

Contaminated Land Management

Guidelines for the NSW Site Auditor Scheme
(3rd edition)

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Preface

Industrial, agricultural and other commercial activities can sometimes result in the discharge of chemicals to the environment which accumulate in soil, sediments, groundwater, surface water or air. Some of these chemicals can remain in the environment for a long time. In some places they are present at levels that can have an adverse impact on human health or the environment and impede the productive use of land or water.

Planning consent authorities need information about a site's known or suspected history of potentially contaminating activities to be able to decide whether the land is suitable for an alternative use, such as residential or commercial development. They must be sure that any risks posed by any chemicals in the environment are acceptable and the land is suitable for its proposed use. In some cases the land and its immediate environment may have to be remediated or managed to make it suitable.

The assessment and remediation of contaminated sites, usually conducted by contaminated site consultants, is technically difficult because of the complex behaviour of chemicals in the environment and their effects on ecosystems and human health. Obtaining dependable information for making reliable decisions can be difficult. It is therefore important that consent authorities and developers have access to advice from appropriately qualified and experienced people in making their land-use planning and development decisions.

To improve access to competent technical advice and increase certainty in the assessment and remediation of contaminated sites, the NSW Government introduced the NSW Site Auditor Scheme in 1998.

Under the scheme, the management of contaminated sites involves both contaminated site consultants and accredited site auditors. Contaminated site consultants, typically engaged by the site owner or developer, conduct site assessments, undertake any necessary remediation and validate the work. Accredited site auditors independently review these consultant activities to ensure the work complies with current regulations and guidelines and meets the standard appropriate for the proposed land use. It is highly desirable that a site auditor is engaged as early in the assessment and remediation process as possible, as early communication between parties to the project improves the efficiency of the audit, usually reflected in timeliness and cost savings.

These guidelines, *Contaminated Land Management – Guidelines for the NSW Site Auditor Scheme*, apply to individuals seeking to be accredited as site auditors in New South Wales and to those already accredited. They may also be of use to other people with an interest in contaminated sites, such as contaminated site consultants and local authorities, as guidance on what is expected of site auditors they may engage or whose work they may assess.

These guidelines consist of four sections:

1. Introduction to the NSW Site Auditor Scheme
2. Accreditation and renewal of accreditation
3. Conducting site audits
4. Contamination assessment, remediation and management.

Appendices provide additional technical and administrative information relating to the scheme.

These guidelines have been made in accordance with the *Contaminated Land Management Act 1997* (CLM Act). They should be read in conjunction with the CLM Act, the Contaminated Land

Management Regulation 2013 (CLM Regulation) and any guidelines made or approved by the NSW Environment Protection Authority (EPA) under the CLM Act.

The guidelines were first published in 1998 and have been updated to reflect changes in legislation and technical guidance, comments about the guidelines received by the EPA and the experience gained by the EPA through administering the scheme. These guidelines revoke the April 2006 edition of the Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition).

1 Introduction to the NSW Site Auditor Scheme

1.1 Objectives

The objectives of the NSW Site Auditor Scheme are to:

- ensure that public health and the environment are protected through proper management of contaminated sites, particularly during changes of land use
- improve access to technical advice on contaminated sites for planning consent authorities and the community by establishing a pool of accredited site auditors
- provide greater certainty for planning consent authorities and the community through the independent review by those auditors of contaminated site assessment¹ and remediation reports, and reports that validate the successful completion of the assessment or remediation.

1.2 Background

In Australia, the use of accredited auditors to review work conducted by contaminated site consultants² was first introduced in Victoria in 1989 through the Victorian EPA's Environmental Auditor (Contaminated Land) Scheme.

In 1998, New South Wales commenced its own Site Auditor Scheme under the CLM Act. The scheme is administered by the EPA.

The CLM Act empowers the EPA to accredit individuals as site auditors³ and to establish guidelines for them.

The CLM Regulation specifies some of the procedural requirements of the scheme.

A list of site auditors accredited under the CLM Act is available from [Accredited site auditors: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme/accredited-site-auditors](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme/accredited-site-auditors) or by phoning Environment Line on 131 555 (within New South Wales) or (02) 9995 5000.

1.3 Site audits in relation to contaminated sites

Site auditors review the work of contaminated site consultants. The CLM Act calls these reviews '**site audits**' and defines a site audit as a review:

- a) that relates to management⁴ (whether under the CLM Act or otherwise) of the actual or possible contamination of land⁵ and

¹ In these guidelines 'assessment' includes the investigation of a site and drawing conclusions about the contamination of a site in light of that investigation.

² Within the context of these guidelines, 'contaminated site consultants' means individuals or corporations engaged to carry out the assessment, remediation, management and validation of contaminated sites.

³ Within the context of these guidelines, a 'site auditor' means any individual accredited as a site auditor under Part 4 of the CLM Act.

⁴ Management of land or of contamination of land means management in relation to the actual or possible contamination of the land, including investigation into the existence, nature and extent of contamination of the land and remediation of contaminated land.

⁵ The CLM Act defines 'land' to include 'water on or below the surface of land and the bed of such water'.

- b) that is conducted for the purpose of determining any one or more of the following matters:
- i) the nature and extent of any contamination of the land
 - ii) the nature and extent of any management of actual or possible contamination of the land
 - iii) whether the land is suitable for any particular use or range of uses
 - iv) what management remains necessary before the land is suitable for any particular use or range of uses
 - v) the suitability and appropriateness of a plan of management, long-term management plan, or a voluntary management proposal.

The main products of a site audit are a 'site audit statement' and a 'site audit report'.

A **site audit statement** is the written opinion by a site auditor, on an EPA-approved form, of the essential findings of a site audit. It includes, where relevant, the site auditor's conclusions regarding the suitability of the site for its current or proposed use. The current approved site audit statement form can be found on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme).

Before issuing a site audit statement, the site auditor must prepare and finalise a detailed **site audit report**. The report must be clearly expressed and presented and contain the information, discussion and rationale that support the conclusions in the site audit statement.

In some circumstances a site audit is required by law. These audits are known as '**statutory site audits**' and may be carried out only by site auditors accredited under the CLM Act. A statutory site audit is one that is required by:

- a regulatory instrument issued under the CLM Act, including approvals issued by the EPA to voluntary management proposals
- the *Environmental Planning and Assessment Act 1979*, including an environmental planning instrument or development consent condition
- any other Act.

The requirements that site auditors must follow in conducting site audits and preparing site audit statements and site audit reports are outlined in Sections 2 to 4 of these guidelines.

1.4 Role of site auditors

The services of a site auditor can be used by anyone who needs an independent and authoritative review of information relating to possible or actual contamination of a site. The review may involve independent expert technical advice or 'sign-off' of contaminated site assessment, remediation or validation work conducted by a contaminated site consultant.

