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report

Defining the philosophy, context and principles of the
National Framework for remediation and management
of contaminated sites in Australia



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Enquiries and additional copies:

CRC CARE, P.O. Box 486, Salisbury South, South Australia, Australia 5106
Tel: +61 (0) 8 8302 5038
Fax: +61 (0) 8 8302 3124
www.crccare.com

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CRC for Contamination Assessment and Remediation of the Environment

Technical Report 27

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national framework for remediation and management of
contaminated sites in Australia**

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Executive summary

BACKGROUND

The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) carries out research into the assessment and clean-up of contaminated sites. During preparation of its successful bid for funding to 2020, the need for a nationally consistent approach to remediation of contaminated sites was identified by:

- representatives of environmental regulatory bodies from across Australia
- major corporate entities which operate and clean-up sites across multiple jurisdictions.

The development of the *National Framework for Remediation and Management of Contaminated Sites in Australia* (the *Framework*) is under way. Following an initial review of frameworks in Australia and internationally in early 2012, two projects were initiated as the second stage of the development of the *Framework* to:

1. define more closely the philosophy, context and principles for the framework
2. review the guidance currently available in both Australia and internationally, in order to determine what may be adopted as is, what could be adopted following adaptation, and gaps for which new guidance would have to be developed.

THIS PROJECT

This project is the first of the two projects in the second stage of the development of the *Framework*. It entailed work on the philosophy, context and principles sections of the draft framework.

OUTCOMES

The project used background information gained from the report *Review of Australian and international frameworks*, and considered current regulation, policy, and principles related to environmental management (site contamination in particular) found in national documents and each of the jurisdictions. It was also imperative that the *Framework* enabled a flow-on from the *National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM)* and that its philosophy, context and principles were compatible and complementary.

The National Remediation Framework Steering Group (NRFSG) provided guidance and input throughout the project. The NRFSG had already identified that the framework should:

- enable a nationally consistent approach to remediation of contaminated sites
- be established under the umbrella of the Standing Council on Environment and Water

- not impinge on the policy and decision-making prerogatives of the states and territories
- not be legally binding
- distill and utilise existing documentation and experience, and
- provide practical guidance within an overall framework which establishes the context for remediation in Australia.

Specific to this project, direction from the NRFSG was sought on the proposed philosophy of the *Framework* and confirmation of the proposed approach to selecting the draft principles to be adopted. Final decisions on the selection of principles will be made following consultation with regulators, industry and key stakeholders.

The NRFSG considered pathways to adoption/jurisdictional arrangements in September 2012 and determined that existing mechanisms could facilitate the carriage/implementation of a framework for remediation and management of contaminated sites without compromising the requirement for a non-binding product. These mechanisms will be examined by the NRFSG during the development of the *Framework*.

The following content has been prepared for consideration for inclusion in the draft *National Framework for Remediation and Management of Contaminated Sites in Australia*.

PREAMBLE

In the past, sites have been polluted by practices no longer accepted for economic, social and environmental reasons. The legacy of these past practices affects present and future generations. Prevention of site contamination and the remediation of contaminated sites are important for their safe and productive use.

While implementing sustainable practices can be challenging, recognising intergenerational equity is a vital tool to long term sustainability and justice. Taking account of the needs of future generations will create the space for healthier, more socially equitable and economically stable communities and countries.

PHILOSOPHY

A risk based, fit-for-purpose philosophy underpins the approach to remediation and management of contaminated sites in Australia. The intended use of the site determines the level of risk that may be permitted to remain on the site. It provides the foundation and rationale upon which the principles and guidance are based.

The concept of risk-based soil quality management (risk-based land management) was introduced to guide the fit-for-purpose approach to environmental management. The fit-for-purpose philosophy implies that the assessment, remediation and management of a contaminated site relates to a specific current or proposed land use.

A risk-based, fit-for-purpose philosophy also underpins the *ASC NEPM*, and this approach determines land-use scenarios for which risk-based health investigation levels and ecological investigation levels have been derived.

CONTEXT

Background

In 1999, the *NEPM* was compiled and adopted in all jurisdictions in Australia. The *NEPM* makes clear, as does the legislation under which it was made, that its guidance should only be considered in relation to the assessment of site contamination. An updated version of the *NEPM* was approved in April 2013.

Given that issues related to remediation and management of contaminated sites are common throughout Australian jurisdictions it would be expected that policy, procedures and best practice would be characterised by a degree of uniformity and consensus. This national framework for remediation and management of contaminated sites codifies existing practice and enhances guidance on best practice remediation and management.

Harmonisation of approach and best practice will not only yield commercial benefits but also provide governments and the public with an assurance of consistency and competence in the remediation and management of contaminated sites.

The contents of this Framework complement and supplement existing regulation in the states and territories.

Legislative powers and liability

Each state and territory legislates for the regulation of activity related to contaminated sites. This recognises a responsibility – social, environmental and economic – to protect human health and the environment and, wherever possible and appropriate, to make productive use of previously contaminated sites.

The ‘polluter pays principle’ is generally adopted for liability and responsibility for the remediation and management of a contaminated site. If it is not possible or practicable to impose liability on the polluter, each jurisdiction has legislative powers to issue notices to appropriate persons.

Purpose of the Framework

Following the guidance on assessment of site contamination provided in the *NEPM*, this document was developed to provide a framework for harmonisation of action when dealing with remediation and management issues regarding sites affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with contaminated sites in a way that is consistent with government policies and legislation.

Extent and limitations

The Framework was developed to:

- establish a common approach to managing contaminated sites
- provide procedural guidance to people managing contaminated sites, and
- educate and inform government, industry and the public about the issues involved.

As with the *ASC NEPM*, some materials are recognised as requiring specialised forms of remediation and management, and legislation specific to those materials has been enacted. Advice should be sought from the relevant environmental protection agency.

For example:

- unexploded ordnance (refer to *Commonwealth Policy on the Management of Land Affected by Unexploded Ordnance* www.defence.gov.au/uxo/).
- radioactive substances (refer to www.oecd-nea.org/law/legislation/australia.pdf)
- biologically pathogenic materials and waste (refer to *AS/NZS 3816 (1998) Management of Clinical and Related Wastes*. Jurisdiction will also have regulations on storage and handling of these wastes. For more information see also the *Biohazard Waste Industry Australia and New Zealand (BWI) Industry Code of Practice for the Management of Clinical and Related Wastes* available at [www.epa.sa.gov.au/xstdfiles/Waste/Code of practice/](http://www.epa.sa.gov.au/xstdfiles/Waste/Code%20of%20practice/)
- contaminated sediments (refer to the *Sediment Quality Guidelines of the Australian Water Quality Guidelines* available at: www.environment.gov.au/water/publications/quality/nwq), and
- acid sulfate soils (refer to the *National Guidance on Acid Sulfate Soils* available at www.environment.gov.au/water/publications/quality/guidance-for-managment-of-acid-sulfate-soils.html).

Intended audience

The intended audience for the *Framework* is those responsible for, or involved with, identifying, assessing, and remediating contaminated sites, including:

- owners/managers of contaminated sites
- government agencies (including environment, health and planning authorities)
- relevant contaminated sites professionals, and
- concerned citizens, and any other person affected by contaminated sites.

PRINCIPLES

A number of jurisdictions share the same or similar principles of contaminated site management. The principles of remediation and management of contaminated sites in Australia set out below harmonise those in use in the states and territories. It is critical

to note that it is the *intent* of the principle that is the important element and that wording variations may be encountered in jurisdictions.

Precautionary principle

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation or human exposure. The application of the precautionary principle relates to remediation and management decisions which should be guided by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- an assessment of the risk-weighted consequences of various options.

Prevention

Contamination, or further contamination, of a site should be prevented. Action should be taken to minimise the creation of additional contaminated sites and to prevent the further contamination of already contaminated sites.

Appropriate measures should be taken when decommissioning premises and developing sites where potentially contaminating activities have taken place.

Risk management during remediation and site management

Risk management refers to a coordinated set of activities and methods that are used to direct and to control risks with the likelihood that any specified objectives can be achieved.

AS/NZS ISO 31000: 2009 indicates that the term risk management also refers to the architecture that is used to manage risk. This architecture includes risk management principles, a risk management framework, and a risk management process.

Contaminated site risk management strategies should reflect the need to protect all segments of the environment, both biological and physical (air, land and water, including groundwater). During the remediation and management of contaminated sites, appropriate controls should be in place to control emissions to air, land and water.

Remediation and management plans should detail all procedures and plans to reduce human health and/or environmental risks to acceptable levels for the proposed site use. On completion of the remediation and validation, the site should be suitable for the proposed use and should provide adequate protection of human health, property and the environment.

Options hierarchy

Contaminated material shall preferably be either treated or managed on site and risk reduced to acceptable levels or treated off site and returned for re-use after the risk has been reduced to acceptable levels.

Disposal of contaminated material to an approved waste disposal facility or landfill or 'cap and contain' management options should be considered if:

- treatment of the contaminated material is shown or demonstrated not to be practicable
- the options to dispose to landfill or 'cap and contain' are undertaken in an environmentally acceptable manner, and
- the risk of disturbance of the contaminant exceeds the risk of leaving it undisturbed and contained on site.

It should be emphasised that the appropriateness of any particular option will vary depending on a range of local factors. Acceptance of any specific option or mix of options in any particular set of circumstances is a matter for the responsible jurisdiction.

Sustainability

Sustainability means an integrated assessment of the environmental, economic, and social impacts of remedial activities which meets the needs of the present without compromising the ability of future generations to meet their own needs. This includes:

- ensuring that decision-making processes effectively integrate both long- and short-term economic, environmental, social, and inter- and intra-generational equity considerations
- planning for the future through long term contaminated sites management strategies and policies
- recognising and considering the global dimension of environmental impacts of actions and policies
- acknowledging the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection
- acknowledging the need to maintain and enhance international competitiveness in an environmentally sound manner
- adopting cost-effective and flexible policy instruments such as improved valuation, pricing and incentive mechanisms, and
- ensuring that decisions and actions provide for broad community involvement on issues which affect them.

National/international obligations

Practitioners taking actions and activities related to the remediation and management of contaminated sites in Australia should be mindful of national and international environmental management obligations, agreements and treaties.

Draft Framework for Remediation and Management of Contaminated Sites

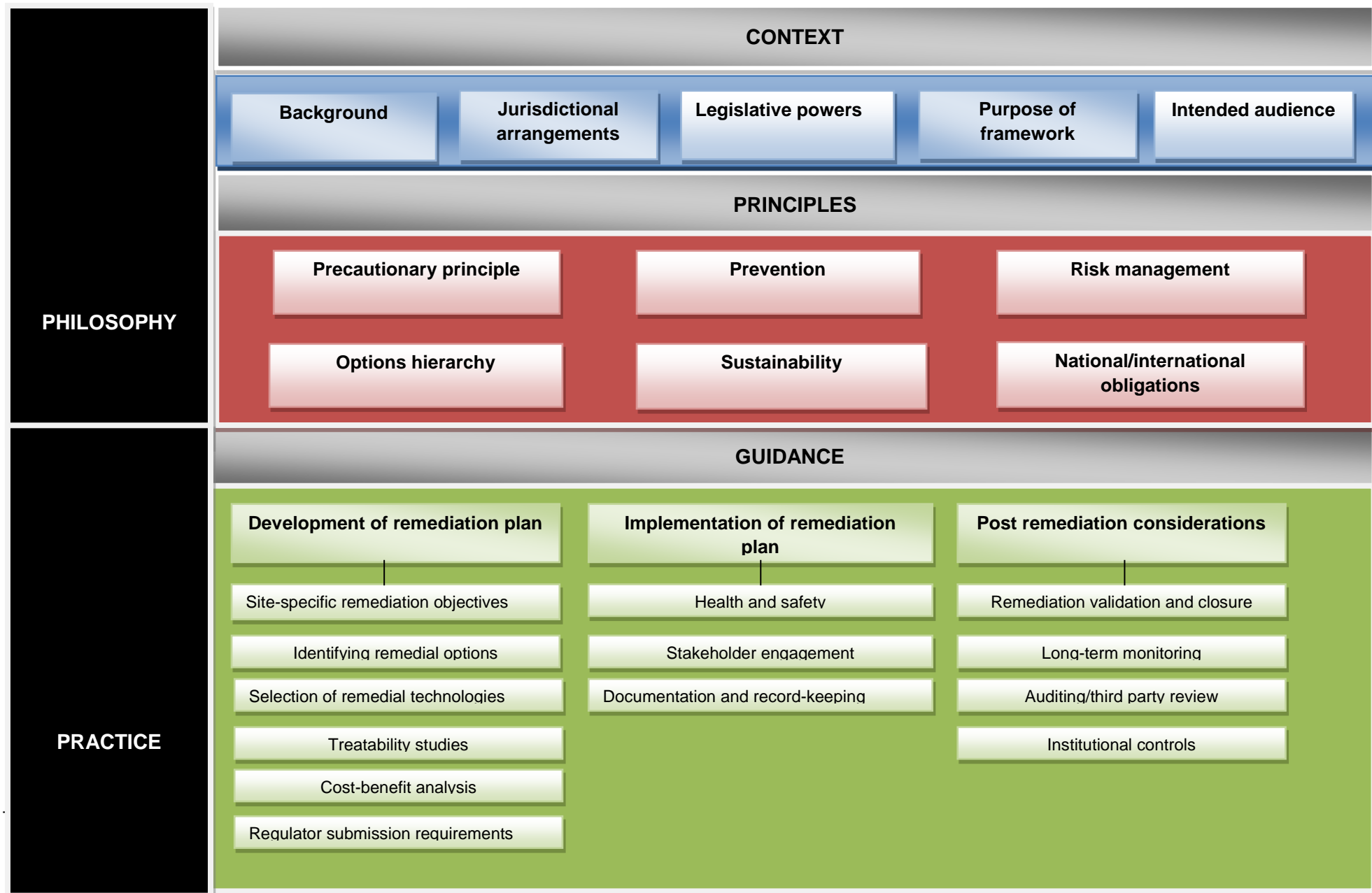


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Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
COAG	Council of Australian Governments
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
EMPC Act	Environmental Management and Pollution Control Act 1994
ESD	Ecologically sustainable development
Framework	National Framework for Remediation and Management of Contaminated Sites in Australia
GSR	Green and sustainable remediation
IGAE	Intergovernmental Agreement on the Environment
ITRC	Interstate Technology and Resource Council
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRFSG	National remediation framework steering group
RAP	Remediation action plan
SCEW	Standing Council on Environment and Water
SERTOOG	Seamless Environmental Regulation Thematic Oversight Group

Glossary

Contamination	the condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level that presents, or potentially presents, an adverse health or environmental impact
Contaminated site	the area impacted by contamination
Ecological risk assessment	a set of formal, scientific methods for defining and estimating the probabilities and magnitudes of adverse impacts on plants, animals and/or the ecology of a specified area posed by a particular stressor(s) – including release of chemicals, human activities and natural catastrophes – and frequency of exposure to the stressor(s)
Health risk assessment	the process of estimating the potential impact of a chemical, biological or physical agent on a specified human population system under a specific set of conditions
Health risk management	evaluating and implementing appropriate options to address risks identified from health risk assessments. The decision making will incorporate scientific, social, economic and political information. The process requires value judgements, for example, on the tolerability and reasonableness of costs
Risk	the probability in a certain timeframe that an adverse outcome will occur in a person, a group of people, plants, animals and/or the ecology of a specified area that is exposed to a particular dose or concentration of a chemical substance, that is, it depends on both the level of toxicity of the chemical substance and the level of exposure to it
Risk management	a coordinated set of activities and methods that are used to direct and to control risks with the likelihood that any specified objectives can be achieved.

