail Corridor	2011	2031	% Change	Annual average
Hunter Valley	107,469	261,689	143.5%	7.18%
Illawarra	9,566	19,602	104.9%	5.25%
Main West	8,576	17,563	104.8%	5.24%
Short North	8,513	16,530	94.2%	4.71%
Main South	5,380	11,302	110.1%	5.50%
North Coast	1,538	3,268	112.5%	5.62%
Metropolitan Freight Network ⁽¹⁾	300,000	2,000,000	566.7%	28.33%
TOTAL	441,042	2,329,954		21.41%

(1) Metropolitan Freight Network activity measured in number of containers p.a. based on current and expected train movements Source: TfNSW (2013), Table 5 (p.190) and p.27

This expected increase in rail freight activity presents a significant challenge for the EPA and Transport for NSW in managing noise levels along freight lines across NSW. The EPA is working with Transport for NSW to identify measures that could be used to reduce the noise impact from expanding freight activity.

As a preliminary measure of how the freight expansion in Table 7 might impact on noise levels, the EPA commissioned a study that estimated the noise increase resulting from the expansion of the Port Botany Freight Terminal (Heggies 2007). Expanding the Port Botany Freight Terminal was estimated to increase noise levels along the Metropolitan Freight Line by 3-6 dB- LA_{eq} above 2006 levels by 2021 (Heggies 2007). The mid-point estimate from this study (a 4.5dB increase, equivalent to a 0.3 dB increase per year between 2006 and 2021) was used as a proxy measure for how an expansion in freight rail activity might be expected to increase noise levels along major NSW rail corridors.

This proxy was used to measure the relative increase in rail noise as a result of the expected growth in freight activity identified in Table 7. This growth was applied to the starting point: an estimate of the current average freight noise level along the North Sydney Freight corridor. Together, these provide an estimate of the expected increase in freight rail noise along the 7 major rail corridors of NSW (Table 8).

Table 8: Expected noise level along NSW freight corridors: Base case

Noise levels dB(A) LAeq	2014**	2015	2016	2017	2018	2019
Metro	55.2	55.5	55.8	56.1	56.4	56.7
Hunter Valley	55.2	55.3	55.4	55.5	55.5	55.6
Illawarra	55.2	55.3	55.3	55.4	55.5	55.5
Main West	55.2	55.3	55.3	55.4	55.5	55.5
Short North	55.2	55.3	55.3	55.4	55.4	55.5
Main South	55.2	55.3	55.4	55.4	55.5	55.5
North Coast	55.2	55.3	55.4	55.4	55.5	55.5

** In the absence of better data on average freight noise levels along each NSW rail corridor, the same estimate was used from SLR (2012, p.28) of the Northern Sydney Freight Corridor

Valuing noise impacts

Noise impacts can be valued in terms of health impacts, annoyance, or through the impact on the value of properties.

The most common method for valuing the impact of noise has been through its impact on property values. Property values reflect a range of characteristics, such as the number of bedrooms and bathrooms, land area, and the proximity to the beach, highway or railway line. 'Hedonic housing price studies' analyse how the value of a property changes with a range of characteristics. By comparing the price of otherwise equivalent properties, these studies can net-out the change in value from a change in a specific attribute such as land area, air pollution or transport noise. And since property values and characteristics are observable they are generally considered more reliable than estimates of health or amenity impacts.

For this reason, hedonic house price studies were used to estimate the impact of rail noise for this analysis. It makes intuitive sense that a property affected by rail noise would generally fetch a lower price than an otherwise identical property on a quiet street. It also makes sense that the price discount would increase with the change in rail noise.

Various studies have valued the impact of rail noise on property prices. Most studies recognise that proximity to public transport can attract a price premium, but that this premium begins to reverse in closer proximity to rail lines and stations. For properties very close to railway lines, values can be discounted by anywhere between 3.5% and 9.8% (Table 9).

What is more important for this analysis is how property values are expected to change with an increase in rail noise. The hedonic studies of Sydney property prices have used the proximity to a railway line or station as a proxy for rail noise, rather than measuring noise directly. However, two international studies measured rail noise directly and found that for each dB increase in rail noise, property prices fell by between 0.11% and 0.7%.

This analysis uses conservative estimates for both the property discount from proximity to railway lines and the impact of increasing rail noise. Consistent with Brandt et al (2011), those properties located less than 0.25km from a railway line were taken to be 'rail-noise affected'. Consistent with the Sydney study by Herath (2014), rail-affected properties were estimated to be worth (on average) 3.8% less than similar properties elsewhere.³⁰ This is consistent with the 3.5% estimate by Brandt et al (2011). In keeping with estimates by Brandt et al (2011), each dB increase in rail noise was expected to further reduce 'rail-affected' property values by

³⁰ The 6.2% discount on properties located within 400 metres of a train station was scaled down to 'rail-affected' properties (250 metres from a railway line): $6.2\% \div 400\text{m} \times 250\text{m} = 3.875\%$.