It is imperative that a site auditor is engaged as early in the site assessment and remediation process as possible. Early communication between the landowner or developer, consultant and site auditor improves the efficiency of the audit process by ensuring all environmental issues have been addressed to the satisfaction of the auditor, in an appropriate manner and in accordance with guidelines made or approved by the EPA.

However, as outlined in greater detail later in these guidelines, it is very important that an auditor's involvement is not such that their review is effectively a review of their own work as this would compromise the independence and objectivity of the audit.

1.5 Site assessment and audit process

The usual stages in the assessment, remediation and validation of a contaminated site, and in the audit of those activities, are as follows:

1. Consultant is commissioned to assess contamination

In most cases, a site owner or developer engages a contaminated site consultant to assess a site for contamination and, where required, to develop a remediation plan, implement the plan and validate the remediation.

The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer.

Before undertaking their work, consultants should refer to [Statutory guidelines: www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines](http://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines) and other relevant guidelines made or approved by the EPA. *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011) provides a brief description of the various stages of contaminated site assessment, remediation and validation, and lists information that should be included in consultants' reports.

2. Site auditor reviews the consultant's work

The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Where the planning consent authority or the EPA uses its legal powers to require the carrying out of a site audit, the site owner or developer must commission a site auditor accredited under the CLM Act to perform this task. This is known as a 'statutory' audit. The CLM Act requires that an auditor must notify the EPA when they have been commissioned by anyone other than the EPA to perform a statutory site audit. The auditor is also required to furnish the local authority and the EPA with a copy of the completed site audit statement and must give a copy of the site audit report to the local authority, the consent authority if different to the local authority and/or the EPA on request.

In some cases, the site owner or developer may wish to have a site audit undertaken although it is not a legal requirement. The audit is termed 'non-statutory'. If their intention is to obtain a site audit statement, they must commission a site auditor accredited under the CLM Act to perform this task. This is because only a site auditor so accredited can issue a site audit statement, and they are obliged to issue one at the end of any site audit. For non-statutory audits, the site auditor must give a copy of the site audit report to the EPA on request.

As required by the CLM Act, the EPA maintains a record of all statutory site audit statements issued in relation to land that is the subject of a regulatory instrument under the CLM Act. Copies are available for public inspection on the [Contaminated land – record of notices: app.epa.nsw.gov.au/prclmapp/aboutregister.aspx](http://app.epa.nsw.gov.au/prclmapp/aboutregister.aspx) on the EPA website. If the local authority receives a copy of a site audit statement, it must list the statement on any certificate it issues under section 149 of the Environmental Planning and Assessment Act in relation to the land concerned.

Section 3.2 outlines the site audit process in greater detail.

1.6 Role of the EPA

The EPA is responsible for:

- establishing selection criteria and processes for accrediting competent individuals as site auditors and renewing their accreditation
- developing regulations relating to site auditors
- developing guidelines for site auditors, contaminated site consultants, local government and the community on the investigation and remediation of contaminated sites
- conducting reviews of the performance of site auditors to ensure that the required standards are maintained, and taking any necessary disciplinary action.

The EPA also works with the Department of Planning and Environment in the development of land-use planning guidelines relating to contaminated sites.

1.7 Using these guidelines

In doing audit work, including the preparation and issuing of site audit statements and site audit reports, accredited site auditors must comply with the mandatory aspects of these guidelines. The mandatory aspects are indicated throughout the guidelines as something that the auditor '**must**' do or refrain from doing. Site auditors must also be able to demonstrate to the EPA's satisfaction, if required, that they have complied with these aspects. This applies to any site audit undertaken by a site auditor, whether it is a statutory or non-statutory audit.

Aspects of the guidelines that are recommendations to site auditors and not mandatory are indicated in the guidelines as something that the auditors '**should**' do or refrain from doing. Site auditors are expected to exercise their professional judgement in these areas and clearly document in the site audit report the reasoning that supports their conclusions.

2 Accreditation and renewal of accreditation

This section outlines the requirements that individuals must satisfy before they can be accredited as site auditors or have their accreditation renewed under the CLM Act. It also outlines some of the quality control mechanisms that are used by the EPA to maintain the integrity of the scheme.

2.1 Application process

There are two ways to apply for accreditation as a NSW site auditor. Applications can be made under the:

- NSW CLM Act, or
- Commonwealth *Mutual Recognition Act 1992*.

The EPA does not set a limit on the number of site auditors who can be accredited under the NSW Site Auditor Scheme at any one time.

Only individuals can be accredited as site auditors; a body corporate cannot.

Special arrangements apply where an application is made under the Mutual Recognition Act: see Appendix B. The following sections deal with applications under the CLM Act.

2.1.1 Submitting an application for accreditation

The EPA anticipates inviting applications for accreditation under the CLM Act at least once every three years.

Applications must be made on the form available from the EPA, received by the EPA as per the instructions provided on the application form, with payment of the application fee, before the advertised deadline. Applicants must prepare their own application and late applications will not be considered.

The application requirements are based on Schedule B9 of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 2013) (the 'NEPM') and the requirements will be specified in the application form available from the EPA. An example application form is available on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme).

Applications will be accepted for consideration by the EPA if they include:

- a) the application requirements specified in the form available from the EPA
- b) confirmation of payment of the application fee.

The prescribed application fee is specified on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme) and is adjusted on 1 September each year in line with the change in the Public Sector Wage Price Index. The application fee and payment instructions will be provided on the application form.

The EPA may seek further information from the applicant, refuse to consider an application or postpone consideration of an application if it considers any of the statements or information in the application to be unsatisfactory, materially false, misleading or incomplete.

2.1.2 Selection criteria

The EPA may refuse an application for accreditation if, in its opinion, the applicant does not satisfy the requirements in these guidelines on eligibility for accreditation or for any other reason it considers sufficient. Accreditation can also be refused if within the two years preceding the application the EPA revoked or refused to renew the applicant's accreditation as a site auditor.

The EPA will consider the recommendations of the accreditation panel (see Section 2.1.4 below) in deciding whether to grant accreditation.

To be eligible for accreditation the applicant must demonstrate, to the EPA's satisfaction, in their application and any associated examination and interview, that they have:

- a) met the assessment criteria specified on the application form
- b) access to an insurance policy for professional liability that will cover their site audit work (minimum \$5 million) (see Section 2.8)
- c) proven high standards of integrity and objectivity – successful applicants will be required to complete a declaration to this effect before they receive accreditation. The declaration form is available on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme).

2.1.3 Assessment of applicants

The EPA will publish on its website the procedure in which applicants will be assessed when the call for applicants is advertised.

