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Contents

- EXECUTIVE SUMMARY 1**
- 1 Background 17**
 - 1.1 Introduction 17
 - 1.2 Development of the NEPM 17
 - 1.3 Objectives of the NEPM 19
 - 1.4 Structure of the NEPM 19
 - 1.5 Application of the NEPM by users 21
 - 1.6 Implementation of the NEPM in jurisdictions 21
 - 1.7 Statutory review of the NEPM 23
 - 1.8 Regulation Impact Statement process 25
 - 1.9 Document layout 25
- 2 Statement of the problem 27**
 - 2.1 Problem statement 27
 - 2.2 Key issues 27
 - 2.2.1 Ecological risk assessment 27
 - 2.2.2 Health risk assessment 27
 - 2.2.3 Assessment of petroleum hydrocarbons and other volatile substances 28
 - 2.2.4 Asbestos 28
 - 2.2.5 Use of investigation levels as cleanup criteria 28
- 3 Objectives 32**
 - 3.1 Objectives of the NEPM 32
 - 3.2 Objectives of the proposed changes to the NEPM 32
- 4 Options 34**
 - 4.1 Introduction 34
 - 4.2 Options considered in the Decision RIS 35
 - 4.3 Key changes proposed in Option 2 35
 - 4.3.1 Ecological risk assessment 35
 - 4.3.2 Health risk assessment 36
 - 4.3.3 Asbestos 37
 - 4.3.4 Petroleum hydrocarbons and other volatile substances 37
- 5 Impact analysis 40**
 - 5.1 Introduction 40
 - 5.2 Analysis framework 40
 - 5.3 Analysis 40
 - 5.3.1 Provision of authoritative guidance on the assessment of site contamination 40
 - 5.3.2 Means and certainty of obtaining adequate human health and environmental protection outcomes
41
 - 5.3.3 Means to achieve an optimal balance between assessment and remediation costs whilst ensuring
protection of human health and the environment 41
 - 5.3.4 Regulation efficiency 42
 - 5.3.5 Impacts on society 43
 - 5.3.6 Impacts on industry/persons responsible for assessment of contaminated sites 44
49
 - 5.3.7 Impact of the proposed key changes jurisdiction by jurisdiction 49
 - 5.3.8 Impact on competition 52
 - 5.4 Summary 52
- 6 Consultation 55**
 - 6.1 Introduction 55

6.2	Public consultation process	55
6.2.1	Objectives	55
6.2.2	Consultation documents.....	55
6.2.3	Consultation period	56
6.2.4	Consultation process and public meetings	56
6.2.5	Public attendance	57
6.2.6	Public submissions received	57
6.3	Consultation response	59
6.4	Summary of submissions on the key changes to the draft NEPM as varied	59
6.4.1	<i>Introduction</i>	59
6.4.2	<i>Ecological risk assessment</i>	60
6.4.3	<i>Health risk assessment</i>	60
6.4.4	<i>Assessment of petroleum hydrocarbons and other volatile substances</i>	61
6.4.5	<i>Asbestos</i>	61
6.5	Submissions on the Consultation RIS	62
7	Conclusions and recommended option.....	64
8	Implementation and review	67
8.1	Approval process	67
8.2	Implementation	67
8.3	Review	68
	Appendix A:	71
	Recommendations of the NEPC Review Report (2006) and location of changes made to the draft NEPM as varied following consultation	71
	Appendix B	75
	Summary of NEPM review process.....	75
	Appendix C	81
	List of public submissions on the draft NEPM as varied (2010).....	81
	Appendix D	83
	Site Assessment Industry in Australia	83
	Appendix E.....	85
	COAG Competition policy assessment	85
	Shortened forms	87

DECISION REGULATION IMPACT STATEMENT



EXECUTIVE SUMMARY



BACKGROUND	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
Introduction	Problem statement	Objectives of the NEPM	Introduction	Introduction	Introduction	
Development of the NEPM	Key issues	Objectives of the proposed changes	Options considered	Framework	Consultation process	
Objectives of the NEPM			Key changes	Assessment of Option 1	Consultation response	
Structure of the NEPM				Assessment of Option 2	Summary of submissions	IMPLEMENTATION & REVIEW
Application by users				Summary		Approval process
Implementation of the NEPM						Implementation
Statutory Review						Review
RIS process						
DRIS layout						APPENDICES

EXECUTIVE SUMMARY

Introduction

This decision Regulatory Impact Statement (RIS) has been prepared to communicate the potential impacts, costs and benefits arising from the proposed amendment of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM).

The NEPM¹ establishes a nationally consistent approach to the assessment of site contamination in order to ensure adequate protection of human health and the environment where contamination occurs.

This RIS has been developed in accordance with the Council of Australian Governments (COAG) regulation impact assessment process and also the requirements of the *National Environment Protection Council (NEPC) Act 1994*.

The RIS was prepared by a Technical Working Group, comprising state regulators of contaminated sites, established to undertake the review of the NEPM.

Background

Site contamination is recognised as a major environmental issue for Australia. In addition to posing a potential threat to public health and the environment, sites affected by contamination can have significant economic, legal and planning implications.

Australia has tens of thousands of potentially contaminated sites distributed across every state and territory. These sites include former factories and tanneries, smelters, town gas plants, oil and chemical refineries, fuel depots and service stations, chemical stores, timber treatment plants, livestock dips, landfills and the sediment of rivers, estuaries and coastlines where waste has been piped in the past from industrial sites for disposal. Contamination occurs in a wide variety of forms, but commonly comprises inorganic compounds such as metals and asbestos and organic compounds such as petroleum hydrocarbons.

The costs associated with assessment and remediation of contamination can be significant. Assessment costs can range from about \$20,000 for preliminary site investigations to more than \$450,000 for more detailed investigations at complex sites. The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) has estimated that the total cost of remediating known and potential contaminated sites in Australia at \$US3-4 billion². The costs associated with the assessment of site contamination arising from the NEPM are discussed further in Section 5.

The NEPM provides a risk based framework for assessing whether contamination requires further investigation, clean up and/or management based on comparison of site data with health investigation levels (HILs), ecological investigation levels (EILs) and groundwater investigation levels (GILs). The assessment may consist of comparing site data with the generic investigation levels provided in the NEPM or site-specific investigation levels developed from applying the guidance in the NEPM. The NEPM also provides guidance on how to sample sites, appropriate methods for data collection and analysis as well as guidance on undertaking health and ecological risk assessments.

¹ The NEPM was made by the National Environment Protection Council (NEPC), the Ministerial Council established under the NEPC Act, on 10 December 1999 and commenced on 22 December 1999. (*Commonwealth of Australia Gazette* No. GN 51, 22 December 1999, p 4246)

² CRC CARE Fact Sheet 1 – Contamination <<http://www.crccare.com/publications/downloads/FS-Contamination.pdf>>

The NEPM guidelines operate as a minimum level of guidance on how the assessment of site contamination should be carried out. The NEPM is applicable to both small and large scale investigation projects; there are no thresholds below which the guidance would not be relevant.

The NEPM forms the basis for the formulation of best practice and also due diligence in the assessment of site contamination, especially in cases of property transaction and the development of former industrial sites. For example, the NEPM guidelines may be applied by the private sector in carrying out site assessments as part of a due diligence process prior to the sale or transfer of land.

The NEPM guidelines are used predominantly by environmental consultants who undertake site assessment work and by auditors and regulators (local and/or state government, depending on the jurisdiction) who review site assessments. It is Australian practice for site investigation reports to be reviewed by accredited third party professionals or jurisdictions when statutory decisions are required in response to land-use change or development proposals.

The NEPM also provides the framework for establishing the necessary competencies for environmental practitioners carrying out site assessments (environmental consultants) and reviewing site assessments (accredited auditors and third-party reviewers).

Each jurisdiction has developed its own regulatory and administrative arrangements to implement the NEPM including³:

- internal policies, guidelines and manuals that include the NEPM guidance and assist staff and contractors with identification, prioritisation and remediation of sites
- the use of compliance registers and databases for incident notification
- audit programs and other regular independent analyses of records
- inclusion of the NEPM in briefs and contracts such that contractors are required to apply the NEPM guidelines where relevant.

The implementation arrangements in jurisdictions are summarised in Table 1.

Table 1 Summary of jurisdictions⁴ NEPM implementation frameworks

Jurisdiction	Summary of NEPM implementation frameworks
Commonwealth	Implemented administratively as guidelines under the <i>NEPC Act 1994</i> . In the case of Australia's Antarctic Territories, very low levels of contamination are considered to be ecologically significant and therefore levels are set according to that specific context rather than using the generic ones in the NEPM.
Australian Capital Territory	Implemented by the Contaminated Sites Environment Protection Policy 2009 made under the <i>Environment Protection Act 1997</i>
New South Wales	Operates under guidelines approved under the <i>Contaminated Land Management Act 1997</i>
Northern Territory	Implemented by audits of contaminated sites and the pollution control provisions of the <i>Waste Management and Pollution Control Act</i>
Queensland	Applied through the <i>Guideline for Contaminated Land Professionals (2012)</i> ; the <i>Guideline for assessing qualified persons according to Sections 381, 395 and 410 of the Environmental Protection Act 1994</i> ; and the <i>Operational policy</i> .

³ *NEPC Annual Report 2009-2010*

⁴ Information provided by jurisdictions except Northern Territory and Tasmania which are sourced from the *NEPC Annual Report 2010-2011*

Jurisdiction	Summary of NEPM implementation frameworks
	<i>Third party reviewers</i>
South Australia	<p>Implemented through the site contamination audit system established under the <i>Environment Protection Act 1993</i> which provides a statutory administrative framework for assessing site contamination.</p> <p>Also implemented through conditions of authorisations issued under the Environment Protection Act.</p> <p>SA EPA codes of practice, standards and guidelines provide technical guidance on the assessment of site contamination in accordance with the NEPM.</p>
Tasmania	<p>The NEPM is a state policy under the <i>State Policies and Projects Act 1993</i>.</p> <p>Implemented under the <i>Environmental Management and Pollution Control Act 1994</i>, and associated guidelines.</p>
Victoria	<p>The NEPM is administered through several legislative instruments:</p> <ul style="list-style-type: none"> - <i>State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002</i> - <i>State Environment Protection Policy (Groundwaters of Victoria) 1997</i> - <i>Environment Protection (Industrial Waste Resource) Regulations 2009</i> - <i>Planning and Environment Act 1987</i> - <i>Environment Protection Act 1970</i>, The Environmental Audit System (Contaminated Land) provides the administrative framework for assessing site contamination. <p>The requirements of these instruments are also reflected in several guidance documents.</p>
Western Australia	<p>Implemented through the <i>Contaminated Sites Act 2003</i>, the <i>Contaminated Sites Regulations 2006</i> and the Contaminated Sites Management Series of guidelines.</p>

In common with other national environment protection measures, the NEPM contains a review clause which states the requirements and terms of reference. In the case of the NEPM, the review period is 5 years and the review is to examine the effectiveness of the NEPM in achieving the desired environmental outcome⁵. The review process is discussed in Section 1, additional information is included in Appendix B.

The first review of the NEPM was carried during 2005-2006 and found that it had delivered benefits to stakeholders and had satisfied many, but not all the needs of its users. Submissions to the review demonstrated strong support for making changes to the NEPM to improve its effectiveness from consultants, land developers, auditors, members of the public and jurisdictions.

⁵ The desired environmental outcome of the NEPM is:

'to provide adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective national approach to the assessment of site contamination.'

The problem

Overall, the review of the NEPM indicated that as it has not been amended since it was made in 1999, the guidance requires updating to provide increased certainty that human health and the environment are being adequately protected by:

- incorporating new scientific knowledge and technical information and
- clarifying certain aspects of the guidance to improve its usability.

The problems with the NEPM can be illustrated by reference to four key issues:

- ecological risk assessment
- human health risk assessment
- petroleum hydrocarbons and
- asbestos.

All four key issues include updating or developing relevant investigation levels and providing guidance on their correct application. The application of investigation levels is a key part of the site assessment process as these are used to determine whether a site is fit for the current/proposed land use or whether further investigation is required.

ecological risk assessment

Although ecological investigation levels (EILs) for 15 substances are provided in the NEPM and are widely used in site assessments, these EILs are not robustly derived and provide only limited certainty that the environment is being adequately protected. The current EILs are based on toxicity to plants or typical concentrations of the substance in Australian urban environments rather than protection of the environment.

The NEPM lacks guidance on how to derive EILs for additional substances or on whether it is appropriate to modify the existing EILs for particular site conditions which can affect toxicity. Given these limitations, the application of the EILs can be impractical particularly when the EILs are below the local background concentrations.

human health risk assessment

Currently the NEPM provides health investigation levels (HILs) for 27 substances found in typical residential settings. The methodology used to derive the HILs for 'residential' landuse is that outlined by the World Health Organization in 1994⁶. Submissions to the NEPM review described the current methodology as adequate but requested it be updated to reflect international best practice.

Australia is a signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs treaty) and has an obligation (Paragraph 1(e) of Article 6) to develop appropriate strategies to identify sites contaminated by chemicals listed in the annexes to the treaty. If the NEPM were to continue as is, Australia may be at risk of not fulfilling its treaty obligations with respect to the identification of contaminated sites as HILs are not currently provided for all POPs.

petroleum hydrocarbons

Contamination of soils and groundwater with petroleum hydrocarbons is a significant concern in Australia; however, the NEPM provides only limited guidance on the assessment of petroleum hydrocarbons and other volatile substances. The absence of a nationally consistent and scientifically based assessment approach in the NEPM has resulted in uncertainties on sites, project delays, risk of unnecessary remediation or understatement of the risks on individual sites, and inconsistencies of approach between different sites and jurisdictions. The review found there was a strong need for the

⁶ WHO 1994, *Environmental Health Criteria 170: Assessing human health risks of chemicals: derivation of guidance values for health-based exposure limits*.

development of guidance based on Australian conditions for the assessment of impacts and risks from petroleum hydrocarbons and volatile substances, including analytical approaches and field methods.

asbestos

Currently there is limited guidance on the assessment of asbestos and no guidance on the different types of asbestos or on 'safe' levels in the NEPM. This results in some site owners and auditors taking excessively risk adverse approaches to the level of asbestos in soil – as they bear responsibility if an incident occurs. This results in very high remediation costs when asbestos is present with little or no gain in health benefits.

Submissions to the NEPM review requested that a consistent approach to the assessment of asbestos be developed to allow an effective and defensible regulatory framework to be established.

Objectives

The goal⁷ of the NEPM is:

'to establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry'

The desired environmental outcome⁸ of the NEPM is:

'to provide adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective national approach to the assessment of site contamination.'

The proposed changes aim to enhance and improve the efficiency and effectiveness of the NEPM in achieving the desired environmental outcomes. The proposed changes are intended to:

- provide authoritative guidance on the assessment of site contamination
- provide the means to obtain satisfactory health and environmental outcomes and increased certainty that human health and the environment are adequately protected
- provide the means to optimise assessment and remediation costs while ensuring the protection of human health and the environment
- increase efficiency for regulatory agencies by
 - decreasing the time required to review site assessments from the application of best practice assessment methods
 - providing investigation levels for a wider range of substances
 - filling gaps in current guidance
- provide improved social justice and equity for the community through
 - increased community confidence in the standard of site assessments and that adequate protection of human health and the environment is obtained
 - optimising the balance between assessment and remediation costs while ensuring the protection of human health and the environment.

⁷ clause 5 (1) of the Measure

⁸ clause 5 (2) of the Measure

Options considered

The fundamental factors favouring the development of a NEPM over any of the five alternatives options considered at the time the NEPM was made in 1999 has not changed, hence the options considered in this RIS are:

- Option 1: the status quo – continuation of the NEPM without amendment
- Option 2: amending the NEPM (the amendment).

The key changes proposed in Option 2 are:

ecological risk assessment

The amendment proposes to adopt a new methodology developed by CSIRO⁹ for deriving ecological investigation levels (EILs). The methodology can be used to derive EILs for land uses of varying environmental sensitivity such as national parks, residential/parkland and commercial/industrial sites. The methodology takes into account that the toxicity of some contaminants is affected by soil properties.

health risk assessment

The health risk assessment methodology in the NEPM has been updated based on the five-step risk assessment process described by enHealth¹⁰. The methodology has been used to derive health investigation levels (HILs) for existing and additional priority soil contaminants for four generic landuse scenarios - residential with garden/accessible soil (includes other sensitive landuses e.g. kindergartens and primary schools), residential with minimal opportunities for soil access (typical high density housing), parks and other recreational areas and commercial/industrial.

The new HILs include all POPs which have been ratified by Australia except for dioxins where a site-specific assessment is recommended. HILs have also been produced for a number of widely used volatile organic chlorinated compounds, such as trichloroethene (TCE) that can move as vapours from contaminated soils into building interiors resulting in potential risk to human health.

asbestos

The new guidance on asbestos is based on that of the Western Australian Department of Health published in 2009¹¹. The guidance places emphasis on carrying out a thorough site history (backed up by careful site observations) to evaluate the nature of the form(s) of asbestos likely to be present. If free asbestos fibres are likely to be present, the guidance recommends that the focus should be on managing the contamination rather than undertaking extensive sampling and laboratory analysis due to the limitations of current analytical methods for this form of asbestos.

petroleum hydrocarbons and other volatile substances.

The methodology to assess human health risk from petroleum hydrocarbons was developed by the Cooperative Research Centre for Contaminant Assessment and Remediation of the Environment (CRC CARE) assisted by an advisory group comprising environmental and health regulators, industry, toxicologists and researchers. With respect to assessing ecological risk from petroleum hydrocarbons, the amendment proposes to adopt ecological screening levels (ESLs) adapted by CSIRO from the

⁹ Heemsbergen D, Warne MStJ, McLaughlin, MJ, & Kookana, R (2009) *The Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils* CSIRO Land and Water Science Report 43/09, Adelaide, Australia.

¹⁰ enHealth 2012, *Environmental health risk assessment. Guidelines for assessing human health risks from environmental hazards*, Department of Health and Ageing & enHealth Council, Canberra.

¹¹ WA DoH 2009, *Guidelines for the assessment, remediation and management of asbestos-contaminated sites in Western Australia*, Department of Health, Perth, Western Australia.

*Canada-wide Standard for Petroleum Hydrocarbons in Soil*¹² for compatibility with the Australian EILs methodology. The amendment also proposes to adopt 'management limits for petroleum hydrocarbons' from the *Canada-wide Standard for Petroleum Hydrocarbons in Soil* to address impacts from the presence of high concentrations of petroleum hydrocarbons such as risk of fire or explosion and damage to buried infrastructure.

Impact analysis

An impact analysis has been undertaken to determine whether the proposed changes deliver a net benefit to the community compared with continuation of the NEPM without amendment (the status quo).

Although the NEPM guidelines only address the assessment of site contamination, consideration of the impact of making the needs to include both assessment and remediation where the majority of cost savings and benefits are likely to occur.

Provision of authoritative guidance

Maintaining the status quo would mean that the NEPM guidance would be viewed as increasingly out dated by users and that the identified gaps in the guidance would not be filled, resulting in a loss of credibility in the NEPM. The proposed changes to the NEPM have been developed based on the recommendations of the NEPM review and consideration of national and international best practice in site assessment. The amendment guidance will provide authoritative guidance on the assessment of site contamination.

Means and certainty of obtaining adequate human health and environmental protection outcomes

The risk assessment methodologies and information used to derive the investigation levels in the NEPM are increasingly outdated and, as time goes on, provide decreasing certainty that they adequately protect human health and the environment.

The adoption of new methodologies for human health and ecological risk assessment and revised investigation and screening levels, plus the incorporation of additional guidance on a wide range of issues in the amendment, will provide greater certainty regarding the level of risk posed by contamination and increased consistency and confidence in the decision-making process.

Means to achieve an optimal balance between assessment and remediation costs whilst ensuring protection of human health and the environment

The investigation levels in the NEPM are often adopted as default clean up levels for reasons of expediency and cost where site results exceed the investigation levels. In some cases, a property owner or developer may require that the most stringent soil criteria (ecological or human health) be applied to counter potential consumer concern regarding the presence of any contamination. Auditors may also defer to more conservative criteria because of liability concerns as they 'sign-off' the assessments in certain jurisdictions. As a result, remediation may be carried out over and above that required to ensure protection of human health and the environment.

The updated methodologies for undertaking health and ecological risk assessments in the amendment provide assessors with greater flexibility to modify investigation and screening levels for site-specific circumstances. This new flexibility will enable assessors to advise site owners on whether it is likely to be beneficial to undertake more detailed site investigation or whether resources would be better used on managing the identified contamination issues.

¹² Canadian Council of Ministers of the Environment, 2008

The updated guidance should also provide greater confidence in the assessment outcomes by site owners, developers and the community and therefore assist with reducing liability concerns and the amount of remediation undertaken which has no health or environmental benefits for site users.

Impacts on regulators

The deficiencies and gaps in the NEPM guidance lead to variation in assessment approaches by environmental consultants and likewise, variation in assessment outcomes. These factors lead to extended review times by auditors and regulators (increasing costs for all concerned). The status quo is likely to lead to more disputes between consultants and auditors/regulators regarding assessment practices and appropriate assessment criteria.

The amended NEPM is expected to provide improvements in the efficiency of regulating contaminated sites from reduced review times arising from greater consistency in assessment approach (from applying the updated methodologies and the clarified and extended guidance) and from improved regulator confidence in assessment outcomes.

In the short term, resource demands on regulators are likely to increase as legislation, guidelines and standards will need to be revised and updated as appropriate for that jurisdiction. Regulators, auditors and practitioners will also need to build up their awareness of the new guidance and update their own processes and procedures. (The requirements of a national training program on the changes are being considered by regulators.)

Impacts on society

Continuation of the NEPM without amendment will result in increasing uncertainty regarding whether assessment outcomes provide adequate levels of protection for the community. This is likely to result in longer reviews by auditors and regulators which will increase costs and potentially result in delays to development projects. Ultimately, the community bears the costs of extended assessment timeframes.

The new and revised investigation and screening levels and associated guidance in the amendment should improve consistency and confidence in site assessment practices and outcomes and therefore contribute to improved social justice and equity in the community.

The updated and extended guidance should provide greater certainty for both buyers and sellers of land and hence reduce one of the main drivers for overly conservative remediation actions (reducing overall costs to society). The adoption of improved site assessment practices as a result of applying the updated guidance, also has the potential to reduce emissions and disturbance to the community by reducing the number of phases of site investigation, with consequent reduction in vehicle movements, exhaust emissions and potentially reduced volumes of waste requiring treatment and disposal.

Impacts on industry/persons responsible for assessment of contaminated sites

The absence of a nationally consistent and scientifically-based assessment approach for assessing asbestos, petroleum hydrocarbon compounds and ecological risks has caused uncertainties on sites, project delays, risk of costly over-remediation or understatement of the risks on individual sites, and inconsistencies of approach between different sites and jurisdictions.

Escalations in project costs arise when there are no authoritative investigation levels available, or when there is uncertainty with regard to investigation requirements resulting in project delays and increased land holding costs. For asbestos, the absence of criteria in the NEPM has resulted in a 'zero tolerance' approach being adopted in some cases with consequent removal of large volumes of soil to ensure that all asbestos fibres have been removed prior to a site being redeveloped. The soil disposal costs incurred can range from a few thousand dollars on small residential sites to millions of dollars for large industrial sites. The practice adds to development costs (which are passed on to consumers and the community) and also uses up valuable landfill space close to metropolitan areas.

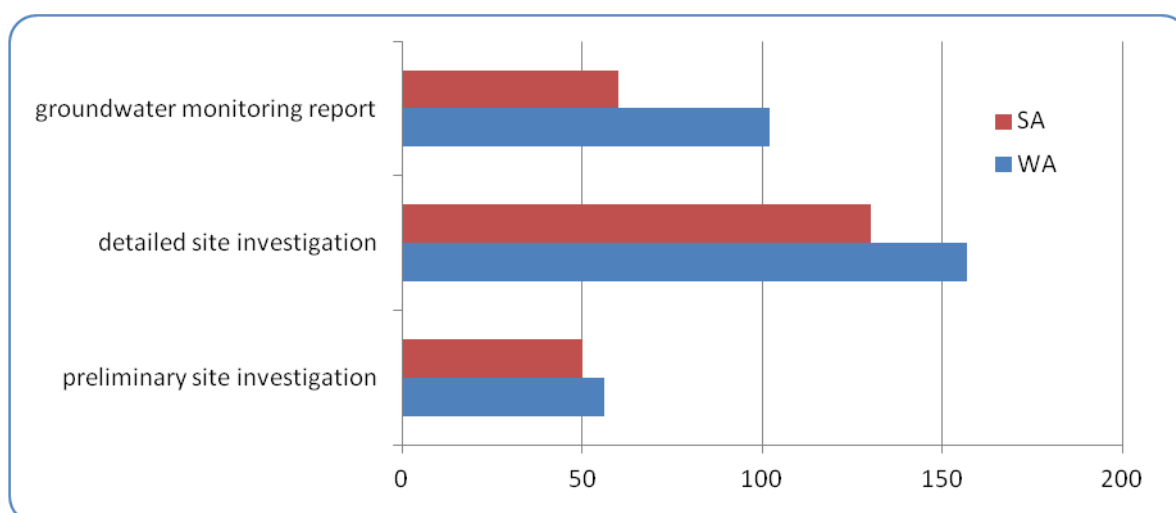
Landfill disposal levies and disposal costs typically form a major component of overall project costs if off-site soil disposal is carried out. Landfill levy costs have increased by a factor of at least 10 in most jurisdictions since the commencement of the NEPM and are likely to continue to rise in the future.