0.11%. The fall in property values were then quantified using a rental rate of return of 4% per annum.

Table 9: previous hedonic price studies valuing the impact of rail noise

Study	Impact of rail noise on housing value
UNSW (2003)	Sydney study found that for each kilometre closer to a train station/line, property values decrease by 0.74%
Hill & Melser (2008)	Sydney study found that for each kilometre closer to a railway station, property prices fell by anywhere between 5.2% (western Sydney) and 9.8% (central Sydney).
Abelson (2013)	Sydney study found that for each 1% decrease in the distance to a train station property values decrease by 0.13%
Herath (2014)	Sydney study found that properties within 400m of a train station were 6.2% cheaper than similar properties elsewhere
Andersson (2010)	Swedish study found that a 1 dB increase in rail noise was associated with a 0.4% - 0.7% decrease in property values
Brandt et al (2011)	German study found that properties <0.25km from a railway line sell for 3.5% less than otherwise, and that each dB(A) increase in rail noise is associated with a 0.11% reduction in house value

The increase in noise levels identified in section 9.1 were combined with the above valuations to estimate the change in values under each option, compared to the base case of unabated freight expansion. It should be noted that properties in Sydney's CBD, eastern and northern suburbs that are not affected by the NSW freight network were excluded from the analysis of noise impacts.

Potential noise abatement measures

Under Option 10, the EPA would have more direct regulatory oversight of rolling stock operators and so would be in a position to introduce some problem- and location-specific noise reduction measures. While the following measures are in no way definitive, they do serve to illustrate the types of programs the EPA could introduce to reduce rail noise.

One scenario would be for the EPA to impose a wheel squeal Pollution Reduction Plan (PRP) on a railway system operator to undertake ongoing monitoring to identify rolling stock that causes wheel squeal. This information would then be passed on to offending rolling stock operators. The EPA could also impose related PRPs on rolling stock operators requiring them to take any necessary action to address identified 'problem' rolling stock so that wheel squeal is mitigated. Monitoring could be strategically located in areas where wheel squeal occurs in proximity to residential areas. Early indications suggest that retrofitting locomotives (to address the 'angle of attack') along with rail lubrication are effective solutions to wheel squeal. These actions have the potential for noise reduction benefits across the state.

This scenario would require retrofitting and/or additional maintenance costs to rolling stock operators to fix any identified problems. However, early indications suggest that addressing wheel squeal can lead to long-term cost savings in fuel and on-going maintenance. Railway system operators and the EPA would not incur any additional costs as an appropriate monitoring program is currently underway. However, because this is a localised issue, it is difficult to estimate the scale of this noise reduction across the NSW rail network.

Another scenario could be the introduction of a PRP where the EPA requires railway system operators to undertake ongoing noise monitoring to identify the noisiest class of locomotives, and pass this information onto the offending rolling stock operators.

A related PRP could then be imposed on rolling stock operators requiring them to take any necessary action to mitigate noise from the identified locomotives, which would result in noise reductions across the NSW rail network.

This scenario could impose additional costs on rolling stock operators to identify noise mitigation solutions. Railway system operators and the EPA would incur no additional costs as a similar monitoring program is already in place. The benefit of this measure in terms of noise reduction across the NSW rail network is difficult to estimate.

Another scenario would involve targeting 'idling hotspots', where locomotives sit idling in one particular location for extended periods (i.e. up to several hours) in residential areas, including at night. This may be because the railway systems operators need to prioritise passenger rail traffic over freight traffic, for example. This causes issues including elevated noise levels and diesel exhaust emissions. Under the base case, the EPA is required to manage the issue by requiring railway system operators to negotiate with rolling stock operators to turn off idling locomotives or negotiate with railway systems operators and rolling stock operators to identify more suitable locations for locomotives. However, this approach is ineffective because system operators are reluctant to get involved in rolling stock operating procedures.

Under the a framework proposed in Option 10, the EPA could license rolling stock operators directly and hold them accountable for idling for extended periods in residential areas. This would allow the EPA to directly liaise with operators, making negotiations more efficient and effective than they are when going through a third party. Under this scenario, the EPA could expect to significantly reduce noise and air emissions from idling at specific locations. Through the change in the behaviour of rolling stock operators, this scenario could lead to wider environmental improvements as operators apply their improved awareness of idling management issues across the entire area of their operations. This scenario would result in cost savings to rolling stock operators from reduced fuel consumption, improved air quality from reduced diesel emissions and reduced noise impacts for affected properties.

Measuring the impact of noise mitigation measures

The changes to the Rail Regulation proposed in Options 4 and 10 would make it easier for the EPA to enforce existing provisions to reduce noise emissions from rolling stock. Examples are provided above.

However, difficulties arise when reconciling the noise impacts of specific regulatory measures with the information needed for an economic valuation of the reduction in rail noise.