2.1.4 Accreditation panel

The accreditation panel advises the EPA on the suitability of applicants for accreditation. The panel is appointed by the EPA and has at least four members:

- an EPA officer who chairs the panel
- a representative of community environmental groups appointed on the nomination of the Nature Conservation Council of NSW
- a representative of industry
- a representative of academia with tertiary qualifications in a discipline relevant to contaminated sites.

The EPA may also appoint additional technical or policy experts to the accreditation panel. Panel members hold office for a period not exceeding five years but are eligible for re-appointment.

2.1.5 Period of accreditation

Applicants granted accreditation are entitled to practise as an accredited auditor for the term specified in the notice of their accreditation. The CLM Act allows the EPA to grant accreditation to auditors for any period up to three years. Newly appointed auditors are generally accredited for an initial period of one year.

2.2 Accreditation conditions

The EPA may attach conditions to a site auditor's accreditation. Auditors must comply with all conditions of their accreditation. Failure to do so is grounds for their accreditation to be suspended, revoked or not renewed.

2.3 Renewal of accreditation

A site auditor's accreditation is not automatically renewed at the end of their accreditation term. Auditors must formally request renewal of their accreditation by applying in writing to the EPA 30–60 days before the expiry of their current term of accreditation. Applications not received within this period will not be accepted and the auditor's accreditation will automatically expire when their accreditation term ends. In this case, a new accreditation application would need to be submitted when applications are next called for. Applications to renew a site auditor's accreditation must include a completed and signed auditor's declaration. The CLM Act sets out the grounds on which the EPA may refuse to renew a site auditor's accreditation.

The EPA's decision on a renewal application, including the period of any renewal, will be based principally on the results of its review of the auditor's work (see Section 2.9.2). The EPA will consider whether it is satisfied with the standard of the work and whether in that work the auditor has met the requirements outlined in Sections 3 and 4 of these guidelines. The EPA may also have regard to any matter that it considers relevant to the auditor's suitability for accreditation, which may extend, for example, to the auditor's conduct in carrying out other relevant professional services such as first-tier work (see Section 3.2.1) as a contaminated land consultant.

If the EPA decides to renew the auditor's accreditation, the auditor must pay the accreditation fee (see Section 2.6). The auditor must also submit to the EPA a copy of a current insurance certificate with a statement that the cover is sufficient to meet the EPA's requirements (as outlined in Section 2.8). The insurance certificate must state the insured name (the auditor's name not their employer) and that they are covered for their audit work under the CLM Act. The policy must cover their site audit work and their period of accreditation, however where the period of accreditation is to be greater than one year, the EPA will still consider an auditor's insurance policy on an annual basis.

Auditors will generally be given accreditation periods of longer than one year only if they satisfy the EPA that they have maintained an acceptable quality of work for no less than the previous three years and have conducted enough site audits during those years to demonstrate they have maintained their understanding of relevant technical and policy issues. In determining what is a sufficient number of audits the EPA will consider the scale, scope and complexity of the audits undertaken in the period under review.

2.4 Continuous professional development

Site auditors must undertake a minimum of 50 hours of continuous professional development (CPD) per calendar year. Site auditors must maintain a log of CPD activities undertaken and a site auditor must make available a copy of their CPD log to the EPA on request. Appendix C provides details of the activities eligible for CPD.

If the EPA requests an auditor to provide a log of the CPD they have undertaken, the following information must be supplied:

- the CPD activities undertaken

- which competency and areas identified in s.6.1 of Schedule B9 of the NEPM the CPD activities undertaken are relevant to
- the hours claimed
- the date the CPD activity was completed
- the learning outcome from the CPD activity undertaken
- details of the provider involved (if relevant)
- verification of participation in CPD activities, such as certificates of attendance or attainment, minutes of meetings, attendance records, diary records and/or a personal declaration.

2.5 Changes in site auditors' circumstances

Site auditors must notify the EPA within 14 days of any material changes in the circumstances of their employment, and of any other changes that could affect their eligibility for accreditation or their capacity to do site audits.

Such changes include:

- a change of employer
- a change in their insurance
- the commencement of legal or disciplinary proceedings against the site auditor in their capacity as a site auditor, a third party reviewer or an environmental consultant in New South Wales or any other jurisdiction.

As site auditors are accredited as individuals, a change of employer will not automatically affect an auditor's ongoing suitability to remain accredited. However if, for example, an auditor's expert support team is no longer available because the team members are staff of the auditor's previous employer, the auditor would need to ensure they had an appropriate new expert support team.

2.6 Accreditation fee

Site auditor accreditation is subject to payment of the correct accreditation fee. The fee is prescribed in the CLM Regulation. The fee is adjusted on 1 September each year by the change in the Public Sector Wage Price Index. The current fees are published on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme).

The fee for the full period of accreditation is to be paid within 30 days of the date of the invoice to the auditor for their accreditation fees or as specified in the accreditation notice. The fee is non-refundable.

2.7 Support team

Site auditors must have access to a support team with expertise in any of the following areas in which the auditor is not expert:

- air quality (volatile emissions and dust) assessment relating to contamination
- assessment of impacts on groundwater from contaminated sites
- contaminant fate and transport

- environmental chemistry
- environmental sampling
- environmental toxicology
- geology
- human health and ecological risk assessment relating to contamination
- human toxicology
- hydrogeology
- identification of contaminants of concern from past industrial land uses
- work health and safety relating to contamination
- remediation technologies and geo-technology
- soil science
- statutory and environmental planning.

Australian-based resources are preferred. Auditors are to ensure that individuals nominated as support team members:

- are able to demonstrate a high level expertise or knowledge in the competencies where the site auditor does not personally possess such expertise or knowledge to the level required
- have a thorough knowledge of relevant Australian guidelines and policies
- hold qualifications relevant to and supporting the nominated competencies
- have at least eight years' relevant experience
- are actively working in the field of the nominated competencies
- are a current member of professional organisations/associations relevant to the field of the nominated competencies
- are able to demonstrate an ongoing commitment to professional training and development.

Detailed curriculum vitae for all support team members, both external and internal, must be provided to the EPA with a consent letter from suppliers of external resources. Site auditors must notify the EPA within 14 days of any changes in the details of an auditor's support team. Auditors must allocate each of their support team to one or more of the specific areas of expertise listed above.

If an auditor nominates themselves as an expert in one or more of the specific areas of expertise, the support team member criteria specified above applies to the site auditor.

2.8 Insurance

Site auditors must satisfy themselves as to the level and duration of insurance cover that will be adequate in respect of any liability or claims for damages for professional negligence on their part arising out of site auditing activities under the CLM Act. Policies must not contain any exclusion that may have the effect of limiting cover for audit work carried out.

Insurance cover must not be for less than \$5 million with provision for reinstatement.