The wider range of investigation and screening levels and the improved methodologies and sampling guidance provided in the amendment should reduce project uncertainty and professional liability concerns. The amendment is expected to deliver considerable cost benefits in the assessment and management of asbestos contaminated sites. The proposed changes were supported by business including the building and construction industry. One industry respondent commented that the amendment would have saved over \$2 million in landfill and cleanup bills for asbestos contaminated soil on one of their sites alone¹³.

The greater flexibility of the updated methodologies will enable assessors to advise site owners on whether it is likely to be beneficial to undertake more detailed site investigation (potentially reducing the volume of soil and groundwater requiring treatment or disposal) or whether resources would be better used on managing the identified contamination issues.

The economic impact on industry/persons responsible for assessment costs has been extrapolated from information held by the Western Australian Department of Environment and Conservation (WA DEC) and the South Australia Environment Protection Agency (SA EPA) supplemented with information provided by other jurisdictions (equivalent cost information was not available from all jurisdictions).

Figure 1 Indicative numbers of site assessment reports submitted to jurisdictions



Derived from WA DEC Contaminated Sites Database and Register data for 2010/2011 and from numbers of site contamination notifications and reports received and recorded by SA EPA in 2011. Equivalent information is not available for other jurisdictions.

Based on the number of reports submitted to WA DEC in 2010/11 (approximately 315 in total) and the indicative costs shown in Table 2, annual assessment costs could increase in WA from about \$29million to around \$35million, an increase of \$6 million (details provided in Appendix D). For South Australia, the annual assessment costs may rise from about \$7.6million to about \$9.2million, an increase of about \$1.6million (details provided in Appendix D). Assuming that WA represents between five (based on Natusch 1997, refer Table 3) and ten per cent (based on information held by jurisdictions, refer Table 3) of the total assessment industry in Australia, the total national increase could be of the order of \$60million to \$120million.

¹³ Australian Sustainable Business Group submission

Table 2 Indicative site assessment costs

Reporting stage	Assessment costs ¹	
	Typical site ²	Complex site ³
Preliminary site investigation	\$5,000 - 25,000	\$20,000 - 50,000
Detailed site investigation	\$30,000 - 100,000	\$250,000 - 500,000
Annual groundwater monitoring	\$15,000 - 50,000	\$50,000 - 100,000

1 Lower range costs provided by SA consultants to SA EPA (2009 costs), higher range costs based on 2012 estimates from WA LandCorp and sites funded from the WA Contaminated Sites Management Account

Costs shown are for metropolitan areas, equivalent investigations in regional areas can be significantly higher

2 Typical sites generally require only one or two phases of site investigation and do not have complex mixtures of contaminants

3 Complex sites generally have had multiple land-uses or contain complex mixtures of contaminants requiring multiple phases of investigation and extensive sampling and analysis programs.

Table 3 Estimated total number of contaminated sites in Australia

Jurisdiction	Total no. of contaminated sites	Comments provided by jurisdictions on the potential number of contamination sites in their state or territory
Commonwealth	-	Information not available
ACT	500*	Information not available
New South Wales	30,000*	As of 30 June 2012, 1452 sites have been notified to NSW EPA, 641 sites have been assessed, 217 sites have been regulated and 107 sites remediated under the <i>Contaminated Land Management Act 1997</i> . This figure of 1452 sites does not account for sites with less significant contamination managed under land-use planning legislation. No state-wide data is available for sites managed under these planning processes. NSW EPA is unable to confirm the derivation of the Natusch (1997) number but it looks like a guestimate.
Northern Territory	1000*	Information not available
Queensland	30,000*	In 2012 the QLD Environmental Management Register held 22,200 sites which are potentially contaminated. The Contaminated Land Register listed 11 sites where the land is contaminated and action is required to remediate the land to prevent serious environmental harm.
South Australia	4,000*	As of November 2011, SA EPA held site contamination information relating to about 1,450 sites. This information includes sites where remediation had been completed. The number of sites where assessments have been conducted is expected to be greater as legislative requirements to notify SA EPA of certain contamination only came into effect in July 2009. The number of sites with information recorded by SA EPA is expected to continue to increase due to legislative notification requirements.
Tasmania	500*	Information not available

Jurisdiction	Total no. of contaminated sites	Comments provided by jurisdictions on the potential number of contamination sites in their state or territory
Victoria	10,000*	Information not available
Western Australia	4,000*	As of 30 June 2012, 2,221 sites had been classified under the <i>Contaminated Sites Act 2003</i> , and make up about half of the total number of sites reported to WA DEC. Of these, 215 have been decontaminated, 518 are known to be contaminated and a further 1123 are possibly contaminated (total 1641 sites). A total of 4,000 known and potentially contaminated sites in WA is a reasonable estimate on this basis.
TOTALS	80,000*	41,113

* Natusch 1997 in *Accounting for Contaminated Sites: How Transparent are Australian Companies?* (Ji & Deegan, 2011, *Australian Accounting Review* 57 v21 Issue 2 2011)

The increase in costs nationally is likely to be substantially less than these amounts as assessment costs are generally dearer in Western Australia compared with most other states. Assuming that the South Australian indicative costs are more reflective of the national situation, and that South Australia represents around five percent (based on Natusch 1997, refer Table 3) of the total assessment industry in Australia, the total national increase may only be of the order of \$32million.

Nearly all sites requiring a detailed site investigation to delineate and assess the risks from contamination will require some form of management or remediation to be carried out. Assuming that 150 detailed site investigations are carried out annually in WA (see Figure 1) and that this represents five to ten per cent of the national total (refer Table 3), would imply that between 1,500 and 3,000 detailed site investigations are carried out nationally each year. If the increased annual assessment costs of \$32million (extrapolated from SA data) to \$120million (extrapolated from WA data) are proportioned evenly over the 1,500 to 3,000 sites, this is equivalent to a \$10,000 to \$80,000 increase and cost savings of this order are anticipated to be achievable on remediation schemes typically costing tens to hundreds of thousands of dollar from application of the revised assessment guidance. In practice, remediation cost savings at individual sites could be much larger. One industry respondent¹⁴ commented that, had the amendment been in place, it could have saved over \$2million in landfill and cleanup bills on one of their sites alone.

Jurisdiction by jurisdiction impact

Information to assess the impacts of the key changes on a jurisdiction basis is limited. However, most jurisdictions have commented that the improved guidance on the assessment of ecological and human health risks will deliver improved public health and environmental outcomes. In some cases, these benefits are already being realised as the guidance on which the amendment is based is already in use for example, the WA Health guidance on the assessment of asbestos in contaminated soils has been taken up in the ACT, QLD and SA as well as WA.

Impact on competition

The continued operation of the current NEPM would not have any implications for competition. An assessment of the proposed amendment against the COAG Competition Policy Principles indicates that overall it will have a minimal effect on competition.

¹⁴ Australian Sustainable Business Group submission

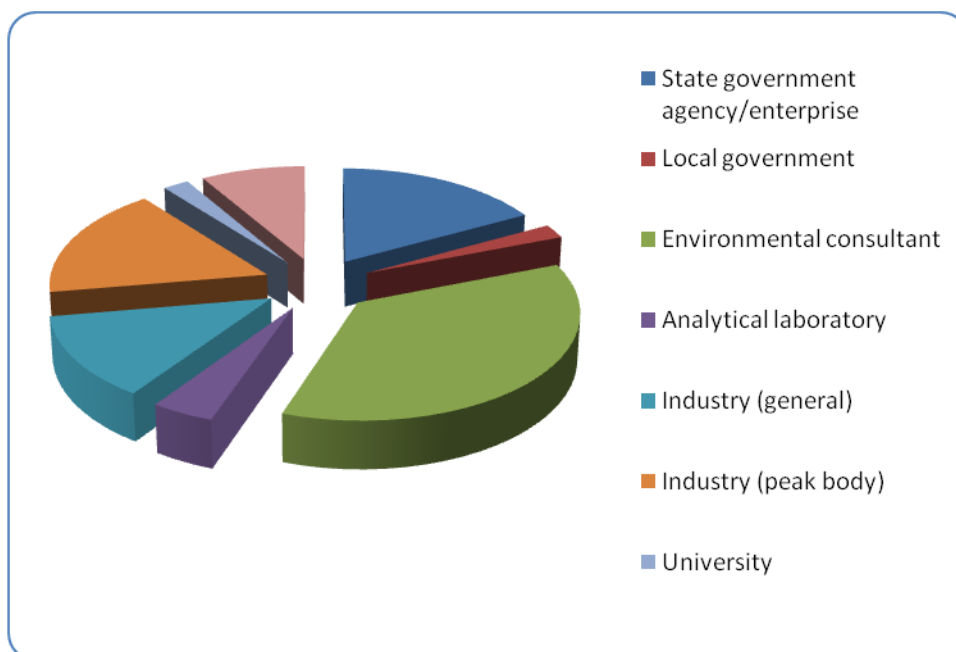
Consultation

Public consultation on the proposed amendment of the NEPM occurred during September – November 2010. Over 600 people attended the public meetings held across Australia and included representatives of state and territory governments, local government, industry, environmental consultants, analytical laboratories, specialist remediation companies, legal representatives and members of the public.

Forty seven (47) written responses, from seven broad stakeholder groups, were received on the revised NEPM as shown in Figure 2. The list of submitters is provided as Appendix C.

Twelve of the public submissions, representing industry and industry peak bodies, state government agencies and environmental consultants, provided comments on the Consultation Impact Statement. Of these, the majority of submissions were from industry (general and peak groups). Environmental consultants represented the next largest stakeholder group that responded.

Figure 2 Distribution of submissions on the draft NEPM as varied by stakeholder group



Detailed comments and the actions or responses taken in relation to the comments are provided in the *Summary of Submissions and NEPC response* document which supports this Decision RIS¹⁵.

Overall, the majority of submissions from all stakeholder groups supported the amendment of the NEPM or did not express a preference as their comments were focussed on technical matters. A small number of submitters across the stakeholder groups did not support specific aspects of the proposed changes. In almost all cases these issues have been addressed in amendments to the draft released for public consultation. Many comments raised questions or issues requiring further clarification or investigation which were addressed by the Technical Working Group as necessary.

Stakeholder comments on the key changes in the amendment are summarised below:

Ecological risk assessment

The responses were generally supportive of the new methodology for deriving EILs. However, two representatives of the tanning industry¹⁶ raised concerns regarding the proposed EIL for chromium who

¹⁶ Johns Environmental and Catherine Money Consulting

stated that it would result in a negative impact by preventing application of tanning wastewater to land. This issue relates to the potential beneficial re-use of industry-specific waste which is dealt with by separate legislation and/or administrative processes in jurisdictions. Notwithstanding, the toxicity information informing the derivation of the EIL is non-specific to the form of chromium present (which could be less toxic) and the methodology could be used to derive an EIL for the specific form of chromium associated with the tanning industry if necessary.

Petroleum and mining industry submissions provided qualified support for the adoption of the ecological screening levels and management levels for petroleum hydrocarbons. The main area of concern was how they would be applied and the inference that they would be mandatory for all sites even when ecological risks were of low concern. The guidance has been clarified on these issues in response.

Health risk assessment

The submissions were generally supportive of the updated risk assessment methodology for deriving HILs. Various comments were received on specific aspects of the derivation of some of the HILs (arsenic, cyanide, mercury, nickel and others). Additional clarification has been added, for example on the form of the contaminant for which the HIL applies.

Assessment of petroleum hydrocarbons and other volatile substances

Industry and environmental consultants commented that the adoption of the HSLs was a major step forward in addressing the inconsistencies on approach currently used to assess sites affected by petroleum compounds. Additional clarification of some aspects of the guidance in relation to the appropriate application of the health screening levels (HSLs) has been added in response to concerns raised by some regulators.

Asbestos

The guidance provided on asbestos was welcomed across the great majority of stakeholder groups. Industry widely supported the pragmatic health risk approach. Revisions were undertaken to address potential misinterpretation of the guidance and to ensure consistency with relevant work, health and safety legislation including the Work Health and Safety Act and Regulations and associated codes of practice published in 2011¹⁷.

Consultation with jurisdictions on the revised draft of the amendment in 2012 resulted in further revisions to the text, particularly on asbestos and petroleum hydrocarbons and updating of the HILs for information published between 2010 and 2012.

Consultation RIS

Only 12 of the 47 public submissions (from industry and industry peak bodies, state government agencies and environmental consultants) provided comments specifically on the Consultation Impact Statement. The comments acknowledged that additional sampling would be required for some sites which would increase costs for assessment. However it was also acknowledged this would be offset by improved health and environmental benefits, minimisation of the understatement of risks and the reduced need for remediation and remediation costs overall through the application of an improved pragmatic risk-based assessment process.

Conclusions and recommended option

A summary of the outcomes of the assessment against the objectives for making changes to the NEPM is shown in Table 4. The table indicates that the amendment of the NEPM, is the most effective and

¹⁷ National model Work Health and Safety Regulations, Safe Work Australia Codes of Practice issued in 2011 (*How to safely remove asbestos Code of Practice* and *Code of Practice for the Management and control of asbestos in workplaces*) and the earlier Code of Practice for the Safe Removal of Asbestos 2nd edn (NOHSC:2002 (2005))

efficient option except for the resulting cost burden on industry/persons responsible for site assessment costs. Although this option has the highest site assessment costs, when potential savings at the remediation and management stage are taken into account, it is likely to have the lowest direct costs to industry and regulators (and indirect costs to society from flow-on effects), as well as providing greater social justice and equity. The amendment of the NEPM is anticipated to have a minimal impact on competition.

On this basis, Option 2, amendment of the NEPM, is considered to provide the greatest net benefit for the community and is the preferred option.

Table 4 Assessment of options against the objectives for amending the NEPM

Criteria	Option 1 Continuation of the NEPM	Option 2 Amending the NEPM
Provision of authoritative guidance	Least authoritative	Most authoritative
Means and certainty of obtaining adequate human health and environment protection outcomes	Least certainty	Most certainty
Means of optimising assessment and remediation costs while ensuring protection of human health and the environment	Limited opportunity for optimising costs	Most opportunity for optimising costs
Regulation efficiency	Higher regulation costs	Lower regulation costs
Social justice and equity for the community	Lower social justice and equity	More social justice and equity
Impact on industry/ persons responsible	Lowest assessment costs	Highest assessment costs
Impact on competition	No impact	Minimal impact

Implementation and review

Implementation

The NEPM is made under the NEPC Act and is given effect by individual legislation and guidelines in each state and territory. A NEPM takes effect in each participating jurisdiction once it is notified in the Commonwealth of Australia Gazette, but is subject to disallowance by either House of the Commonwealth Parliament.

Implementation of the NEPM as varied is the responsibility of each jurisdiction. Any supporting regulatory or legislative mechanisms that jurisdictions use to assist in implementation of NEPMs are developed using appropriate processes in those jurisdictions. Agencies may choose to implement transitional arrangements in the implementation of the NEPM amendment to facilitate the completion of assessments of site contamination which have already substantially commenced.

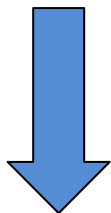
Review

The review of the NEPC Act currently underway may have implications for the next review of the NEPM. No decision has yet been made about the timing of the next review. Timing is ultimately determined by NEPC, however, it is not expected that another review will be conducted until sufficient time has elapsed to also enable assessment of the impact of the 2013 amendments. This approach would make a review meaningful, efficient and cost effective. Whilst the NEPC Act Review has not yet been considered by NEPC, there is a recommendation that reviews be extended to no more than 10 years.

The NEPM was subject to a 5 year review requirement as specified in Clause 10 of the NEPM. Although no further review of the NEPM is required, it is proposed that future reviews are carried out within 10 years of commencement of an amendment.

Table 5 Summary of arrangements for the implementation of the NEPM as varied in jurisdictions

Jurisdiction	Proposed (or potential) arrangements for the implementation of the NEPM as varied
Commonwealth	<p>The NEPM will be implemented as guidelines under the NEPC Act 1994.</p> <p>In the case of Australia’s Antarctic Territories, the current version of the NEPM was not relevant because very low levels of contamination are considered to be ecologically significant and therefore levels are set according to that specific context rather than using the generic ones in the NEPM.</p>
Australian Capital Territory	Update the Contaminated Sites Environment Protection Policy, 2009 (ACT EPA) to reflect the latest version of the NEPM
New South Wales	<p>Revise the existing approved guidelines and adopt the NEPM as varied and associated schedules as guidelines under Section 105 of the <i>Contaminated Land Management Act 1997</i>.</p> <p>Transitional arrangements will apply for site assessments already substantially commenced at the time the guidelines are gazetted</p>
Northern Territory	No action is required as the NEPM is captured under the <i>Waste Management and Pollution Control Act</i>
Queensland	No transitional arrangements will be required as the NEPM is applied through the Department of Environment and Heritage Protection’s published guidance material. The guidance material will be updated to reflect the NEPM as varied from time to time.
South Australia	<p>Seek the NEPM as varied to be made an Environment Protection Policy (EPP) under the <i>Environment Protection Act 1993</i>.</p> <p>Revise relevant EPA guidelines.</p> <p>Transitional arrangements will apply for site assessments already substantially commenced at the time the NEPM is varied until it is made an EPP under the Act.</p>
Tasmania	No action is required as a NEPM (and any amendment to it) is taken to be a state policy under the <i>State Policies and Projects Act 1993</i>
Victoria	<p>Amend State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002 to incorporate the NEPM amendment.</p> <p>Review other legislative instruments as appropriate.</p>
Western Australia	<p>Update the WA DEC Contaminated Management Series of guidelines and/or gazette the NEPM schedules as guidelines under s.97 of the <i>Contaminated Sites Act 2003</i></p> <p>Transitional arrangements will apply for 6 – 12 month, from the time the NEPM is varied, for site assessments which are already substantially commenced.</p>



BACKGROUND	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
Introduction	Problem statement	Objectives of the NEPM	Introduction	Introduction	Introduction	
Development of the NEPM	Key issues	Objectives of the proposed changes	Options considered	Analysis Framework	Consultation process	
Objectives of the NEPM			Key changes	Analysis	Consultation response	
Structure of the NEPM				Conclusions	Summary of submissions	IMPLEMENTATION & REVIEW
Application by users						Approval process
Implementation of the NEPM						Implementation
Statutory Review						Review
RIS process						
DRIS layout						APPENDICES

1 Background

1.1 Introduction

Site contamination is recognised as a major environmental issue for Australia. In addition to posing a potential threat to public health and the environment, sites affected by contamination can have significant economic, legal and planning implications.

Australia has tens of thousands of potentially contaminated sites distributed across every state and territory. These sites include former factories and tanneries, smelters, town gas plants, oil and chemical refineries, fuel depots and service stations, chemical stores, timber treatment plants, livestock dips, landfills and the sediment of rivers, estuaries and coastlines where waste has been piped in the past from industrial sites for disposal¹⁸.

Contamination occurs in a wide variety of forms, but commonly comprises:

- Inorganic compounds such as ammonium and metals e.g. arsenic, copper, lead, mercury, nickel and zinc
- organic compounds, consisting of chemicals groups such as Persistent Organic Pollutants (PoPs), polychloro biphenyls (PCBs), chlorinated hydrocarbons such as trichloroethene (TCE) and perchloroethylene (PCE), polyaromatic hydrocarbons (PAHs) such as benzo-a-pyrene, and monoaromatic hydrocarbons such as benzene, toluene, ethylbenzene and xylenes
- asbestos.

The costs associated with assessment and remediation of contamination can be significant. Assessment costs can range from \$30,000 for typical preliminary site investigations to more than \$450,000 for more detailed investigations at complex sites (see Section 5)¹⁹. The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) has estimated that the total cost of remediating known and potential contaminated sites in Australia at \$US3-4 billion²⁰. The costs associated with the assessment of site contamination arising from the NEPM are discussed further in Section 5.

1.2 Development of the NEPM

Prior to 1995, the responsibility for developing policy and legislation on the assessment of site contamination lay entirely with jurisdictions. In the absence of nationally agreed standards or guidelines, an *ad hoc* approach developed over time as each state and territory developed its own response resulting in a variety of approaches being applied across Australia.

To address this situation, the Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health Medical Research Council (NHMRC) jointly developed technical guidelines for contaminated sites: *The Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (ANZECC & NHMRC 1992).

The adoption of the ANZECC & NHMRC 1992 guidelines by jurisdictions resulted in improvements in site contamination assessment and management across Australia; however, the guidelines did not have any formal status and once again there were variations in how the guidelines were implemented.

¹⁸ Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Fact sheet 1, Contamination

¹⁹ WA Landcorp

²⁰ CRC CARE Fact Sheet 1 – Contamination <<http://www.crccare.com/publications/downloads/FS-Contamination.pdf>>

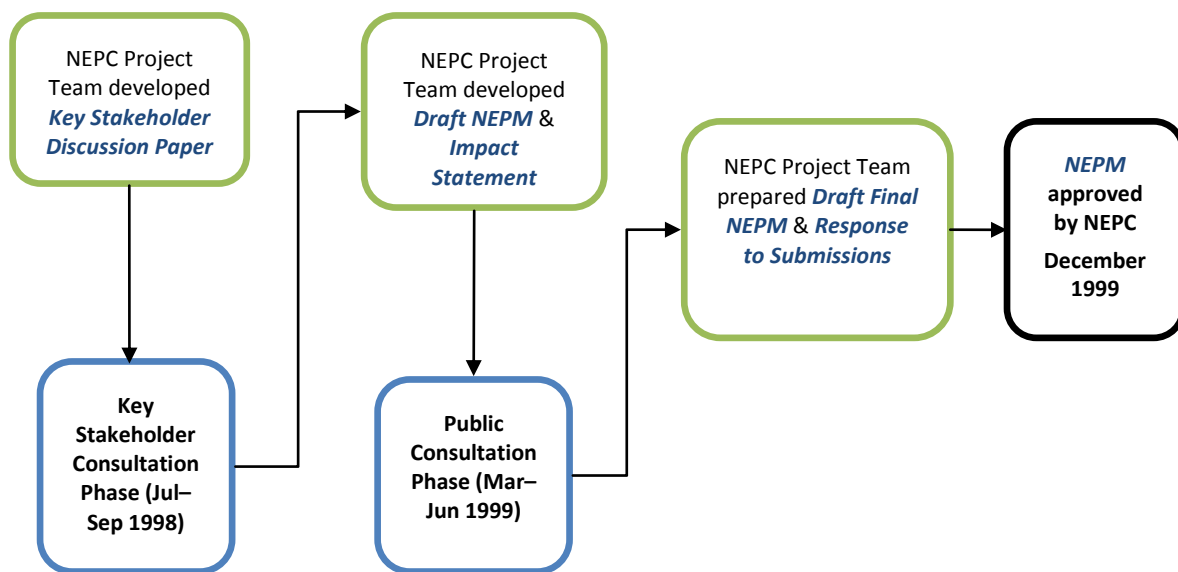
A systematic review of the guidelines began in 1995 by a technical committee established by ANZECC and NHMRC. This review found that the guidelines were basically sound, although there were gaps in several key areas.

Responsibility for addressing these gaps and all further work on the assessment of site contamination was transferred from ANZECC/NHMRC to the National Environment Protection Council (NEPC)²¹ in cooperation with NHMRC in 1995. It was recognised that a National Environmental Protection Measure (NEPM)²² made by the NEPC, was far more likely than the ANZECC/NHMRC guidelines to provide the level of national guidance required to ensure consistency in approach and to provide the community with confidence that public health and environmental concerns were being appropriately addressed at the national level.²³

In developing a NEPM the NEPC recognised that, in the face of increasing pressure to redevelop former industrial and agricultural land, there was a need to ensure that appropriate processes were in place to properly assess site contamination. There was also a growing recognition that the economic and environmental needs of present and future generations must be considered when dealing with contaminated sites. The development of the NEPM was a significant move to ensure that environmental protection became an integral part of the assessment of contaminated sites.