AS/NZS ISO 31000: 2009, indicates that the term *risk management* also refers to the architecture that is used to manage risk. This architecture includes risk management principles, a risk management framework, and a risk management process

1. Introduction

1.1 Background

The need for a national remediation framework was identified during the development of the funding extension bid of the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). The bid was successful and CRC CARE is committed to the development of the national framework. The development and utilisation of the national framework for remediation has strong support from contaminated sites assessors and remediation practitioners and will be a significant boon to the site contamination industry and community in Australia.

In May 2011, CRC CARE held a workshop to specifically consider the framework, where it was acknowledged that there is a strong link between the proposed remediation framework and the Council of Australian Governments (COAG) initiative for national harmonisation. A National Remediation Framework Steering Group (NRFSG) was established to provide strategic guidance and oversight.

An initial project was undertaken by CRC CARE in the period December 2011 to February 2012 to identify current state and territory regulation and international frameworks for the remediation and management of contaminated sites. It included reference to the legislative basis of the frameworks under review. Specifically the project:

- identified international remediation and management frameworks which may be suitable for adoption or adaption in an Australian context, and
- surveyed Australian jurisdictions identifying:
 - current regulation of remediation and management of site contamination
 - barriers or pathways to the adoption of an Australian national framework for remediation and management of contaminated sites.

The report on the project, *Review of Australian and international frameworks* (Scott & McInerney 2012), suggested a draft structure for the framework, comprising 'philosophy' which incorporates 'context' and 'principles' sections as well as 'practice' which incorporates a number of sections for specific guidance for remediation and post-remediation practices (see updated diagram on page viii of this report). The NRFSG accepted the report and approved broad terms of reference for the second stage of framework development.

1.2 The project brief – a summary

This project is the first of the two projects in the second stage of the development of the *National Framework for Remediation and Management of Contaminated Sites in Australia* (the *Framework*) and entailed work on the philosophy, context and principles sections. The project used background information gained from the report *Review of Australian and international framework* (Scott & McInerney 2012), and considered

current regulation, policy and principles in each of the jurisdictions, as well as input from the NRFSG.

It was also an imperative with the NRFSG that in developing the framework, harmonisation of approaches related only to philosophy and practice, not legislation.

1.2.1 Developing the Philosophy, Context and Principles of the Framework

It is intended that an introductory section of the *Framework* address the key guiding philosophy adopted in developing the national framework. It will include a preamble and outline the philosophical approach to remediation and management of contaminated sites.

Sub-sets of the philosophy section of the draft national remediation framework are two components – context and principles.

The first component, context, entailed researching and writing material to provide:

- the background to the *Framework*
- the purpose of the *Framework*
- jurisdictional arrangements, and
- detail about the intended audience.

The second component, principles, entailed researching, writing and validating with steering group members and jurisdictions the principles that already underpin regulatory practice across Australia in order to:

- identify and synthesise principles and policies that can be adapted to a national context without compromising jurisdictional independence
- identify areas of agreement regarding principles and policies through liaison with Australian jurisdictions, and
- document principles that will underpin a national, harmonised approach to the remediation and management of contaminated sites.

1.3 Notes on provided information

This report refers to legislation and regulations as detailed in statutes and as explained by jurisdictional sources and the CRC CARE Law and Policy Directory website. This information is used to provide a summary basis for discussion about approaches and principles related to remediation and management of contaminated sites. The information provided in this report is neither complete nor comprehensive and it does not, in any way, constitute legal advice.

2. The Australian approach to contaminated sites

2.1 Development of the national approach to assessment

Contaminated sites are an important environmental, health, economic, and planning issue in Australia. With changing community standards and the redevelopment of former industrial and agricultural land, there is increasing recognition of the problems associated with contaminated sites. The environmental implication of chemically contaminated sites has become a worldwide issue and, in response, many countries, including Australia, have developed a range of approaches to deal with the associated problems (*ASC NEPM Impact Statement* (NEPC 1999a)).

Prior to the introduction of the *National Environment Protection Council Act 1994* the responsibility for site contamination assessment legislation and policy lay entirely with each individual jurisdiction. In the absence of nationally agreed standards or guidelines, an ad hoc approach to the assessment and management of site contamination began to develop over time as each state and territory developed its own response to the issues. This resulted in a variety of approaches being applied across Australia to the assessment of site contamination.

In 1992, in an effort to overcome this situation, the Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC) jointly developed technical guidelines for contaminated sites to be used as the basis of a common approach across Australia. The main purpose of the ANZECC/NHMRC guidelines was to provide a framework for the proper assessment and management of contaminated sites to bring about an acceptable level of consistency in site assessment and subsequent management of contaminated sites. It was believed at the time that the adoption of the ANZECC/NHMRC framework would provide the national guidance required by those responsible for the assessment and management of site contamination and provide assurance to the community that public health and environmental concerns were being addressed at a national level (Scott & McInerney 2012).

At the time the ANZECC/NHMRC guidelines were developed it was recognised that as more information became available, criteria developed, and technologies for assessment and clean-up improved, the guidelines would need to be amended and updated accordingly. The importance of maintaining broadly based national support for the protocols and processes set out in the guidelines was also recognised (NEPC 1999b).

In 1995, a joint ANZECC and NHMRC Contaminated Sites Technical Review committee began a systematic review of the policy and technical components of the 1992 guidelines. This review concluded that the ANZECC/NHMRC guidelines were basically sound, although deficient in several key technical areas.

In 1995, the National Environment Protection Council (NEPC) was established through the *National Environment Protection Council Act 1994*, with a charter to:

‘ensure that the people of Australia enjoy the benefit of equivalent protection from air, water and soil pollution and from noise, wherever they

live; and that decisions by businesses are not distorted and markets are not fragmented by variations between jurisdictions (*National Environment Protection Council Act*).’

Accordingly, ANZECC/NHMRC resolved that the most appropriate vehicle to develop the key policy and technical matters relating to the assessment of contaminated sites was via a National Environment Protection Measure (NEPM).

In 1996, the NEPC formally decided to begin the development of a NEPM for the Assessment of Site Contamination and responsibility for the work was transferred from ANZECC/NHMRC to NEPC in cooperation with NHMRC.

The NEPC recognised that a NEPM on the assessment of site contamination would:

- enhance the ability of industry to understand and adopt sound environmental practices as part of its normal business procedures
- provide the community with information on the issues involved in assessing contaminated sites
- improve the quality of assessment of the potential health and environmental impacts of site contamination, and
- provide an accepted common basis to be used throughout Australia to assist assessors, environmental auditors, developers and regulators to avoid costly duplication in the development and application of assessment methods (NEPC 1999b).

The NEPC compiled the *NEPM* in 1999 and it is the premier guidance document for the assessment of site contamination in Australia. The *NEPM* has since been reviewed and a variation process was completed in early 2012. The variation to the *NEPM* by the Standing Council on the Environment and Water (SCEW) was made in April 2013.

2.2 Remediation and management of contaminated sites

In Australia, there is no stand-alone legislation at a national level that deals specifically with the remediation and management of site contamination. As the remediation and management of contaminated sites is regulated at an individual jurisdictional level, approaches vary according to local requirements.

Process-related and technical advice has been given to practitioners through relevant regulatory bodies and, if developed locally, is usually based on or consistent with the general principles of environmental management. Practitioners and other interested parties access advice, guidance and information through referral from local regulatory authorities, through industry associations and groups, and through a range of information ‘clearinghouses,’ for example, the various sustainable remediation forums (SuRFs) and the Network for Contaminated Land in Europe (NICOLE).

3. National remediation and management framework

3.1 Developing the Philosophy for the Framework

As mentioned previously, it is intended that the introductory section of the *Framework* will include a preamble and outline the philosophical approach to remediation and management of contaminated sites in Australia.

3.1.1 Preamble

At the February 2012 meeting of the NRFSG, an introductory preamble was discussed and a draft of the preamble was provided by members. Further consideration by the NRFSG in September 2012 and March 2013 resulted in refinements of the wording. The resulting text (provided below) was prepared for inclusion in the draft *Framework*.

‘In the past, sites have been polluted by practices no longer accepted for economic, social and environmental reasons. The legacy of these past practices affects present and future generations. Prevention of site contamination and the remediation of contaminated sites are important for their safe and productive use.

While implementing sustainable practices can be challenging, recognising intergenerational equity is a vital tool to long term sustainability and justice. Taking account of the needs of future generations will create the space for healthier, more socially equitable and economically stable communities and countries.’

3.1.2 Philosophy

Determining the philosophy underpinning the approach to remediation and management of contaminated sites in Australia is of utmost importance. It provides the foundation and rationale upon which the principles and guidance in the *Framework* are based.

Since the 1970s, hazard analysis and quantified risk assessment have been developed as decision-making tools for land-use planning. Their use involves a formal identification of the relevant hazards and an estimation of the risk level through consideration of the likelihood and possible consequences of hazardous incidents.

The approach acknowledges that risks can never be eliminated completely. However, an understanding of the nature and extent of risks provides a basis for the development of land-use strategies and controls that ensure that risks are appropriately managed. The techniques also enable an educated debate and judgement as to the tolerability of the residual risk to the broader community.

The concept of risk-based soil quality management (risk-based land management) was introduced to guide the fit-for-purpose approach to environmental management (see below).

The major philosophies and approaches to environmental management currently adopted in various forms around the world are summarised below.

These key philosophies are:

- fit-for-purpose
- sustainable remediation
- green remediation, and
- green and sustainable remediation (GSR).

Confusing matters is that concepts of sustainability (sustainable remediation, ecologically sustainable development, green remediation and GSR) are often included as principles within a framework, rather than the overall approach or philosophical basis for contaminated sites management.

These different concepts of sustainability are summarised here, but are also included in the principles sections of this report.

3.1.2.1. *Fit-for-purpose remediation and management*

Since the 1980s the concept of fit-for-purpose has become the leading concept in most countries due to its effectiveness in dealing with a significant number of sites and the cost efficiencies of assessment, management and remediation. The fit-for-purpose concept implies that the assessment and management of a contaminated site relates to a specific type of current or proposed land use:

‘The fitness-for-use [fit-for-purpose] is a rather logical concept. The idea behind this conception is that, such as most common things in life, things need to be suited for a specific, appropriate purpose (Swartjes 2011).’

The advantages of the fit-for-purpose approach are the cost and time efficiencies that can be achieved and that appropriate management and remediation requirements can be applied.

The risk-based fit-for-purpose philosophy underpins the *ASC NEPM*, and this philosophy determines land-use scenarios for which risk-based health investigation levels and ecological investigation levels have been derived. The intended use of the site determines the level of contamination risk that may be permitted to remain on the site.

‘The disadvantage of the fitness-for-use [fit-for-purpose] approach is that aftercare is often needed...intensive administration procedures are needed in order to keep an ongoing account of the state of the soil contamination and of the restrictions for the use of the site (Swartjes 2011).’

All jurisdictions in Australia have implemented post-remediation/management controls. These institutional controls include management plans, clean-up notices, ongoing maintenance orders and enforcement, financial assurances, abatement notices,

contaminated site registers, memorials or notations on land titles, and aligned planning and development permit approval processes.

Should the land use of the site change, the process is re-instituted and the assessment, management and remediation procedures are carried out in accordance with the new intended land use.

SuRF 2010 noted that:

‘in Australia the environmental agencies in each State and Territory are influential in setting the detailed technical requirements for the objectives and extent of clean-up that is required (SuRF 2010).’

In general, because the environmental agencies are charged with protecting the environment, their guidance reflects this charter and requires protection of the beneficial uses or environmental values of land, groundwater and surface water. In terms of recognising that there is a balance to be achieved between the social, economic and environmental benefits of a program of management and remediation of contamination, environmental agencies have developed guidance such as that relating to ‘clean up to the extent practicable’ (for example Victoria and New South Wales), ‘remediation to the extent necessary’ (for example South Australia), monitored natural attenuation (Western Australia), and an assessment of risk to beneficial uses – rather than necessarily achieving strict compliance. This guidance recognises that in some cases complete clean-up is not practicable or necessary, and allows for alternative methods to be applied that will not necessarily achieve full clean up within a short timeframe.

Groundwater

According to the *ASC NEPM* groundwater is assessed on the basis of its suitability for current or realistic future use and the risk that use may pose to human health and/or the environment. The assessment takes into account factors relevant to the environmental value of the groundwater resource such as the proposed and realistic future uses, physiochemical and bioavailability characteristics of the particular contaminant(s) and the distribution of the contamination. In this approach, the potential receptor, either human or ecological, determines the level of protection required.

This reflects the national approach to groundwater protection which is to protect it as a resource for future use as detailed in the *Guidelines for groundwater protection in Australia* (ARMCANZ & ANZECC 1995).