The insurance policy may be written on either an occurrence basis or a claims-made basis. However, for insurance written on a claims-made basis the EPA would expect:

- the policy to have unlimited retroactivity
- the cover to be maintained in respect of the site auditor for a minimum of seven years after the site auditor ceases to be accredited, however auditors should obtain professional advice to determine if a longer period of run-off cover is appropriate for their circumstances.

It is the auditor's responsibility to ensure their insurance coverage meets the requirements of the CLM Act and these guidelines.

Applicants for accreditation must satisfy the EPA they will have insurance coverage which meets the requirements of the CLM Act and these guidelines.

2.9 Site Auditor Scheme compliance

The EPA monitors the activities and reviews the work of site auditors on an ongoing basis to ensure the standard of their performance is acceptable. Such routine monitoring will include reviewing site audit reports and site audit statements, examination of records held at auditor offices, discussions with auditors on audits in progress, and internal consultation.

Where it is considered an auditor's performance is unacceptable, the EPA may take action under the CLM Act to require improvement in particular areas of an auditor's work. This section sets out the procedures that the EPA will generally follow when, after reviewing the performance of a site auditor, it considers the auditor's performance is unacceptable. It may depart from these procedures in particular cases where it is appropriate to do so. In such cases, the EPA will notify the site auditor involved of changes to the procedures.

Factors which may lead the EPA to consider that a special review of an auditor's performance is warranted would include where it considers the legislation may have been breached, where the auditor is believed to have failed to adhere to guidelines, where there are perceptions of conflicts of interest, or where the EPA has received complaints about an auditor's work.

2.9.1 Review of site auditor's work and assessment of auditor understanding

When the EPA is to specially review a site auditor's work after forming a view that the auditor's performance is not acceptable, the auditor will generally be notified in advance and told the nature of the review.

As part of the review, the EPA will check whether the auditor has complied with the requirements for site auditors, including those described in Sections 3 and 4 of these guidelines.

In carrying out a review, or at any other time, the EPA may use its powers under the CLM Act to:

- examine documents within the site auditor's files
- require the site auditor to provide a written explanation or other supporting evidence to justify the auditor's decisions and conclusions in a site audit
- request the site auditor to meet with EPA officers to discuss the conduct of the audit and the basis for the auditor's decisions and conclusions
- conduct an investigation (including collecting samples at a site and inspecting records, site conditions, and/or equipment) in relation to a site or a site audit
- make enquiries of administrators of site audit schemes operating elsewhere in Australia about an auditor's work under those schemes

- refer work done by the auditor to appropriate experts for independent review
- take any other action it deems necessary to determine the standard of the auditor's performance.

The EPA may also refer site audit reports and statements to members of the accreditation panel for their information or review or to other experts if appropriate.

Where the EPA has concerns about whether an auditor has:

- a high level of expertise in the technical competencies identified in s.6.1 of Schedule B9 of the NEPM; and/or
- a good knowledge of NSW legislation relating to contaminated sites and environment protection in general; and/or
- a good understanding of guidelines made or approved by the EPA under s.105 of the CLM Act

the EPA may require an auditor to undertake an examination or interview, or provide a statement of understanding to demonstrate their expertise, knowledge and/or understanding.

The EPA will provide feedback to the site auditor on the review of their work and/or their assessment of understanding to assist them to address any areas of concern and/or clarify the EPA's expectations of the auditor.

2.9.2 Complaints and their resolution

If the EPA receives a complaint about a site auditor's work, it may choose to review that work.

The EPA will first write to the site auditor with details of the complainant's concerns and requesting the auditor to provide a written response. If the response and the outcome of any review undertaken are acceptable to the EPA, no further action will be taken. If they are not, the EPA will determine the action needed to address the complainant's concerns.

In all cases, the EPA will notify both the site auditor and the complainant in writing of its decision in relation to the complaint.

2.9.3 Disciplinary measures

Where a problem with an auditor's work is identified or an auditor's understanding is found to be unsatisfactory, the EPA will advise the auditor of the problem and attempt to identify why it is occurring. It will also seek feedback from the auditor on how they intend to address the problem.

Where necessary, disciplinary action may be taken. This may include:

- placing conditions on the auditor's accreditation (see Section 2.2)
- issuing directions to the auditor
- suspending or revoking the auditor's accreditation
- not renewing the auditor's accreditation or renewing it for a shorter period than previously.

The nature of any disciplinary action will depend on the severity or significance of the issue identified and the auditor's previous performance.

2.9.4 Directions to an auditor

The EPA may at any time issue directions to an auditor under the CLM Act, stating particular requirements with which the auditor must comply in conducting their site audit work.

The EPA's intent in issuing these directions will generally be to focus the auditor on improving specific areas of their site audit work.

Auditors must comply with all directions issued to them under the CLM Act. Failure to do so is grounds for suspension, revocation or non-renewal of their accreditation.

2.9.5 Suspension, revocation or non-renewal of accreditation

The grounds for suspension, revocation or non-renewal of an auditor's accreditation are set out in the CLM Act.

Where the EPA proposes to take such action, it will give the auditor notice in writing and invite them to make a written submission on why this action should not be taken within a reasonable specified time (usually 14 days).

On occasion, it will be appropriate to suspend an auditor while the EPA investigates performance issues.

3 Conducting site audits

This section outlines requirements that site auditors must comply with in undertaking site audits. In assessing auditor performance, the EPA will examine whether an auditor has complied with these mandatory aspects as well as how the auditor has addressed the non-mandatory aspects.

This section also provides guidance to assist other interested parties understand the site audit process.

3.1 Obligations of site auditors

In conducting their work, site auditors owe a primary duty of care to the environment and the health, safety and welfare of the people of New South Wales.

When carrying out their site audits, including the preparation of site audit reports and statements, site auditors must:

- maintain a high professional standard
- exercise their professional and independent judgement, applying their knowledge and skill appropriately to each audit they undertake
- be objective
- conduct the audits at arm's length from any person who engaged them to do the audit and whose work they are reviewing in the audit
- act with due care and diligence.

At the outset of an audit commission, the auditor should make themselves aware of the circumstances which triggered the need for an audit. The auditor should also ensure the client is aware of what the site audit process entails.

The site auditor must check that all relevant legal requirements applicable to the site assessment, remediation and validation work have been complied with and are considered in the site audit. Examples of the principal requirements are set out in Appendix D, although this list is not exhaustive. All cases of apparent non-compliance (or deficiencies of information) should be reported and discussed in the site audit report.