In December 1996, the NEPC advertised its intention to develop a NEPM for assessment of site contamination. Public comments were sought on the scope of the NEPM and the methodology to be used in developing the NEPM. An outline of the process followed is shown in Figure 1.1.

Figure 1.1 Development process for the Assessment of Site Contamination NEPM



The NEPM was approved by the NEPC on 10 December 1999²⁴ and commenced on 22 December 1999.²⁵

²¹ The NEPC was established in 1995 as a statutory national body by the Commonwealth, state and territory governments.

²² The NEPC has responsibility for making NEPMs which are broad framework-setting statutory instruments for protecting particular aspects of the environment, developed through a process of inter-governmental and public consultation. NEPMs may consist of any combination of goals, standards, protocols, and guidelines.

²³ Assessment of Site Contamination Impact Statement, NEPC March 1999

²⁴ The NEPM was made under Section 14(1) of the Commonwealth *National Environment Protection Council Act 1994* (the NEPC Act) which prescribes that the National Environment Protection Council (NEPC) may make a NEPM that relates to general guidelines for the assessment of site contamination.

1.3 Objectives of the NEPM

The goal²⁶ of the *Assessment of Site Contamination NEPM* (the NEPM) is:

‘to establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry’

The desired environmental outcome²⁷ of the NEPM is:

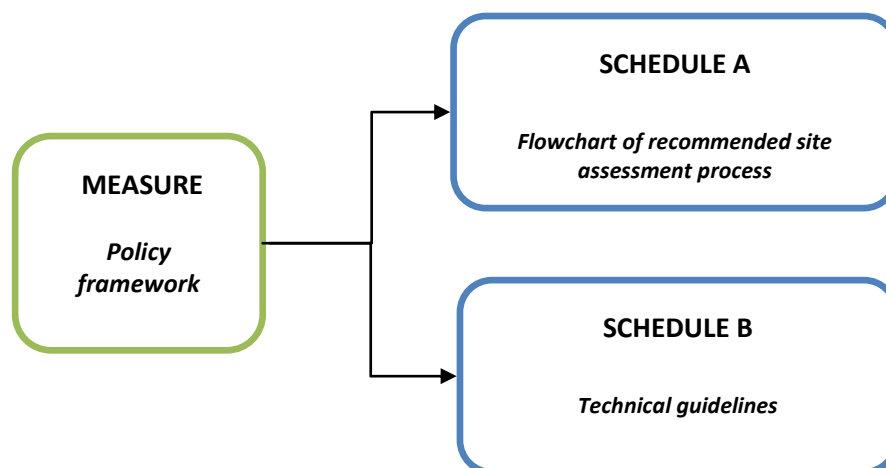
‘to provide adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective national approach to the assessment of site contamination.’

Australia, as a signatory to the Rio Declaration on the Environment and Development²⁸, is committed to conserving, protecting and restoring the health and integrity of Australia’s ecosystems. The development of the NEPM in 1999 was a significant step in ensuring that commitment was met.

1.4 Structure of the NEPM

The NEPM comprises a policy framework supported by two schedules:

Figure 1.2 Structure of the NEPM



The technical guidelines which make up Schedule B (the NEPM guidelines) are listed in Table 1.1.

²⁵ *Commonwealth of Australia Gazette* No GN 51, 22 December 1999, p 4246

²⁶ clause 5 (1) of the Measure

²⁷ clause 5 (2) of the Measure

²⁸ The United Nations Conference on Environment and Development, Rio de Janeiro Jun 1992, United Nations publication, Sales No. E.73.II.A.14 and corrigendum), chap. I.

Table 1.1 List of technical guidelines making up Schedule B of the NEPM

Schedule	Guideline	Title
B	1	Guideline on investigation levels for soil and groundwater
	2	Guideline on data collection, sample design and reporting
	3	Guideline on laboratory analysis of potentially contaminated soils
	4	Guideline on health risk assessment methodology
	5	Guideline on ecological risk assessment
	6	Guideline on risk based assessment of groundwater contamination
	7	Schedule B (7A) Guideline on health-based investigation levels Schedule B (7B) Guidelines on exposure scenarios and exposure settings
	8	Guideline on community consultation and risk communication
	9	Guideline on protection of health and the environment during the assessment of site contamination
	10	Guideline on competencies and acceptance of environmental auditors and related professionals

The NEPM provides a framework for assessing whether contamination requires further investigation, clean up and/or management based on comparison of site data with health and environment-based soil and groundwater investigation levels (Box 1). The assessment may consist of comparing site data with the generic investigation levels provided in the NEPM or site-specific investigation levels developed from applying the guidance in the NEPM. The NEPM also provides guidance on how to sample sites, appropriate methods for data collection and analysis as well as guidance on undertaking health and ecological risk assessments.

Box 1 Risk based approach to the assessment of site contamination established by the NEPM

An Investigation level is the concentration of a contaminant above which further appropriate investigation and evaluation is required.

Screening risk assessment (also referred to as a Tier 1 risk assessment)

Site data are compared with the generic investigation levels in the NEPM which are based on conservative assumptions about exposure for various land uses. If the site contaminant data are below the relevant investigation levels for a particular land use then the site is suitable for that land use. If site data are above the relevant investigation levels further assessment (or management of contamination) is required.

Detailed risk assessment (Tier 2 and 3 assessments)

Site data are used to modify the generic criteria in the NEPM or are used to develop site-specific criteria using the guidance in the NEPM. The use of site-specific information about actual exposure ensures that a health protective effect is achieved even though the site-specific criteria may consist of higher concentrations than the generic investigation levels in the NEPM.

1.5 Application of the NEPM by users

The NEPM guidelines operate as a minimum level of guidance on how the assessment of site contamination should be carried out. The NEPM is applicable to both small and large scale investigation projects; there are no thresholds below which the guidance would not be relevant.

The NEPM forms the basis for the formulation of best practice and also due diligence in the assessment of site contamination, especially in cases of property transaction and the development of former industrial sites. For example, the NEPM guidelines may be applied by the private sector in carrying out site assessments as part of a due diligence process prior to the sale or transfer of land.

The NEPM guidelines are used predominantly by environmental consultants who undertake site assessment work and by auditors and regulators (local and/or state government, depending on the jurisdiction) who review site assessments. It is Australian practice for site investigation reports to be reviewed by accredited third party professionals or jurisdictions when statutory decisions are required in response to land-use change or development proposals.

The NEPM also provides the framework for establishing the necessary competencies for environmental practitioners carrying out (environmental consultants) and reviewing (accredited auditors and third-party reviewers) site assessments.

1.6 Implementation of the NEPM in jurisdictions

Each jurisdiction has developed its own regulatory and administrative arrangements to implement the NEPM including²⁹:

- internal policies, guidelines and manuals that include the NEPM guidance and assist staff and contractors with identification, prioritisation and remediation of sites
- the use of compliance registers and databases for incident notification
- audit programs and other regular independent analyses of records
- inclusion of the NEPM in briefs and contracts such that contractors are required to apply the NEPM guidelines where relevant.

The implementation arrangements in jurisdictions are summarised in Table 1.2.

Table 1.2 Summary of NEPM implementation frameworks in jurisdictions³⁰

Jurisdiction	Summary of NEPM implementation frameworks
Commonwealth	Implemented administratively as guidelines under the <i>NEPC Act 1994</i> . In the case of Australia's Antarctic Territories, very low levels of contamination are considered to be ecologically significant and therefore levels are set according to that specific context rather than using the generic ones in the NEPM.
Australian Capital Territory	Implemented by the Contaminated Sites Environment Protection Policy 2009 made under the <i>Environment Protection Act 1997</i>
New South Wales	Operates under guidelines approved under the <i>Contaminated Land Management Act 1997</i>

²⁹ NEPC Annual Report 2009-2010

³⁰ Information provided by jurisdictions January 2013 except for the Northern Territory and Tasmania which are sourced from NEPC Annual Report 2010-2011

Northern Territory	Implemented by audits of contaminated sites and the pollution control provisions of the <i>Waste Management and Pollution Control Act</i>
Queensland	Applied through the <i>Guideline for Contaminated Land Professionals (2012)</i> ; the <i>Guideline for assessing qualified persons according to Sections 381, 395 and 410 of the Environmental Protection Act 1994</i> ; and the <i>Operational policy: Third party reviewers</i>
South Australia	Implemented through the site contamination audit system established under the <i>Environment Protection Act 1993</i> which provides a statutory administrative framework for assessing site contamination. Also implemented through conditions of authorisations issued under the <i>Environment Protection Act</i> . SA EPA codes of practice, standards and guidelines provide technical guidance on the assessment of site contamination in accordance with the NEPM.
Tasmania	The NEPM is a state policy under the <i>State Policies and Projects Act 1993</i> . Implemented under the <i>Environmental Management and Pollution Control Act 1994</i> , and associated guidelines.
Victoria	The NEPM is administered through several legislative instruments: <ul style="list-style-type: none"> - <i>State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002</i> - <i>State Environment Protection Policy (Groundwaters of Victoria) 1997</i> - <i>Environment Protection (Industrial Waste Resource) Regulations 2009</i> - <i>Planning and Environment Act 1987</i> - <i>Environment Protection Act 1970</i>, The Environmental Audit System (Contaminated Land) provides the administrative framework for assessing site contamination. The requirements of these instruments are also reflected in several guidance documents.
Western Australia	Implemented through the <i>Contaminated Sites Act 2003</i> , the <i>Contaminated Sites Regulations 2006</i> and the Contaminated Sites Management Series of guidelines.

State and territory government agencies also work with local government on contamination issues via the relevant landuse planning systems. Most jurisdictions have taken up the NEPM guidelines into legislation or planning codes to ensure greater compliance with the guidance.

As required by the NEPC Act³¹, each jurisdiction reports annually on NEPM implementation activities. In recent NEPC annual reports³² jurisdictions have reported that there is a high level of compliance of site assessments with the NEPM guidelines and that the NEPM is beneficial in protecting human health and the environment. Jurisdictions commented that the proposed changes to the NEPM would address gaps in current guidance and provide efficiencies for regulators of contaminated sites.

³¹ Division 3 Assessment and reporting on implementation and effectiveness of measures

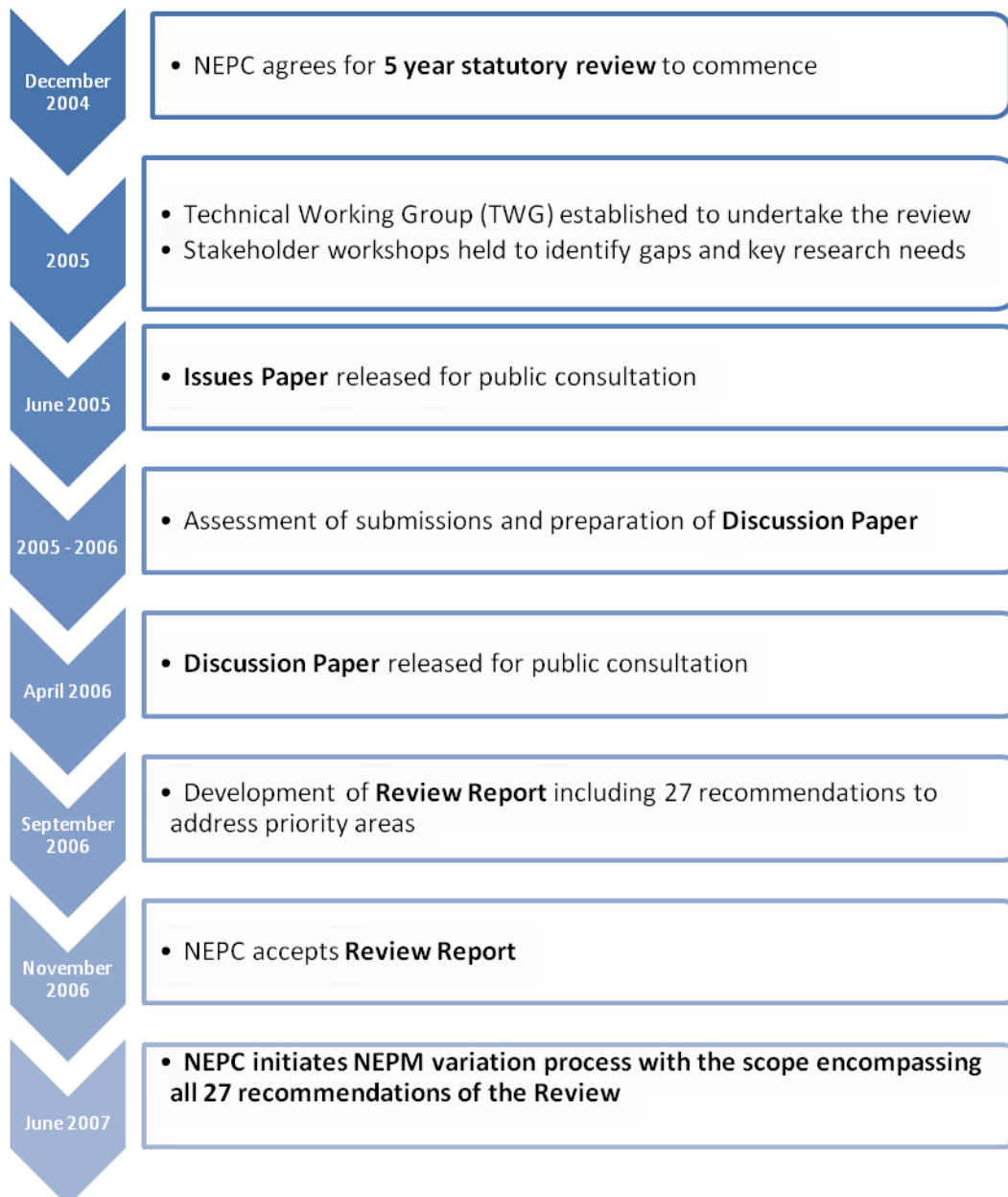
³² *NEPC Annual Reports 2009-2010 and 2010-2011*

1.7 Statutory review of the NEPM

In common with other NEPMs, this NEPM contains a review clause which states the requirements and terms of reference. In the case of this NEPM, the review period is 5 years and the review is to examine the effectiveness of the NEPM in achieving the desired environmental outcome³³. Additional information on the review process is included at Appendix B.

In 2004, five years after commencement, the NEPC agreed to conduct the first review of the NEPM (the review). The process followed is illustrated in Figure 1.3:

Figure 1.3 NEPM review process



³³ Clause 10 of the Measure

Key findings of the review

The review of the NEPM found that it had delivered benefits to stakeholders and had satisfied many, but not all of the needs of its users. The key findings are described in Table 1.3.

Table 1.3 Key findings of the NEPM review³⁴

Key findings of the Review of the NEPM
<p>NEPM clarity</p> <p>The NEPM policy framework on the assessment of site contamination was found to require revision to improve clarity and understanding of the fundamental principles of site assessment and to emphasise appropriate use of the NEPM guidance.</p>
<p>Ecological risk assessment</p> <p>There was particular concern over the lack of a nationally agreed methodology for terrestrial ecological risk assessment and scientifically derived EILs.</p>
<p>Health risk assessment</p> <p>The adopted HILs were generally considered to be conservative and derived from outdated knowledge. There was strong support for revision of the methodology for deriving HILs based on current Australian and international knowledge. There was also support for development of guidance on the risk based assessment of priority and carcinogenic substances and mixtures.</p>
<p>Asbestos</p> <p>The review found that small amounts of asbestos can have significant and potentially unjustified impacts on the costs of remediation projects arising from a combination of poor risk communication and concerns regarding issues of liability. There was widespread support for updating the guidance on asbestos in the NEPM.</p>
<p>Petroleum hydrocarbons</p> <p>Petroleum hydrocarbon contamination in soils and groundwater are a significant concern in Australia; however, the NEPM provides limited guidance on the assessment of petroleum hydrocarbons and volatile substances.</p> <p>There was found to be a strong need for the development of guidance based on Australian conditions for the assessment of impacts and risks from petroleum hydrocarbons and volatile substances, including analytical approaches and field methods.</p>
<p>Misuse of investigation levels</p> <p>The majority of submissions agreed that there was misuse of the current investigation levels as default remediation criteria leading to general concern about the accuracy and inherent conservatism of the EILs and HILs.</p>

Submissions to the review from assessors, consultants, land developers, auditors, members of the public and jurisdictions demonstrated strong support for making changes to the NEPM to improve its effectiveness. In response, significant scientific research, consultation and development of technical guidance to address the recommendations of the review were carried out between 2007 and 2010 resulting in the proposed draft amendment of the NEPM.

Public consultation on the draft amendment and Consultation Impact Statement was carried out in late 2010 (further information is provided in Section 7). Following the public consultation process, revisions were made to the draft documents taking into account the comments and issues identified by stakeholders.

³⁴ Review Report (NEPC) September 2006

Consultation with jurisdictions on the revised draft in 2012 resulted in further revisions to the text and updating of the Health Investigation Levels for information published between 2010 and 2012.

1.8 Regulation Impact Statement process

A regulatory impact analysis (RIA) which examines the likely impacts of proposed regulation and alternative options which could meet the government's policy objectives, is required to be undertaken for agreements or decisions that are likely to have a regulatory impact on business or the not-for profit sector, unless of a minor or machinery nature³⁵. The development of a regulation impact statement (RIS) is central to the RIA process. It formalises and provides evidence of the steps taken during development of the process.

The RIA for the NEPM has been undertaken in a two-stage process involving the preparation of a Consultation RIS which was subject to public consultation in late 2010 (see Section 6) and this Decision RIS.

The purpose of the Consultation RIS was to provide stakeholders with information on the proposed changes to the NEPM and also to gather specific feedback on the costs and benefits of the proposed amendment to inform the detailed analysis to be undertaken in the Decision RIS.

This Decision RIS has been prepared by the NEPM Technical Working Group and draws on the information gathered during the review process and public comment phases together with additional information provided by jurisdictions. It provides a detailed analysis of the proposed amendment to the NEPM and evaluates whether the proposed amendment is effective in delivering a net benefit to the community.

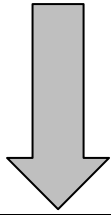
Although comments on the costs and benefits of the proposed amendment were sought in the Consultation RIS, the vast majority of material submitted was of a technical nature and included limited financial information. To offset this data gap, cost information from jurisdictional sources has been used in the analysis supplemented with information from targeted organisations and individuals.

1.9 Document layout

In accordance with best practice, this RIS considers the following key elements:

- the background and context for key decisions leading up to the amendment of the NEPM, the amendment process and purpose of the Decision RIS (Section 1).
- the nature and extent of the problem that the amendment of the NEPM is seeking to address and provides an overview of the current NEPM (Section 2)
- the objectives for amending the NEPM (Section 3),
- the options to address the problem, addressed in the context of the NEPC Act (Section 4)
- assesses the potential impacts of the identified options, including health and environmental protection benefits, competition effects and costs and benefits (Section 5)
- provides information on the public consultation process and summarises stakeholder views on key issues (Section 6)
- identifies the option which provides the greatest net benefit to the community (Section 7)
- outlines the implementation and review process for the amendment (Section 8).

³⁵ Australian Government 2010, *Best Practice Regulation Handbook*, Canberra



INTRODUCTION	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
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Document layout						APPENDICES

2 Statement of the problem

2.1 Problem statement

The NEPM provides guidance on a complex and multi-disciplinary area. As the NEPM guidance has not been amended since it was made in 1999, it requires updating to improve its effectiveness and efficiency by:

- incorporating new scientific knowledge and technical information and
- clarifying certain aspects of the guidance to improve its usability.

Addressing these issues would maintain the credibility of the NEPM as the premier source of technical guidance on site assessment in Australia.

2.2 Key issues

The problems with the NEPM can be illustrated by reference to four key areas:

- ecological risk assessment
- human health risk assessment
- petroleum hydrocarbons and
- asbestos.

The application of investigation levels (refer Box 1 in Section 1.4) is a key part of the site assessment process as these are used to determine whether a site is fit for the current/proposed land use or whether further investigation is required. All four key issues include updating or developing relevant investigation levels and providing guidance on their correct application.

2.2.1 Ecological risk assessment

Although ecological investigation levels (EILs) for 15 substances are provided in the NEPM and are widely used in site assessments, these EILs are not robustly derived and provide only limited certainty that the environment is being adequately protected. The current EILs are based on toxicity to plants or typical concentrations of the substance in Australian urban environments rather than protection of the environment.

The NEPM lacks guidance on how to derive EILs for additional substances or on whether it is appropriate to modify the existing EILs for particular site conditions which can affect toxicity. Given these limitations, the application of the EILs can be impractical particularly when the EILs are below the local background concentrations.

Guidance is provided in the NEPM on conducting a more detailed assessment if the EILs are exceeded, however, the guidance is considered difficult and time consuming to apply by users. In response, investigation levels are commonly adopted as default clean-up levels (see Section 2.2.5).

2.2.2 Health risk assessment

Currently the NEPM provides health investigation levels (HILs) for 27 substances found in typical residential settings. The methodology used to derive the HILs for 'residential' landuse is that outlined by the World Health Organization³⁶. Submissions to the NEPM review described the current methodology as adequate but requested it be updated to reflect international best practice.

In the absence of an HIL for a particular substance in the NEPM, assessors commonly adopt an equivalent value from international sources. These alternative values are generally developed using

³⁶ WHO 1994, *Environmental Health Criteria 170: Assessing human health risks of chemicals: derivation of guidance values for health-based exposure limits*.

different assumptions about human exposure and consequently may be over or under protective in typical Australian conditions. Where assessors have adopted levels from elsewhere, the values selected must be reviewed for their suitability by auditors and regulators on an individual site basis leading to inefficiencies for both site owners and regulators and, potentially inconsistencies in regulatory practice.

Australia is a signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs treaty) and has an obligation (Paragraph 1(e) of Article 6) to develop appropriate strategies to identify sites contaminated by chemicals listed in the annexes to the treaty. The NEPM currently does not include criteria for all the listed POPs. Australia's National Implementation Plan for the POPs treaty states that in the review of the NEPM, treaty obligations should be taken into consideration. If the NEPM were to continue as is, Australia may be at risk of not fulfilling its treaty obligations with respect to the identification of contaminated sites.

2.2.3 Assessment of petroleum hydrocarbons and other volatile substances

Although contamination with petroleum hydrocarbons, particularly from fuels, is the most commonly found form of contamination across Australia³⁷, the NEPM provides limited guidance on these substances as the science to inform regulatory policy was not sufficiently developed at the time the NEPM was made.

The absence of a nationally consistent and scientifically based assessment approach in the NEPM has caused uncertainties on sites, project delays, risk of unnecessary remediation or understatement of the risks on individual sites, and inconsistencies of approach between different sites and jurisdictions.

2.2.4 Asbestos

Currently there is limited guidance on the assessment of asbestos and no guidance on the different types of asbestos or on 'safe' levels in the NEPM. This results in some site owners and auditors taking excessively risk adverse approaches to the level of asbestos in soil – as they bear responsibility if an incident occurs. This results in very high remediation costs when asbestos is present with little or no gain in health benefits.

Submissions to the NEPM review requested that a consistent approach to the assessment of asbestos be developed to allow an effective and defensible regulatory framework to be established.

2.2.5 Use of investigation levels as cleanup criteria

Although not encouraged by regulators, investigation levels are often adopted as default clean up levels for reasons of expediency and cost. In some cases, a property owner or developer may require that the most stringent soil criteria (ecological or human health) be applied to counter any potential consumer concern regarding site contamination. Auditors and consultants may also defer to more conservative criteria because of liability concerns. These problems are illustrated by the case studies included below. The case studies demonstrate the importance of incorporating new scientific and technical information into the NEPM to minimise time delays and unnecessary remediation.

More rigorously developed EILs and HILs would provide greater certainty that human health and the environment are adequately protected and potentially would provide a more cost effective basis to manage site development costs and consumer concerns.

Review respondents requested clarification on how to apply investigation levels and for guidance to counter their use as default cleanup criteria.

³⁷ The contamination often results from leakage of underground storage tanks, for example from retailing of petroleum products, manufacturing and transport industries, motor and machinery maintenance and repair, fuel depots and oil refineries

Case study 1 - large gas works – major capital city

Initial estimated site remediation cost of \$25 million and assessment costs of the order of 15% -20% (\$3.75–\$5 million).

The remediation contract price was fixed and the contract conditions required site clean-up to enable 'any land use' (in practice this would mean suitable for low density residential use). The condition for 'any land use' placed more stringent requirement on site assessment and remediation activities, raised liability concerns for all parties involved and an escalation in costs.