It differs from the assessment process for land contamination in that there is emphasis on suitability for current and realistic future uses with the groundwater assessment whereas there is emphasis on current and intended uses with soil assessment. The focus on the protection of realistic future uses (based on the inherent capacity of the aquifer to support those uses) is derived from the following considerations:

- groundwater contamination is often persistent and difficult to contain
- some groundwater contamination may persist beyond current planning horizons, affecting future uses which today are not considered likely, and
- the stress on Australia’s water resources is expected to increase.

3.1.2.2. Sustainable remediation

Sustainable development aims to achieve a better quality of life for now and future generations. Sustainable development has been defined by the Brundtland Commission *Report of the World Commission on Environment and Development* as:

‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’

and has been enshrined in documents approved at the highest political level. It has also been adopted in some Australian jurisdictions as a principle of intergenerational equity (Brundtland Commission 1989).

Sustainable development is concerned with achieving economic development in the form of higher living standards while protecting and enhancing the environment. The overall aim is to ensure that these economic and environmental benefits are available to everybody.

The achievement of sustainable development requires collective partnership approaches to decision making for environmental protection. It is about integrating economic demands and social needs with the capacity of the environment to cope with discharges, pollution and other perturbation, and to support human and other life. Decisions based on environmental risk assessments must therefore also take account of the likely economic and social impacts of the options under consideration (Brundtland Commission 1989).

Sustainable remediation has been described as an integrated assessment of the environmental, economic, and social impacts of remedial activities. Existing definitions include the following:

- ‘A remedy or combination of remedies whose net benefit on human health and the environment is maximized through the judicious use of limited resources (SuRF 2009)’
- ‘The practice of demonstrating, in terms of environmental, economic, and social indicators, that an acceptable balance exists between the effects of undertaking remediation activities and the benefits that those activities deliver (SuRF-UK 2010), and
- ‘Sustainable practices result in clean-ups minimizing the environmental and energy ‘footprints’ of all actions taken during a project life (ITRC 2011).

3.1.2.3. Green remediation

The USA Interstate Technology & Regulatory Council (ITRC) maintain that there is no single definition of ‘green’ but put forward a general definition from Vilsack quoted in the Brundtland Commission Report as:

‘being environmentally friendly or beneficial to the environment (Brundtland Commission 1989).’

The ITRC go on to state that green remediation refers to the use of environmentally conscious practices and approaches at any stage in the site clean-up process to maximise net benefits for the environment.

The US EPA define green remediation as:

‘the practice of considering all environmental effects of remedy implementation and incorporating options to maximize net environmental benefits of clean-up options (US EPA 2008).’

They go on to propose that green remediation reduces the demand placed on the environment during clean-up actions, otherwise known as the footprint of remediation, and avoids the potential for collateral environmental damage.

The US EPA list a number of green remediation objectives, as follows:

- achieve remedial action goals
- support use and re-use of remediated parcels
- increase operational efficiencies
- reduce total pollutants and waste burdens on the environment
- minimise degradation or enhance ecology of the site and other affected areas
- reduce air emissions and greenhouse gas production
- minimise impacts to water quality and water cycle
- conserve natural resources
- achieve greater long-term financial return from investments, and
- increase sustainability of site clean-ups (US EPA 2008).

3.1.2.4. Green and Sustainable Remediation (GSR)

The ITRC consider that an important aspect of defining and understanding GSR approaches is reducing the confusion that arises from use of the terms ‘green remediation’ and ‘green and sustainable remediation’. The ITRC believe that there are three main factors contributing to lack of clarity regarding the terminology:

- statutory and regulatory authorities do not explicitly recognise sustainability principles as balancing factors
- many organisations internationally are drafting various, albeit reasonably similar, definitions and policies, all of which are unique and serve different purposes, and
- the two distinct yet related terms ‘green’ and ‘sustainable’ are often used interchangeably.

Green and sustainable remediation is a term that collectively describes various remedial approaches, ideas, and especially, practices of green remediation and sustainable remediation. Many Australian jurisdictions have introduced, into their

contaminated sites policies and regulations, principles of sustainability and 'green' remediation practices.

3.1.3 Current approach in Australia

The *National Strategy for Ecologically Sustainable Development* was endorsed by COAG in 1992. In most jurisdictions the principles of ecologically sustainable development underpin their various Acts in reference to environmental management.

The release of the *World Conservation Strategy* in 1980, the *National Conservation Strategy for Australia* in 1983, and more importantly, the 1987 *Report of the World Commission on Environment and Development* (the *Brundtland Report*) made it clear that the world's current pattern of economic growth is not sustainable on ecological grounds and that a new type of development is required to meet foreseeable human needs (*National Strategy for Ecologically Sustainable Development 1992*).

While there is no universally accepted definition of ecologically sustainable development (ESD), in 1990 the Commonwealth Government suggested the following definition for ESD in Australia:

'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased (*National Strategy for Ecologically Sustainable Development 1992*).'

The *National Strategy for Ecologically Sustainable Development* provides broad strategic directions and a framework for governments to direct policy and decision making. It states that the strategy facilitates a coordinated and cooperative approach to ecologically sustainable development and encourages long-term benefits for Australia over short-term gains.

The guiding principles of the National Strategy are as follows:

- decision-making processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the global dimension of environmental impacts of actions and policies should be recognised and considered
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised
- cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms, and

- decisions and actions should provide for broad community involvement on issues which affect them.

The strategy states that these guiding principles and core objectives need to be considered as a package. A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD (*National Strategy for Ecologically Sustainable Development 1992*). ESD principles have been adopted, to some extent, by all states and territories.

3.1.3.1. Intergovernmental Agreement on the Environment

On 31 October 1990, Heads of Government of the Commonwealth, States and Territories of Australia, and representatives of Local Government in Australia, meeting at a Special Premiers' Conference held in Brisbane, agreed to develop and conclude an Intergovernmental Agreement on the Environment (IGAE) to provide a mechanism by which to facilitate:

- a cooperative national approach to the environment
- a better definition of the roles of the respective governments
- a reduction in the number of disputes between the Commonwealth and the States and Territories on environment issues
- greater certainty of government and business decision making, and
- better environment protection.

The *Intergovernmental Agreement on the Environment 1992*:

- is a fundamental document
- includes 'principles of environmental policy'
- is an appendix to the NEPC Acts
- has principles that have been taken up by the NEPC into NEPMs, including the ASC NEPM, and
- has principles that have been taken up by states/territories in legislation/regulation.

3.1.4 Decisions from the National Remediation Framework Steering Group

The information provided above was presented to the NRFSG in September 2012 and March 2013. The NRFSG considered that the *Framework* should be cognisant of existing principles in use in jurisdictions and should be compatible with the approaches taken in the ASC NEPM.

Given the overlap of concepts contained within principles of sustainability, ecologically sustainable development and green remediation, the NRFSG agreed that remediation and management outcomes that are fit-for purpose should be the underpinning philosophy of the framework and that an encompassing principle of sustainability be

adopted which incorporates relevant principles of ESD and green remediation currently followed by states and territories (see section 3.4.7).

As a result the following text was prepared for inclusion in the draft *Framework*.

Philosophy

A risk based, fit-for-purpose philosophy underpins the approach to remediation and management of contaminated sites in Australia. The intended use of the site determines the level of risk that may be permitted to remain on the site. It provides the foundation and rationale upon which the principles and guidance are based.

The concept of risk-based soil quality management (risk-based land management) was introduced to guide the fit-for-purpose approach to environmental management. The fit-for-purpose philosophy implies that the assessment, remediation and management of a contaminated site relates to a specific current or proposed land use.

A risk-based, fit-for-purpose philosophy also underpins the ASC NEPM, and this approach determines land-use scenarios for which risk-based health investigation levels and ecological investigation levels have been derived.

3.2 Developing the ‘context’ section of the framework

The context section of the framework comprises 4 elements which provide readers with the context in which the framework operates. These context elements are:

- background
- jurisdictional arrangements
- purpose of the framework, and
- intended audience.

3.2.1 Background

As mentioned previously, there is no stand-alone legislation at a national level that deals specifically with the remediation and management of contaminated sites.

Following the NRFSG meeting in September 2012, the following text was prepared for inclusion in the draft National Framework for Remediation and Management of Contaminated Sites in Australia.

‘In 1999, the National Environment Protection (Assessment of Site Contamination) Measure (the NEPM) was made and adopted in all jurisdictions in Australia. The NEPM makes clear, as does the legislation under which it was made, that its guidance should only be considered in relation to the assessment of site contamination. An updated version of the NEPM was approved in April 2013.

Given that issues related to remediation and management of contaminated sites are common throughout Australian jurisdictions it would be expected that policy, procedures and best practice would be characterised by a degree of uniformity and consensus. This national framework for remediation and management of contaminated sites codifies existing practice and enhances guidance on best practice remediation and management.

Harmonisation of approach and best practice will not only yield commercial benefits but also provide governments and the public with an assurance of consistency and competence in the remediation and management of contaminated sites.

The contents in this Framework complement and supplement existing regulation in the states and territories.'

3.2.2 Jurisdictional arrangements (pathway to adoption)

The NRFSG considered the issue of pathways to adoption/jurisdictional arrangement in September 2012 and considered existing mechanisms that could facilitate the carriage/implementation of a framework for remediation and management of contaminated sites, without compromising the requirement for a non-binding product. This issue will be examined further by the NRFSG during the development of the framework.

An example of an existing mechanism is the COAG SCEW which considers matters of national significance on environment and water issues and is supported by a Senior Officials Committee. SCEW is responsible for the delivery of COAG's strategic themes by pursuing and monitoring priority issues of national significance which require a sustained, collaborative effort, and overseeing delivery of a range of policy, implementation and governance functions, including management of projects. COAG has endorsed the following priorities:

1. pursuing seamless environmental regulation and regulatory practice across jurisdictions
2. progressing national water reform, including through implementing the National Water Initiative, the outcomes of the forthcoming COAG review of the National Water Initiative, and other COAG commitments on water
3. implementing the National Waste Policy
4. implementing a national partnership approach to the conservation and management of land, waters, the marine environment and biodiversity at the landscape and ecosystem scale, and to building resilience in a changing climate, and
5. developing and implementing a National Plan for Clean Air to improve air quality and community health and wellbeing (Standing Council on Environment and Water on the EPHC website).

The Seamless Environmental Regulatory Thematic Oversight Group (SERTOOG) is already established and provides a mechanism through which harmonisation of practice across jurisdictions can be fostered. In 2011, the development of a national remediation framework was selected as a pilot project for SERTOOG.

3.2.2.1. International arrangements

Many leading international jurisdictions work at a national level in managing contaminated sites. The following text from the *Review of Australian and international frameworks for remediation* provides a brief summary of this approach.

'The UK Model Framework was developed as guidance for the UK Department for Environment, Food and Rural Affairs which oversees the contaminated sites legislative regime under Part 2A of the Environmental Protection Act 1990 (UK).

The Canadian approach to environmental matters results from the division of powers between the federal and provincial governments, between the provinces and their municipalities, and between different departments or ministries of the same government. Provincial and territorial governments take the lead role in the development and enforcement of environmental legislation. The role of the federal government has traditionally been to provide leadership in information-gathering, research and setting national standards and objectives, generally with the participation of provincial and territorial governments, as is the case with the work of the Canadian Council of Ministers of the Environment (CCME), not unlike Australia's Standing Council for the Environment and Water.

The intention of the CCME in producing its own framework was to provide general guidance on the assessment and remediation of contaminated sites and to link existing CCME and other technical references. The framework clearly states that it does not establish or affect legal rights or obligations or establish binding norms (Scott & McInerney 2012).'

3.2.3 Legislative powers and liability

Each jurisdiction has in place legislation to empower it to issue and serve orders or notifications to assess, manage or remediate a contaminated site. The mechanism to do this is different for each jurisdiction. There is no common principle with none of the state and territory Acts specifying a particular principle for this activity. The principle formulated for this activity is grounded in the rationale, or justification for regulation.

In relation to the assessment and remediation of contaminated sites, the polluter pays principle is specifically endorsed by ANZECC in its position paper, *Financial Liability for Contaminated Site Remediation* (ANZECC 1994). ANZECC suggests in the document that this principle should apply 'even though a period of time has elapsed since those (sic) activities were undertaken, although this involves an element of retrospectivity'.

The ANZECC position paper recommends that where the original polluter of a contaminated site is either insolvent or unidentifiable, the person(s) in control of the site, regardless of whether that person is the owner or occupier should, as a general rule, be liable for the cost of remediation.

Generally speaking, Australian jurisdictions have adopted the approach that if it is not practicable to impose liability on the polluter, the owner who has acquired title with knowledge of the contamination (or who reasonably should have had that knowledge) will be liable (ANZECC 1994).

Most jurisdictions have power under their environment protection act to impose responsibility by issuing a works approval, licence or notice. The EPA may, as a condition of a clean-up notice, order the occupier of a site, or the person who has caused or permitted the pollution to occur, to take clean-up measures and observe ongoing management conditions. While there is some variation across jurisdictions, common responsible parties include:

- the occupier of a site
- the original polluter or polluters, and
- any person who has abandoned or dumped any industrial waste or potentially hazardous substance.

In accordance with the methodology for selecting principles for the framework agreed by the NRFSG the following text, drawn from the 1992 ANZECC/NHMRC Guidelines (ANZECC & NHMRC 1992) and SA EPA, has been prepared as the principle on liability and appropriate persons for inclusion in the *Framework*.

‘Each state and territory legislates for the regulation of activity related to contaminated sites. This recognises a responsibility – social, environmental and economic – to protect human health and the environment and, wherever possible and appropriate, to make productive use of previously contaminated sites.

The ‘polluter pays principle’ is generally adopted for liability and responsibility for the remediation and management of a contaminated site. If it is not possible or practicable to impose liability on the polluter, each jurisdiction has legislative powers to issue notices to appropriate persons.’

3.2.4 Purpose of the Framework

As mentioned previously, the need for a nationally consistent approach to remediation and management of contaminated sites was identified by representatives of environmental regulatory bodies from across Australia and major corporate entities which operate and clean-up sites across multiple jurisdictions.

Early discussions regarding the purpose, benefits and limitations of a remediation and management framework identified the following elements as important in the consideration of the approach, structure and content of the *Framework* should:

- enable a nationally consistent approach to remediation of contaminated sites
- be established under the umbrella of the SCEW
- not impinge on the policy and decision-making prerogatives of the states and territories
- not be legally binding
- distil and utilise existing documentation and experience, and
- provide practical guidance within an overall framework which establishes the context for remediation in Australia.