The site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

- a) comply with applicable provisions of the CLM Act, regulations, environmental planning instruments, and any guidelines made or approved by the EPA under the CLM Act
- b) not have a conflict of interest in relation to the audit as defined by the CLM Act
- c) where these guidelines allow an auditor to adopt or endorse an approach that differs from policies made or approved by the EPA, exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for taking this course
- d) finalise the site audit report before signing the site audit statement
- e) provide in the site audit report a clear, logical discussion of issues covered in the site audit and clearly substantiate the rationale for the auditor's conclusions

- f) discuss in the site audit report all issues pertinent to the actual or potential contamination of the site and all issues required by these guidelines to be raised during a site audit
- g) state clearly why any human health and environmental issues that would normally be of concern are not of concern in the case of this audit
- h) make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit
- i) obtain advice from the appropriate expert support team members on issues that are outside the auditor's professional education, training or experience, and document in the site audit report where and from whom advice has been obtained
- j) exercise independent and professional judgement in deciding whether or not they have sufficient information to make a decision about the suitability of a site or a plan or to draw any other conclusion in relation to actual or potential contamination of a site in the course of a site audit, with justification for conclusions to be given in the site audit report
- k) make reasonable endeavours to find out whether any other audits have been commissioned in relation to the site and, if so, whether any of them were prematurely ceased and why
- l) state in the audit report the scope and findings of any previous audits
- m) in cases where the audit involves a review of site assessment, remediation or management work, visit the site to observe and verify, as far as is practicable, the completion of this work.

3.2 Site audit process

3.2.1 Stages in site assessment and remediation

A site audit is the second in two tiers of work in the site assessment and remediation process.

The **'first tier' is the work of a contaminated site consultant**, generally engaged by the site owner or developer. The contaminated site consultant designs and conducts a site assessment and any necessary remediation and validation, and documents the processes and information in reports.

The **'second tier' is the site audit** which involves a site auditor independently and at arm's length reviewing, for one of the audit purposes stated in the CLM Act, the consultant's assessment, remediation, validation and management plans or reports. The material outcomes of a site audit are a site audit report and site audit statement.

3.2.2 Independence

The integrity and rigour of the NSW Site Auditor Scheme depends on the auditor's critique of site assessment, remediation, validation and management work being carried out at arm's length from the people who did the work.

A site auditor must be able to demonstrate that in conducting their audits they have exercised their own professional judgement and that the opinions they express in the audit documentation have been reached independently. The auditor must be able to satisfy the EPA that in forming those opinions they have not been unduly influenced by the views or actions of others, particularly those who may have an interest in the outcome of the audit.

To help ensure that an audit is conducted at arm's length, the auditor should not be engaged by the consultant whose work is to be reviewed. Such an engagement is one that might reasonably be seen to give rise to a conflict between the site auditor's duties as a site auditor and their interests under the engagement. As per the definition on page 1, in the context of these guidelines, 'contaminated site consultants' means individuals or corporations engaged to carry out the assessment, remediation, validation and management of contaminated sites.

Auditors must not audit first-tier work if they have been involved in any aspect of that work because they would not have the necessary independence from this work.

A peer review undertaken by a consultant in their capacity as an accredited site auditor cannot be changed into something other than a site audit by such expedients as not issuing a site audit statement, issuing a disclaimer to the effect that 'this is not a site audit', or not complying with provisions about site audits in the CLM Act or these guidelines.

A consultant who is an accredited site auditor must not do a peer review of work in their capacity as a consultant, either as an individual or part of a team, if the review fits within the definition of 'site audit' in the CLM Act. A consultant who is an accredited site auditor may review work prepared by a colleague (or colleagues) as part of internal quality assurance checks or as part of a managerial role, however this work must not be signed off as an accredited site auditor for and on behalf of the consultancy.

A consultant who is an accredited site auditor must ensure that their participation in any first-tier work is manifestly being carried out in their capacity as a consultant. For example, any reports or correspondence produced in this work must not be signed off as an accredited site auditor for and on behalf of the consultancy.

A consultant who is also an accredited site auditor and who carries out first tier activities (for example, by being directly involved in the design, or implementation of the site assessment, its remediation or validation) is not, in carrying out those activities, conducting an independent review of the first-tier work.

If an auditor seeks to independently satisfy themselves of the representativeness of sample results, auditors may collect verification samples for analysis. Verification samples are not required if the auditor is satisfied that the information collected by others is adequate. Verification samples should be comparable to assessment samples i.e. taken in the same location and similar material.

Site auditors as expert witnesses

The CLM Act is not intended to capture as 'site audits', situations where site auditors provide independent opinions solely for the purpose of giving evidence as expert witnesses in Court proceedings. In these circumstances, site auditors need not comply with the requirements relating to site audits in giving those opinions or that evidence. However site auditors should, of course, be familiar with details of the case, exercise all due care, comply with all relevant legal requirements and act professionally.

3.2.3 Conflicts of interest

The obligations of site auditors with regard to avoiding conflicts of interest are detailed in the CLM Act. In broad terms, a site auditor must not carry out a site audit of land:

- a) if he or she is, or is related to, a person by whom any part of the land is owned or occupied
- b) if he or she has a pecuniary interest in any part of the land or any activity carried out on any part of the land

- c) if it involves the site auditor reviewing any aspect of work carried out by, or a report written by, the site auditor or a person to whom the site auditor is related.

The categories of persons that are considered to be related to the site auditor and the tests for pecuniary interest are set out in the CLM Act.

The responsibility to ensure there is no conflict of interest rests with the auditor. If an auditor is uncertain whether there is a conflict, they should seek independent legal advice. The EPA cannot provide that advice.

3.2.4 Scope of a site audit

Depending on its purpose, a site audit determines whether, in the auditor's opinion, the consultant's work complied with relevant procedures and guidelines, whether it provides a robust basis for decisions or actions relating to the land concerned and/or whether the land is suitable for particular uses.

While a site audit must be for one or more of the purposes referred to in the CLM Act, the precise scope of work involved in the audit is usually defined by a site owner or developer. They may wish to know the current condition of the land for which they are contemplating a change in use, require an independent review of plans for assessment, investigation and/or remediation of the site, or need to know if remediation work has been completed to the level required for a particular land-use category. In some situations, consent authorities may define or contribute to, the scope of the site audit, particularly where the outcome of the audit is intended to be used to support the development consent process.

A site audit may include, but is not limited to, review of:

- the site's history of contaminating or potentially contaminating activities
- the conceptual site model(s) for the site
- planning of the sampling and analysis program (data quality objectives)
- sample collection and sample transport procedures
- quality control and quality assurance procedures
- chemical analyses of site samples
- impacts of chemicals and chemical mixtures on human health and the environment
- potential for off-site migration of contamination
- data collection, evaluation and interpretation
- mathematical modelling
- assessment of risk
- remediation plans
- waste management and disposal
- validation and monitoring
- environmental management plans
- conclusions and recommendations.

3.2.5 Procedures for statutory and non-statutory site audits

The meaning of statutory and non-statutory audits is given in Section 1.5.