Notwithstanding the specific commercial complexities for the particular site, the absence of comprehensive human health and environmental criteria limited the available options for managing the site. Liability concerns arising from uncertainty with remediation criteria and contract requirements contributed to a doubling of the assessment and remediation cost to approximately \$52 million.

The high cost of site assessment and remediation and the absence of appropriate investigation and screening levels resulted in higher land costs per dwelling/ commercial unit for the proposed development. The cost increase could have been contained if appropriate investigation and screening levels had been available.

Case study 2 - large gas works site – major capital city

Lot 1 - \$7.5 million site assessment and remediation program

Development for high-density residential use was achieved by statutory management of some residual low risk contamination on-site after completion of the site assessment and remediation program. The site assessors had few liability concerns as the 1999 NEPM soil investigation levels were sufficient guidance for most areas of the site.

Lot 2 – \$14 million site assessment and remediation program

Development was also achieved by statutory management of some residual contamination on-site. However, the costs were almost double that for Lot 1, as a result of different site conditions and the absence of appropriate investigation and screening levels for Tier 1 risk assessment for the proposed site uses.

The absence of suitable criteria and guidance led to a greater aversion to risk and greater soil removal with subsequent higher disposal costs.

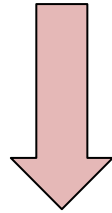
Case study 3 - possible asbestos impacted site – Queensland

A low lying development site (about 11 ha) in an industrial area was partly covered with approximately 1.5 m of clean fill to raise the level of the land for a proposed development. When building works commenced, some of the fill was removed and a short length of 'asbestos rope' (less than 15 cm long) was discovered. As a result:

- Site workers became concerned and stopped work.
- Occupational health and safety officers inspected the site and could not find any issues of concern, no visible asbestos on the surface or in shallow soil.
- A dispute arose between the land owner and the developer.
- Both parties engaged environmental professionals who undertook site investigations of varying sufficiency.
- Very small quantities of bonded asbestos containing material (ACM) in good condition (i.e. non-friable and posing a low risk of releasing free fibres) were found in the sub-surface in limited areas.
- The site assessors arrived at different conclusions about potential risks from exposure to asbestos fibres.
- Lawyers were engaged by both parties
- The parties did not reach a satisfactory resolution of the dispute.
- Environmental authorities were finally provided with the assessment reports and the site was cleared of any risk of concern from asbestos

The project was delayed for 9-12 months and total legal and site assessment costs exceeded \$500,000.

It is not unusual for fill to contain minor quantities of bonded ACM fragments. The problems that arose were the direct result of insufficient guidance on screening levels for low risk forms of asbestos in soil and acceptable management practices.



INTRODUCTION	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
Introduction	Problem statement	Objectives of the NEPM	Introduction	Introduction	Introduction	
Development of the NEPM	Key issues	Objectives of the proposed changes	Options considered	Analysis Framework	Consultation process	
Objectives of the NEPM			Key changes	Analysis	Consultation response	
Structure of the NEPM				Conclusions	Summary of submissions	IMPLEMENTATION & REVIEW
Application by users						Approval process
Implementation of the NEPM						Implementation
Statutory Review						Review
RIS process						
DRIS layout						APPENDICES

3 Objectives

3.1 Objectives of the NEPM

The goal³⁸ of the *Assessment of Site Contamination NEPM* (the NEPM) is:

‘to establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry’

The desired environmental outcome³⁹ of the NEPM is:

‘to provide adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective national approach to the assessment of site contamination.’

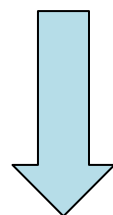
3.2 Objectives of the proposed changes to the NEPM

The proposed changes aim to enhance and improve the efficiency and effectiveness of the NEPM in achieving the desired environmental outcomes. The proposed changes should:

- provide authoritative guidance on the assessment of site contamination
- provide the means to obtain satisfactory health and environmental outcomes and increased certainty that human health and the environment are adequately protected
- provide the means to optimise assessment and remediation costs while ensuring the protection of human health and the environment
- increase regulation efficiency by
 - decreasing the time required to review site assessments from the application of best practice assessment methods
 - providing investigation levels for a wider range of substances
 - filling gaps in current guidance
- provide improved social justice and equity for the community through
 - increased community confidence in the standard of site assessments and that adequate protection of human health and the environment is obtained and
 - optimising the balance between assessment and remediation costs while ensuring protection of human health and the environment.

³⁸ clause 5 (1) of the Measure

³⁹ clause 5 (2) of the Measure



INTRODUCTION	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
Introduction	Problem statement	Objectives of the NEPM	Introduction	Introduction	Introduction	
Development of the NEPM	Key issues	Objectives of the proposed changes	Options considered	Analysis Framework	Consultation process	
Objectives of the NEPM			Key changes	Analysis	Consultation response	
Structure of the NEPM				Conclusions	Summary of submissions	IMPLEMENTATION & REVIEW
Application by users						Approval process
Implementation of the NEPM						Implementation
Statutory Review						Review
RIS process						
DRIS layout						APPENDICES

4 Options

4.1 Introduction

Five alternatives to a NEPM were considered leading up to the development of the NEPM 1999⁴⁰. These options were assessed for their ability to deliver the desired environmental outcome and are outlined in Table 5.1 below.

Table 5.1 Alternative options to the development of a NEPM for Assessment of Site Contamination.

Option	Analysis of option
<i>1. Legislation by the Commonwealth</i>	<ul style="list-style-type: none"> ○ The Commonwealth may not have the powers under the Constitution to introduce legislation on the Assessment of Site Contamination. ○ Parliaments have specifically legislated for NEPMs in order to overcome the inherent difficulty of a Commonwealth legislated approach on the assessment of site contamination
<i>2. Review of the ANZECC & NHMRC 1992 Guidelines</i>	<ul style="list-style-type: none"> ○ Not all the Guidelines were fully accepted by jurisdictions. ○ Governments, industry and the community recognised that a review of the existing guidelines was required. ○ ANZECC and the NEPC, in consultation with the NHMRC, agreed that the best mechanism to review the existing guidelines and to develop any new guidelines was through the development of a NEPM. The open nature of the NEPM development process and that any revised or new guidelines would have the force of a NEPM was seen as a positive step.
<i>3. Mirror or complementary legislation enacted by States, Territories and the Commonwealth</i>	<ul style="list-style-type: none"> ○ This approach does not appear to offer any advantage over a NEPM as a similar process would be required to develop complementary legislation and no legal obligations would fall on jurisdictions to report on the implementation and effectiveness of the legislation ○ Changes to jurisdiction-based legislation could subsequently be made uni-laterally and would not be subject to public scrutiny at a national level.
<i>4. All jurisdictions entering into an agreement to ensure national consistency in the assessment of site contamination</i>	<ul style="list-style-type: none"> ○ Similar to complementary legislation, consistency in approach could be achieved by agreement, either roughly in line with the NEPC process or by each jurisdiction agreeing to handle this issue within their jurisdiction in some way. ○ Such an approach would not necessarily have any legislative basis, making withdrawal from any agreement relatively easy compared with repealing or amending legislation ○ This approach does not appear to offer any advantage over a NEPM as a similar process would be required.
<i>5. Maintaining the status quo</i>	<ul style="list-style-type: none"> ○ Maintaining the status quo implies that individual jurisdictions continuing to develop their own guidelines (or adopt/modify already developed guidelines) is the most efficient option. ○ Costs are incurred by jurisdictions in developing and revising their respective approaches and by industry in providing data, resulting in duplication of costs and effort. ○ The statue quo option does not deliver any improved national uniformity in assessment practices

Based on this analysis, it was concluded that the development of a NEPM was the preferred option.

⁴⁰ Impact Statement for the Assessment of Site Contamination (NEPC 1999)

An industry-based (self-regulatory) model would have similar issues to option 5 in Table 5.1 Without the benefit of the national framework of the NEPM guidelines, industry would be forced to develop guidance or seek relevant guidance from other jurisdictions in Australia or internationally and apply it as a best fit with relevant legislation and guidelines. This would quickly result in varied approaches being implemented across the country which would add to business complexity and costs.

Companies and environmental practitioners operating across the states and territories need to be familiar with the range of specific jurisdictional approaches and requirements. Having a consistent national framework provides significant financial benefits by establishing a greater level of certainty as to what these approaches and requirements are, thereby facilitating work across jurisdictional borders. It also minimises costs and time delays that would otherwise be incurred by parties in having to train staff in a number of requirements and processes.

Under the current arrangements, auditors and/or jurisdictions review the work completed by environmental consultants. In many cases, this is an iterative process as the work undertaken has not been completed to a sufficient standard. In the absence of this review process, the general standard of work undertaken is likely to fall with resulting implications for the protection of human health and the environment.

A self-regulatory approach would be unlikely to be supported by the community. Trust and credibility are critical factors for communities in relation to their perception of contamination issues and risk management. The willingness of communities to accept or trust explanations and outcomes is directly affected by their experience and relationships. The ability of industry to engage effectively with communities is dependent on the community's confidence in how well it conducts its business and the perceived influence of industries on investigations. Recent Australian research has shown that both the general community and those communities affected by contamination have significantly greater confidence that information from government / regulatory bodies can be trusted (74%), compared with when provided by site owners and their consultants (44%)⁴¹. Practice both nationally and internationally involves regulators and government agencies having a key role in community engagement where contamination is an issue.

4.2 Options considered in the Decision RIS

The fundamental factors favouring the development of a NEPM over any of the five alternatives considered at the time the NEPM 1999 was made has not changed, hence the options considered in this RIS are:

- Option 1: the status quo – continuation of the NEPM without amendment
- Option 2: amendment of the NEPM.

The key changes proposed in Option 2 are discussed in the following sections. A summary relating the proposed changes to the recommendations of the Review Report is included as Appendix A.

4.3 Key changes proposed in Option 2

4.3.1 Ecological risk assessment

The amendment proposes to adopt a new methodology for deriving ecological investigation levels EILs which was developed by CSIRO⁴² for the NSW Environmental Trust. The CSIRO project included a review

⁴¹ Unpublished survey conducted in March 2012 for South Australia Environment Protection Authority. The survey included 200 door-to-door interviews in areas affected by contamination and 400 telephone interviews with the general public across South Australia.

⁴² Heemsbergen D, Warne MStJ, McLaughlin, MJ, & Kookana, R (2009) *The Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils* CSIRO Land and Water Science Report 43/09, Adelaide, Australia.

of methods being used in Australia and internationally. The new methodology is similar to that used in the Australian and New Zealand water quality guidelines⁴³.

The review process for the development of the methodology comprised:

- a public workshop on the proposed methodology in June 2007
- release of the draft methodology for public comment in February 2008
- a second public workshop on the revised methodology in November 2008, and
- international peer review of the methodology.

The methodology can be used to derive EILs for land uses of varying environmental sensitivity such as national parks, residential/parkland and commercial/industrial sites. The methodology takes into account the ambient background concentrations and that the toxicity of some contaminants is affected by soil properties. Where it is not possible to derive soil-specific EILs because of data limitations, an alternative procedure to develop generic EILs can be used.

The amendment proposes to adopt EILs for eight common substances (arsenic, copper, chromium III, DDT, naphthalene, nickel, lead and zinc) derived using the new methodology.

4.3.2 Health risk assessment

A scoping workshop was held in December 2006 to determine how the health recommendations of the review report could be addressed. The Australian Centre for Human Health Risk Assessment facilitated the workshop; invitees included representatives from the National Health and Medical Research Council (NHMRC), the Australian Contaminated Land Consultants Association, the enHealth toxicology working group, the National Research Centre for Environmental Toxicology (entox) and the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE).

The updating of the health risk assessment methodology and derivation of health investigation levels (HILs) was undertaken by the NHMRC for NEPC with the assistance of a steering committee comprising Australian health experts. A second workshop was held in February 2010 to discuss and agree certain aspects of the methodology and parameter inputs. Participants included expert representatives from state and territory health departments (ACT, VIC, NSW, QLD, TAS and SA), CRC CARE, entox, the NEPM Technical Working Group and an invited international expert from the National Institute of Environmental Health Sciences (US Department of Health and Human Services).

The five-step risk assessment process described by enHealth⁴⁴ was used to derive the health investigation levels (HILs) for existing and additional priority soil contaminants. The revised NEPM includes a detailed description of the methodology as well as additional guidance applicable to more detailed site-specific health risk assessment. The exposure scenarios considered have been simplified to four generic landuse scenarios as follows:

- HIL A —residential with garden/accessible soil (includes other sensitive landuses e.g. kindergartens and primary schools)
- HIL B —residential with minimal opportunities for soil access (typical high density housing)
- HIL C— parks, recreational areas and secondary school playing fields
- HIL D — Commercial/industrial.

⁴³ ANZECC & ARMCANZ 2000, *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality*, Australian and New Zealand Conservation Council and Agriculture, & Resource Management Council of Australia and New Zealand.

⁴⁴ enHealth 2012, *Environmental health risk assessment. Guidelines for assessing human health risks from environmental hazards*, Department of Health and Ageing & enHealth Council, Canberra.

Additional exposure pathways, such as the inhalation of vapours from soil, have been included for each landuse where relevant for the particular contaminant.

The exposure parameters used to derive the HILs have been updated in accordance with the latest information and are generally sourced from the enHealth Australian Exposure Factor Guidance (enHealth, 2012). A further iteration of the draft HILs was carried out in June 2012 to ensure that the toxicity assumptions were current and changes made as necessary.

The proposed amendment includes HILs for 41 substances including all of the priority contaminants in the Stockholm Convention on Persistent Organic Pollutants (POPs treaty) which have been ratified by Australia. In addition, HILs have been produced for a number of widely used volatile organic chlorinated compounds such as trichloroethene (TCE) that can move as vapours from sub-surface soils into building interiors resulting in potential risk to human health by inhalation of contaminant vapours.

4.3.3 Asbestos

Bonded asbestos containing material (bonded ACM) has been widely used in Australia for example for building walls and roofing and also for fencing. As a result of this widespread use, fragmented bonded ACM is the most commonly occurring form of asbestos in contaminated soils.

The minimal guidance on asbestos in the current NEPM has been expanded and is based on guidance released by the Western Australian Department of Health in 2009⁴⁵ following a public consultation and peer review process. It is proposed to adopt the WA health screening levels for asbestos contamination in soil. In line with enHealth guidance⁴⁶ a more conservative approach is adopted for friable forms of asbestos.

The guidance places emphasis on carrying out a thorough site history (backed up by careful site observations) to evaluate whether free asbestos fibres are likely to be present. If free fibres are detected⁴⁷, then the guidance recommends that the focus should then be on managing the contamination rather than undertaking extensive laboratory analysis to determine the presence (or absence) of asbestos fibres in soil. The guidance recognises the limitations of quantifiable measurement of asbestos fibres in soil as there is no practical sampling and laboratory method to quantify dispersed low levels of asbestos fibres.

The guidance is expected to provide improved protection for human health, more surety and better decision-making for sites with asbestos contamination and reduce the amount of asbestos contaminated soil being transported to landfill for disposal.

4.3.4 Petroleum hydrocarbons and other volatile substances

Petroleum hydrocarbon contamination can cause health and ecological risks both on and away from the site of origin, by vapour penetration of buildings and contamination of groundwater and surface water. All respondents to this issue in the NEPM review called for more guidance on the assessment of volatile substances such as petroleum hydrocarbons.

Concurrent with the review and amendment of the NEPM, CRC CARE undertook a project⁴⁸ to derive health screening levels (HSLs) for petroleum hydrocarbon compounds for the protection of human health. The 3-year project was conducted with the assistance of a stakeholder advisory group which included members of the NEPM technical working group, other government health and environmental

⁴⁵ WA DoH 2009, *Guidelines for the assessment, remediation and management of asbestos-contaminated sites in Western Australia*, Department of Health, Perth, Western Australia.

⁴⁶ enHealth 2005, *Management of asbestos in the non-occupational environment*, Department of Health and Ageing, Canberra.

⁴⁷ AS 4964-2004 *Method for the qualitative identification of asbestos in bulk samples*

⁴⁸ Friebel E & Nadebaum, P 2010a, *HSLs for petroleum hydrocarbons in soil and groundwater; part 1: technical development document, Technical report no. 10*, CRC for Contamination Assessment and Remediation of the Environment, Adelaide.

representatives and industry representatives. The project was subject to local and international peer review at critical milestones.

Following a stakeholder workshop and review of vapour transport models by CSIRO⁴⁹, the widely applied Johnson and Ettinger vapour intrusion model was selected as the base model for development of the HSLs. Emphasis was placed on determining appropriate assumptions for Australian conditions including relevant soil and building parameters.

The amendment proposes to adopt the HSLs developed by CRC CARE. A summary of the HSL methodology and key points for their application and limitations on their use is included in Schedule B1. The supporting CRC CARE HSLs reports (application document⁵⁰ and sensitivity analysis⁵¹) are referenced in Schedule B1 and a link to the CRC CARE website, where these can be downloaded, will be available via the NEPM Toolbox on the NEPC/SCEW website.

With respect to assessing ecological risk from petroleum hydrocarbons, the amendment proposes to adopt ecological screening levels (ESLs) based on the *Canada-wide Standard for Petroleum Hydrocarbons in Soil* (Canadian Council of Ministers of the Environment, 2008) for protection of the terrestrial environment. The Canadian approach has been reviewed by CSIRO for compatibility with the Australian EILs methodology and its applicability to Australian conditions⁵². CSIRO applied the Australian EIL methodology to the available data set (comprising common plant and soil invertebrate species) to derive ESLs for Australian landuse settings.

The amendment also proposes to adopt 'management limits for petroleum hydrocarbons' from the *Canada-wide Standard for Petroleum Hydrocarbons in Soil* to address impacts from the presence of high concentrations of petroleum hydrocarbons such as risk of fire or explosion and damage to buried infrastructure.

A flowchart and a number of case studies have been included in Schedule B1 to illustrate the correct use of the HSLs, ESLs and management limits.

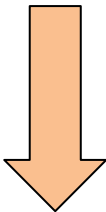
⁴⁹ Davis GB, MG Trefry & Patterson, BM 2009, *Petroleum Vapour Comparison CRC CARE Technical report no. 9*, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

⁵⁰ Friebe, E & Nedebaum, P 2010b, *Health screening levels for petroleum hydrocarbons in soil and groundwater; part 2 application document (draft), Technical report no. 10*, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia

⁵¹ Friebe, E & Nedebaum, P 2010c, *Health screening levels for petroleum hydrocarbons in soil and groundwater; part 3: sensitivity assessment (draft), Technical report no. 10*, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

⁵² Warne, MSTJ 2010a, *Review of the appropriateness of the Canadian petroleum hydrocarbon countrywide standards in soil, for incorporation into the Australian National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council, Australia.

Warne, MSTJ 2010b, *Review of the appropriateness of selected Canadian soil quality guidelines (benzene, benzo(a)pyrene, ethylbenzene, toluene and xylenes), for incorporation into the Australian National Environment Protection (Assessment of Site Contamination) Measure, and Recommended ecological investigation levels*, National Environment Protection Council, Australia.



INTRODUCTION	THE PROBLEM	OBJECTIVES	OPTIONS	IMPACT ANALYSIS	CONSULTATION	CONCLUSIONS
Introduction	Problem statement	Objectives of the NEPM	Introduction	Introduction	Introduction	
Development of the NEPM	Key issues	Objectives of the proposed changes	Options considered	Analysis Framework	Consultation process	
Objectives of the NEPM			Key changes	Analysis	Consultation response	
Structure of the NEPM				Conclusions	Summary of submissions	
Application by users						IMPLEMENTATION & REVIEW
Implementation of the NEPM						Approval process
Statutory Review						Implementation
RIS process						Review
DRIS layout						APPENDICES

5 Impact analysis

5.1 Introduction

The purpose of this impact analysis is to determine:

- the impact of the proposed amendment of the NEPM and
- whether the proposed changes deliver a net benefit for the community compared with the status quo comprising continuation of the NEPM without amendment.

In the case of the NEPM, the objective of government action is:

‘to provide an efficient and effective national approach to the assessment of site contamination which delivers adequate and balanced protection of human health and the environment where site contamination occurs’.

5.2 Analysis framework

This analysis is undertaken using both qualitative and semi-quantitative information. The aim is to provide an ‘on-balance’ assessment of the impacts of amending the NEPM using a range of factors which represent the key costs and benefits.

Although the NEPM guidelines only address the assessment of site contamination, consideration of the impact of making the amendment needs to include both assessment and remediation where the majority of cost savings and benefits are likely to occur.

The criteria used to determine whether the status quo or the proposed changes to the NEPM deliver better outcomes (benefits) are:

- provision of authoritative guidance on the assessment of site contamination
- means and certainty of obtaining adequate human health and environmental protection outcomes
- means to achieve an optimal balance between assessment and remediation costs whilst ensuring protection of human health and the environment
- regulation efficiency
- impacts on industry/persons responsible for site assessment costs
- impacts on society and social justice and equity issues
- marketplace and competition impacts.

This section also considers the impact of the proposed key changes on a jurisdiction by jurisdiction basis.

The analysis section concludes with an assessment of the overall impact of amending the NEPM and considers whether Option 1 (continuation of the NEPM without amendment) or Option 2 (amendment of the NEPM) provides the greatest net benefit for the community.

5.3 Analysis

5.3.1 Provision of authoritative guidance on the assessment of site contamination

Status quo

Submissions to the review indicated that stakeholders considered that the guidance provided in the NEPM, although adequate in some areas, required updating to take account of developments in site assessment practice since the NEPM commenced in 1999 (see Section 1.7). The risk assessment methodologies and information on which the current investigation levels are based are increasingly

outdated. There are also notable gaps in the guidance, such as those for asbestos, certain petroleum compounds and persistent organic pollutants (POPs).

Maintaining the status quo would mean that the NEPM guidance would be viewed as increasingly outdated by users and that the identified gaps in the guidance would not be filled resulting in a loss of credibility of the NEPM.

Proposed amendment

The proposed amendment of the NEPM provides updated and expanded guidance on many aspects of site assessment. The proposed changes have been developed based on the recommendations of the NEPM review and consideration of national and international best practice in site assessment as outlined in Section 4. The amendment guidance will provide authoritative guidance on the assessment of site contamination.

5.3.2 Means and certainty of obtaining adequate human health and environmental protection outcomes

Status quo

As indicated above, the risk assessment methodologies and information used to derive the investigation levels in the NEPM are increasingly outdated and therefore provide decreasing certainty that they adequately protect human health and the environment. The gaps in the guidance, such as for asbestos and petroleum hydrocarbons, lead to variation in assessment approaches by environmental consultants. The diversity of assessment approaches results in longer timeframes being required by auditors and regulators to ensure that the assessment outcomes provide adequate protection of human health and the environment.

If the NEPM is not updated, then these concerns are likely to increase with time to compensate for the reducing certainty that human health and the environment are adequately protected.

Proposed amendment

The updated and transparent methodologies for deriving investigation and screening levels are based on review of current national and international best practice and will provide assessors and reviewers with a scientifically sound basis to determine and manage risks to human health and the environment.

The adoption of the new and revised investigation and screening levels, plus the incorporation of additional guidance on a wide range of issues, will provide greater certainty regarding the level of risk posed by contamination and increased consistency and confidence in the decision-making process. Specific examples of how this will be achieved include:

- the updated and increased number of HILs (including for POPs) combined with the more extensive guidance on undertaking site-specific health risk assessment
- the updated EILs and the new methodology to derive EILs
- the adoption of health and ecological screening levels for petroleum hydrocarbons
- the inclusion of guidance on asbestos contamination in soils.

The wider range of issues addressed by the amendment will ensure that potential risks from site contamination to human health and the environment can be better defined and managed and also improve consistency in assessment between jurisdictions.

5.3.3 Means to achieve an optimal balance between assessment and remediation costs whilst ensuring protection of human health and the environment

Status quo

As discussed in Section 2.2.5, investigation levels are often adopted as default clean up levels for reasons of expediency and cost where site results exceed the investigation levels. In some cases, a property owner or developer may require that the most stringent soil criteria (ecological or human health) be applied to counter potential consumer concern regarding site contamination. Auditors may also defer to more conservative criteria because of liability concerns as they 'sign-off' the assessments in

certain jurisdictions. As a result, remediation may be carried out over and above that required to ensure protection of human health and the environment.

Proposed amendment

The updated methodologies for undertaking health and ecological risk assessments provide assessors with greater flexibility to modify investigation and screening levels for site-specific circumstances. For example, the new methodology for derivation of EILs enables modifications to be carried out based on soil properties. The modified EILs will typically be higher where the contaminants are present in clay-rich and/or organic-rich soils which can limit the effects of contamination on the environment. The inclusion of guidance on asbestos and petroleum hydrocarbons will allow risks from contamination to be better defined. This new flexibility will enable assessors to advise site owners on whether it is likely to be beneficial to undertake more detailed site investigation or whether resources would be better used on managing the identified contamination issues.