Clearly, a remediation framework must be consistent with, and articulate with, the approach to assessment in the NEPM. To be consistent with the ASC NEPM, the following text was prepared for inclusion in the draft *Framework*.

‘As a subsequent process to guidance on the assessment of site contamination, this document was developed to provide a framework for harmonisation of action when dealing with remediation and management issues regarding sites affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with contaminated sites in a way that is consistent with government policies and legislation.’

Extent and limitations

The *Framework* was developed in order to:

- establish a common approach to managing contaminated sites
- provide procedural guidance to people who are managing contaminated sites, and
- educate and inform government, industry and the public about the issues involved.

As with the ASC NEPM, some materials are recognised as requiring specialised forms of remediation and management. The ASC NEPM has legislation specific to those materials. Advice should be sought from the relevant environmental protection agency.

For example:

- unexploded ordnance (refer to *Commonwealth Policy on the Management of Land Affected by Unexploded Ordnance* www.defence.gov.au/uxo/).
- radioactive substances (refer to www.oecd-nea.org/law/legislation/australia.pdf)
- biologically pathogenic materials and waste (refer to *AS/NZS 3816 (1998) Management of Clinical and Related Wastes*. Jurisdiction will also have regulations on storage and handling of these wastes For more information see also the *Biohazard Waste Industry Australia and New Zealand (BWI) Industry Code of Practice for the Management of Clinical and Related Wastes* available at: www.epa.sa.gov.au/xstd_files/Waste/code_of_practice/)

- contaminated sediments (refer to the Sediment Quality Guidelines of the *Australian Water Quality Guidelines* available at: www.environment.gov.au/water/publications/quality/nwq)
- acid sulfate soils (refer to the *National Guidance on Acid Sulfate soils* available at www.environment.gov.au/water/publications/quality/guidance-for-managment-of-acid-sulfate-soils.html).

3.2.5 Intended audience

The target audience for the *Framework* should be consistent with that identified in the ASC NEPM. The following text was prepared for inclusion in the draft *Framework*.

‘The intended audience for the Framework is those responsible for, or involved with, identifying, assessing and remediating contaminated sites, including:

- owners/managers of contaminated sites
- government agencies (including environment, health and planning authorities)
- relevant contaminated sites professionals, and
- concerned citizens, and any other person affected by contaminated sites.’

3.3 Developing the ‘principles’ section of the *Framework*

The work undertaken to complete this part of the project included:

- identifying and synthesising principles and policies that can be adapted to a national context. Identification of existing Australian policy and principles was undertaken by extracting information from the Review Report, the CRC CARE Law and Policy website, the NEPM, the NEPC Act, jurisdictional Acts, regulation and policy documents, and relevant jurisdictional agency websites
- identifying areas of agreement regarding principles and policies
- documenting principles and policies that will underpin a national, harmonised approach to the remediation and management of contaminated sites. This area of work involved writing clear and concise agreed intent of principles and policies for the *Framework*.

3.3.1 Background

The review report, completed in February 2012, (the first project in the development of the *Framework*) identified a number of core principles for consideration in the

development of the *Framework*. The report included a draft framework which contained the following core principles:

- precautionary principle
- prevention
- risk management
- requirement to remediate
- liability and appropriate persons
- options hierarchy
- sustainability, and
- national/international obligations.

During research for this project involving Acts and regulations for each jurisdiction, further principles relevant to site contamination were also identified:

- intergenerational equity
- integration of economic, social and environmental considerations
- conservation of biological diversity and ecological integrity
- improved valuation, pricing and incentive mechanisms
- shared responsibility
- product stewardship
- waste hierarchy
- integrated environmental management
- enforcement
- accountability
- polluter pays
- full lifecycle costs
- waste minimisation, and
- general environmental duty.

3.4 Principles selected for the national framework

A number of jurisdictions share the same or similar principles, particularly in relation to the core principles listed in the draft remediation framework diagram on viii of this report.

At its meeting in September 2012, the NRFSG considered the proposal to adopt, as draft principles for inclusion in the *Framework*, those principles which have their origins

in acts or other legislation as a priority, followed by those in common usage in regulation or policy throughout the jurisdictions.

For example, the precautionary principle is embedded in the IGAE (a schedule to the *National Environment Protection Council Act 1994*), has been adopted in NEPMs, and has been embraced by jurisdictions, though in some cases with wording variations.

It was agreed by the NRFSG that the principles section of the framework explain that the ‘intent’ of the principles is the important element and that variations to those principles may be encountered in jurisdictions. This would not compromise existing legislation or regulation in adopting the *Framework*. The principles were further refined by the NRFSG in March 2013.

A key milestone for the development of the *Framework* is consultation with regulators, industry and key stakeholders. Final decisions on the selection of principles will be made following consultation.

3.4.1 Precautionary principle

The national statement of the precautionary principle comes from the *Intergovernmental Agreement on the Environment 1992* which states:

‘Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

1. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
2. an assessment of the risk-weighted consequences of various options (*Intergovernmental Agreement on the Environment 1992*).’

Three jurisdictions have adopted the IGAE precautionary principle into their own Acts:

- New South Wales – *Contaminated Land Management Act 1997*
- Victoria – *Environment Protection Act 1970* and its *State Environment Protection Policies (SEPPs)*
- Western Australia – *Environmental Protection Act 1986*.

Three jurisdictions refer to a ‘precautionary approach,’ for example ‘when assessing environmental risk to ensure that all aspects of environmental quality, including ecosystem sustainability and integrity and beneficial uses of the environment, are considered in assessing, and making decisions in relation to, the environment:’

- South Australia – *Environment Protection Act 1993*
- Australian Capital Territory – *Environment Protection Act 1997*
- Tasmania – *Environmental Management and Pollution Protection and Control Act 1994*

The Australian Capital Territory also includes the IGAE statement:

'Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (*Intergovernmental Agreement on the Environment* 1992).'

The Northern Territory and Queensland do not specify a precautionary principle or approach; however, as party to the IGAE and participating jurisdictions in the adoption of the ASC NEPM, they support the precautionary principle.

In accordance with the methodology for selecting principles for the *Framework*, agreed by the NRFSG, the following text drawn from the IGAE has been prepared for inclusion in the *Framework*.

'Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation or human exposure.

The application of the precautionary principle relates to remediation and management decisions which should be guided by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment;
- an assessment of the risk-weighted consequences of various options.'

3.4.2 Prevention

The *Key Principles for the Remediation and Management of Contaminated Sites* (1992) distilled from the ANZECC/NHMRC Guidelines list the following statement of principles for prevention:

- 'Contamination, or further contamination, of a site should be prevented. Steps need to be taken to minimise the creation of additional contaminated sites and to prevent the further contamination of already contaminated sites.
- Appropriate precautionary measures need to be taken when decommissioning industrial premises and developing sites where potentially contaminating activities have taken place (*Key Principles for the Remediation and Management of Contaminated Sites* 1992).'

The New South Wales *Protection of the Environment Operations Act* 1997 includes the following statements on prevention:

'(a) To reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:

- (i) pollution prevention and cleaner production
- (ii) the reduction to harmless levels of the discharge of substances likely to cause harm to the environment
- (iia) the elimination of harmful wastes

- (iii) the reduction in the use of materials and the re-use, recovery or recycling of materials (*Protection of the Environment Operations Act 1997*).

The Victorian *State Environment Protection Policy (Prevention and Management of Contamination of Land)* has the following policy goal:

Maintain and where appropriate and practicable improve the condition of the land environment sufficient to protect current and future beneficial uses of land from the detrimental effects of contamination by:

- 'a. preventing contamination of land
- b. where pollution has occurred, adopting management practices that will ensure:
 - (i) unacceptable risks to human health and the environment are prevented; and
 - (ii) pollution is cleaned up or otherwise managed to protect beneficial uses.'

All other jurisdictions have, within their environment protection legislation, statements on prevention and pollution control containing similar objectives to Victoria and New South Wales and are not in conflict with the ANZECC/NHMRC Guidelines statements.

In accordance with the methodology for selecting principles for the framework agreed by the NRFSG, the following text, drawn from the *Key Principles for the Remediation and Management of Contaminated Sites* distilled from the 1992 ANZECC/NHMRC guidelines, has been prepared as the principle on prevention for inclusion in the *Framework*.

'Contamination, or further contamination, of a site should be prevented. Action should be taken to minimise the creation of additional contaminated sites and to prevent the further contamination of already contaminated sites.

Appropriate precautionary measures should be taken when decommissioning industrial premises and developing sites where potentially contaminating activities have taken place.'

3.4.3 Risk management

The national statement, and most of the jurisdictional Acts and policies on risk management, refer primarily to risk assessment and to the reporting of contamination. Risk management as a remediation option does not appear to be included.

The ANZECC/NHMRC 1992 guidelines list a number of principles for remediation and management of contaminated sites, including:

'Contaminated site management strategies should reflect the need to protect all segments of the environment, both biological and physical (air,

land and water, including groundwater). During the assessment and remediation of sites, there should be appropriate controls in place to control emissions to air, land and water (ANZECC & NHMRC 1992).'

In NSW, investigation and risk assessment is undertaken in accordance with the values and methods contained in the NEPM and the ANZECC guidelines. Once this has been done, the approach to remediation becomes site-specific and based on factors such as the assessed risk, cost and proposed land use (NEPC 1999).

The NSW *Managing Land Contamination Planning Guidelines* state:

'a site remedial action plan should:

- set remediation goals that ensure the remediated site will be suitable for the proposed use and will not pose unacceptable risk to human health or the environment
- document in detail all procedures and plans to be implemented to reduce risks to acceptable levels for the proposed site use
- establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner.'

The same guidelines outline the approach to the remediation of contaminated sites in NSW. One of its key principles states that the integration of site contamination management into the planning and development control process will ensure that changes of land use will not increase the risk to health or the environment. The guidelines also identify the need for health and safety risk management during the construction and operation of remedial works.

In Victoria, the State Environment Protection Policy (Prevention and management of contamination of land) 2002, states that where a state of pollution exists, the site must be cleaned up and/or managed so that:

- 'there is no immediate threat to human health on site or off site or the environment off site
- contamination does not preclude protected beneficial uses of the relevant land use
- the risk of contamination from the site adversely affecting any beneficial use protected under any State environment protection policy off site is reduced to a level acceptable to the Authority.'

The South Australian *Environment Protection Act 1993* provides for a risk-based approach to remediation, as follows:

'It is expected that all remediation projects will have a 'remediation action plan' (RAP) prepared. The RAP will set remediation goals that ensure that, on completion of the remediation and validation, the site will be suitable for the proposed use and will provide adequate protection of human health, property and the environment. The RAP should also detail all procedures and plans to reduce human health and/or environmental risks to acceptable levels for the proposed site use.'

All other jurisdictions have similar general statements of risk assessment and operational procedures for remediation activities.

In accordance with the methodology for selecting principles for the *Framework* agreed by the NRFSG the following text, drawn from the 1992 ANZECC/NHMRC Guidelines and SA EPA, has been prepared as the principle on risk management for inclusion in the *Framework*.

'Risk management during remediation and site management

Risk management refers to a coordinated set of activities and methods that are used to direct and to control risks with the likelihood that any specified objectives can be achieved.

In *AS/NZS ISO 31000: 2009*, the term risk management also refers to the architecture that is used to manage risk. This architecture includes risk management principles, a risk management framework, and a risk management process.

Contaminated site risk management strategies should reflect the need to protect all segments of the environment, both biological and physical (air, land and water, including groundwater). During the remediation and management of contaminated sites, appropriate controls should be in place to control emissions to air, land and water.

Remediation and management plans should detail all procedures and plans to reduce human health and/or environmental risks to acceptable levels for the proposed site use. On completion of the remediation and validation, the site should be suitable for the proposed use and should provide adequate protection of human health, property and the environment.'

3.4.4 Options hierarchy

Both the ANZECC guidelines (1992) and the ASC NEPM (1999) state that the preferred order of options for site clean-up and management are:

- on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
- off-site treatment of excavated soil after which, depending on the residual levels of contamination, the treated material is then returned to the site, removed to an approved waste disposal site or facility or used as fill for landfill.

The ANZECC guidelines (1992) and the NEPM (1999) further state that should it not be possible for either of these options to be implemented, then other options that should be considered include:

- removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill
- isolation of the soil by covering with a properly designed barrier
- choosing a less sensitive land use to minimise the need for remedial works which may include partial remediation

- leaving contaminated material in situ providing there is no immediate danger to the environment or community and the site has appropriate controls in place, and
- where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

While all jurisdictions either adopt the ANZECC guidelines and/or include the waste hierarchy as a guide to remediation options, Western Australia has adopted a succinct summary of the options hierarchy and for this reason the following text from WA has been prepared for inclusion in the *Framework*.

'Contaminated material shall preferably be either treated or managed on site and risk reduced to acceptable levels, or treated off site and returned for re-use after the risk has been reduced to acceptable levels.

Disposal of contaminated material to an approved waste disposal facility or landfill or 'cap and contain' management options should be considered if:

- treatment of the contaminated material is shown or demonstrated not to be practicable
- the options to dispose to landfill or 'cap and contain' are undertaken in an environmentally acceptable manner
- the risk of disturbance of the contaminant exceeds the risk of leaving it undisturbed and contained on site.

It should be emphasised that the appropriateness of any particular option will vary depending on a range of local factors. Acceptance of any specific option or mix of options in any particular set of circumstances is a matter for the responsible participating jurisdiction.'

3.4.5 Sustainability

The *National Strategy for Ecologically Sustainable Development* has been adopted throughout Australian jurisdictions, incorporating a number of guiding principles of environmental protection. Many of these principles have been adopted as separate principles in Acts, regulations or policies in the jurisdictions, and account for most of the additional principles found during the research for this project.

Since development and adoption of the principles in the ESD Strategy, new considerations have emerged globally (for example green remediation). In September 2012, the NRFSG considered the various approaches to (and processes of) sustainability and concluded that a broad interpretation of sustainability, which included principles embedded in ESD, would provide a more comprehensive view of sustainability and ensure that principles currently adopted in jurisdictions would be reflected in the *Framework*.