Statutory site audits

For statutory site audits, a site auditor must carry out the following steps in the order indicated:

1. Notify the EPA in writing, using the site audit notification form approved by the EPA, within seven days of being commissioned by any person to carry out a site audit, specifying the name of the person and the location of the land concerned.
2. Prepare and finalise a site audit report.
3. After finalising the report, prepare a site audit statement using the form approved by the EPA.
4. Issue the site audit report and statement to the person who commissioned the site audit.
5. Provide a copy of the site audit statement to the EPA and the local authority at the same time as it is issued to the person who commissioned the site audit.
6. Submit the details of the site audit in the auditor's annual return (see Section 3.9).

Non-statutory site audits

For non-statutory site audits, steps 2 to 4 and 6 (above) must be followed and in the same order. Auditors should confirm with the client and/or local authority that the audit remains a non-statutory audit before signing the site audit statement. If the audit changes from a non-statutory audit to a statutory audit the auditor must notify the EPA in writing in accordance with step 1 (above).

3.2.6 Role of expert support team

The role of the auditor's expert support team is limited to providing advice to the auditor in areas relating to the team member's expertise. The auditor must not use an expert support team member who has been involved in any aspect of the first-tier work for the audit site.

The auditor is personally responsible for undertaking the site audit and making the final decision about the audit conclusions. The auditor must critically assess the information provided by the expert support team when forming that decision and preparing the site audit report and site audit statement. The advice of team members should be acknowledged in the audit report.

3.3 Site audit report

The site audit report must be a critical review of the information gathered by consultants during the site assessment and remediation process. The site audit report must clearly set out the rationale for the auditor's findings and any conclusions that will be contained in the site audit statement. The site audit report must not be a narrative summary of the work conducted by the consultants.

The site auditor must, as far as practicable, ensure that the report is a self-contained document which requires little or no direct reference by the reader to other material or documents to support the audit findings or the conclusions contained in the site audit statement.

In particular, the auditor must include in the report all of the following information or a clear and reasonable rationale for not doing so:

- a) site location details, including maps giving details of potential receptors
- b) site history including past, current and proposed zoning and approved use, describing all potentially contaminating activities on the site and adjoining land
- c) a clear outline of the actual or potential contamination of the land
- d) potential contaminants of concern from both on-site and off-site sources, listing each specific contaminant – where the auditor considers that a contaminant that would usually be expected to be of concern is not in this case, the auditor must state this and give reasons for this conclusion
- e) soil stratigraphy and hydrogeology
- f) a conceptual site model
- g) a clear statement of the investigation and remediation that has taken place
- h) evaluation of quality assurance and quality control plans, including appropriate implementation of sampling plan(s), sample handling, collection and transport processes
- i) a summary of all analytical results and an evaluation of those results
- j) a summary and justification of environmental quality criteria used by the auditor in assessing the reports of consultants
- k) assessment of risks to human health, structures and the environment arising from the actual or potential contamination of land
- l) the need for any ongoing management of residual contamination and how that management should be achieved
- m) requirements relevant to the audit imposed by the planning consent authority, EPA or any other public authority and documented evidence that these requirements have been met
- n) any evidence of, or potential for, migration of contaminants from the site including odour, air quality, stormwater, sedimentation, soil vapour, ground gases and groundwater issues – where the auditor considers that off-site migration is not a potential issue, the auditor must say this and give reasons for this conclusion
- o) an assessment of aesthetic issues, odours and background soil concentrations where these are required by these guidelines or other guidelines made or approved by the EPA
- p) conclusions and recommendations, and details of how they have been reached
- q) any other information relevant to the site audit, including copies of correspondence between the auditor and consultant(s) relevant to the outcome of the assessment, remediation and validation works
- r) the auditor's opinion of the adequacy of the work of each consultant in relation to all of the above areas
- s) documentation of all cases where the consultants have departed from applicable guidelines with appropriate comment on whether these departures are acceptable.

If requested by the EPA, the site auditor must promptly submit a copy of the site audit report to the EPA, together with any other requested related information.

A consent authority may also request a copy of the site audit report from a site auditor to assist it in decision-making or determine factual information that needs to be recorded for planning purposes.

The site auditor must prepare and finalise the site audit report before issuing the site audit statement.

3.4 Site audit statements

3.4.1 Preparing a site audit statement

The site auditor must prepare and issue a site audit statement which is consistent with the scope of the site audit which they were commissioned to do. For example, if the commission was solely to review whether a remediation plan was appropriate for its purpose, the conclusions in the site audit statement must be limited to that review.

The auditor must prepare the statement on the form approved by the EPA at the time the statement is issued. The wording on the approved form must not be altered except as permitted by the instructions on the form and the form must be completed in accordance with the explanatory notes on the form.

To assist in describing the area which is the subject of the audit, a survey plan clearly depicting the area may be attached to the site audit statement provided it is in a format that can be readily used by a consent authority and is capable of clear black and white reproduction.

If contamination is to remain on the site in a discrete area, such as in a containment cell, a surveyed plan showing the area concerned must be attached to the site audit statement.

3.4.2 Signing and issuing site audit statements

When signing a site audit statement, auditors are certifying that they have personally completed a site audit and have examined and are familiar with the information contained in the statement and all reports and other information referred to in the statement or report.

A site auditor must not sign a site audit statement on behalf of another auditor.

If an auditor certifies when issuing a site audit statement that a site is suitable for a specific use(s) subject to no conditions an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the particular use(s).

If an auditor certifies when issuing a site audit statement that a site is suitable for a specific use(s) subject to compliance with a specified environmental management plan an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the environmental management plan was feasible and would enable the particular use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the particular use(s).

If an auditor certifies when issuing a site audit statement a site can be made suitable for a use(s) if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the particular use(s) of the site in the future.

Auditors may include comments on the site audit statement which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

The site auditor must give a signed copy of the completed site audit statement to the person who commissioned the site audit.

For **statutory** site audits only, the auditor must also give a copy of the site audit statement to the EPA and the local authority at the same time it is issued to the person who commissioned it.

The auditor must assign each site audit statement its own consecutive number and keep a copy of each statement.

3.4.3 Finality of site audit statements

The site auditor must not change or withdraw the site audit statement after they have signed it. It is therefore crucial that site auditors ensure the accuracy of all information contained in the site audit statement before signing it.

Should errors be found after the site audit statement has been signed, the site auditor must send a corrected version of the statement to the person who commissioned the site audit and any other person the auditor provided the statement to. The same site audit statement number must be retained but suffixed or prefixed with an 'R' to indicate that this is a revised statement. If it is a **statutory** site audit, copies of the revised statement must also be sent to the EPA and the local authority, within 14 days of signing the revised statement, in writing specifying what the amendments were.

Errors which may be corrected in this manner include changes which do not affect the auditor's conclusions such as typographical or formatting changes or amended property descriptors.