The updated guidance should also provide greater confidence in the assessment outcomes by site owners, developers and the community and therefore assist with reducing liability concerns and the amount of remediation undertaken which has no health or environmental benefits for site occupants.

5.3.4 Regulation efficiency

Status quo

The deficiencies and gaps in the NEPM guidance, such as for asbestos and petroleum hydrocarbons, lead to variation in assessment approaches by environmental consultants and likewise, variation in assessment outcomes. These factors lead to extended review times by auditors and regulators.

The majority of site assessment reports provided to auditors and regulators require one or more stages of amendment to ensure technical and administrative compliance. Detailed assessment reports may require an average of 10 hours of review time⁵³ to ensure the assessment complies with the relevant guidance. The review time required increases with the complexity of the site, and in particular where vapours are identified as a potential human health risk – one of the identified gaps in the current NEPM guidance.

Continuation of the NEPM without amendment is likely to lead to more disputes between regulators and stakeholders, such as developers, consultants, risk assessors and auditors in relation to assessment practices and appropriate assessment criteria. As a result, individual regulators may develop state-based guidelines and potentially create inconsistencies between jurisdictions. These inconsistencies are counter to the objective of the NEPM which is an efficient and effective national approach to the assessment of site contamination delivering adequate and balanced protection of human health and the environment where site contamination occurs.

Australia is a signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs treaty) and has an obligation (Paragraph 1(e) of Article 6) to develop appropriate strategies to identify sites contaminated by chemicals listed in the annexes to the treaty. The NEPM currently does not include criteria for all the listed POPs. Australia's National Implementation Plan for the POPs treaty states that in the review of the NEPM, treaty obligations should be taken into consideration. If the NEPM were to continue as is, Australia may be at risk of not fulfilling its treaty obligations with respect to the identification of contaminated sites.

Proposed amendment

The amendment is expected to provide cost savings for regulators (i.e. improvements in the efficiency of regulating contaminated sites) from:

- greater consistency in assessment approach from applying the updated methodologies and the clarified and extended guidance resulting in reduced review times for auditors and regulators

⁵³ Information provided by SA EPA.

- submission of fewer detailed site-specific risk assessments (as the amendment provides additional guidance on how to modify the health and ecological investigation levels for site-specific circumstances) reducing the necessity to audit site-specific methodologies and assumptions
- improved confidence in assessment outcomes from application of the updated methodologies and the clarified and extended guidance resulting in fewer disputes between site assessors, auditors and regulators

Specific examples include:

- The greater number of HILs and inclusion of the HSLs for petroleum hydrocarbons are likely to reduce regulatory concerns and potential risks to government in considering health risks on specific sites as, in the absence of nationally adopted health-based criteria, contaminated land professionals are required to justify the approach undertaken.
- The amendment incorporates additional information and guidance on the assessment of dioxins and includes HILs for all of the POPs adopted in the Stockholm Convention ratified by Australia, with the exception of dioxins, which are recommended to be addressed on a site-specific basis.
- Regulation of the ecological impacts of contaminated sites can be contentious due to the limited basis on which the current NEPM interim EILs were derived. The new methodology and EILs provide regulators with a scientific basis for decision making which will reduce disputes about acceptable levels of protection with assessors, auditors and third party reviewers.
- Many site investigation reports are reviewed by accredited third party professionals or jurisdictions when statutory decisions are required in relation to land-use change or development proposals. Regulators will benefit from the provision of more reliable and comprehensive assessments from auditors and third-party reviewers.

In the short term, resource demands on regulators are likely to increase as legislation, guidelines and standards will need to be revised and updated as appropriate for that jurisdiction (requirements for implementation are discussed in Section 7 by jurisdiction). Regulators, auditors and practitioners will also need to build up their awareness of the new guidance and update their own processes and procedures. Arrangements for a national program of training/awareness raising on the proposed changes to the NEPM are currently being considered by the COAG Seamless Environmental Regulation Thematic Oversight Group (SERTOOG).

5.3.5 Impacts on society

Status Quo

Continuation of the NEPM as is will result in increasing uncertainty regarding whether assessment outcomes provide adequate levels of protection for the community. This is likely to result in longer reviews by auditors and/or regulators which will increase costs and potentially result in delays to development projects. Ultimately, the community bears the costs of extended assessment timeframes.

A common result of the lack of adequate site assessment guidance is the flow-on costs to society caused by overly conservative reactions to the presence of any contamination. This conservative response arises from personal liability concerns about future legal action with respect to real or potential health risks and to perceptions of stigma in relation to property values (for example Case Study 1 in Section 2).

Australia is a signatory to the Stockholm Convention on Persistent Organic Pollutants (POPs treaty) and has an obligation (Paragraph 1(e) of Article 6) to develop appropriate strategies to identify sites contaminated by chemicals listed in the annexes to the treaty. The NEPM currently does not include criteria for all the listed POPs. Australia's National Implementation Plan for the POPs treaty states that in the review of the NEPM, treaty obligations should be taken into consideration. If the NEPM were to continue as is, Australia may be at risk of not fulfilling its treaty obligations with respect to the identification of contaminated sites.

Proposed amendment

The new and revised investigation and screening levels and associated guidance should improve consistency and confidence in site assessment practices and outcomes and therefore contribute to improved social justice and equity in the community. For example, the increased range of contaminants covered by health investigation levels (HILs) will ensure that potential risks from site contamination to householders and local communities can be better defined and managed.

The amendment incorporates additional information and guidance on the assessment of dioxins and includes HILs for all of the POPs adopted in the Stockholm Convention ratified by Australia, with the exception of dioxins, which are recommended to be addressed on a site-specific basis.

Increases in site development costs are almost always passed on to consumers either directly through increased property costs or indirectly through higher prices for goods and services. The proposed changes to the NEPM may in some cases increase assessment costs, however, the increase will in many cases be offset by lower remediation costs as the contamination can be better defined and managed. In addition, the improved clarity of the guidance may reduce timeframes for assessment and review which will mean that land can be returned more quickly to use, benefitting the wider community.

The updated and extended guidance should provide greater certainty for both buyers and sellers of land and hence reduce one of the main drivers for overly conservative remediation actions (reducing overall costs to society). The adoption of improved site assessment practices as a result of applying the updated guidance, also has the potential to reduce emissions and disturbance to the community by reducing the number of phases of site investigation, with consequent reduction in vehicle movements, exhaust emissions and also reduced volumes of waste requiring treatment and disposal.

The updated guidance is expected to improve the overall standard of site assessments carried out and result in improved delineation of contamination and hence better outcomes for the affected community. A major economic and social benefit resulting from the adequate assessment and remediation of contaminated sites is the prevention or reduction in health impacts and the costs associated with those health impacts. Many of the chemicals that cause site contamination are linked to various health impacts, including cancer. Direct medical costs represent only a portion of the total benefits associated with reduction of exposure to chemical contaminants⁵⁴ and if site contamination is not adequately identified and addressed, society bears the cost of lost productivity and wages, and increased pain and suffering.

5.3.6 Impacts on industry/persons responsible for assessment of contaminated sites

Status quo

The absence of a nationally consistent and scientifically-based assessment approach for assessing asbestos, petroleum hydrocarbon compounds and ecological risks has caused uncertainties on sites, project delays, risk of costly over-remediation or understatement of the risks on individual sites, and inconsistencies of approach between different sites and jurisdictions.

The use of investigation levels as triggers for cleanup can increase property development costs arising from earthworks, soil transport, landfill disposal and additional professional consulting services and can also cause disturbance to the site and local environment. The main component of increased costs is associated with the disposal of materials to landfill that do not pose any environmental risk (note waste soils disposed to landfill are received subject to regulation and control).

For asbestos, the absence of criteria in the NEPM has resulted in a 'zero tolerance' approach being adopted in some cases with consequent removal of large volumes of soil to ensure that all asbestos fibres have been removed prior to a site being redeveloped. An example of the consequences of this approach is illustrated by Case Study 3 in Section 2. The soil disposal costs incurred can range from a few thousand dollars on small residential sites to millions of dollars for large industrial sites. The practice

⁵⁴Cost of illness Handbook, US EPA Office of Pollution Prevention and Toxics, <http://www.epa.gov/oppt/coi/>

adds to development costs (which are passed on to consumers and the community) and also uses up valuable landfill space close to metropolitan areas.

Landfill disposal levies (see Table 5.1) and disposal costs typically form a major component of overall project costs if off-site soil disposal is carried out. Landfill levy costs have increased by a factor of at least 10 in most jurisdictions since the commencement of the NEPM and are likely to continue to rise in the future.

Table 5.1 Changes in landfill levy costs since the commencement of the NEPM in 1999

Jurisdiction	Comparison of changes in landfill levy costs*
Australian Capital Territory	\$3/tonne in 1994/95 (putrescibles) to \$122/tonne (contaminated soil) in 2011/12
New South Wales	\$10/tonne in 1996 to \$95.20 /tonne in 2013 in the Sydney metropolitan area. (NSW EPA, http://www.environment.nsw.gov.au/wr/index.htm)
Northern Territory	Information not available
Queensland	A waste levy of \$35 a tonne for contaminated soil was introduced on 1 December 2011, with opportunities for exemptions in certain circumstances. The levy was repealed on 1 July 2012.
South Australia	\$2/tonne in 1994/1995 to \$42/tonne (metropolitan Adelaide) and \$21/tonne (non-metropolitan Adelaide). Further increases to at least \$50/tonne are foreshadowed in metropolitan Adelaide
Tasmania	Information not available
Victoria	1992 - \$2/tonne (municipal), \$3/tonne (industrial/prescribed) 2012 – 2013 (rising incrementally to July 2014) – ~\$24/48/tonne (municipal), ~\$42/48/tonne (industrial) (costs are dependent on the premises type) 2008-present - \$30/tonne (asbestos), \$70 or \$250/tonne (prescribed industrial waste) (costs are dependent on the level of contamination)
Western Australia	1998 - \$1/tonne (putrescibles) and \$3/tonne(inert) 2010 to present - \$28/tonne (putrescibles) and \$12/m ³ (inert) (WA Waste Authority, www.zerowaste.wa.gov.au/about/levy)

*Disposal gate prices are set by individual disposal site operators.

Proposed amendment

Escalations in project costs currently arise when there are no authoritative investigation levels available, or when there is uncertainty with regard to investigation requirements resulting in project delays and increased land holding costs.

The wider range of investigation and screening levels and the improved methodologies and sampling guidance provided in the amendment should reduce project uncertainty and professional liability concerns. Their application in the Case Studies discussed in Section 2.2.5 could have substantially reduced the assessment and remediation costs.

The amendment is expected to deliver considerable cost benefits in the assessment and management of asbestos contaminated sites. The proposed changes were supported by business including the building and construction industry. One industry respondent commented that the amendment would have saved over \$2 million in landfill and cleanup bills for asbestos contaminated soil on one of their sites alone⁵⁵.

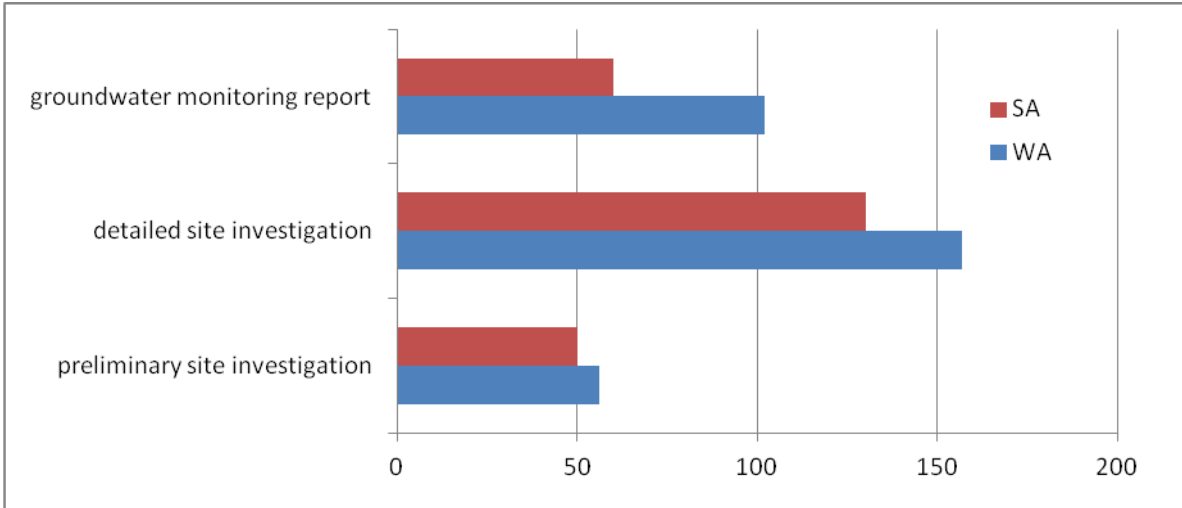
As discussed in Section 5.3.3, the updated methodologies for undertaking health and ecological risk assessments provide assessors with greater flexibility to modify the new investigation and screening levels for site-specific circumstances without compromising protection of human health and the environment. This flexibility will enable assessors to advise site owners on whether it is likely to be beneficial to undertake more detailed site investigation (potentially reducing the volume of soil and groundwater requiring treatment or disposal) or whether resources would be better used on managing the identified contamination issues.

The cost savings for site owners with multiple sites are likely to be significant. Informal discussions with petroleum industry representatives indicate that the adoption of the health screening levels for petroleum hydrocarbons will result in substantial annual cost savings in investigation and remediation costs (in excess of \$1million for one major petroleum company alone).

The economic impact on industry/persons responsible for assessment costs has been extrapolated from information held by the Western Australian Department of Environment and Conservation (WA DEC) and the South Australia Environment Protection Agency (SA EPA) supplemented with information provided by other jurisdictions.

The WA *Contaminated Sites Act 2003* places an obligation on certain persons to report known and suspected contamination to WA DEC. Information on over 4000 sites is now held by WA DEC on the WA contaminated sites database and contaminated sites register. Not all sites will be active at any one time; however, the size of the assessment industry can be extrapolated from the number of site contamination reports submitted to WA DEC on an annual basis. In 2010/11 DEC received approximately 315 technical site assessment reports, the breakdown is shown in Figure 5.1.

Figure 5.1 Indicative numbers of site assessment reports submitted to jurisdictions



Derived from WA DEC Contaminated Sites Database and Register data for 2010/2011 and from numbers of site contamination notifications and reports received and recorded by SA EPA in 2011. Equivalent information is not available for other jurisdictions.

In South Australia, the size of the assessment industry can be extrapolated from the numbers of site contamination notifications and reports received and recorded by SA EPA which was approximately 240 in 2011. As at November 2011, site contamination information relating to about 1,450 sites was held by

⁵⁵ Australian Sustainable Business Group submission

SA EPA and includes sites where remediation has been completed. The total number of sites where assessments have been conducted is expected to be much greater as legislative requirements to notify SA EPA of certain contamination only came into effect in July 2009. The number and type of site assessment reports submitted to SA EPA in 2011 is shown in Figure 5.1.

Approximately 50% of these reports & notifications related to a detailed site investigation (DSI) where the largest increases in costs will occur as this is the most intensive period of sampling and analysis, data reporting and risk assessment. The increase in assessment costs have been estimated to be in the range of 10-25%⁵⁶. The lower figure reflects that some environmental consultants have already developed procedures based on best practice methods. For preliminary site investigations, the costs attributable to the proposed amendment are anticipated to be less than 10% of existing costs as only minimal sampling and analysis is typically undertaken at this stage of an investigation.

Table 5.2 Indicative site assessment costs

Reporting stage	Assessment costs ¹	
	Typical site ²	Complex site ³
Preliminary site investigation	\$5,000 - 25,000	\$20,000 - 50,000
Detailed site investigation	\$30,000 - 100,000	\$250,000 - 500,000
Annual groundwater monitoring	\$15,000 - 50,000	\$50,000 - 100,000

1 Lower range costs provided by SA consultants to SA EPA (2009 costs), higher range costs based on 2012 estimates from WA LandCorp and sites funded from the WA Contaminated Sites Management Account

Costs shown are for metropolitan areas, equivalent investigations in regional areas can be significantly higher

2 Typical sites generally require only one or two phases of site investigation and do not have complex mixtures of contaminants

3 Complex sites generally have had multiple land-uses or contain complex mixtures of contaminants requiring multiple phases of investigation and extensive sampling and analysis programs.

Based on the number of reports submitted in WA for 2010/11, the indicative costs shown in Table 5.2 and an increase of up to 25%, overall annual assessment costs could increase in WA from about \$29million to around \$35million, an increase of \$6 million (details provided in Appendix D). For SA, the overall annual assessment costs may rise from about \$7.6million to about \$9.2million, an increase of about \$1.6million (details provided in Appendix D) based on an increase of 25%.

Assuming that WA represents between five (based on Natusch 1997, refer Table5.3) and ten per cent (based on information held by jurisdictions, refer Table 5.3) of the total assessment industry in Australia, the total national increase could be of the order of \$60million to \$120million. The increase in costs nationally is likely to be substantially less than these amounts as increases of 25% are not expected for all sites and costs are generally dearer in Western Australia compared with the eastern states. Assuming that the SA indicative costs are more reflective of the national situation, and that SA represents around five per cent (based on Natusch 1997, refer Table5.3) of the total assessment industry in Australia, the total national increase may only be of the order of \$32million.

Nearly all sites requiring a detailed site investigation to delineate and assess the risks from contamination will require some form of management or remediation to be carried out. Assuming that 150 detailed site investigations are carried out annually in WA (see Figure 5.1) and that this represents five to ten per cent of the national total (refer Table5.3), would imply that between 1,500 and 3,000 detailed site investigations are carried out nationally each year.

⁵⁶ Australian Sustainable Business Group members provided a guesstimate of up to 25% increase in costs related to an increase in the number and types of samples required. The majority of costs would be in the establishment stage of the sampling program; however, once the sampling regime had been set up, economies of scale could be anticipated.

Table 5.3 Estimated total number of contaminated sites in Australia

Jurisdiction	Total no. contaminated sites	Comments provided by jurisdictions on the potential number of contamination sites in their state or territory
Commonwealth	-	Information not available
ACT	500*	Information not available
New South Wales	30,000*	<p>As of 30 June 2012, 1452 sites have been notified to NSW EPA, 641 sites have been assessed, 217 sites have been regulated and 107 sites remediated under the <i>Contaminated Land Management Act 1997</i>.</p> <p>This figure of 1452 sites does not account for sites with less significant contamination managed under land-use planning legislation. No state-wide data is available for sites managed under these planning processes.</p> <p>NSW EPA is unable to confirm the derivation of the Natusch (1997) number but it looks like a guestimate.</p>
Northern Territory	1000*	Information not available
Queensland	30,000*	In 2012 the QLD Environmental Management Register held 22,200 sites which are potentially contaminated. The Contaminated Land Register listed 11 sites where the land is contaminated and action is required to remediate the land to prevent serious environmental harm.
South Australia	4,000*	<p>As of November 2011, SA EPA held site contamination information relating to about 1,450 sites. This information includes sites where remediation had been completed.</p> <p>The number of sites where assessments have been conducted is expected to be greater as legislative requirements to notify SA EPA of certain contamination only came into effect in July 2009.</p> <p>The number of sites with information recorded by SA EPA is expected to continue to increase due to legislative notification requirements.</p>
Tasmania	500*	Information not available
Victoria	10,000*	Information not available
Western Australia	4,000*	<p>As of 30 June 2012, 2,221 sites had been classified under the <i>Contaminated Sites Act 2003</i>, and make up about half of the total number of sites reported to WA DEC. Of these, 215 have been decontaminated, 518 are known to be contaminated and a further 1123 are possibly contaminated (total 1641 sites).</p> <p>A total of 4,000 known and potentially contaminated sites in WA is a reasonable estimate on this basis.</p>
TOTALS	80,000*	41,113

* Natusch 1997 in *Accounting for Contaminated Sites: How Transparent are Australian Companies?* (Ji & Deegan, 2011, *Australian Accounting Review* 57 v21 Issue 2 2011)

If the increased annual assessment costs of \$32million (extrapolated from SA data) to \$120million (extrapolated from WA data) are proportioned evenly over the 1,500 to 3,000 sites, this is equivalent to a \$10,000 to \$80,000 increase and cost savings of this order are anticipated to be achievable on remediation schemes typically costing tens to hundreds of thousands of dollars from application of the revised assessment guidance. In practice, remediation cost savings at individual sites could be much larger. As indicated earlier, one industry respondent⁵⁷ commented that, had the amendment been in place, it could have saved over \$2million in landfill and cleanup bills on one of their sites alone.

5.3.7 Impact of the proposed key changes jurisdiction by jurisdiction

Information to assess the impacts of the key changes proposed in the amendment of the NEPM on a jurisdiction basis is limited. However, most jurisdictions have commented that the improved guidance on the assessment of ecological and human health risks will deliver improved public health and environmental outcomes. In some cases, these benefits are already being realised as the guidance on which the amendment is based is already in use, for example the WA Health guidance on the assessment of asbestos in contaminated soils has been taken up in the ACT, QLD and SA as well as WA. The anticipated impacts of the key changes are summarised in Table 5.4.