In accordance with the methodology for selecting principles for the framework agreed by the NRFSG, the following text, adapted from the National Strategy for Ecologically Sustainable Development, has been prepared for inclusion in the *Framework*.

‘Sustainability means an integrated assessment of the environmental, economic, and social impacts of remedial activities which meets the needs of the present without compromising the ability of future generations to meet their own needs. This includes:

- ensuring that decision-making processes effectively integrate both long and short-term economic, environmental, social and inter- and intra-generational equity considerations
- planning for the future through long term contaminated sites management strategies and policies
- recognising and considering the global dimension of environmental impacts of actions and policies
- acknowledging the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection
- acknowledging the need to maintain and enhance international competitiveness in an environmentally sound manner
- adopting cost-effective and flexible policy instruments such as improved valuation, pricing and incentive mechanisms
- ensuring that decisions and actions provide for broad community involvement on issues which affect them.’

3.4.6 National/international obligations

The *Report of the World Commission on Environment and Development 1989* acted as a catalyst for a number of international developments on environment and development issues, including negotiation of a range of international treaties and conventions. These developments culminated in the United Nations Conference on Environment and Development, which was held in Brazil in June 1992 and was attended by most of the world's governments.

The *National Strategy for Ecologically Sustainable Development 1992* states that:

‘within Australia, a number of processes were commenced that were important to achieving the overall goal of ecological sustainability. Some of these initiatives commenced before the formal ESD Working Group process. Related initiatives include the Intergovernmental Agreement on the Environment (IGAE), the National Greenhouse Response Strategy, the development of the National Strategy for the Conservation of Australia's Biological Diversity, the National Waste Minimisation and Recycling Strategy, the Commonwealth Major Projects Facilitation initiative, and National Forest Policy Statement. Governments are also addressing the

domestic implications of international documents such as Agenda 21, the UN Framework Convention on Climate Change and the UN Convention on Biological Diversity.'

Furthermore it was noted that:

'as Australia's goal, core objectives and principles for ESD have been developed, refined and found increasing acceptance, they have been reflected to a greater or lesser extent in these initiatives. Others have been brought directly under an umbrella ecologically sustainable development strategy.'

It is proposed that an overarching principle of recognition of Australia's national and international obligations for inclusion in the *National Framework for Remediation and Management of Contaminated Sites in Australia* be as follows:

'Practitioners taking actions and activities related to the remediation and management of contaminated sites in Australia should be mindful of national and international environmental management obligations, agreements and treaties.'

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APPENDIX A.

Summary of principles of contaminated site management

The following summaries are taken directly, or adapted, from state or national legislation relating to site contamination, national documents on environmental management, and the CRC CARE Law and Policy website.

PRECAUTIONARY PRINCIPLE

National

The IGAE offers the accepted definition of the precautionary principle. This states that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- ii. an assessment of the risk-weighted consequences of various options.

New South Wales

In NSW, the management of contaminated site is approached according to principles of ecologically sustainable development. The *Contaminated Land Management Act 1997* defines a number of principles and programs through which ecologically sustainable development can be achieved, one of which is the precautionary principle, as defined by the IGAE.

Victoria

The principles of environment protection that underpin Victoria's approach to site contamination are detailed in the *Environment Protection Act 1970*. It adopts the precautionary principle, as defined in the IGAE.

Queensland

In Queensland, the *Environmental Protection Act 1994* is underpinned by the principle of ecologically sustainable development. The Act does not define any further principles in relation to the management of contaminated sites and a search of relevant legislation and literature found no other reference to specific principles underpinning the State's approach to the remediation of contaminated sites.

Western Australia

In Western Australia, the precautionary principle forms one of the underlying principles that underpin the *Environmental Protection Act 1986*. WA has adopted the IGAE definition of precautionary principle.

South Australia

In South Australia, the IGAE definition of the precautionary principle has not been adopted. However, one of the objects of the *Environmental Protection Act 1993* is to apply a precautionary approach to the assessment of risk of environmental harm and ensure that all aspects of environmental quality affected by pollution and waste (including ecosystem sustainability and valued environmental attributes) are considered in decisions relating to the environment.

Tasmania

Tasmania has taken a similar approach to SA and has not endorsed the IGAE-defined precautionary principle. However one of the objectives of the *Environmental Protection and Control Act 1994* is to adopt a precautionary approach when assessing environmental risk to ensure that all aspects of environmental quality, including ecosystem sustainability and integrity and beneficial uses of the environment, are considered in assessing, and making decisions in relation to, the environment.

Australian Capital Territory

In the ACT, the *Environment Protection Act 1997* lists a number of objects, one of which is to promote the principles of ecologically sustainable development. To achieve ecologically sustainable development, the Act notes that the precautionary principle (as defined by the IGAE) must be implemented. A further object of the Act is to adopt a precautionary approach when assessing environmental risk to ensure that all aspects of environmental quality, including ecosystem sustainability and integrity and beneficial use of the environment, are considered in assessing, and making decisions in relation to, the environment.

Northern Territory

The assessment and management of contaminated sites in the Northern Territory is implemented through the auditing and pollution control provisions of the *Waste Management and Pollution Control Act 1998*. When land use is changing to a more sensitive use provisions of the *Planning Act 1999* may also be used and the Development Consent Authority may direct a site assessment to be undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure.

The *Waste Management and Pollution Control Act* does not specify any particular principles. However, the Northern Territory is a party to the IGAE and supports the principles of the NEPM. It is therefore assumed that the precautionary principle as defined by the IGAE applies in the Northern Territory.

PREVENTION

Prevention underpins much of the legislative and policy basis for the remediation of contaminated sites in Australia.

National

ANZECC Guidelines

The concept of prevention was identified as the policy basis for the ANZECC guidelines, which state:

‘Prevention of site contamination is of paramount importance. Steps need to be taken to minimise the creation of additional contaminated sites and to prevent the further contamination of already contaminated sites which can occur either as a result of accidents or of ongoing poorly managed industrial, agricultural or commercial activities.

Management should seek to minimise the risk of contamination associated with day to day operation of processes and accidents, spillages, fires and explosions.

Contingency plans should also be developed to minimise the risk of contamination in the event of an accident.

Appropriate precautionary measures need to be taken when decommissioning industrial premises. Such measures include exercising care during dismantling, containment of residual and hazardous materials and the carrying out of clean-up procedures as decommissioning takes place.’

Site Assessment NEPM

Prevention is also one of the key principles of the assessment of site contamination in the NEPM (1999). The NEPM states:

‘Contamination, or further contamination, of a site should be prevented. Investigation Levels or Response Levels provided as part of this policy framework process should not be construed as desirable soil/water quality criteria or levels up to which contamination may be allowed to occur.

There should be no noticeable or measurable change in the characteristics of soil, or associated ground or surface waters. It is recognised that certain activities will lead to the addition of substances to the soil which raise the background levels of soils. These are valid and legitimate activities where they are undertaken in accordance with relevant laws and best practice guidelines.’

IGAE

Prevention is also a key element in the precautionary principles defined in the IGAE (1992), which states that the application of the principle should be guided by 'careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment'. Those jurisdictions that have incorporated these precautionary principles in their respective legislation therefore have prevention as an underpinning principle.

New South Wales

In NSW, one of the objects of the *Protection of the Environment Operations Act 1997* is to reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:

- (i) pollution prevention and cleaner production
- (ii) the reduction to harmless levels of the discharge of substances likely to cause harm to the environment
 - (iia) the elimination of harmful wastes
- (iii) the reduction in the use of materials and the re-use, recovery or recycling of materials
- (iv) the making of progressive environmental improvements, including the reduction of pollution at source
- (v) the monitoring and reporting of environmental quality on a regular basis.

Guidelines issued by the NSW Department of Urban Affairs and Planning in 1998 also stress the importance of prevention. These state that the prevention of future contamination and the minimisation of risk from existing contamination may be achieved by diligent investigation of contamination issues and the appropriate recording of information on land use and potentially contaminating activities. Measures to prevent possible pollution at its source may help to reduce future site contamination and the need for remedial action. Therefore future economic consequences of contamination play a part in the current motivation for prevention. The guidelines suggest a number of principles for a pro-active approach that could be applied by planning authorities (*Managing Land Contamination Planning Guidelines 1998 (NSW)*).

Victoria

Victoria has quite detailed requirements in relation to the prevention and management of contamination. The State Environment Protection Policy (Prevention and Management of Contamination of Land) (SEPP) was released in 2002 to bring together all matters relating to contamination of sites, including responsibilities for prevention and management of contamination (*Victoria State Environmental Protection Policy (prevention and management of contamination of land) 2002*).

The policy goal for the SEPP is to maintain and, where appropriate and practicable, improve the condition of the land environment sufficient to protect current and future beneficial uses of land from the detrimental effects of contamination by:

- preventing contamination of land
- where pollution has occurred, adopting management practices that will ensure:
 - unacceptable risks to human health and the environment are prevented
 - pollution is cleaned up or otherwise managed to protect beneficial uses.

The policy intent of the SEPP is that human health and the environment will be protected through the prevention of contamination of sites and clean-up and management of pollution of the environment.

Section 17 of the SEPP deals specifically with the prevention of contamination and states that the occupier of any site must ensure that the site is managed to prevent contamination. This includes the transport, storage or handling of any chemical substance or waste, where best practice and relevant waste management policy or dangerous goods legislation must be complied with.

Further to this, occupiers of a premises where the principal activity is storing or handling chemical substances or waste that has the potential to contaminate the site, should prepare and implement an Environment Improvement Plan to prevent contamination.

The SEPP also highlights the need for site management strategies to ensure the prevention of further contamination where contamination has already occurred.

Queensland

In Queensland, the general environmental duty, outlined in the *Environmental Protection Act 1994*, highlights the duty to prevent and minimise environmental harm. It states that a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.

The Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland were produced by the Department of Environment to establish best practice for managing site contamination through the planning and development control process. No specific guidelines or policy for the prevention of contamination in Queensland were identified during the research phase of this project.

Western Australia

No specific information on prevention is listed in the *Contaminated Sites Act 2003*. The Environmental Protection Authority (EPA) is an independent statutory authority and is the key provider of independent environmental advice to Government. The EPA's objectives are to protect the environment and to prevent, control and abate pollution.

The EPA also provides strategic advice to Government on key issues so that environmental risks can be mitigated or avoided (WA Environmental Protection Authority 2010, Strategic Plan, 2010–13).

The WA Department for Environment & Conservation (DEC) outlines its responsibilities in relation to pollution control on its website as having strong regulatory powers which it uses to manage and protect the environment, particularly in areas where human activities have the potential to pollute or otherwise impact on the quality of air, land or water (WA Environmental Protection Authority 2010, Strategic Plan, 2010–13).

South Australia

In South Australia, the *Environment Protection Act 1993* states that one of its objects is to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment and to prevent, reduce, minimise and, where practicable, eliminate harm to the environment by programs to encourage and assist action aimed at pollution prevention, clean production and technologies, reduction, re-use and recycling of material and natural resources, and waste minimisation.

Section 25 of the Act requires that ‘a person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm’.

Tasmania

In Tasmania, the *Environmental Management and Pollution Control Act 1994* (EMPC Act) provides for the management and control of the environment and pollution. At its core, the EMPC Act is designed to prevent, reduce and remediate environmental harm. The Act states that the objectives of the environmental management and pollution control system are:

- to prevent environmental degradation and adverse risks to human health and the health of ecosystems by promoting pollution prevention, clean production technology, re-use and recycling of materials and waste minimisation programs
- to regulate, reduce or eliminate the discharge of pollutants and hazardous substances to air, land or water consistent with maintaining environmental quality.

Local councils have a duty under the EMPC Act to prevent or control acts which may cause pollution. The general environmental duty under the Act further stipulates that a person must take such steps as are practicable or reasonable to prevent or minimise environmental harm or environmental nuisance caused, or likely to be caused, by an activity conducted by that person.

Australian Capital Territory

In the ACT, the objects of the *Environment Protection Act 1997* contain and describe the principles underpinning the approach to remediation and management of site contamination in the territory. These include the prevention of environmental degradation and adverse risks to human health and the health of ecosystems by promoting pollution prevention, clean production technology, re-use and recycling of materials and waste minimisation programs. The Act further states its object as being to regulate, reduce or eliminate the discharge of pollutants and hazardous substances into the air, land or water consistent with maintaining environmental quality.

The ACT has also developed Environmental Protection Policies (EPPs) to help people comply with the legal requirements of the Act and Regulation and the general environmental duty. The general environmental duty requires all people to take practicable and reasonable steps to prevent or minimise any environmental harm or environmental nuisance their actions may cause.

Northern Territory

The purpose of the NT *Waste Management and Pollution Control Act 1998* is to provide for the protection of the environment through encouragement of effective waste management and pollution prevention and control practices and for related purposes. The objectives of the Act are to protect, and where practicable to restore and enhance the quality of, the territory environment by:

- preventing pollution
- reducing the likelihood of pollution occurring
- effectively responding to pollution
- avoiding and reducing the generation of waste
- increasing the re-use and re-cycling of waste
- effectively managing waste disposal, preventing pollution and reducing the likelihood of pollution occurring.

Part 3 of the Act outlines the general environmental duty, which states that a person who conducts an activity or performs an action that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste, must take all measures that are reasonable and practicable to:

- prevent or minimise the pollution or environmental harm
- reduce the amount of the waste.

RISK MANAGEMENT

The concept of risk underpins most legislation and national guidelines and is inherent in most jurisdictions through various occupational health and safety Acts and practices.

However, its relationship to the remediation of contaminated sites is implied, rather than succinctly outlined.

National

ANZECC Guidelines

Risk management underpins the policy basis of the ANZECC guidelines (1992), being inherent in both the Prevention and Management elements of the guidelines. The guidelines state that one of the goals of contaminated site assessment and clean-up is to minimise environmental and health risks, both on and off site.

The guidelines also discuss occupational health and safety considerations and state that 'consideration must be given to appropriate occupational health and safety measures from the time of the preliminary assessment of a site'.

Section 6.3 deals with the risk assessment process. Interestingly, the guidelines state that 'perception of risk is an extremely important factor and may alter the types of criteria and degree of clean-up required for a given site'.

Site assessment NEPM

The NEPM (1999) specifically deals with the assessment of site contamination, rather than the remediation of contaminated sites. However, several of the underlying principles of the NEPM have some relevance in relation to remediation.