Further remediation after a site audit statement has been issued

In some cases, after a site audit statement which certifies that a site is suitable for a particular use has been issued, further remedial work is undertaken on the site to allow a more sensitive use. A new site audit may be necessary if the consent authority requires confirmation that the new land use is suitable.

3.4.4 Significant new findings

After a site audit statement has been issued, the site auditor may become aware of new information about contamination at the site that may materially affect the validity or appropriateness of the conclusions in the site audit statement or report. Such circumstances may arise, for instance, where formerly unknown and unrecorded site history information becomes available after the statement is issued. Where the audit is statutory, the auditor must promptly notify the client, the EPA, the local authority and any other person the auditor provided the statement to.

Where an auditor is commissioned to do so, they must issue an amended site audit report and/or statement (as appropriate) to take account of this new information and issue the amended version to the client and any other person the auditor provided the report and/or statement to (with a different number from the original). If it was a **statutory** site audit, the auditor must also send the amended site audit statement to the EPA and the local authority.

The auditor must not issue an amended site audit report and/or statement for a statutory audit without first providing to the EPA written justification for issuing an amended document and receiving the EPA's written approval to do so.

3.4.5 Conditions included in site audit statements

Site audit statements must be issued with either no conditions or as few conditions as practicable, since conditions qualify the auditor's conclusions, and therefore detract from the definitive nature of the statement.

There will be some occasions when it will be appropriate for a site audit statement to contain conditions, such as a condition requiring the implementation of an environmental management plan (EMP) (see Section 3.4.6).

Where the site audit statement states a site can be made suitable for a use(s) if remediated in accordance with a specified plan, any conditions specified by the auditor on the site audit statement should be limited to minor modifications or additions to the specified plan.

Where the site audit statement states that future assessment or remediation of the site is required – for example, if development is proposed on an area where contaminated soils were contained – it must also state whether the assessment or remediation should be audited by an accredited site auditor.

Where the site audit is being done as part of the planning approval process under the Environmental Planning and Assessment Act, the method for ensuring compliance with any condition should be discussed by the auditor with the consent authority. The consent authority should be asked their view on the method for ensuring compliance and given reasonable opportunity to respond.

Where compliance with a condition could only be ensured with the involvement of an authority, auditors must seek written approval from the relevant authority before issuing a site audit statement with that condition. For example, auditors must have written approval from the EPA or a local authority before issuing conditions that involve the EPA or the local authority, respectively.

Any conditions that are included in the site audit statement must also be able to be complied with by lawful means, for example because compliance with it is a requirement of a notice under the CLM Act or of development consent conditions issued by the relevant consent authority.

Where the site audit statement states a site can be made suitable for a particular use(s) if remediated or managed in accordance with a specified plan the plan must be attached to the site audit statement and included in the site audit report.

Where the site audit statement states a site is suitable for a particular uses(s) if managed in accordance with a specified plan, the plan must be attached to the site audit statement and included in the site audit report.

3.4.6 Environmental management plans

Within the context of contaminated sites management, an environmental management plan (EMP, sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

An EMP can be an effective means of ensuring the environment is protected, users of the site are not exposed to contamination remaining on site and the site remains suitable for the proposed use when:

- complete remediation of contamination affecting an area is not practicable (for example low levels of contamination under a concrete slab)
- contaminants are being capped or contained on site
- remediation is likely to cause a greater adverse impact than would occur if the site were left undisturbed.

The length and precise content of the EMP will depend on the complexity of site issues. However a short, concise EMP may be adequate to address issues at a simple site. Regardless of its length, an EMP must be a stand-alone document with enough detail and clarity in the description of the site and the actions required to be readily understood. Generally, EMPs should be prepared by an environmental consultant for review by the site auditor, rather than by the site auditor. However, where the requirements of an EMP are of a minor nature, it may be acceptable for the site auditor to prepare it.

Systems to manage contamination detailed within an EMP may be passive or active. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components. In some cases, passive systems may relate to notification of residual contamination to ensure mechanisms for managing risks are applied e.g. outline procedures that protect people who could come into contact with contaminated groundwater, such as workers undertaking excavations below the water table.

Active management systems usually incorporate mechanical components and/or require monitoring and regular maintenance and inspection are necessary. Most active management systems are applied at sites where, if the systems are not implemented, an unacceptable risk may occur. Active management systems must only be considered for properties where effective long-term management is feasible.

Implementation of an EMP must not be included by a site auditor as a condition on a site audit statement nor accepted by the auditor as a means of managing contamination of a site unless the following conditions have been met.

- a) The EMP has been reviewed by the auditor.
- b) The EMP can reasonably be made to be legally enforceable, for example because compliance with it is a requirement of a notice under the CLM Act or of development consent conditions issued by the relevant consent authority. The relevant authority (the EPA or the local authority in these cases, respectively) should be asked their view on the legality of the draft EMP. How implementation of an EMP can reasonably be made to be legally enforceable should take into account exempt and complying development which may occur at the site.
- c) There will be appropriate public notification of any restrictions applying to the land to ensure that potential purchasers or other interested individuals are aware of the restrictions, for example appropriate notations on a planning certificate issued under s.149(2) of the Environmental Planning and Assessment Act or a covenant registered on the title to land under s.88B of the *Conveyancing Act 1919*.
- d) There is no off-site migration of contamination from the site which is the subject of the site audit, or where there is off-site migration or its potential, that contamination within the site is managed or monitored so it does not present an unacceptable risk to either the on-site or off-site environments.

If an auditor includes a condition on a site audit statement requiring the implementation of an EMP, the auditor must state on the site audit statement form whether the EMP requires

operation and/or maintenance of active management systems or requires maintenance of passive management systems only.

3.5 Finalising audit statements

3.5.1 Site audit statement findings

Site auditors must ensure that their finding that a site is suitable for a particular use does not assume or depend on the completion of unfinished remediation work to make the land suitable for that use.

Before a site auditor certifies a site can be made suitable if remediated in accordance with a specified plan, they must be satisfied that:

- the plan takes into account the particular conditions of that site, that is it is not a generic 'off-the-shelf' plan
- it is feasible to implement the plan at the site at some time.

3.5.2 Unsatisfactory assessment, remediation or validation

Where an auditor is not satisfied with the assessment, remediation or validation of a site, or considers that the site is not suitable for the proposed land use, the auditor must discuss this with the person who commissioned the audit, before issuing the site audit statement. Where appropriate, the auditor should suggest further work that would satisfy them that the site is suitable for the proposed use. Alternatively, the auditor may suggest the development of the site for a less sensitive use.

If the site auditor decides to issue the site audit statement without further work being done, they must certify that the site is not suitable for its proposed use.