Table 5.4 Summary of the anticipated jurisdiction by jurisdiction impacts for the four key changes as a result of amending the NEPM

Jurisdiction	Guidance area	Anticipated impact
Commonwealth		Information not available
ACT	ecological risk assessment	The updated guidance is expected to provide greater scientific rigor and certainty to the assessment of ecological and human health risks at sites in the ACT.
	human health risk assessment	
	petroleum hydrocarbons	Over 55% of the contaminated sites recorded in the ACT are known or suspected to be impacted by hydrocarbon contamination. Whilst some initial increase in assessment costs are anticipated better overall environmental, human health and economic outcomes are expected from the amended guidance.
	asbestos	Minimal impact is expected as the amendment is based on the WA Health Asbestos guidelines which have been in use in the ACT since 2010.
New South Wales	ecological risk assessment	Assessment of ecological risks is not always expected for known and suspected contaminated sites in NSW, however when indicated, a robust and defensible process enables better decision making by both regulators and proponents. The updated guidance on ecological risk assessment (and the new EILs) is expected to lead to improved risk assessment practices in NSW and better regulatory and environmental outcomes.*
	human health risk assessment	An assessment of human health risks is expected for all known and suspected contaminated sites in NSW in accordance with the NEPM. The updated guidance on human health risk assessment (and the new HILs) is expected to lead to improved risk assessment

⁵⁷ Australian Sustainable Business Group

Jurisdiction	Guidance area	Anticipated impact
		practices in NSW.*
	petroleum hydrocarbons	As of 31 August 2012, 68% of sites notified to the EPA of potentially significant site contamination involve petroleum hydrocarbons. Adoption of the HSLs and ESLs will improve assessment of petroleum-impacted sites and may result in an increase in the number of sites notified to the NSW EPA and better regulatory, environmental and public health outcomes.*
	asbestos	While inclusion of asbestos related guidance will help clarify appropriate assessment actions on affected sites, it may significantly increase costs for sites impacted by asbestos, due to increased assessment and laboratory costs. Initial reviews have shown increases of 120% in the analytical costs (\$35 to \$80 per sample).
Northern Territory		Information not available
Queensland	ecological risk assessment	Minimal impacts are expected as assessments of contaminated and potentially contaminated land in Queensland are already expected to consider the amended NEPM requirements.
	human health risk assessment	Minimal impacts are expected as assessments of contaminated and potentially contaminated land in Queensland are already expected to consider the amended NEPM requirements.
	petroleum hydrocarbons	There are currently over 8,000 sites on the Environmental Management Register, which have a history of use involving petroleum hydrocarbons and have the potential for vapour intrusion. The adoption of ESLs and HSLs in the assessment framework will provide greater certainty that risks to ecosystems and human health are adequately assessed and managed. However, the impacts cannot be quantified at this stage as dealing with these types of sites for contamination assessment and management is largely a client driven process so it is not known how many such affected sites will need to be assessed for land use suitability in the future.
	asbestos	Minimal impact is expected as the amendment is based on WA Health guidance which has been used in QLD for some time.
South Australia	ecological risk assessment	The assessment of ecological and human health risks in accordance with the NEPM is required where site contamination is known or suspected to address any actual or potential harm to human health and the environment taking into account current or proposed land uses or harm to water that is not trivial.
	human health risk assessment	The updated guidance including the new EILs and HILs and updated GILs is expected to lead to improved risk assessment practices in SA. The assessment of ecological and human health risks in accordance with the NEPM is required where site contamination is known or suspected to address any actual or potential harm to human health and the environment taking into account current or proposed land uses or harm to water that is not trivial. The updated guidance including the new EILs and HILs and updated GILs is expected to lead to improved risk assessment practices in SA.*
	petroleum hydrocarbons	More than 60% of notifications of site contamination received by the EPA since July 2009 relate to sites where potentially

Jurisdiction	Guidance area	Anticipated impact
		<p>contaminating activities have occurred or are occurring which involve petroleum hydrocarbons or volatile organic substances.</p> <p>The assessment of vapour intrusion is required at an increasing number of sites.</p> <p>It expected this key change will have the most impact in SA however it is noted that aspects of the guidance are available in relevant CRC CARE technical reports which are already being applied to some extent in SA.</p> <p>The provision of national guidance on vapour assessment in the context of an integrated risk assessment framework, incorporating the appropriate application of petroleum hydrocarbon HSLs and interim soil gas HILs for volatile organic carbon compounds (VOCCs), is expected to provide greater certainty that human health and the environment are adequately protected.</p>
	asbestos	Minimal impact is expected as the amendment is based on WA Health guidance which is recommended to be used in SA. It is estimated that asbestos disposal has been identified as an issue in less than 10% of sites where information is recorded by the EPA.
Tasmania	ecological risk assessment	An assessment of ecological and human health risks is required for all sites where Notices are served under Part5A of the <i>Environmental Management and Pollution Control Act 1994</i> . The updated guidance on human health and ecological risk assessment (and the new EILS and HILs) is expected to lead to improved risk assessment practices in Tasmania. Data are not available to quantify this impact.
	human health risk assessment	
	petroleum hydrocarbons	Part 5A Notices are served to investigate, remediate or manage site contamination; 90% of these Notices relate to sites contaminated with petroleum hydrocarbons. As the HSLs for protection of human health have been recommended for use in Tasmania since 2011 the impact for many of these sites will be minimal. Observation suggests that basic site assessments have been simplified through use of the HSL's due to the minimising of the need for site specific assessment. Data are not available to quantify this impact.
	asbestos	Data not available to quantify this impact.
Victoria	ecological risk assessment	Victoria does not currently have a database of existing site data that allows it to definitively comment on the impact these changes will have. Nor does it currently have an idea of how many sites may be impacted by them in future.
	human health risk assessment	
	petroleum hydrocarbons	Victoria is currently in the process of reviewing how it administers its contaminated sites system and policy framework. As a result, while it is believed that minimal impacts will be likely as assessment in these areas is already largely expected in accordance with the NEPM, it would be most accurate to state that the information is not currently available.
	asbestos	

Jurisdiction	Guidance area	Anticipated impact
Western Australia	ecological risk assessment	The updated GILs for protection of aquatic ecosystems and human health are already in use in WA. An assessment of ecological and human health risks is required for all known and suspected contaminated sites in WA. The updated guidance on human health and ecological risk assessment (and the new EILs and HILs) is expected to lead to improved risk assessment practices in WA.*
	human health risk assessment	
	petroleum hydrocarbons	Petroleum hydrocarbons are estimated to affect over 50% of the 2,221 sites classified up to 30 June 2012 under the <i>Contaminated Sites Act 2003</i> . As the HSLs for protection of human health have been in use in WA since 2011 the impact for many of these sites will be minimal. The adoption of the ESLs and the framework for assessment of volatile contaminants will provide greater certainty that ecosystems and human health are adequately protected.*
	asbestos	Minimal impact expected as the amendment is based on WA Health guidance which has been in use in WA since 2009. Approximately 10% of sites classified under the <i>Contaminated Sites Act 2003</i> concern asbestos.

*Data not available to assess this impact.

5.3.8 Impact on competition

Status quo

The continued operation of the NEPM without amendment would not have any implications for competition.

Proposed amendment

There is a possibility that some service providers (such as environmental consultants at the lower end of the market) will not have the knowledge and expertise to provide assessment services consistent with the improved investigation standards of the amended NEPM. It is also possible that the higher standards will mean that new entrants may find it more difficult to enter the market. As a result, affected parties will need to recruit staff with more appropriate expertise or undertake a suitable training and development program. The impact on the market, however, is outweighed by the benefits to the community as site assessments will be carried out by more competent service providers and to a higher standard.

An assessment of the proposed amendment against the COAG Competition Policy Principles indicates that overall it will have a minimal effect on competition.

Additional information is provided in Appendix E.

5.4 Summary

This DRIS assessed two options for the assessment of site contamination: continuation of the NEPM as is (Option 1) and amending the NEPM (Option 2). The impact analysis has been undertaken using both qualitative and semi-quantitative information, the aim being to provide an 'on-balance' assessment of the impacts of amending the NEPM using a range of factors which represent the key costs and benefits.

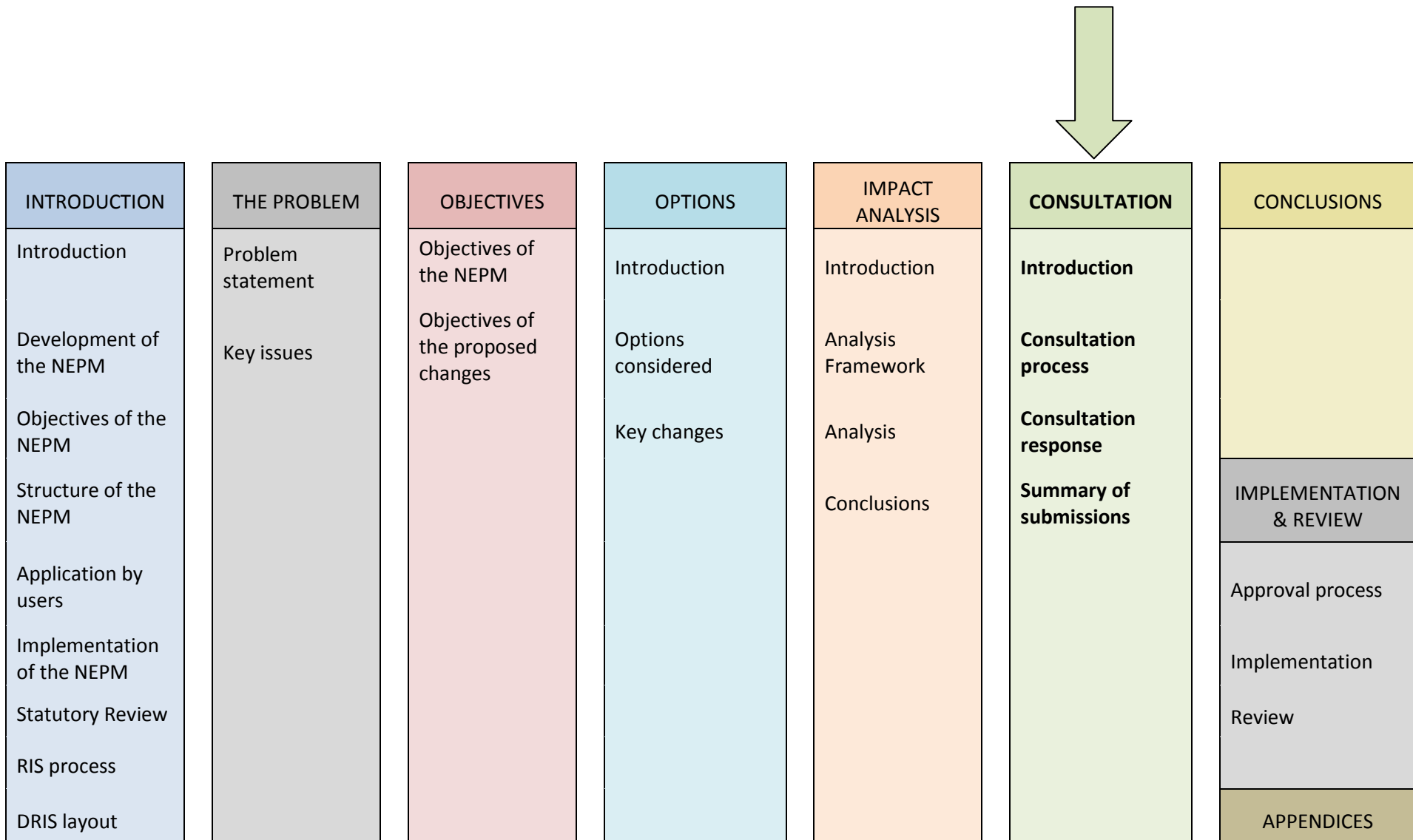
A comparison of the impacts of the two options, considered in the context of the objectives for the proposed changes outlined in Section 3.2, is provided in Table 5.2. The table indicates that Option 2, the amendment of the NEPM is the most effective and efficient option except for the resulting cost burden on industry/persons responsible for site assessment costs and the minimal effect on competition. Although Option 2 has the highest site assessment costs, when potential savings at the

remediation/management stage are taken into account, option 2 is likely to have the lowest direct and indirect costs to industry, society and regulators, as well as providing greater social justice and equity.

Table 5.2 Comparison of the impacts of amending the NEPM with the status quo

Criteria*	Option 1 Continuation of the NEPM	Option 2 Amending the NEPM
Provision of authoritative guidance	Least authoritative	Most authoritative
Means and certainty of obtaining adequate human health and environment protection outcomes	Least certainty	Most certainty
Means of optimising assessment and remediation costs while ensuring protection of human health and the environment	Limited opportunity for optimising costs	Most opportunity for optimising costs
Regulation efficiency	Higher regulation costs	Lower regulation costs
Impact on society	Higher indirect costs and lower social justice and equity	Lower indirect costs and more social justice and equity
Impact on industry/ persons responsible	Lowest assessment costs	Highest assessment costs
Impact on competition	No effect	Minimal effect

*Based on the objectives of making changes to the NEPM discussed in Section 3.



6 Consultation

6.1 Introduction

Consultation at various stages of the review and amendment process has included a broad range of stakeholders including non-government organisations, state and territory regulators, the National Health and Medical Research Council (NHMRC), enHealth, industry and the private sector, peak industry bodies and scientific organisations including CSIRO and CRC CARE, local government and the public. The responses demonstrated a high level of support for amending the NEPM.

Consultation with key stakeholders and the broader community is a key part of the regulation impact assessment process. The aim is to help identify additional information on impacts, costs and benefits to better understand how the proposed actions may affect particular stakeholder groups and to provide transparency in decision making.

The release of the Consultation RIS provided further opportunity for stakeholders and the broader community to understand the nature of site contamination assessment and the options being considered for addressing these impacts, and to provide feedback.

6.2 Public consultation process

6.2.1 Objectives

In 2010 the NEPC approved public consultation on a Consultation Regulatory Impact Statement (Consultation RIS) and draft NEPM amendment in accordance with the requirements of Section 18(1) of the NEPC Act.

The objective of the public consultation was:

- to invite public comment on the appropriateness of the draft amendment to the NEPM and the Consultation Impact Statement
- to encourage public discussion on the content of the guidelines included in the draft Schedules
- to ensure the process of developing the amendment to the NEPM was as open and transparent as practicable.

The NEPC sought comments, information and feedback about:

- the appropriateness of the draft amendment to the NEPM
- the usefulness of the draft amendment to the Schedules
- the analysis of the potential environmental, social and economic impacts of the draft amendment to the NEPM as provided in the Consultation Impact Statement.

6.2.2 Consultation documents

The following documents were released for public consultation and were made available on the EPHC website < <http://www.nepc.gov.au/contam/pcdocs>>:

- Consultation Regulatory Impact Statement (Consultation RIS)
- Draft NEPM as varied (incorporating Schedule A)
- Schedule B1: Guideline on investigation levels for soil & groundwater
- Schedule B2: Guideline on site characterisation
- Schedule B3: Guideline on laboratory analysis of potentially contaminated soils

- Schedule B4: Guideline on site-specific health risk assessment
- Schedule B5a: Guideline on ecological risk assessment
- Schedule B5b: Guideline on methodology to derive Ecological Investigation Levels in contaminated soils
- Schedule B5c: Guideline on soil quality guidelines for arsenic, chromium(III), copper, DDT, lead, naphthalene, nickel and zinc
- Schedule B6: Guideline on risk based assessment of groundwater contamination
- Schedule B7: Guideline on health-based investigation levels
- Schedule B8: Guideline on community engagement & risk communication
- Schedule B9: Guideline on competencies and acceptance of environmental auditors and related professionals.

6.2.3 Consultation period

The public consultation period on the draft amendment to the NEPM and the Consultation RIS was from 24 September to 26 November 2010, in accordance with the requirements of Section 18(3) of the NEPC Act.

The consultation period was widely advertised, including through:

- public notices in *The Australian*
- public notices in a prominent daily newspaper in each State and Territory (e.g. *The West Australian* in WA)
- details published on the EPHC website < <http://www.nepc.gov.au/contam/pcdocs>>
- email advice to the EPHC mailing list (in excess of 600 people and organisations)
- industry via the Association of Contaminated Land Consultants Australia (ACLCA) and the Australasian Land and Groundwater Association (ALGA).

6.2.4 Consultation process and public meetings

To assist people who wished to make submissions, public meetings were held in every state and territory capital city between 12 and 26 October 2010.

These meetings were advertised on the EPHC website at <www.ephc.gov.au> and widely advertised in each State and Territory. Each meeting took the form of:

- an 'open-house' session with poster displays on the main changes and opportunity for one-to-one discussions with members of the technical working group
- a formal presentation followed by
- a panel discussion.

To facilitate the consultation process, the posters and formal presentations which were used in the public meetings were also made available for download from the EPHC website at <<http://www.nepc.gov.au/contam/pcmtg>>:

- Presentation - Public Consultation Meetings - Introduction
- Presentation - Public Consultation Meetings - Summary of Major Changes
- Presentation - Public Consultation Meetings - Asbestos
- Poster 1 - Overview of the Amendment

- Poster 2 - General process for assessment of site contamination
- Poster 3 - Investigation levels and screening levels
- Poster 4 - Petroleum hydrocarbons
- Poster 5 - Asbestos
- Poster 6 - Health risk assessment
- Poster 7 - Ecological risk assessment
- Poster 8 - Site characterisation
- Poster 9 - Schedules B3, B8 and B9.

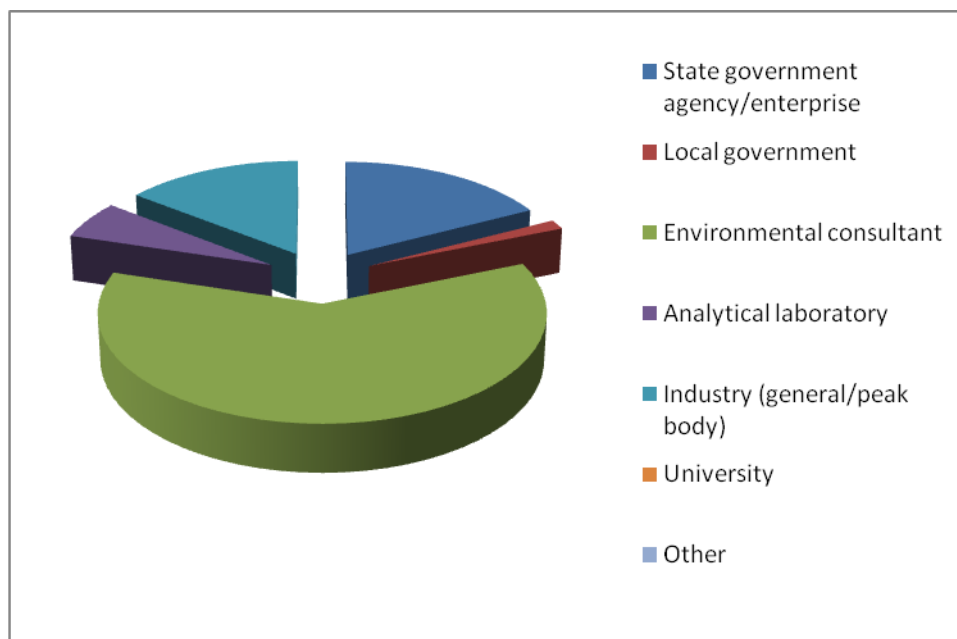
An electronic form for lodging comments arising from the public consultation was available via the EPHC website at <www.ephc.gov.au>.

6.2.5 Public attendance

In total, over 600 people attended the public meetings held across Australia. This included representatives of state and territory governments, local government, industry, environmental consultants, analytical laboratories, specialist remediation companies, legal representatives and members of the public.

A record was taken of those attending the public meeting held in Perth. A total of 69 people was recorded as attending the meeting. The majority of those attending represented environment consultants (approximately 61%). A break-down of the stakeholder groups represented by the persons attending the Perth public meeting is shown in Figure 6.1. This break-down is considered representative of the attendance at the other public meetings held across Australia.

Figure 6.1 Break down of stakeholder groups attending the public meetings (Perth 2010)



6.2.6 Public submissions received

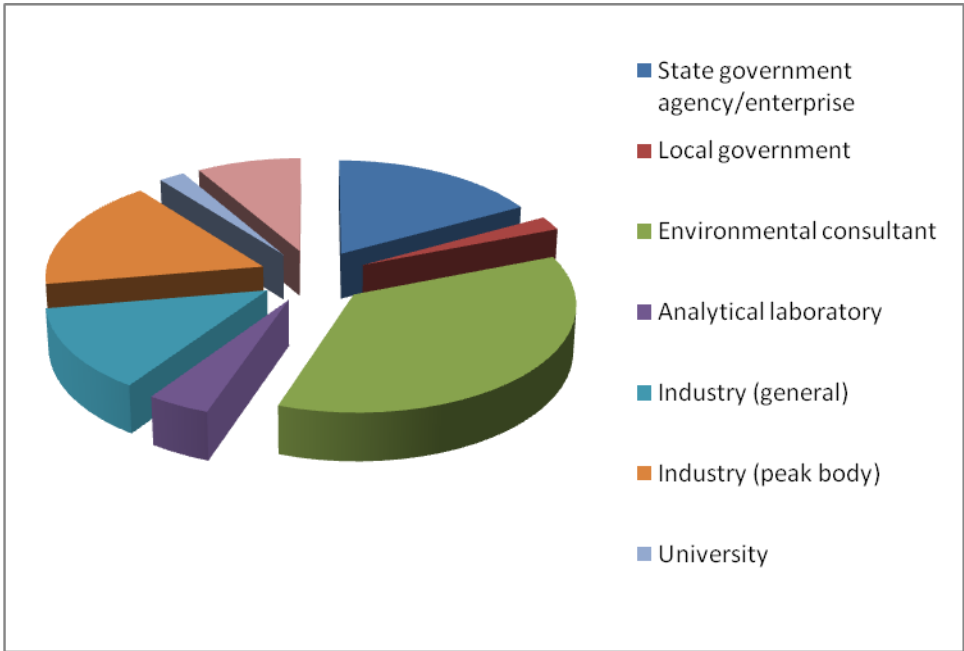
Forty seven (47) written responses were received on the draft NEPM and Consultation Impact Statement and represented a broad range of individual business, industry, academic and state and local government perspectives. The list of submitters is provided as Appendix C.

The receipt of all written submissions received on the draft amendment to the Measure and the Impact Statement was acknowledged by NEPC. The public submissions represented seven broad stakeholder groups:

- state government agencies/enterprises
- local government
- environmental consultants
- analytical laboratories
- industry (general and peak bodies)
- Universities
- other (such as research and development or advisory organisations).

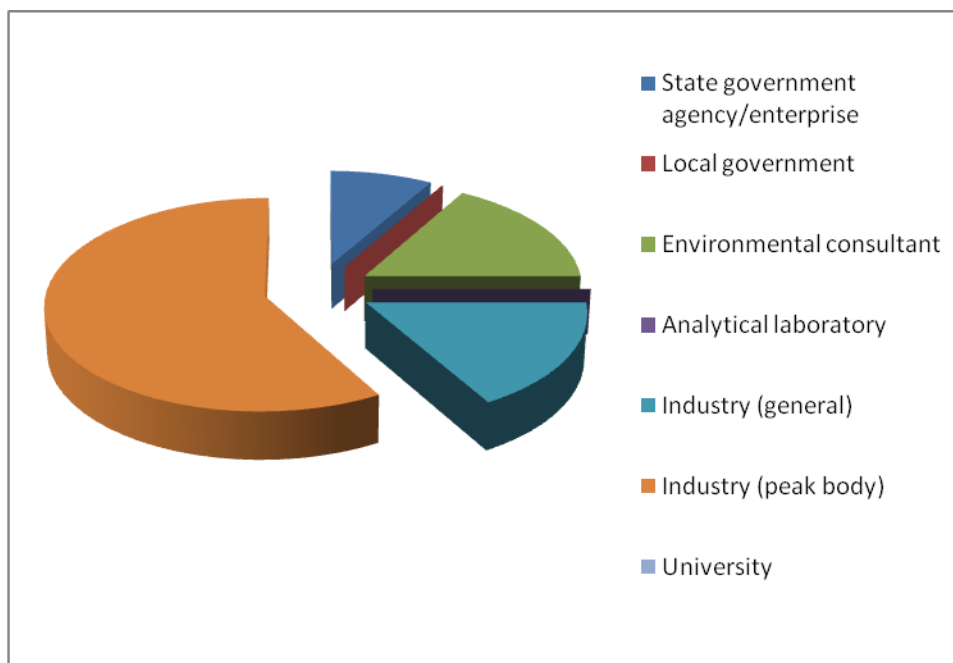
Public submissions from all stakeholder groups were received on the draft NEPM. Over one third of submissions (approximately 36%) were from environmental consultants. State government and industry groups represented the next largest stakeholder groups that responded. No responses were received from members of the public. A break-down of public submissions received on the draft NEPM from each stakeholder group is shown in Figure 6.2.

Figure 6.2 Distribution of submissions on the draft NEPM as varied by stakeholder groups



Only twelve of the public submissions (approximately 25%), representing industry and industry peak bodies, state government agencies and environmental consultants, provided comments on the Consultation Impact Statement. Of these, the majority of submissions were from industry (general and peak groups). Environmental consultants represented the next largest stakeholder group that responded. A break-down of public submissions by stakeholder group on the Consultation Impact Statement is shown in Figure 6.3.

Figure 6.3 Distribution of submissions on the Consultation Impact Statement by stakeholder groups



6.3 Consultation response

All public comments submitted by the closing date of 26 November 2010 were individually considered and analysed by the Technical Working Group to determine the appropriate response. More weight was given to a submission where comments referred to published guidance in Australia and/or referenced established policy positions by other jurisdictions.

Many comments raised questions or issues requiring further clarification or investigation which were initiated by the Technical Working Group as necessary. Numerous comments were identified as involving editorial or document layout changes.

The submissions have been collated and categorised in the *Summary of Submissions and NEPC response* document (NEPC 2013) as follows:

- comments raised on the draft amendment to the Measure
- comments on the draft amendment to the Schedules
- comments on the Consultation RIS and additional information submitted on the potential economic, health, social and environmental consequences of making the amendment.

Every effort was made by the Technical Working Group to incorporate relevant comments into the summary and response document; however, comments making a statement or providing a personal opinion which was not backed up with supporting material were noted without further comment.

A summary of submissions on the main issues, considering the responding stakeholder groups, of the draft NEPM and Schedules is included in Section 6.4 and on the Consultation RIS in Section 6.5 of this Decision RIS.

6.4 Summary of submissions on the key changes to the draft NEPM as varied

6.4.1 Introduction

As indicated in Section 6.2.6, public submissions from all seven broad stakeholder groups were received on the draft NEPM. The great majority of submissions supported the amendment of the NEPM or did

not express a preference (i.e. the comment was restricted to one small part of the amendment). A small number of submitters across the stakeholder groups did not support specific aspects of the draft released for public consultation. In almost all cases, these aspects have been addressed in the amendments to the draft released for public consultation.

A summary of the submissions on the key issues arising from the public consultation is included below.

6.4.2 Ecological risk assessment

The majority of comments came from environmental consultants; the remaining comments were from industry and other stakeholder groups.

Ecological investigation levels

The responses were generally supportive of the proposed EIL methodologies and the new EILs with no major issues of concern identified on the new methodology. The comments were largely editorial or seeking clarification on the EIL methodology and the application of the EILs.

Two submissions⁵⁸ raised concerns in relation to the implications to their industry from the validity of the EIL for chromium(III) and that it would result in negative impacts to the tanning industry by preventing application of tanning wastewater to land. This issue relates to the potential beneficial re-use of industry-specific waste which is dealt with by separate jurisdiction legislative and/or administrative processes. The toxicity information informing the derivation of the EIL is non-specific to the form of chromium present. If desired, the tanning industry could undertake specific research based on the EIL methodology contained in the NEPM for the specific form of chromium associated with the industry.