In the NEPM, risk is defined as 'the probability in a certain timeframe that an adverse outcome will occur in a person, a group of people, plants, animals and/or the ecology of a specified area that is exposed to a particular dose or concentration of a hazardous agent, i.e. it depends on both the level of toxicity of the hazardous agent and the level of exposure'.

The concept of risk management underpins the assessment process in the NEPM, stating that '(t)he purpose of site assessment is to determine whether site contamination poses an actual or potential risk to human health and the environment, either on or off the site, of sufficient magnitude to warrant remediation appropriate to the current or proposed land use'. In assessing that risk a balance is to be achieved between:

- optimising the current or intended use of the site
- the need to adequately protect human health and the environment.

New South Wales

Investigation and risk assessment is undertaken in accordance with the values and methods contained in the NEPM (1999) and the ANZECC guidelines (1992). Once this has been done, the approach to remediation becomes site-specific and is based on factors such as the assessed risk, cost and proposed land use (NEPC 1999).

The *NSW Managing Land Contamination Planning Guidelines 1998* state that a site remedial action plan should:

- set remediation goals that ensure the remediated site will be suitable for the proposed use and will not pose unacceptable risk to human health or the environment
- document in detail all procedures and plans to be implemented to reduce risks to acceptable levels for the proposed site use
- establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner.

The same guidelines outline the approach to the remediation of contaminated sites one of its key principles states that the integration of site contamination management into the planning and development control process will ensure that changes of land use will not increase the risk to health or the environment. The guidelines also identify the need for health and safety risk management during the construction and operation of remedial works.

The guidelines also state that a planning authority must consider the possibility that a previous land use has caused contamination of the site as well as the potential risk to health or the environment from that contamination. Decisions must then be made as to whether the site should be remediated, or its use of the land restricted, in order to reduce the risk.

Victoria

The *State Environment Protection Policy (Prevention and Management of Contamination of Land)* (SEPP) states that where a state of pollution exists, the site must be cleaned up and/or managed so that:

- a) there is no immediate threat to human health on site or off site or the environment off site
- b) contamination does not preclude protected beneficial uses of the relevant land use
- c) the risk of contamination from the site adversely affecting any beneficial use protected under any State environment protection policy off site is reduced to a level acceptable to the Authority.

It further goes on to state that where contamination has occurred, site management strategies must prevent further contamination.

Queensland

In November 1997, the Queensland Government integrated the provisions of the Contaminated Land Act with the *Environmental Protection Act 1994*. The integrated legislation adopts the concept of risk management through the development of two

registers for the recording of land - the Contaminated Land Register (CLR) and the Environmental Management Register (EMR). The Act identifies sites on the basis of risk assessment: 'low-risk' sites are recorded on the EMR and 'risk' sites are recorded on the CLR (*Draft guidelines for the assessment and management of contaminated land in Queensland 1998*).

The *Draft guidelines for the assessment and management of contaminated land in Queensland 1998* describe the technical and administrative procedures which must be followed when managing contaminated sites. Queensland follows the staged process, based on the ANZECC/NHMRC guidelines, which emphasises the site-specific nature of contaminated site assessment and remediation.

These stages are:

Stage 1 – Preliminary site investigation

Stage 2 – Detailed site investigation

Stage 3 – Health and environmental assessment and determination of remediation plan

Stage 4 – Implementation of agreed remediation plan and validation sampling.

The Draft Guidelines note that, where sites have some contamination that does not present a health or environmental risk for the existing or proposed use, it may be more practical for the contamination to be safely managed on site under specified conditions. These conditions form the body of a site management plan (SMP).

The Draft Guidelines state that the SMP approach is an effective solution for managing contamination on specific sites enabling environmental and development objectives to be achieved without unnecessary expenditure. The Department of Environment and Resource Management (DERM) encourages the use of SMPs in appropriate circumstances and SMPs may be applicable in some industrial, commercial and high-density residential projects or for managing contamination in existing residential areas.

Under the Guidelines for Issue of Certificates and Statements of Environmental Audit, when conducting an environmental audit, an auditor is required to determine whether human health is protected at a site by assessing the risk to all users of the site, including workers involved in remediation works.

Western Australia

In WA, the Department of Environmental and Conservation (DEC) has issued guidelines on the reporting of site assessments. The guidelines refer to guidance in the NEPM for further information on conducting risk assessments and state that if a site investigation indicates that the site poses unacceptable risks to human health or the environment, on site or off site, and under either the present or the proposed land use, then a Site Management Plan (SMP) needs to be developed and implemented.

The guidelines also discuss the development of a SMP, which involves the selection of an effective management strategy which is practical, achieves the desired outcomes

and is socially and environmentally acceptable. One of the elements that the SMP should address is identifying the additional information required for the selection and/or design of remedial and/or management options, for example, active remediation or risk mitigation (DEP WA 2001).

The EPA defines risk as the likelihood that specific effects harmful to man and the environment will occur within a specified period or in specified circumstances. The only aspect of risk that the EPA is likely to continue to assess during environmental impact assessment is significant risk to the physical or biological environment. This is known as environmental risk and relates to the likelihood of damage to the physical or biological environment arising from a hazardous event associated with hazardous industrial plant (WA Environmental Protection Authority WA 2008 *Environmental Guidance for Planning and Development* number 33).

South Australia

Upon the verification of potential site contamination, the EPA needs to ascertain whether the contamination poses a risk to the public. This assessment is usually conducted by a site contamination consultant or auditor employed by the site owner or developer – who may not have been the person or company who originally caused the contamination.

It is expected that all remediation projects will have a remediation action plan (RAP) prepared. It is expected that the RAP will set remediation goals that ensure that, on completion of the remediation and validation, the site will be suitable for the proposed use and will provide adequate protection of human health, property and the environment. The RAP should also detail all procedures and plans to reduce human health and/or environmental risks to acceptable levels for the proposed site use (EPA SA 2006).

Tasmania

CRC CARE's Law & Policy Directory notes that in Tasmania, the *Environmental Management and Pollution Control Act 1994* (EMPC Act) is the principal vehicle for identifying and managing contaminated sites. However, the land-use planning process remains an important tool to identify and manage contaminated sites. Contaminated sites that do not pose a serious risk of harm to humans or the environment are generally dealt with by local councils through the planning process.

The EPA document, *The Site Contamination Sign-off Process 2011* notes that the Tasmanian *Building Act 2000* states that a person must not carry out any building work on land that, in the opinion of the environmental health officer is '...contaminated, unhealthy and not suitable for the purpose until the land is cleaned or remedied...'.

Australian Capital Territory

The ACT *Strategic Plan – Contaminated Sites Management* (1995) defines ‘Risk Sites’ which are sites where human health is at risk, either on site or off site, and/or the environment is at risk because of contaminant migration. The Plan is based on the ANZECC guidelines.

The Strategic Plan for Contaminated Sites Management (1995) states that ‘(i)t is important that a consolidated listing of currently known locations of potential contamination be prepared and systematically investigated where there are potential risks to the health of the ACT community and/or the environment, and to ensure such sites are managed appropriately according to their land use’.

Northern Territory

There was little information found during the research phase of this project about the Northern Territory’s approach to risk in relation to the remediation of contaminated sites. Risk mitigation is inferred in the *Waste Management & Pollution Control Act 1998*.

Remediation activities reflect the NEPM principles and follow the risk-based approach outlined in the ANZECC and NHMRC Guidelines for the assessment and management of contaminated sites (Scott & McInerney 2012).

SUSTAINABILITY

National

The *National Strategy for Ecologically Sustainable Development 1991* was endorsed by the COAG in 1992. In most jurisdictions the principles of *ecologically sustainable development* underpin their various Acts in reference to the management of contaminated sites.

The *National Strategy for Ecologically Sustainable Development* contains a number of guiding principles, including that:

- decision-making processes should effectively integrate both long- and short-term economic, environmental, social and equity considerations
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the global dimension of environmental impacts of actions and policies should be recognised and considered
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised

- cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms
- decisions and actions should provide for broad community involvement on issues which affect them.

In most jurisdictions, the principles of ecologically sustainable development underpin their various Acts in reference to the management of contaminated sites and account for many of the additional principles found in jurisdictional policy during research for this project.

The IGAE (1992), endorsed by all States and Territories, is based on the premise that all parties to the agreement recognise 'that the concept of ecologically sustainable development including proper resource accounting provides potential for the integration of environmental and economic considerations in decision making and for balancing the interests of current and future generations' (*Intergovernmental Agreement on the Environment* 1992).

New South Wales

The NSW *Contaminated Land Management Act 1997* states that one of its objects is to ensure that contaminated sites are managed with regard to the principles of ecologically sustainable development.

In addition, the *Protection of the Environment Operations Act 1997* states that one of its objectives is to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development.

Victoria

In Victoria, the *Environmental Protection Act 1970* states its purpose as being to create a legislative framework for the protection of the environment having regard to the principles of environment protection. It further goes on to state, under the principle of integration of economic, social and environmental considerations, that sound environmental practices and procedures should be adopted as a basis for ecologically sustainable development for the benefit of all human beings and the environment.

Queensland

In Queensland, the *Environmental Protection Act 1994* states its object as being to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).

Western Australia

Neither the WA *Environmental Protection Act 1986* nor the *Contaminated Sites Act 2003* contains reference to ecologically sustainable development. Some reference is made on the EPA website, but mostly in reference to mining development.

South Australia

The SA *Environment Protection Act 1993* states its objects are to promote a number of principles of ecologically sustainable development.

Under the SA *Development Act 1993*, its objects include to provide for the creation of development plans:

- to facilitate sustainable development and the protection of the environment
- to encourage the management of the natural and constructed environment in an ecologically sustainable manner

Tasmania

In Tasmania, the *Environmental Protection and Control Act 1994* outlines the principles of ecologically sustainable development. The Act states that the objectives of the resource management and planning system of Tasmania are to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity.

By sustainable development is meant managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while:

- sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations
- safeguarding the life-supporting capacity of air, water, soil and ecosystems
- avoiding, remedying or mitigating any adverse effects of activities on the environment.

Australian Capital Territory

One of the objects of the *Environment Protection Act 1997* is to promote the principles of ecologically sustainable development. In this context, ecologically sustainable development means the effective integration of economic and environmental considerations in decision-making processes, to be achieved through implementation of the following principles:

- the precautionary principle, namely, that if there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be

used as a reason for postponing measures to prevent environmental degradation

- the inter-generational principle, namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- conservation of biological diversity and ecological integrity
- improved valuation and pricing of environmental resources.

Northern Territory

One of the objectives of the *Waste Management and Pollution Control Act 1998* is to encourage ecologically sustainable development. This is defined as development that improves the total quality of life both in the present and in the future in a way that maintains the ecological processes on which life depends.

LIABILITY & APPROPRIATE PERSONS

National

ANZECC Guidelines

In relation to the assessment and remediation of contaminated sites the polluter pays principle is specifically endorsed by ANZECC in its 1994 position paper, *Financial Liability for Contaminated Site Remediation*. ANZECC suggests in the document that this principle should apply even though a period of time has elapsed since those (sic) activities were undertaken, although this involves an element of retrospectivity.

The ANZECC position paper also recommends that where the original polluter of a contaminated site is either insolvent or unidentifiable, the person(s) in control of the site, regardless of whether that person is the owner or occupier, should as a general rule, be liable for the cost of remediation.

Generally speaking, Australian jurisdictions have adopted the principle that if it is not practicable to impose liability on the polluter, the owner who has acquired title with knowledge of the contamination (or who reasonably should have had that knowledge) will be liable.

New South Wales

In NSW, through the requirements contained in the *Contaminated Land Management Act 1997*, the hierarchy of appropriate persons in relation to the investigation and remediation of sites is based on the polluter pays principle. The Act gives the Office of Environment & Heritage (OEH) the power to serve a preliminary investigation order where it reasonably suspects that a site is contaminated.

The Act imposes a hierarchy of responsibility on the person responsible for the contamination, the owner and notional owner of contaminated site, respectively. The application of the power is not dependent upon a hierarchy of responsible persons: the OEH can select any one on the list of responsible persons. However, the hierarchy is to be followed 'as far as practicable'. Moreover, management orders may be served on more than one person.

Orphan sites

There is no 'superfund' established in New South Wales for the purposes of assessing and remediating orphan sites. In circumstances where neither the polluter nor the owner can be held responsible, the State will intervene if it considers the contamination is significant enough to require regulation. The CRC CARE Contaminated Sites Law and Policy Directory describes grants that have been made available for managing certain sites from the *Environmental Trust Act 1998* and describes how, in certain circumstances, NSW public authorities can be required to take responsibility for contaminated sites.

Hierarchy of responsibility

The *Contaminated Land Management Act* specifies the circumstances in which a person is responsible for contamination of a site. Broadly speaking, a person is responsible for contamination where that person:

- caused the contamination
- undertook activities that converted a non-contaminating substance into a contaminating substance
- as owner or occupier of the land, knew (or ought reasonably have known) the contamination would occur and failed to prevent it
- carried on activities on the land that generated or consumed the same substances that caused the contamination or generated or consumed substances that by reacting with each other converted to the same substances that caused the contamination – unless the person can prove that the person did not cause the contamination.

In determining whether a person is responsible for contamination, it is irrelevant that the contamination did not arise contemporaneously with the activity of the person that is taken to be responsible for the contamination of the site.

An appropriate person on whom to serve a management order upon should initially be:

- a person who is responsible for significant contamination of the site (whether or not there were other persons who had responsibility for such contamination of the land with the substance)

or

- if that is not practicable, an owner of the site (whether or not the person had any responsibility for such contamination of the land with the substance)

or

- if that is not practicable, a notional owner of the site (whether or not the person had any responsibility for such contamination of the site with the substance).

Victoria

In Victoria, the EPA has power under the *Environment Protection Act 1970* to impose responsibility by issuing a works approval, licence or notice.

A range of parties may be held potentially responsible for the contamination and remediation of a site. Potentially responsible parties include:

- the occupier of a site
- the original polluter or polluters
- any person who has abandoned or dumped any industrial waste or potentially hazardous substance.