The economic impact of rail noise on property values (section 9.2) depends on people's perception of rail noise and their subsequent willingness to pay for a property considering the full set of property attributes, their income, and other suitable properties available on the market. Previous studies suggest that buyers' personal valuation includes a discount for properties in close proximity to a railway line, which will be partly independent of the actual noise level generated by rail activity.

On the other hand, the actual noise generated from rail activities is generally a very localised issue. The examples provided consider wheel squeal, monitoring of locomotives and idling. Taking regulatory actions on these issues will reduce noise – particularly where they occur locally. However, estimating the benefit across the NSW rail network is challenging. This is because the noise received at any one location will depend on several factors including:

- distance from the rail line
- presence or absence of shielding (for example other properties or landforms)
- the volume of rail traffic at that particular location, including the different types of locomotives (freight and transport)
- the speed locomotives travel and whether they are accelerating, braking, going around a curve or a gradient, or 'stretching' and 'bunching'.

Each of these factors will mean the received noise level can be quite different within a locality, so estimating the 'average' reduction in noise from specific noise mitigation programs is very challenging and complex.

The disconnect between specific measures the EPA could impose, the quantified outcomes of these location-specific measures, and the information needed to value the economic impacts of noise reductions, meant that it was not possible to properly quantify the economic impact of specific measures to reduce rail noise.

However, in recognition that Option 4 and 10 would increase the EPAs effectiveness in controlling rail noise, and also that it is not possible to provide robust quantitative data on the noise impacts of amending the Regulation, the decision was made to assume that Option 4 and 10 would reduce rail noise levels by 0.1 dB compared to the base case. While the actual change in noise will depend on the action taken, and will vary from location to location, a 0.1 dB noise reduction represents conservative assumptions which serve to illustrate the potential economic benefits from measures to reduce rail noise without overstating the likely economic benefits.

Appendix 3: Sensitivity analysis

7.1 Discount rates

The discount rate reflects the degree to which people value current versus future income. It is primarily based on the return people could have earned had the money used for an investment been invested elsewhere. In keeping with guidance from NSW Treasury, this analysis has been undertaken using a real discount rate of 7% (NSW Treasury 2007). The sensitivity of these results is gauged by using discount rates of 4% and 10%. Table 5 is reproduced below with discount rates of 4%, 7% and 10% (Tables 10-12). It is apparent that none of the three variations in the discount rate change the original ranking of options provided in Table 5.

Table 10: Costs & benefits over 5 years (\$m Present Values) - Low – 10%

	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.660	-1.769	-1.680	-1.796
EPA regulatory costs	-1.336	-1.336	-1.399	-1.825
Value of rail affected properties	17,536.6	17,536.6	17,536.6	17,537.8
TOTAL costs	17,533.6	17,533.5	17,533.5	17,534.2

Table 11: Costs & benefits over 5 years (\$m Present Values) - Default – 7%

Option	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.798	-1.910	-1.821	-1.945
EPA regulatory costs	-1.447	-1.447	-1.507	-1.977
Value of rail affected properties	18,969.5	18,969.5	18,969.5	18,970.8
TOTAL costs	18,966.2	18,966.1	18,966.1	18,966.9

Table 12: Costs & benefits over 5 years (\$m Present Values) - High – 4%

Option	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.955	-2.070	-1.981	-2.115
EPA regulatory costs	-1.574	-1.574	-1.629	-2.149
Value of rail affected properties	20,598.0	20,598.0	20,598.0	20,599.4
TOTAL costs	20,594.4	20,594.3	20,594.3	20,595.1

Rental rate of return

The real rental rate of return is used to measure the economic return from assets, in this case, property. Tables 13-15 show the effect of higher and lower rental returns on the various options. It is apparent that the costs to the rail industry and the EPA do not change, although the value of rail affected property becomes less important for the analysis at lower rates of

return. Overall, the ranking of options does not change within the bounds tested for the real rental rate of return.

Table 13: Costs & benefits over 5 years (\$m Present Values) – Low – 2%

Option	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.798	-1.910	-1.821	-1.945
EPA regulatory costs	-1.447	-1.447	-1.507	-1.977
Value of rail affected properties	9,484.7	9,484.7	9,484.7	9,485.4
TOTAL costs	9,481.5	9,481.4	9,481.4	9,481.5

Table 14: Costs & benefits over 5 years (\$m Present Values) – Moderate – 4%

Option	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.798	-1.910	-1.821	-1.945
EPA regulatory costs	-1.447	-1.447	-1.507	-1.977
Value of rail affected properties	18,969.5	18,969.5	18,969.5	18,970.8
TOTAL costs	18,966.2	18,966.1	18,966.1	18,966.9

Table 15: Costs & benefits over 5 years (\$m Present Values) - High – 10%

Option	Option 1	Option 2	Option 4	Option 10
Industry compliance costs	-1.798	-1.910	-1.821	-1.945
EPA regulatory costs	-1.447	-1.447	-1.507	-1.977
Value of rail affected properties	47,423.7	47,423.7	47,423.7	47,427.0
TOTAL costs	47,420.4	47,420.3	47,420.3	47,423.1

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