Ecological screening levels

The proposed adoption of the ESLs and associated 'management limits' was generally supported by submitters. Some major fuel companies were supportive provided specific clarifications were made. The main area of concern was how the ESLs and 'management limits' were to be applied and the inference they would be mandatory for all sites even when ecological risks were of low concern.

The relevant text, including the case studies, was revised to ensure that the application process was clear and robust.

Detailed comments and responses in relation to this issue are included in Appendices C and G of the *Summary of Submissions and NEPC response* document.

6.4.3 Health risk assessment

The majority of comments were submitted by environmental consultants. The remaining comments were from industry and industry peak bodies, state government agencies and other stakeholder groups.

Responses received were generally supportive of the proposed revisions to the current methodology for deriving health investigation levels (HILs). No major issues of concern were raised.

The comments were largely suggestions of editorial changes, several requests for additional references to be inserted, and requests for clarification of passages of text. An overwhelming majority of these requests were addressed; references, including to other Schedules, Appendices, or sections of the NEPM or documents in the NEPM toolbox were inserted as appropriate.

The non-availability of the final versions of the updated enHealth guidance on health risk assessment and exposure factors was raised in some submissions. It is noted that most submitters had access to a

⁵⁸ Johns Environmental and Catherine Money Consulting

near final draft of the document which underwent very few changes leading to the final versions released by enHealth in 2012⁵⁹.

Some issues were raised with specific HIL values e.g. arsenic, cyanide, mercury, nickel and others, and these were dealt with on a case-by-case basis with appropriate revisions to the text and/or rationale for the derivation of the values included.

6.4.4 Assessment of petroleum hydrocarbons and other volatile substances

The inclusion of guidance on the assessment of vapours, including the vapour intrusion assessment framework, was uniformly supported by submitters. A number of submitters commented that the guidance should be extended to include ground gases (such as landfill gas) as this issue is now of major concern during many site assessments. This was not carried out as it was beyond the approved scope of the amendment. However, additional references have been added to clarify these issues and related considerations.

Health screening levels for petroleum hydrocarbons

Responses generally supported the inclusion of the HSLs in the amendment. Industry and environmental consultants (including auditors and Third Party Reviewers) considered the adoption of the HSLs as a major step forward in addressing the inconsistencies in approach for sites affected by petroleum hydrocarbon contamination.

The introduction of soil gas HSLs was also generally welcomed in the submissions. It was raised that these HSLs in particular would involve an increase in assessment costs. Soil gas HSLs are supported with HSLs for soil and groundwater and the selection of the appropriate HSLs is site-specific. Soil gas sampling will not be required for all sites. Their use will improve delineation and site health risk assessment. While soil gas assessment will involve additional costs, remediation costs are likely to be lowered by the improved delineation of the areas of impact. Most submitters accepted that soil gas HSLs would be a valuable additional tool in site health risk assessment.

Detailed comments and responses in relation to this issue are included in Appendices C, F and I of the *Summary of Submissions and NEPC response* document.

6.4.5 Asbestos

The guidance provided on asbestos in soil and the emphasis on bonded-ACM was welcomed across the great majority of stakeholder groups. Industry widely supported the pragmatic health risk approach to this issue based on the WA Department of Health guidance and scientific research in this area since the making of the original NEPM.

The comments were generally editorial and dealt with potential misinterpretation of the guidance and unnecessary use of detailed health risk assessment on individual sites. This has resulted in substantial revision of the text and clarification of the use of the screening levels for bonded-ACM in soil.

Some stakeholder groups, in particular state government agencies, raised concerns on potential inconsistencies between the application of workplace health and safety regulations relating to asbestos and the draft variation guidance. Revisions were undertaken to ensure consistency with the revised Work Health and Safety Act and Regulations and associated codes of practice published in 2011⁶⁰. The

⁵⁹ enHealth 2012a, *Environmental health risk assessment; guidelines for assessing human health risks from environmental hazards*, Environmental Health Subcommittee (enHealth) of the Australian Health Protection Principal Committee, Canberra

enHealth 2012b, *Australian exposure factor guidance*, Environmental Health Subcommittee (enHealth) of the Australian Health Protection Principal Committee, Canberra

⁶⁰ National model Work Health and Safety Regulations, Safe Work Australia Codes of Practice issued in 2011 (*How to safely remove asbestos Code of Practice* and *Code of Practice for the Management and control of asbestos in workplaces*) and the earlier Code of Practice for the Safe Removal of Asbestos 2nd edn (NOHSC:2002 (2005))

guidance now emphasises that if visible asbestos is present, which may be disturbed during work activities, then it must be removed prior to earthworks or construction works commencing.

Submitters took the view that the guidance will lessen the costs to the community by reducing the need for detailed site and health risk assessment and greater use of pragmatic qualitative assessment by appropriately qualified persons. Lower costs of site excavation, removal and disposal of large quantities of soil with levels of bonded-ACM less than the screening level as currently occurs are beneficial outcomes. In addition the use of national health based screening levels for bonded-ACM will assist in alleviating public concerns about this commonly encountered form of asbestos.

Detailed comments and responses in relation to this issue are included in Appendices C and D of the *Summary of Submissions and NEPC response* document.

6.5 Submissions on the Consultation RIS

Only 12 of the 47 public submissions (from industry and industry peak bodies, state government agencies and environmental consultants) provided comments specifically on the Consultation Impact Statement.

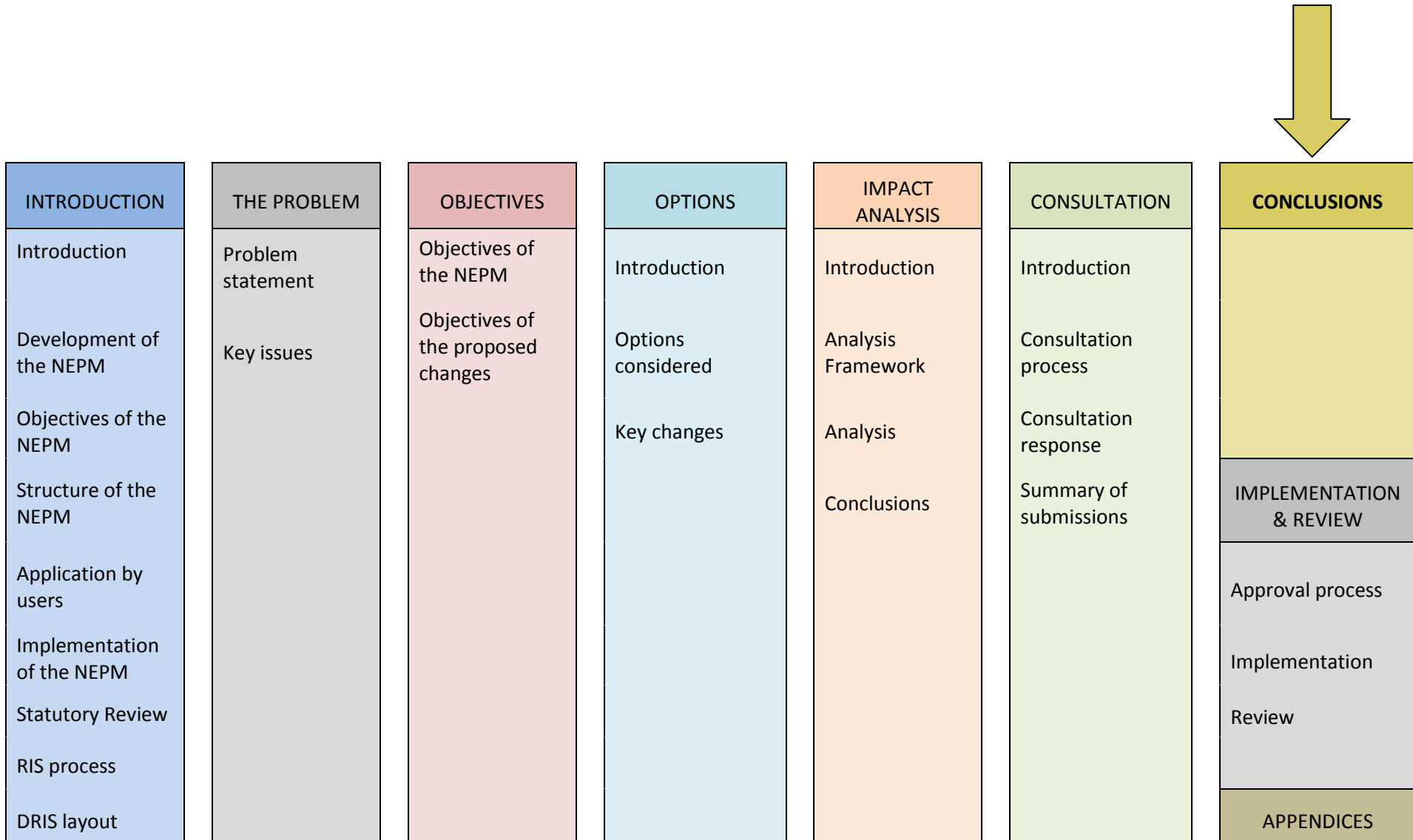
The comments acknowledged that additional sampling would be required for some sites which would increase costs for assessment. However it was also acknowledged this would be offset by improved health and environmental benefits, minimisation of the understatement of risks and the reduced need for remediation and remediation costs overall through the application of an improved pragmatic risk based assessment process.

Two industry submissions⁶¹ raised concerns in relation to the implications to their industry from the validity of the EIL for chromium(III) and that it would result in negative impacts to the tanning industry by preventing application of tanning wastewater to land. The toxicity information informing the derivation of the EIL is non-specific to the form of chromium(III) present. If desired, industries could undertake specific research based on the EIL methodology contained in the NEPM for the specific form of chromium associated with the industry. In any case, this issue relates to the potential beneficial re-use of industry-specific waste and is not directly relevant to the assessment of site contamination. It is an issue which is dealt with by separate jurisdiction legislative or administrative processes.

One state government agency commented on the lack of a cost benefit analysis. A semi-quantitative approach which extrapolates from available information has been used in this Decision RIS.

A summary of key points raised on the Consultation Impact Statement and an explanation of how public comments have been taken into account is included in Appendix L of the *Summary of Submissions and NEPC response* document.

⁶¹ Johns Environmental and Catherine Money Consulting



7 Conclusions and recommended option

This DRIS assessed two options for the assessment of site contamination: continuation of the NEPM as is (Option 1) and amending the NEPM (Option 2). The objectives of the proposed changes to the NEPM are to:

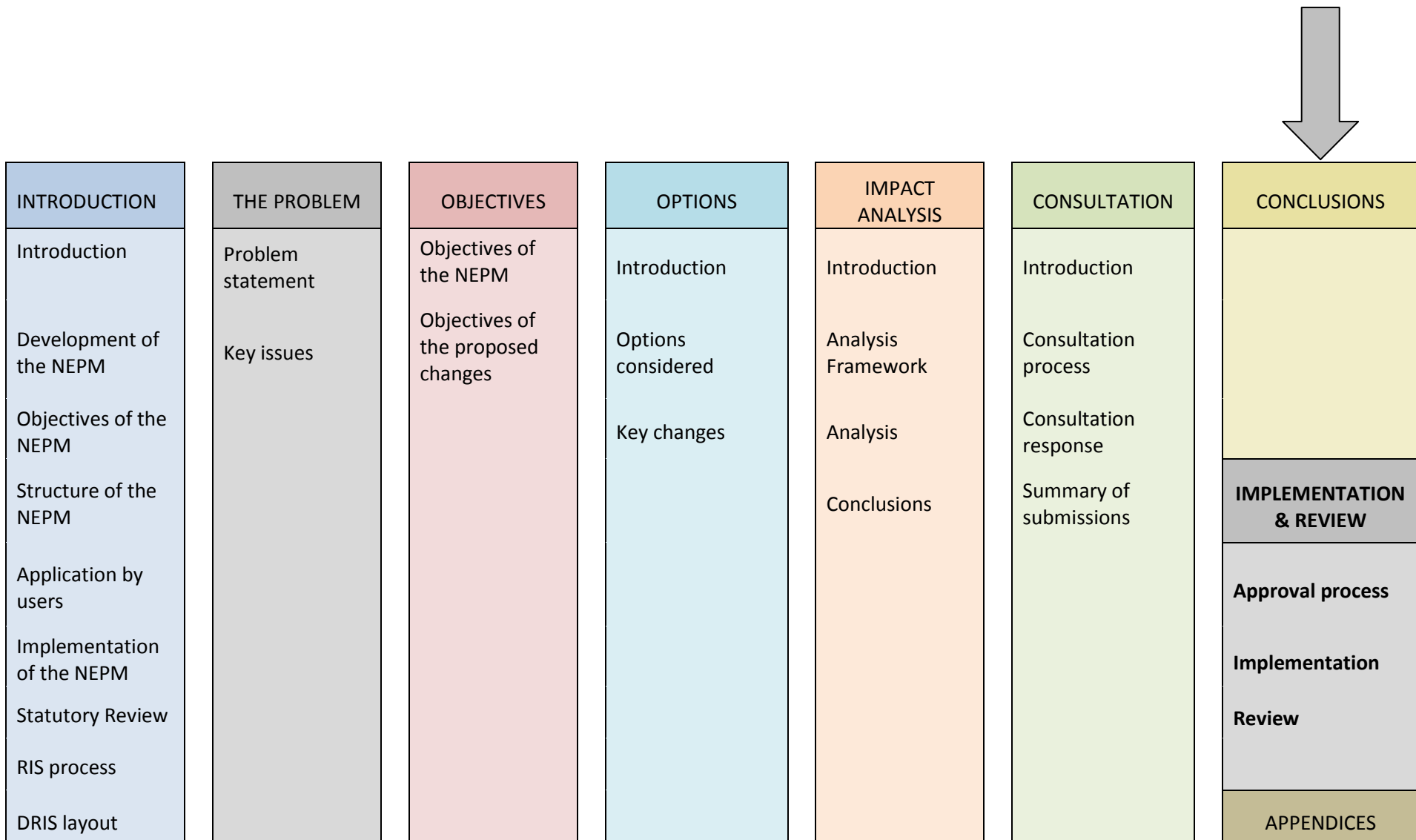
- provide authoritative guidance on the assessment of site contamination
- provide the means to obtain satisfactory health and environmental outcomes and increased certainty that human health and the environment are adequately protected
- provide the means to optimise assessment and remediation costs while ensuring the protection of human health and the environment
- increase regulation efficiency of contaminated sites by
 - decreasing the time required to review site assessments from the application of best practice assessment methods
 - providing investigation levels for a wider range of substances
 - filling gaps in current guidance
- provide improved social justice and equity for the community through
 - increased community confidence in the standard of site assessments and that adequate protection of human health and the environment is obtained
 - optimising the balance between assessment and remediation costs while ensuring protection of human health and the environment.

A summary of the outcomes of the assessment against these objectives is shown in Table 7.1.

Table 7.1 Assessment of options against the objectives for amending the NEPM

Criteria	Option 1 Continuation of the NEPM	Option 2 Amending the NEPM
Provision of authoritative guidance	Least authoritative	Most authoritative
Means and certainty of obtaining adequate human health and environment protection outcomes	Least certainty	Most certainty
Means of optimising assessment and remediation costs while ensuring protection of human health and the environment	Limited opportunity for optimising costs	Most opportunity for optimising costs
Regulation efficiency	Higher regulation costs	Lower regulation costs
Social justice and equity for the community	Lower social justice and equity	More social justice and equity
Impact on industry/ persons responsible	Lowest assessment costs	Highest assessment costs
Impact on competition	No effect	Minimal effect

Table 7.1 indicates that Option 2, amending the NEPM, is the most effective and efficient option except for the resulting cost burden on industry/persons responsible for site assessment costs. Although this option has the highest site assessment costs, when potential savings at the remediation and management stage are taken into account, Option 2 is likely to have the lowest direct costs to industry and regulators (and indirect costs to society from flow-on effects), as well as providing greater social justice and equity. The amendment of the NEPM is anticipated to have a minimal impact on competition. On this basis, Option 2, amending the NEPM, is considered to provide the greatest net benefit for the community and is the preferred option.



8 Implementation and review

8.1 Approval process

It is intended that the draft NEPM as varied and Decision RIS will be considered by the Commonwealth Standing Council for Environment and Water⁶² (SCEW) at its meeting on 11 April 2013. As part of the ministerial approval process, the documents will first be considered and endorsed by SCEW Senior Officials Committee and the Waste and Chemicals Thematic Oversight Group.

8.2 Implementation

The NEPM is made under the NEPC Act and is given effect by individual legislation and guidelines in each state and territory. A NEPM takes effect in each participating jurisdiction once it is notified in the Commonwealth of Australia Gazette, but is subject to disallowance by either House of the Commonwealth Parliament.

Implementation of the NEPM as varied is the responsibility of each jurisdiction. Any supporting regulatory or legislative mechanisms that jurisdictions use to assist in implementation of NEPMs are developed using appropriate processes in those jurisdictions. A summary of the processes is provided in Table 8.1.

Table 8.1 Summary of arrangements for the implementation of the NEPM as varied in jurisdictions

Jurisdiction	Proposed (or potential) arrangements for the implementation of the NEPM as varied
Commonwealth	Implement the revised guidelines administratively under the NEPC Act 1994.
Australian Capital Territory	Update the Contaminated Sites Environment Protection Policy, 2009 (ACT EPA) to reflect the latest version of the NEPM
New South Wales	Revise the existing approved guidelines and adopt the NEPM as varied and associated schedules as guidelines under Section 105 of the <i>Contaminated Land Management Act 1997</i> . Transitional arrangements will apply for site assessments already substantially commenced at the time the guidelines are gazetted
Northern Territory	No action is required as the NEPM is captured under the <i>Waste Management and Pollution Control Act</i>
Queensland	No transitional arrangements will be required as the NEPM is applied through the Department of Environment and Heritage Protection's published guidance material. The guidance material will be updated to reflect the NEPM as varied from time to time.
South Australia	Seek the NEPM as varied to be made an Environment Protection Policy (EPP) under the <i>Environment Protection Act 1993</i> . Revise relevant EPA guidelines. Transitional arrangements will apply for site assessments already substantially commenced at the time the NEPM is varied until it is made an EPP under the Act.

⁶² The COAG Standing Council on Environment and Water (SCEW) was established in 2011 following the 2010 review of the ministerial council system by the Council of Australian Governments (COAG). SCEW sits as the National Environment Protection Council (NEPC) for NEPC business.

Jurisdiction	Proposed (or potential) arrangements for the implementation of the NEPM as varied
Tasmania	No action is required as a NEPM (and any amendment to it) is taken to be a state policy under the <i>State Policies and Projects Act 1993</i>
Victoria	Amend State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002 to incorporate the NEPM amendment. Review other legislative instruments as appropriate.
Western Australia	Update the WA DEC Contaminated Management Series of guidelines and/or gazette the NEPM schedules as guidelines under s.97 of the <i>Contaminated Sites Act 2003</i> Transitional arrangements will apply for 6 – 12 month, from the time the NEPM is varied, for site assessments which are already substantially commenced.

As the NEPM review and amendment process has actively involved representatives from all states and territories, agencies responsible for implementing the NEPM are aware of the changes proposed in the amendment. Agencies may choose to implement transitional arrangements in the implementation of the NEPM amendment to facilitate the completion of assessments of site contamination which have already substantially commenced.

8.3 Review

The review of the NEPC Act currently underway may have implications for the next review of the NEPM. No decision has yet been made about the timing of the next review. Timing is ultimately determined by NEPC, however, it is not expected that another review will be conducted until sufficient time has elapsed to also enable assessment of the impact of the 2013 amendments. This approach would make a review meaningful, efficient and cost effective. Whilst the NEPC Act Review has not yet been considered by NEPC, there is a recommendation that reviews be extended to no more than 10 years.

The NEPM was subject to a 5 year review requirement as specified in Clause 10 of the NEPM. Although no further review of the NEPM is required, it is proposed that future reviews are carried out within 10 years of commencement of an amendment.

Appendices

Appendix A	Recommendations of the NEPC Review Report (2006) and location of changes made to the draft NEPM as varied following consultation
Appendix B	Summary of NEPM Review Process
Appendix C	List of public submissions on the draft NEPM as varied (2010)
Appendix D	Site assessment industry in Australia
Appendix E	Assessment of COAG Competition Policy

Appendix A:

Recommendations of the NEPC Review Report (2006) and location of changes made to the draft NEPM as varied following consultation

No.	Recommendation	Where addressed in draft NEPM as varied
1	Revise the NEPM policy framework and Schedule A to improve clarity and understanding of the fundamental site assessment principles and emphasise the appropriate use of the NEPM.	Measure Schedule A flowchart
2	EPHC to initiate an update of the management components of the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, published by Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC), in 1992.	Inclusion of principle 19 in the Measure
3	Develop an agreed methodology for deriving terrestrial Ecological Investigation Levels to revise existing Ecological Investigation Levels, and derive new Ecological Investigation Levels.	Schedules 5a, 5b and 5c
4	Revise the existing Interim Urban EILs taking into account the outcomes of research that has been completed since making of the NEPM including use of phytotoxicity, microbial, and invertebrate ecotoxicity data, and other relevant research, to address issues while awaiting the outcomes of an agreed methodology (Rec. 3).	Schedule B1
5	Revise existing Health-based Investigation Levels in the light of current knowledge, leading to more accurate and often less conservative values.	Schedules B4 and B7
6	Derive additional Health-based Investigation Levels for priority substances.	Schedules B7 and B1
7	Develop guidance to further clarify the use of Health-based Investigation Levels to counter their inappropriate use as remediation criteria.	Schedules B1 and B7
8	Develop Health-based Investigation Levels for a priority list of carcinogenic contaminants.	Schedule B7
9	Update the Groundwater Investigation Levels to be consistent with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2004 and Australian Drinking Water Guidelines 2004.	Schedule B6 GILS updated to Australian Drinking Water Guidelines 2011

No.	Recommendation	Where addressed in draft NEPM as varied
10	Develop interim national screening levels for Total Petroleum Hydrocarbon fractions based on existing Australian values with reference to relevant overseas values.	<p>Schedule B1, adopted HSLs developed by CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia (CRC CARE). Refer to:</p> <ul style="list-style-type: none"> • Friebel E & Nadebaum, P 2010a, <i>HSLs for petroleum hydrocarbons in soil and groundwater; part 1: technical development document, Technical report no. 10,</i> • Friebel, E & Nadebaum, P 2010b, <i>Health screening levels for petroleum hydrocarbons in soil and groundwater; part 2 application document (draft), Technical report no. 10,</i> CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia ...
11	Undertake a scoping exercise to determine if there is a need to develop investigation levels for specified fuel additives based on overseas or Australian values.	Insufficient information was available to undertake the review.
12	The NEPM be revised to provide more information based on existing documentation relating to the investigation and assessment of various forms of asbestos.	Schedules B1 and B2
13	NEPC undertake discussions with relevant stakeholders, including environment protection authorities, health practitioners, the legal fraternity and suppliers of professional liability insurance, to determine appropriate strategies to better communicate the risks of asbestos contamination to the public.	<p>Outcomes considered in asbestos guidance in Schedules B1 and B2</p> <p>Guidance was published by enHealth in May 2012 which provides information to the public on asbestos (<i>Asbestos A guide for householders and the general public</i>)</p>
14	Develop guidance on the relevance of site history and activities which may indicate the need to screen sites for the potential presence of dioxin-like substances, including comments on the use of “indicator substances” where relevant.	Schedule B2 (including Appendix E)

No.	Recommendation	Where addressed in draft NEPM as varied
15	Develop Health-based Investigation Levels, in a prioritised fashion, for all non-dioxin Persistent Organic Pollutants that currently do not have one. This work should be conducted as part of the overall Health-based Investigation Level revision process (Recommendation 6).	Guidance and HILs developed for all of the POPs adopted in the Stockholm Convention and ratified by Australia, with the exception of PCDD/PCDF. Schedules B7, B1 and B2 (including Appendix E)
16	Update the Western Australian Department of Environment and Conservation review of models and field methods on the assessment of volatiles. Select and adopt as interim guidance in the NEPM a model(s) and field methods most suited to Australian conditions.	Program of work carried out by CRC CARE Schedule B1 and B2
17	Develop and validate an Australian specific non-steady state model for volatile substances to assist in the development of Health-based Investigation Levels for volatile substances.	Program of work and development of health-based screening levels carried out by CRC CARE. A widely used existing model was adapted to develop the health screening levels since the physical processes modelled are not unique to Australia. However, input parameters were adjusted to reflect Australian conditions as far as possible. Schedule B1
18	Provide guidance on deriving guideline values for mixtures based on a review of: <ul style="list-style-type: none"> • published information on the integrated toxicity of several commonly found mixtures; • published information on current best practice, including the utility of probabilistic modelling; and • the use of direct toxicity tests to measure the effect of mixtures, including the use of suitable biomarkers. 	Schedule B4
19	Provide guidance on identifying and considering Data Quality Objectives that includes a review of current NEPM Quality Assurance/Quality Control procedures. Guidance needs to consider varying scenarios and lists of Data Quality Objectives for specific investigations and contaminants of concern.	Schedule B2
20	Provide checklist (or checklists) for field use that detail the parameters of data to be collected based on the objectives of the investigation and the contaminants of concern. It is anticipated that a single checklist could be developed that would address the majority of situations.	Provided in the NEPM toolbox

No.	Recommendation	Where addressed in draft NEPM as varied
21	Provide guidance on appropriate methods for establishing the vertical and lateral extent of contamination, which includes references or links to published guidance on the delineation of the lateral and vertical extent of contamination. Also investigate stockpile sampling issues.	Schedule B2
22	Undertake a revision of Schedule B2 (Guideline on Data Collection), Section 5 (Groundwater investigation), and update the procedures and methodologies with reference to current guidance provided in Australian and other developed jurisdictions.	Schedule B2
23	Revise the guideline on laboratory analysis in consultation with appropriate representative laboratory bodies and relevant stakeholders.	Schedule B3
24	Undertake a review of current bioavailability and leachability approaches, methods and limitations to provide general guidance in the NEPM for determining their use and application in site assessment.	Schedule B4 and B3
25	Undertake revisions to the Guideline on Community Consultation and Risk Communication to expand information on risk communication approaches utilising, and making reference to, current related guidance on risk communication that is available in Australian jurisdictions.	Schedule B8
26	Update the current guideline for acceptable competencies of consultants for jurisdictional and stakeholder use.	Schedule B9
27	Revise the guideline relating to auditors and third party reviewers to reflect current practices in Australian jurisdictions.	Schedule B9

Appendix B

Summary of NEPM review process

Amendment process and requirements

The NEPC Act⁶³ provides for the NEPC to vary (amend) or revoke a National Environment Protection Measure. In amending NEPMs, the NEPC must have regard to the following considerations detailed in Section 15 of the NEPC Act:

- whether the measure is consistent with Section 3 (Principles of Environmental Policy) of the Intergovernmental Agreement on the Environment
- the environmental, economic and social impacts of the measure
- the simplicity, efficiency and effectiveness of the administration of the measure and
- whether the most effective means of achieving the desired environmental outcomes of the measure is by means of a national environment protection standard, goal or guideline or any particular combination thereof and
- the relationship of the measure to existing inter-governmental mechanisms and
- relevant international agreements to which Australia is a party and
- any regional environmental differences in Australia.