Orphan sites

There is no 'superfund' system operating in Victoria to secure the clean-up of contaminated sites. Neither the *Environment Protection Act* nor the SEPP makes specific financial provision for the assessment and/or remediation of contaminated sites where there are no persons who can be realistically required to pay: that is, it is an orphan site.

Queensland

Private responsibility for assessing and remediating contaminated sites is based on the polluter pays principle. On this basis, the polluter of a contaminated site will be primarily responsible for investigation and clean-up. In certain limited circumstances, local governments may be responsible. Otherwise, responsibility falls to the owners (including lessees, licensees and permittees).

Liability

The potential for persons to be required by the Department of Environment and Resource Management (DERM) to conduct a site investigation or to undertake remediation is based on the following hierarchy:

- the polluter, if known and can be located

- local government (where the local government has been in some way responsible for the contamination)
- the owner of the site.

There appears to be no statutory constraint on the extent of responsibility for clean-up. It is apparent that a remediation notice must state the work to be conducted or commissioned by the recipient to remediate the land. The scope of remediation will be determined largely by the contents of the site investigation report.

Orphan sites

There is no specific provision under the Act allocating to the DERM, or any other government agency, responsibility for orphan sites. It appears that the only means by which an orphan site might be investigated and remediated is where a local government has in some way contributed to the condition of the site. However, where the person responsible for contaminating the site is not known or cannot be located, the relevant local government can be required by the DERM in certain circumstances to undertake an investigation and, where necessary, remediation.

There is no statutory provision for an orphan sites fund under the Environmental Protection Act. It is assumed that should the DERM undertake investigation and remediation where the public interest demands, for example, where there exists an immediate threat to human health or the environment, the cost would be met out of general revenue.

Western Australia

In WA, the *Contaminated Sites Act 2003* establishes a system for the reporting and classification of known or suspected contaminated sites. The Act introduces a hierarchy of responsibility, which establishes who is responsible for remediation of sites. Investigation of such sites can occur voluntarily or through the issuing of various notices by the CEO of the Department of Environment and Conservation (DEC). Under Section 29 of the Act, the State is responsible for remediation where:

- contamination was a direct and unavoidable result of a direction given, or an action carried out, by a public authority, other than a local authority. This does not apply where the contamination resulted from a reasonable direction given, or a reasonable act carried out, in an emergency situation to save life, protect property or protect the environment
- contamination was present, or was caused or contributed to by contamination that was present, on land that comprised all, or part, of the site and where a certificate of contamination audit was given which at the time:
 - failed to identify the contamination due to a failure to take into account any relevant guideline; any currently accepted industrial standard; or any other information contained in, or accompanying, the request for the certificate of contamination audit; or

- identified the contamination, but failed to classify the site as 'contaminated – remediation required', 'contamination – restricted use' or 'remediated for restricted use' as a result of that contamination being identified
- no other person is responsible for remediation of the site under the hierarchy of responsibility.

A person who caused or contributed to the contamination before the commencement of the Act is responsible for remediation of the site only to the extent that the person caused the contamination by an unlawful act. The Act does not specify the nature of the liability. However, from the wording of the provisions it is likely that liability for remediation of contaminated sites is strict. In other words, the person who caused the contamination is held responsible for remediation regardless of the mental element (e.g. intention, recklessness) the person had at the time and whether or not negligence is involved.

Orphan sites

WA differs in many other jurisdictions in that the Act establishes a Contaminated Sites Management Account for the purposes of assisting the investigation and remediation of orphan sites and sites where the State is responsible for the contaminated state of the site. The Account sources its funds from periodic appropriations, the sale of orphan sites, fees received, costs recovered and charges on site that is recovered. The funds may be spent on the investigation and remediation of sites for which the State is responsible or where the CEO has taken action because the responsible person has failed to do so.

South Australia

In South Australia, the *Environment Protection Act 1993* essentially imposes responsibility for assessment and remediation of contaminated and potentially contaminated sites through the issuing of Site Contamination Assessment Orders (SCAOs) and Site Remediation Orders (SROs).

The site contamination provisions of the Environment Protection Act do not provide for the assumption of responsibility by the EPA or any other government 'orphan' agency. That is, there is no provision addressing identification, assessment or remediation of contaminated sites.

The concept of 'appropriate person' determines to whom an SCAO or SRO may be issued. The appropriate person to be issued with an SCAO or an SRO is the person who caused the site contamination. If it is not practicable to issue the order to that person, it is the owner of the site provided that:

- before the person acquired the site, the person knew or ought reasonably to have been aware that chemical substances were present such as to require or be likely to require remediation

or

- before the person acquired the site, the person knew or ought reasonably to have known that the activity that caused the contamination had been carried on at the site, or while the person was the owner the person ought reasonably to have known that the activity causing the contamination was being carried on at the site and the activity is prescribed by the regulations as a potentially contaminating activity.

Liability

The Act attributes responsibility for site contamination to two classes of persons – those who 'caused' the contamination at the site and 'owners' of the site in specified circumstances.

Liability is based on the polluter pays principle. The Act presents a hierarchy of responsibility with the person who caused contamination being principally liable for the issuing of orders. Where that is not practicable the owner of the relevant site, subject to specified qualifications, may be subject to the issuing of an order.

Orphan sites

There is no provision in the Environment Protection Act which obliges the EPA or any other State agency to assume responsibility for the assessment or remediation of contaminated sites. That is, there is no provision for addressing orphan sites.

Tasmania

The remediation of contaminated sites in Tasmania under the *Environmental Management and Pollution Control Act 1994* (EMPC Act) is based principally on civil liability imposed on the polluter initially or the owner in certain circumstances.

Liability

The issue of contaminated sites can present significant liabilities for those involved. In general, Tasmania adopts the polluter pays principle where appropriate. A range of parties may be held potentially responsible for the contamination and remediation of a site. These include the occupier, 'person in charge', owner, mortgagee (in limited cases), and the Crown.

A hierarchy of responsibility for contaminated sites is established in the EMPC Act. The 'polluter' or other person(s) wholly or partly responsible for causing the contamination is the first party sought when issuing an investigation notice or remediation notice under the Act. Importantly, 'polluter' is defined to include a person who has allowed contaminants to be emitted onto their site or has allowed contaminants to escape during their occupancy of the site. If the person considered to be the 'polluter' cannot be located by the Director of the EPA or this person is insolvent, a notice may be served on the current owner of the site.

Orphan sites

There is no specific legislative provision referring to orphan contaminated sites, with the exception of abandoned mines. That is, there is no general contaminated sites fund in Tasmania. The EMPC Act does provide for the circumstance where a person on whom an investigation, remediation or site management notice is to be served cannot be located. In this circumstance, the Director, or his or her agent, is empowered to undertake any work or action as may be required by the relevant notice.

Australian Capital Territory

In the ACT, a range of parties may be held potentially responsible for the contamination and remediation of a site. The *Environment Protection Act 1997* includes provisions for apportioning responsibility for assessment and remediation of contaminated sites, and outlines an administrative process for assessment and remediation. The Act is consistent with the nationally agreed polluter pays principle, meaning that those who contaminate sites should bear the costs of any required assessment or remediation. The EPA may impose liability for contaminated sites by the issuance of assessment and/or remediation orders under the Act

Consistent with the polluter pays principle the Act introduces a concept of an appropriate person to take the responsibility for contaminated sites. The appropriate person(s) is chosen in the following order:

- the person(s) who was responsible for contamination of the land
or, if not practicable:
- a lessee of the land (whether or not the person had any responsibility for such contamination)
or, if not practicable:
- a notional lessee of the land (whether or not the person had any responsibility for such contamination).

It is possible that an appropriate person cannot be chosen because the person(s) cannot be identified or located, or the person(s) does not have adequate resources to remediate the contamination. Where an appropriate person cannot be identified, the ACT Government in the case of Territory land and the Commonwealth Government in the case of national land shall take the necessary action to remediate the site.

Orphan sites

The issue of orphan sites is not specifically addressed in the relevant legislation and, at present, there is no 'superfund' program whereby the ACT government strategically funds clean-ups of contaminated sites. The ACT Government may take on the responsibility for assessing and/or remediating a site where an 'appropriate person' cannot be identified. The Authority may conduct an assessment or remediation itself where there is a significant risk of harm to human health or the environment. Orphan

provisions exist for the recovery of clean-up costs where clean-up is undertaken by the ACT Government under the *Environment Protection Act*. Where it takes action in relation to the assessment and remediation of contaminated sites it may recover the costs of so doing under section 91K of the *Environment Protection Act* (2009).

Northern Territory

In the Northern Territory, liability for pollution and waste is categorised according to the level of environmental harm caused. While levels of environmental harm are categorised, it does not appear to identify who is responsible for assessment and clean-up.

OPTIONS HIERARCHY

National

ANZECC Guidelines (1992)

The guidelines state that the preferred order of options for site clean-up and management are:

- on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
- off-site treatment of excavated soil which, depending on the residual levels of contamination, is then returned to the site, removed to an approved waste disposal site or facility or used as fill for landfill.

Should it not be possible for either of these options to be implemented, then other options that should be considered include:

- removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill
- isolation of the soil by covering with a properly designed barrier
- choosing a less sensitive land use to minimise the need for remedial works which may include partial remediation
- leaving contaminated material in-situ providing there is no immediate danger to the environment or community and the site has appropriate controls in place.

In cases where a limited number of highly localised hot spots are involved, responsible authorities may agree to mixing with clean soil or subsoil to reduce the concentration of contaminants to acceptable levels. However, it should be emphasised that this is not seen as a preferred clean-up strategy.

It should also be emphasised that the appropriateness of any particular option will vary depending on a range of local factors. Acceptance of any specific option or mix of options in any particular set of circumstances is therefore a matter for the responsible authority.

NEPM (1999)

The NEPM (1999) reflects the ANZECC guidelines (1992). The assessment of site contamination should be placed within the context of the broader site assessment and management process. In particular, in assessing the contamination, the site assessor and others should take into account the preferred hierarchy of options for site clean-up and/or management which is outlined as follows:

- if practicable, on-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level
- off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site

or, if the above are not practicable:

- consolidation and isolation of the soil on site by containment with a properly designed barrier
- removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material

or

- where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

In cases where no readily available or economically feasible method is available for remediation, it may be possible to adopt appropriate regulatory controls or develop other forms of remediation.

It should be emphasised that the appropriateness of any particular option will vary depending on a range of local factors. Acceptance of any specific option or mix of options in any particular set of circumstances is therefore a matter for the responsible participating jurisdiction.

New South Wales

The ANZECC guidelines (1992) are followed in NSW (NSW DEC 2006). This means that soil remediation and management is implemented in the following preferred order:

1. on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
2. off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site
3. removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill

4. consolidation and isolation of the soil on site by containment within a properly designed barrier.

If remediation is likely to cause a greater adverse effect than leaving the site undisturbed, remediation should not proceed. In cases where it is not viable to remediate large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

The appropriateness of any particular option will depend on a range of local factors. Where a site auditor supports, in the site audit report, any specific remediation option or options proposed by the consultant, they must clearly justify the reasons for their support in terms of relative advantages, as well as the reasons for the rejection of particular options.

In NSW, remediation options are likely to be site-specific and based upon such factors as the assessed risk, cost and proposed use of the site. Because of the individualised nature of remediation options relative to particular sites, there is little available by way of published literature on remediation criteria other than in the broad sense as outlined in the ANZECC guidelines.

The clean-up objectives for groundwater contamination differ from soil remediation objectives. The *Guidelines for the Assessment and Management of Groundwater Contamination 2007 (NSW)* state that clean-up objectives for contaminated groundwater should be established in the following preferential order:

1. clean-up so natural background water quality is restored
2. clean-up to protect the relevant environmental values of groundwater, and human and ecological health
3. clean-up to the extent practicable.

Victoria

In Victoria the waste hierarchy in the *Environment Protection Act 1970* states that wastes should be managed in accordance with the following order of preference:

- (a) avoidance
- (b) re-use
- (c) re-cycling
- (d) recovery of energy
- (e) treatment
- (f) containment
- (g) disposal.

Any clean-up of pollution of site will reflect the order of preference set out in the waste hierarchy; that is, treatment and re-use on site is preferred to treatment and re-use off

site (provided an equivalent environmental outcome is achieved) and where long-term containment off site is least preferred (EPA VIC 2002).

Where clean-up is required to protect beneficial uses, clean-up will either:

- (a) meet the relevant objectives of Table 2* for the protected beneficial uses
- or
- (b) be determined through a site-specific risk assessment in accordance with the methodology set out in the *National Environment Protection (Assessment of Site Contamination) Measure* or another risk assessment methodology approved by the Authority.

*NB: Table 2 in the SEPP outlines the indicators and objectives for land that determine whether the level of any contaminant at any site poses an unacceptable risk to protected beneficial uses.

Queensland

The Queensland Government has adopted the principles as defined in the ANZECC guidelines. It has therefore endorsed the staged process of assessment and remediation which emphasises the site-specific nature of the management of contaminated sites. The Department of Environment and Resource Management (DERM) has prepared Draft guidelines for the assessment and management of contaminated sites in Queensland (1998), which provides general guidance for practitioners.

The guidelines state that the remediation strategy for contaminated sites follows the process outlined in the *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, which state that the preferred order of options for site clean-up and management are:

- on-site treatment of the soil so that the contaminant is destroyed or the associated hazard is reduced to an acceptable level
- off-site treatment of excavated soil so that the contaminant is destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site.

Should it not be possible to implement either of the above options, other options will have to be considered. Strategies can be implemented to reduce the concentrations of contaminants to acceptable levels without necessarily excavating all affected soil and disposing of it off site at a landfill. DERM actively supports the national target of a 50% reduction in waste going to landfill, and disposal to landfill should be a last resort in the hierarchy of remediation options. (*Draft guidelines for the assessment and management of contaminated sites in Queensland 1998*).

Western Australia

The EPA has produced a publication – *Guidance Statement for Remediation Hierarchy for Contaminated Land. No 17*. This document addresses the remediation hierarchy for

contaminated sites and provides information which the EPA will consider when assessing proposals where contaminated sites are a relevant environmental factor in an assessment. The guidelines state that, to meet the EPA objectives and achieve the desired outcomes, the following principles should be considered and addressed when determining remediation methods or options for the remediation of contaminated sites:

Principle 1

Contaminated material shall preferably be either treated on site and the contaminants reduced to acceptable levels, or be treated off site and returned for re-use after the contaminants have been reduced to acceptable levels.

Principle 2

Disposal of contaminated material to an approved waste disposal facility or landfill or 'cap and contain' management options will only be considered if:

- treatment of the contaminated material is shown or demonstrated not to be practicable
- the options to dispose to landfill or 'cap and contain' are undertaken in an environmentally acceptable manner
- the risk of disturbance of the contaminant exceeds the risk of leaving it undisturbed and contained on site.

South Australia

In South Australia, the EPA has developed guidelines for environmental management of on-site remediation. These note that the primary regulatory requirements in relation to remediation and the environment in SA are the *Environment Protection Act 1993*, Regulations and Environment Protection Policies (EPPs) and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM). In seeking to comply with the Act, those undertaking remediation activities are expected to implement the measures described in this guideline, or be able to demonstrate that any alternative approach achieves an equivalent or higher level of environmental performance (SA EPA 2010, *Guidelines for the site contamination audit system*).

The guidelines note that the appropriateness of any particular remediation option will depend on a range of local factors. They go on to say that in preparing an audit report, where an auditor supports any specific remediation option or options proposed by the consultant, the reasons for the auditor's support must be clearly justified in terms of relative advantages. Where the auditor does not support any specific remediation option or options proposed by the consultant, the reason for the rejection of particular options must also be clearly justified (SA EPA 2010, *Guidelines for the site contamination audit system*).

Because of the individualised nature of remediation options relative to particular sites, there is little available by way of published literature on remediation criteria other than those outlined in the ANZECC guidelines. Until recently, there has been an inclination for developers, consultants and auditors to adopt, as default remediation criteria, the

investigation levels in the NEPM (Assessment of Site Contamination). This approach has encouraged 'dig and dump' as the preferred strategy. However, for a range of economic and environmental reasons, this strategy is becoming less attractive in many cases.

Tasmania

In Tasmania, the *Environmental Management and Pollution Control Act 1994* is the principal vehicle for identifying and managing contaminated sites; however, the Act does not specify remediation requirements, so it is assumed that the remediation options under the NEPM are state policy.

Australian Capital Territory

The Contaminated Sites Environment Protection Policy, the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM), and the ANZECC Guidelines for the Assessment and Management of Contaminated Sites provide the framework for investigation and risk assessment of contaminated sites in the ACT. Due to the complex nature of contaminated sites remediation, remedial actions are developed on a site-specific basis utilising best practice methodology and remedial techniques (*Contaminated Sites Environment Protection Policy 2009*).

The preferred order of options for site remediation and management are:

- on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
- off-site treatment of excavated soils which, depending on the residual levels of contamination in the treated material, is then returned to site, removed to an EPA approved site for beneficial re-use or removed as waste to an EPA approved landfill.

In accordance with the No Waste Strategy there is an established hierarchy for waste management which is - from most preferred to least preferred: (ACT Department for Environment and Sustainable Development 2011, Information sheet 4 – Requirements for the reuse and disposal of contaminated soil):

- avoidance
- reduction
- re-use
- recycling
- recovery
- disposal.

Northern Territory

In the Northern Territory, remediation activities reflect the NEPM (1999) principles and follow the risk-based approach outlined in the ANZECC and NHMRC Guidelines for the assessment and management of contaminated sites (1992).

REQUIREMENT TO REMEDIATE

National

Neither the ANZECC & NH&MRC Guidelines for the Assessment and Management of Contaminated Sites nor the Site Assessment NEPM addresses the requirement to remediate. The responsibility for this rests solely with states and territories or with the Commonwealth for contaminated sites within its own jurisdiction.

New South Wales

In NSW, the *Contaminated Land Management Act 1997* allows the EPA to issue orders and directions to ensure that contaminated sites are identified and, if necessary, remediated.

The EPA has the power to serve a preliminary investigation order where it reasonably suspects that the site is contaminated. The application of the power is not dependent upon a hierarchy of responsible persons: the EPA can select any one on the list of responsible persons. A preliminary investigation order can be served on:

- the person whom the EPA reasonably suspects of causing the contamination
- the land owner
- a notional owner (e.g. a mortgagee in possession)
- a public authority.

If the EPA has reason to believe that contamination is significant enough to warrant regulation under the Act, the EPA can declare the site to be 'significantly contaminated land'. This then enables the EPA to issue a management order directing somebody to carry out management actions on the site (such as remediation work).

The EPA can choose to give the management order to one of the following persons:

- a person who is responsible for the significant contamination of the land
- an owner of the land (whether or not they are responsible for the contamination)
- a notional owner of the land (e.g. mortgagee in possession whether or not they are responsible for the contamination).

Victoria

In Victoria, there is no obligation on the EPA or any other entity under the *Environment Protection Act 1970* to undertake any proactive identification of potentially contaminated sites. Neither are there any provisions under the Act empowering or requiring any authority to seek out potentially contaminated sites. Similarly, no mechanisms are in place for the mandatory reporting of site contamination.

Consequently, no polluter, owner, occupier, land developer or any other entity is required to disclose the existence of site contamination once it has been discovered. The Act, however, does require auditors to report (to the EPA) any imminent environmental hazard that becomes apparent during the environmental audit process.

However, under the *Planning and Environment Act 1987* – Ministerial Direction No. 1 – Potentially Contaminated Land, where changes to land use would allow potentially contaminated land to be used for a sensitive use, agriculture or public open space, a planning authority must satisfy itself that the environmental conditions of that land are or will be suitable for that use. (Government of Victoria 1989, *Planning and Environment Act 1987*, Section 12(2a), Direction Number 1, Potentially Contaminated Land).

The *Environment Protection Act 1970* allows the EPA to issue a works approval, licence or notice with conditions that relate to the assessment and remediation of contaminated sites. Through the issuing of a works approval or licence, the EPA may require the occupier of a site to undertake a site contamination assessment or a statutory environmental audit. As a condition of a clean-up notice, the EPA may order the occupier of a site, or the person who has caused or permitted the pollution to occur, to take clean-up measures, undertake a site contamination assessment or conduct an environmental audit. The EPA may also specify ongoing management. As the majority of contaminated site assessment and remediation occurs through the land-use planning system, formal processes are used normally for problem sites where the public interest warrants intervention by the EPA.

Queensland

There is no obligation on the Department of Environment and Resource Management (DERM) to actively or pro-actively identify contaminated sites in the State. Owners or occupiers of land and local governments who become aware that land has been or is currently being used for a 'notifiable activity' (specified industrial activities as described in the Environmental Protection Act) or is contaminated must notify DERM. When the Chief Executive of DERM believes that land is or has been used for a 'notifiable activity' or is contaminated he/she will enter it on the Environmental Management Register (EMR). Only if land is on the EMR may DERM issue a notice to a person to undertake a site investigation.

The Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (Draft Guidelines) state that where land has been investigated and the administering authority (DERM) is satisfied that action needs to be taken to remediate the land to prevent serious environmental harm, the land is recorded on the

Contaminated Land Register (CLR). Sites recorded on the EMR or CLR will require an investigation and, possibly, remediation when a development application is made for a change of material use or reconfiguring a lot. Risk sites are likely to be subject to remediation notices issued under the Environmental Protection Act. Landowners are usually responsible for the investigation of their land for contamination and remediation (Qld Department of Environment 1998, Draft guidelines for the assessment and management of contaminated sites in Queensland).

Where the particulars of land are recorded on the EMR or CLR, the DERM may require the following persons to remediate the land and submit a validation report:

- the person who contaminated the land
- the relevant local government

or

- the owner of the land.

DERM may require a local government to remediate land only in the following circumstances:

- the land was contaminated because the local government gave an unlawful approval for the contaminating use and should have known that the approval would have resulted in land contamination

or

- the land was recorded under the previous Contaminated Land Act as a 'restricted site' and after the recording the local government gave approval for the land use contrary to the restriction

or

- particulars of the land were recorded in the registers under either the previous Act or the Environmental Protection Act, the local government subsequently approved a land use inconsistent with the particulars recorded, and the use resulted in damage to human health or the environment.

There are no statutory criteria for determining when DERM will require remediation of a contaminated site although any such decision must be based on the submitted site investigation report. The draft guidelines are also not specific as to the criteria to be used by DERM when determining whether land listed on the CLR should be subject to remediation.

Under the Environmental Protection Act, DERM can issue a notice to investigate land if, after a preliminary investigation, the land is recorded on the EMR because it is contaminated and the hazardous contaminant is in a concentration that has the potential to cause serious or material environmental harm.

DERM can also issue a notice to remediate contaminated sites if it is recorded on the CLR and the administering authority is satisfied that the contamination must be

managed to remediate the site and prevent serious environmental harm. Where a site investigation has been conducted and the site is found to be contaminated and is recorded on the EMR or CLR, the DERM can issue a notice to prepare a draft site management plan (Qld Department of Environment 1998, Draft guidelines for the assessment and management of contaminated sites in Queensland).

Western Australia

In Western Australia, the *Contaminated Sites Act 2003* establishes a system for the reporting and classification of known or suspected contaminated sites. The Act establishes a hierarchy of responsibility for remediation of sites. Investigation of such sites can occur voluntarily or through the issuing of various notices by the CEO of the Department of Environment and Conservation (DEC). Western Australia differs from other jurisdictions in that the CEO of DEC may 'sign off' on the contamination status of the site through the issuing of a 'certificate of contamination audit'. The State will accept responsibility for remediation where it fails to identify contamination in specific circumstances or fails to assign the appropriate 'warning' classification.

The Contaminated Sites Act imposes no obligation on state agencies or local government to undertake any proactive identification of suspected or potentially contaminated sites. However, the CEO of DEC may approve a program for the identification and reporting of sites described in the program. The Act establishes a Contaminated Sites Committee to decide who is responsible for remediating particular contaminated sites, consider disclosure statements submitted by landowners seeking exemption from responsibility for remediation, and determine appeals against certain decisions made by the CEO of DEC. Remediation occurs through the preparation of a Site Management Plan which includes the proposed remediation method and criteria by which remediation and monitoring can be assessed through a site validation process.

The Act places a duty upon the following people who know or suspect that a site is contaminated to report that site to DEC:

- an owner or occupier of the site
- a person who knows, or suspects, that he or she has caused, or contributed to, the contamination
- a contaminated sites auditor engaged to provide a report that is required for the purposes of the Act in respect of the site.

The Act requires DEC to classify sites reported to it, based on the risk the sites pose to human health and the environment. The only sites that are required to be remediated under the Act are sites classified as 'contaminated – remediation required' (*Government of WA, Contaminated Sites Act, 2003*).

The Contaminated Sites Act provides for the issuing of a notice, in writing, to persons deemed responsible for the remediation of a contaminated site. A notice includes a clean-up notice, a hazard abatement notice, and an investigation notice.

South Australia

The *Environment Protection Act 1993* makes no specific provision for the proactive identification of contaminated sites by either the EPA or any other government agency in SA. The owners and occupiers of contaminated sites and auditors and consultants commissioned to assess such sites have a duty to notify the EPA as soon as is practicable after becoming aware of site contamination that affects or threatens underground water. Sites will also be identified through the development approvals process where re-zoning or development applications involve contaminated sites.

The Environment Protection Act gives the EPA the power to issue a site contamination assessment order (SCAO) or a site remediation order (SRO), requiring the person who caused site contamination or, in specified circumstances, the owner of the contaminated site, to undertake assessment and/or remediation of the site. A SCAO may be issued to an 'appropriate person' where the Authority is satisfied that site contamination exists at a site or suspects that it exists because a potentially contaminating activity of a type prescribed by regulation has occurred there.

Tasmania

The *Environmental Management and Pollution Control Act 1994*, (EMPC Act) does not impose an obligation on either the EPA or local government to proactively identify contaminated sites. The Act does however impose a duty on those who contaminate sites and on owners of land who are aware (or should be aware) that their land is contaminated to notify the EPA. Notices may be issued under the Act where the EPA considers a site to be contaminated in such a manner as to present a serious or material risk of harm to human health or the environment.

Owners or occupiers of land who believe, or should reasonably believe, it is contaminated must notify the Director of the EPA of the details of the suspected pollutant and the circumstances surrounding its release within 24 hours after becoming aware, or first reasonably believed, or should reasonably have believed, that the land is a contaminated site

Australian Capital Territory

In the ACT, the *Environment Protection Act 1997* provides regulatory control over contaminated sites reflective of the risk to the environment and human health arising from that site. Importantly, the enforcement provisions under the Environment Protection Act have not been used in the ACT. Rather, site contamination is often dealt with on a voluntary basis through the development application process. The ACT Government may take on the responsibility for assessing and/or remediating a site where an 'appropriate person' cannot be identified. The EPA may conduct an assessment or remediation itself where there is a significant risk of harm to human health or the environment.

Under the Environment Protection Act, the EPA may order an appropriate person to remediate site contamination (where it is determined to present a significant risk of

harm to human health or serious environmental harm) or it may conduct the remediation itself.

The Environment Protection Policy (Contaminated Sites) indicates that where a person responsible for contamination cannot be identified, the ACT Government in the case of Territory land, and the Commonwealth government in the case of Commonwealth land, will undertake the necessary action to remediate the site.

Northern Territory

In the Northern Territory, the *Waste Management and Pollution Control Act 1998* requires that the responsible agency (the Department of Natural Resources, Environment, the Arts and Sport (DRETAS)) maintain the Waste Management and Pollution Control Register. This contains a list of all current environmental approvals and licences (and waste discharge licences granted under the Water Act) (Environmental Defenders Office NT). The register holds:

- a. plans for environmental management provided to the Administering Agency in accordance with a condition of an environment protection approval or a licence granted under the Act
- b. compliance plans
- c. pollution abatement notices, and
- d. incidents of which the Administering Agency is notified under section 14 of the Act.

The *Waste Management and Pollution Control Act 1998* also enables the CEO of DRETAS to issue a pollution abatement notice to a person who he or she believes on reasonable grounds has committed or may commit an offence, has contravened or failed to comply with the Act, or who is the owner or occupier of land that is polluted (Environmental Defenders Office NT).

A pollution abatement notice may require a person, within a specified time:

- a. to take remedial action to return polluted land as far as possible to a specified condition that the Minister thinks appropriate for the protection of the environment or the use of the land.