A draft variation (amendment) and related impact statement must be prepared⁶⁴ and the impact statement must include:

- the desired environmental outcomes
- the reasons for the proposed measure and the environmental impact of not making the measure
- a statement of the alternative methods of achieving the desired environmental outcomes and the reasons why those alternatives have not been adopted
- an identification and assessment of the economic and social impact on the community (including industry) of making the proposed measure
- a statement of the manner in which any regional environmental differences in Australia have been addressed in the development of the proposed measure
- the intended date for making the proposed measure
- the timetable (if any) for the implementation of the proposed measure and
- the transitional arrangements (if any) in relation to the proposed measure be prepared

Once the draft amendment and impact statement have been prepared, public consultation must be carried out stating how the documents may be obtained and inviting submissions within a specified period⁶⁵. The NEPC Act requires that both the draft amendment to the NEPM and the impact statement be made available for public consultation for a period of at least two months. The NEPC must have regard to the impact statement and submissions received during public consultation in deciding whether or not to make or vary that NEPM.

⁶³ Clause 20 of the NEPC Act

⁶⁴ Clause 17 of the NEPC Act

⁶⁵ Clause 18 of the NEPC Act

In addition to addressing the requirements of the NEPC Act, impact statements are to be developed which are mindful of the requirements of the Council of Australian Governments (COAG) as outlined in *Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies*⁶⁶.

Review terms of reference

The terms of reference for the review were established by the NEPC in accordance with Clause 10 of the NEPM:

This Measure will be subject to a review five years from the date of commencement, or within any lesser period determined by the Council, which will consider:

- *The effectiveness of the Measure in achieving the desired environmental outcome set within it*
- *The resources available for implementing the Measure*
- *The need, if any, to amend the Measure in accordance with the Act, to make changes to the Schedule, or to improve the effectiveness of the Measure in achieving the desired environmental outcomes set within it.*

The factors considered in assessing the effectiveness of the NEPM were:

- how well is the NEPM achieving the purpose for which it was intended (ensuring human health and the environment are adequately protected through the development of an efficient and effective national risk based approach)
- clarity, i.e. is it being used appropriately
- completeness, i.e. did it contain sufficient guidance to address situations commonly encountered
- currency, i.e. whether the schedules need updating in light of current technology and knowledge to maintain the credibility and relevance of the NEPM as national guidance
- whether issues surrounding the management and remediation of contaminated land impact on the effectiveness of the NEPM
- whether the Australian approach to site assessment is in keeping with international approaches.

Review bodies

The Technical Working Group was chaired by the Western Australian NEPC committee member and comprised representatives from Western Australia, South Australia, Queensland, Victoria, a corresponding member from New South Wales and an observer from New Zealand's Ministry for Environment. As the objective of the NEPM is to protect human health and the environment from the effects of site contamination, the Health sector is a key stakeholder in the NEPM amendment. Recognising the importance of high level technical advice on an ongoing basis, the Review and Variation Technical Working Groups also included a representative from the Commonwealth Department of Health and Ageing.

A Non-government organisation (NGO) Advisory Group and Jurisdictional Reference Network (JRN) were also established to provide policy, technical and operational advice and information on the NEPM.

The JRN enabled intra-jurisdiction consultation to occur at key stages of both the review and amendment process, through the nomination of a jurisdictional representative in each of the States and Territories to coordinate appropriate consultation on the process and draft documents.

Review process

The review process comprised the following components:

⁶⁶ As amended June 2004

- the establishment of a Technical Working Group to undertake the review and an associated Non-government organisation (NGO) Advisory Group and Jurisdictional Reference Network (JRN)
- stakeholder workshops to identify gaps and key research needs to inform the review
- development of a draft Issues Paper (February to April 2005)
- meeting of JRN and NGO Advisory Group to consider the Issues Paper
- release of the Issues Paper, public consultation and call for submissions (June 2005)
- assessment of submissions and preparation of a Discussion Paper
- consultation with the JRN on the Discussion Paper
- release of the Discussion Paper, public consultation and call for submissions (April 2006)
- development of a Review Report and recommendations to the NEPC (September 2006).

Issues paper

An Issues Paper was prepared by the Technical Working Group to assist in the identification and discussion of key issues to be addressed in the review. The Issues Paper addressed the terms of reference for the review as detailed in the NEPM, together with issues arising from proceedings from stakeholder workshops, and in consultation with the NGO Advisory Group and the JRN. The Technical Working Group also considered the recommendations in the Banks Report (*Rethinking Regulation: Report of the Taskforce on Reducing Regulatory Burden on Business, 2006*) related to the NEPM.

The major issues identified within the Issues Paper included:

- assessing NEPM effectiveness
- investigation levels (Ecological Investigation Levels - EILs, Health-based Investigation Levels - HILs, Groundwater Investigation Levels - GILs)
- fuel components
- total petroleum hydrocarbons
- fuel storage sites
- assessing asbestos impacts
- data quality objectives
- collection of field data
- vertical delineation
- groundwater assessment
- laboratory methods and techniques
- bioavailability/leachability
- volatile substances
- community consultation
- consultant competencies.

The Issues Paper can be found at:

http://www.nepc.gov.au/sites/default/files/ASC_NEPM_Review_IssPpr_200505.pdf >.

Public consultation on the Issues Paper occurred for six weeks from 6 June 2005 to 15 July 2005.

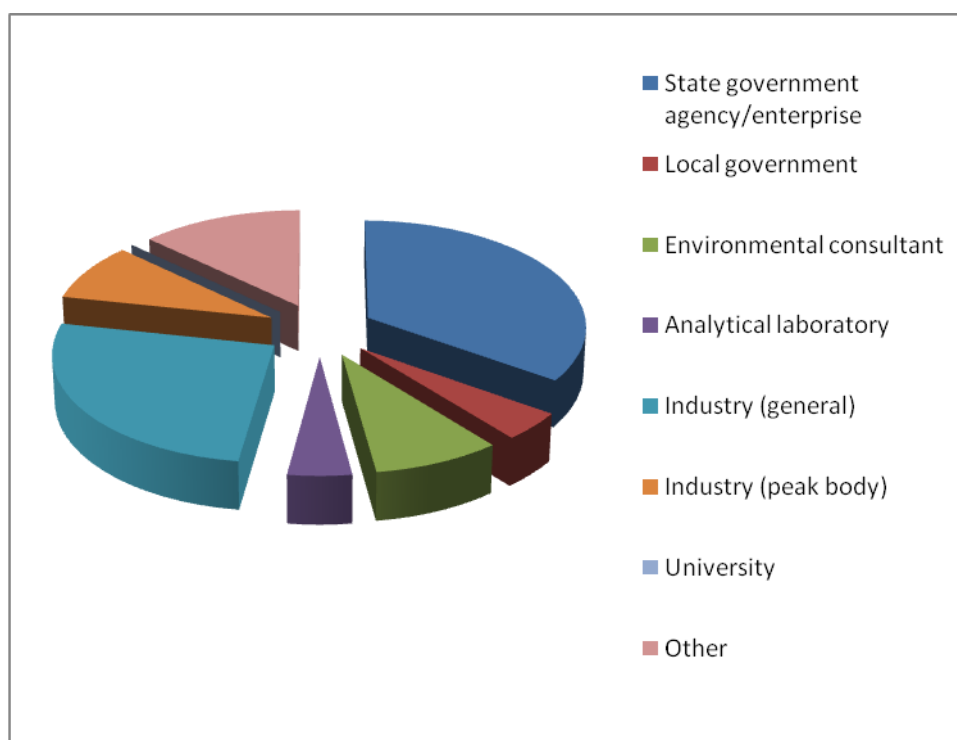
Twenty-three submissions were received. The majority of responses were received from industry and state government bodies (approximately 35% for each), with submissions from environmental consultants comprising approximately 9% of total public submissions.

Submissions were generally supportive of the NEPM. A summary of the public submissions on the Issues Paper (*Summary of Submissions received in relation to the Issues Paper for the Review of the Assessment of Site Contamination NEPM* document dated April 2006) was prepared and can be found at:

http://www.nepc.gov.au/sites/default/files/ASC_NEPM_Review_IssPpr_Summary_of_Submissions_200604.pdf >.

A break-down of the type of public submission for the 2006 Issues Paper is shown in Figure B1.

Figure B1 Analysis of public submissions on the Issues Paper (2006)



Discussion paper

Following analysis of submissions to the Issues Paper by the Technical Working Group a Discussion Paper was developed and released for public consultation in April 2006. Thirty-eight submissions were received.

The purpose of the Discussion Paper was to encourage consideration and debate on the range of options put forward to address issues raised during consultation on the Issues Paper. The Discussion Paper examined options to address issues such as the derivation and use of EILs and HILs, investigation levels for substances currently not included in the NEPM, various aspects of assessment procedures and quality control mechanisms, community consultation and consultant competencies. It was particularly aimed at establishing the options preferred by stakeholders and regulators, so that these could be evaluated against the issues raised and recommendations made to NEPC for its consideration in initiating potential changes to the NEPM.

The Discussion Paper can be found at:

http://www.nepc.gov.au/sites/default/files/ASC_NEPM_Review_Discussion_Paper_200604.pdf >.

Consultation meetings were held in each capital city and one regional centre (Townsville) with 312 people attending.

There were many cases in which a particular option had the strong support of submitters, while a few cases demonstrated a lack of agreement or lack of strong opinion on the best option to address the issue. In these instances the Technical Working Group was required to assess the best option to recommend based on regulator support and confidence in the most viable and achievable option.

Review report

A Review Report was then prepared by the Technical Working Group in September 2006. The Review Report contains a summary of the outcomes and recommendations based on the submissions received and the public consultation.

The Review Report can be found at:

http://www.nepc.gov.au/sites/default/files/ASC_NEPM_Review_Report_200609.pdf >.

The Review Report recommended 27 changes to significantly improve the effectiveness and efficiency of the NEPM by addressing technological, scientific and health risk issues raised by environmental auditors and consultants, analytical laboratories, industry (general and peak bodies), universities, the public, state and local government raised in response to the Issues Paper.

Submissions to the review (on the Issues and Discussion Papers) demonstrated strong support for a variation to the NEPM.

The full list of the review recommendations can be found in Appendix A.

Key stakeholder input

CRC CARE

The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) has undertaken research projects, with input from CSIRO, universities, industry and the private sector, that have provided a substantial contribution to the proposed amendment to the NEPM. Research outcomes on health screening levels (HSLs) for petroleum hydrocarbons, field assessment and modelling of volatile substances and contaminant bioavailability have been incorporated into the amendment.

Members of the Technical Working Group were also members of the CRC CARE Policy Advisory Committee and the Petroleum Advisory Group which links regulators, industry and research providers.

CSIRO/ NSW Environmental Trust

In addition to its work for CRC CARE, CSIRO has undertaken a research project for NSW Environmental Trust to develop a new ecological risk assessment methodology and derivation of four ecological investigation levels for use in Australia. CSIRO were contracted to carry out follow up research for NEPC for incorporation in the draft amendment. This work included the derivation of four additional ecological investigation levels and ecological screening levels (ESLs) for petroleum hydrocarbons.

Industry and private sector

Information on the progress of the NEPM review and amendment was presented to stakeholders at a variety of events including:

- national conferences including EcoForum and CleanUp
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) workshops
- CSIRO workshops and presentations for industry and regulators

- Meetings and workshops of industry organisations including the Australasian Land & Groundwater Association (ALGA), the Australian Contaminated Land Consultant Association (ACLCA) & others.

Feedback from participants enabled improvements to the various components of the revised guidance proposed for inclusion in the NEPM as varied.

Appendix C

List of public submissions on the draft NEPM as varied (2010)

Refer also to the separate report '*Summary of submissions and NEPC response*', which documents the individual submissions and responses in detail.

Number	Submitter	Type
1	WorkSafe Victoria	State government agency
2	Contaminated Land & Water Environmental Risk Assessment Pty Ltd	Environmental consultant
3	CH2M Hill Australia	Environmental consultant
4	Envirolab Services	Analytical laboratory services
5	GHD Pty Ltd	Environmental consultant
6	Douglas Partners	Environmental consultant
7	Catherine Money Consulting on behalf of <ul style="list-style-type: none"> • Casino Hide Tanners • Gunnedah Leather Processors Pty Ltd • Walfertan Processors Pty Ltd 	Industry
8	Gilbert and Sutherland	Environmental consultant
9	Sutherland Shire Council	Local government
10	WA Health	State government agency
11	Australian Laboratory Services	Analytical laboratory services
12	Hg Recoveries Pty Ltd	other
13	School of the Environment, Flinders University	University
14	URS Australia	Environmental consultant
15	Environmental Earth Sciences	Environmental consultant
16	Port of Melbourne Corporation	State government enterprise
17	NATA (National Association of Testing Authorities)	other
18	CRC CARE	other
19	Energy Networks Association	Industry peak body
20	Australian Institute of Petroleum (AIP) general comments on behalf of <ul style="list-style-type: none"> • BP Australia Pty Ltd • Caltex Australia Ltd • Mobil Oil Australia Pty Ltd and • The Shell Company of Australia Pty Ltd 	Industry peak body
21	Master Builders Australia	Industry peak body
22	BP Australia	Industry
23	NSW Department of Environment & Climate Change (NSW DECC) on behalf of : <ul style="list-style-type: none"> • NSW DECC • NSW Department of Housing 	State government agency

	<ul style="list-style-type: none"> NSW WorkCover 	
24	ENVIRON Australia	Environmental consultant
25	OTEK	Environmental consultant
26	Caltex	Industry
27	Environmental Strategies	Environmental consultant
28	<i>Confidentiality requested</i>	Environmental consultant
29	Shell Company of Australia	Industry
30	Peter J Ramsay & Associates	Environmental consultant
31	Coffey Environments	Environmental consultant
32	Urban Development Institute of Australia	Industry peak body
33	Australasian Land & Groundwater Association	Industry peak body
34	PACIA (Plastics and Chemicals Industries Association)	Industry peak body
35	Rio Tinto	Industry
36	Cavvanba Consulting	Environmental consultant
37	Alyson Macdonald, ERM Australia (personal view)	Environmental consultant
38	Centre for Mined Land Rehabilitation, University of Queensland on behalf of <ul style="list-style-type: none"> the Environmental Technical Group, NATA 	other
39	WA Department of Environment and Conservation (WA DEC) on behalf of <ul style="list-style-type: none"> WA DEC LandCorp WA Department of Water 	State government agencies
40	Johns Environmental on behalf of <ul style="list-style-type: none"> Northern Cooperative Meat Company 	Industry
41	Beacon Environmental Services Inc.	Environmental consultant
42	Australian Sustainable Business Group	Industry peak body
43	SA Health	State government agency
44	NT Department of Natural Resources, Environment, The Arts and Sport	State government agency
45	RCA Australia	Environmental consultant
46	EPA Division, Department of Tourism, Arts and Environment Tasmania	State government agency
47	Australian Contaminated Land Consultants Association	Industry peak body

Appendix D

Site Assessment Industry in Australia

Western Australia						
'typical' site investigations	number per year#	average cost* (\$)	total cost	% change	new cost (\$)	additional cost (\$)
preliminary site investigation	51	25,000	1,275,000	1.00	1,275,000	0
detailed site investigation	142	100,000	14,200,000	1.25	17,750,000	3,550,000
groundwater monitoring report	92	50,000	4,600,000	1.10	5,060,000	460,000
typical' site totals	285		20,075,000		24,085,000	4,010,000
'complex' site investigations	number per year	average cost* (\$)	total cost	% change	new cost (\$)	additional cost (\$)
preliminary site investigation	5	50,000	250,000	1.00	250,000	0
detailed site investigation	15	500,000	7,500,000	1.25	9,375,000	1,875,000
groundwater monitoring report	10	100,000	1,000,000	1.10	1,100,000	100,000
'complex' site totals	30		8,750,000		10,725,000	1,975,000
'simple' plus 'complex' site totals	315		28,825,000		34,810,000	5,985,000
<p><i># Based on data for 2010/2011 from WA contaminated sites database and contaminated sites register</i></p> <p><i>* Based on estimates from LandCorp and sites funded from the WA Contaminated Sites Management Account (excluding audit costs)</i></p> <p><i>Typical sites generally require only one or two phases of site investigation and do not have complex mixtures of contaminants</i></p> <p><i>Complex sites generally have had multiple land-uses or contain complex mixtures of contaminants requiring multiple phases of investigation and extensive sampling and analysis programs.</i></p> <p><i>Complex sites are estimated to be approximately 10% of the total number of sites.</i></p>						

South Australia						
'typical' site investigations	number per year#	average cost* (\$)	total cost	% change	new cost (\$)	additional cost (\$)
preliminary site investigation	40	5,000	200,000	1.00	200,000	0
detailed site investigation	120	30,000	3,600,000	1.25	4,500,000	900,000
groundwater monitoring report	60	20,000	1,200,000	1.10	1,320,000	120,000
typical' site totals	220		5,000,000		6,020,000	1,020,000
'complex' site investigations	number per year	average cost* (\$)	total cost	% change	new cost (\$)	additional cost (\$)
preliminary site investigation	5	20,000	100,000	1.00	100,000	0
detailed site investigation	10	250,000	2,500,000	1.25	3,125,000	625,000
groundwater monitoring report	5	50,000	250,000	1.10	275,000	25,000
'complex' site totals	20		2,850,000		3,500,000	650,000
'simple' plus 'complex' site totals	240		7,850,000		9,520,000	1,670,000
<p><i># Extrapolated from numbers of site contamination notifications and reports received and recorded by SA EPA (approximately 240 for 2011)</i></p> <p><i>* Based on indicative cost ranges provided by consultants in 2009</i></p> <p><i>Typical sites generally require only one or two phases of site investigation and do not have complex mixtures of contaminants</i></p> <p><i>Complex sites generally have had multiple land-uses or contain complex mixtures of contaminants requiring multiple phases of investigation and extensive sampling and analysis programs.</i></p> <p><i>Complex sites are estimated to be approximately 10% of the total number of sites.</i></p>						

Appendix E

COAG Competition policy assessment

Under the COAG Competition Principles an assessment of competitive implications is required as part of the process for making subordinate legislation. If approved by NEPC, the amendment will be adopted as subordinate legislation within most jurisdictions (under the processes for adoption of NEPMs set out in the NEPC Act passed by each jurisdiction).

The draft amendment has been framed within the objects of the NEPC (as set out in Section 3 of the NEPC Act) to ensure that:

- people enjoy the benefit of equivalent environmental protection from air, water or soil pollution and from noise wherever they live in Australia
- decisions of the business community are not distorted, and markets are not fragmented, by variations between participating jurisdictions in relation to the adoption or implementation of major environment protection NEPMs.

These objectives generally complement the aims of the Competition Policy Principles. Accordingly, every effort has been made to ensure that the proposed changes to the NEPM reflect these objectives and that due regard was given to the Competition Policy Principles.

An assessment of the COAG Competition Policy Principles against the draft amendment indicates that it will not adversely affect competition within any market to any significant degree. The draft amendment does not impose a requirement for direct environmental improvement action by companies or individuals although some consultants and individuals may need to improve their skill set and capabilities to operate effectively under the improved investigation standards of the amended NEPM. As practising professionals, individuals in the site assessment market are expected to undertake continuous professional development on a regular basis. The changes in the NEPM guidance will provide training providers with the opportunity to develop targeted training courses on the changes.

As noted in the impact statement, the amendment proposes to significantly improve the effectiveness and efficiency of the NEPM by addressing technological, scientific and health risk issues raised by industry, governments and community, which will:

- enhance the ability of industry to understand and apply sound environmental practices as part of its normal business procedures
- provide the community with better information on the issues involved in assessing contaminated sites
- provide up-to-date scientific and technological information as the common basis for the assessment of site contamination to be used throughout Australia.

The development of the draft amendment, which includes a consistent set of national guidelines for the assessment of site contamination, is expected to contribute greatly towards achieving the National Competition Policy Principle aims of:

- reducing regulatory complexity and administrative duplication between various governments
- ensuring that, as far as possible, the same rules of market conduct apply to all market participants, regardless of the form of business ownership (e.g. government business activities should not enjoy any special advantages).

As the NEPM provides guidelines only, as required under Section 14.1(d) of the NEPC Act, it is considered unlikely to introduce inequalities which would run counter to aspects of the Competition Policy Principles Agreement. The draft variation to the NEPM has been designed to provide for an

improved approach, execution and understanding of contaminated site assessment, but not in such a manner that will affect a particular stakeholder or stakeholder group in an unequal manner.

Shortened forms

ADWG	Australian Drinking Water Guidelines
ACLCA	Australian Contaminated Land Consultant Association
ALGA	Australasian Land & Groundwater Association
ACT	Australian Capital territory
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
AS	Australian Standard
AWQG	Australian Water Quality Guidelines - Australian and New Zealand Guidelines for Fresh and Marine Water Quality
Bonded ACM	Bonded asbestos containing material
COAG	Council of Australian Governments
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CSIRO	Commonwealth Scientific Industrial Research Organisation
DRIS	Decision regulatory impact statement
DSI	Detailed site investigation
EILs	Ecological investigation levels
entox	National Research Centre for Environmental Toxicology
EPHC	Environment Protection and Heritage Council
EPA	Environment Protection Agency
EPP	Environment Protection Policy
ERA	Ecological risk assessment
ESLs	Ecological screening levels
GILs	Groundwater investigation levels
HILs	Health-based investigation levels
HRA	Health risk assessment
HSLs	Health screening levels
JRN	Jurisdictional reference network
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NGO	Non-government organisation
NHMRC	National Health and Medical Research Council
NSW EPA	New South Wales Environment Protection Agency
PAHs	Polycyclic aromatic hydrocarbons
PCE	Perchloroethylene (tetrachloroethene)
POPs	Persistent organic pollutants
QLD DEHP	Queensland Department of Environment and Heritage Protection
RIS	Regulatory Impact Statement

SA EPA	South Australia Environment Protection Agency
SCEW	(COAG) Standing Council on Environment and Water
SEPP	State Environment Protection Policy
TCE	Trichloroethene
TWG	Technical working group
US EPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds
WA DEC	Western Australian Department of Environment and Conservation
WA DoH	Western Australian Department of Health
WHO	World Health Organization