3.6 Progressive development of a site

3.6.1 Development of a site in sections or stages

Where a site is to be developed progressively, section by section, discrete site audits may be required in relation to each section. As each section is developed, the site auditor may issue a site audit statement concerning the suitability of that section for the proposed land use. The land parcel subject to the audit must be clearly identified in the site audit statement in an appropriate format for use by a consent authority, for example as a separate lot in a deposited plan, or – where it is part of a lot – depicted on a survey plan attached to the statement.

The site auditor must consider the compatibility of land uses during staged developments and take reasonable steps to ensure that sections that have been certified as suitable for a proposed use are not re-contaminated by ongoing site works or adjacent contamination.

3.6.2 Multi-stage audits

If a site auditor is commissioned to undertake a single site audit involving a lengthy, multi-stage or multi-purpose review, the auditor must issue a site audit statement only when the process is completed. An example would be an audit involving reviews of the adequacy of firstly the site investigation, then the remediation, followed by the validation leading to a statement about the suitability of the land use. However the auditor may provide written interim advice on the work

plans or reports in the lead-up to issuing the final site audit statement at the end of the entire audit.

When this interim advice is provided, the site auditor must:

- specify that the interim advice does not constitute a site audit report or statement
- ensure the interim advice is consistent with EPA guidelines and policy
- not pre-empt the conclusion to be drawn at the end of the site audit process
- clarify that a site audit statement will be issued at the end of the audit process
- document in the site audit report all interim advice that was given.

However, if the auditor is expressly commissioned to provide a series of site audits for certain discrete, designated stages of a project, the auditor should issue a separate site audit statement for each of those audits.

3.7 Other considerations for auditors

3.7.1 Change of site auditor

If a site auditor is unable to proceed with or finalise an audit and another site auditor is appointed, the new auditor must undertake a full audit in relation to the site concerned. The new auditor should comment on the circumstances surrounding the change of auditor in the site audit report if it has a material bearing on the audit.

The new site auditor may refer to the work of the previous auditor. However, they must not defer to the previous auditor's judgement on any of the matters required to be considered in undertaking the audit. The new auditor must exercise their own professional judgement and make their own independent decisions about all matters that form part of the site audit report and site audit statement.

For statutory audits, the new auditor must submit a site audit notification as described in Section 3.2.5.

3.7.2 False audits or information

Under the CLM Act it is an offence for a person to make any statement, either in connection with a site audit or a site audit statement, that the person knows is false or misleading in a material respect. The maximum penalty for the offence for an individual is \$250,000, and for a corporation \$1,000,000.

3.7.3 Falsely claiming to be a site auditor

It is an offence under the CLM Act for an individual to represent themselves as a site auditor accredited under the CLM Act when they are not, including while their accreditation is under suspension, or to conduct types of site audits which they are prohibited from conducting as a condition of their accreditation. It is also an offence for an auditor to allow someone else to make this sort of representation about them.

It is an offence for a body corporate to represent itself, or allow others to represent it, as an accredited site auditor.

The maximum penalty for these offences for an individual is \$120,000 and for a body corporate \$250,000.

3.8 Communications with the EPA

3.8.1 Significant health or environmental problems posed by the site

Site auditors must bring to the attention of the EPA any significant environmental or public health problem that the auditor considers is posed by a site being audited, as soon as practicable after the auditor becomes aware of the problem.

3.8.2 Notification and regulation of sites under the CLM Act

If an auditor is commissioned to undertake a site audit for a contaminated site which has been notified to the EPA the auditor must contact the EPA to discuss the site before completing their audit. [List of NSW contaminated sites notified to EPA](http://www.epa.nsw.gov.au/your-environment/contaminated-land/notification-policy/contaminated-sites-list) is available on the EPA webpage www.epa.nsw.gov.au/your-environment/contaminated-land/notification-policy/contaminated-sites-list.

Similarly, if an auditor is commissioned to undertake a site audit for a site which is being regulated by the EPA under the CLM Act, the auditor must contact the EPA to discuss the regulation of the site before completing their audit. The list of contaminated sites regulated by the EPA is available via [Search the contaminated land record: app.epa.nsw.gov.au/prclmapp/searchregister.aspx](http://app.epa.nsw.gov.au/prclmapp/searchregister.aspx).

If an auditor concludes the site they are auditing should be notified to the EPA under the CLM Act, the auditor must as soon as practicable after making the conclusion take reasonable steps clearly and in writing to advise the person who commissioned the site audit of the duty of site owners and polluters to notify the EPA of contamination. A copy of the written advice must also be provided to the EPA at the same time it is provided to the person who commissioned the site audit and the advice should be emailed to the EPA at nswauditors@epa.nsw.gov.au.

The written advice should include:

- the contaminants of concern
- what aspects of the environment are affected
- who and what is potentially at risk
- the reasons why the auditor considers the site they are auditing should be notified to the EPA under the CLM Act.

3.8.3 Hazardous ground gases and groundwater contamination

If an auditor is assessing land-use suitability for a site impacted by hazardous ground gases or where groundwater contamination is present, the auditor must discuss with the EPA whether any remediation is required to address potential risks to off-site receptors and, if so, what regulatory mechanism may be required for this further work.

Section 4.2.2 provides further detail on assessing groundwater, Section 4.2.3 provides further detail on assessing hazardous ground gases and Section 4.4 provides further detail on evaluating land-use suitability.

3.8.4 Premature cessation of a statutory site audit

If, after commencing a statutory site audit, the site auditor permanently stops working on the audit for any reason (for example, because they have been directed to cease work by the

person who commissioned the audit), the auditor must provide the EPA with the following information in writing within seven days:

- the number of the auditor's notification to the EPA
- the site details
- the details of the person who commissioned the site audit (name, address, phone number)
- the reason for the audit being stopped
- the date on which the audit was stopped.

The auditor should also send this information to the relevant consent authority.

Premature cessation of non-statutory audits should be recorded in the auditor's annual return.

3.9 Auditors' returns

Site auditors are required to provide the EPA with details of all completed statutory and non-statutory audits, as well as those in progress, for the period between July of one year and June of the next year. Site auditors must use the annual return template provided by the EPA. For newly accredited auditors, the annual return period runs from the date of accreditation to the end of June. The annual return is to be furnished by 31 July each year. In their annual return, an auditor must provide the following information for each site as prescribed by the CLM Regulation:

- the location of the site, including lot and DP numbers, street address, suburb and local government area
- the size of the site
- the site's zoning under the Environmental Planning and Assessment Act and, if a change in zoning is proposed, its proposed zoning
- the date when the auditor was commissioned to conduct the site audit
- the date the site audit commenced
- the date by which the site audit was completed or is expected to be completed
- the land use(s) of the site that have caused the contamination for which remedial action was carried out
- the current land use of the site and any proposed land use
- the conclusions of the site audit about the suitability of the site for the current and proposed land uses
- the name of the person who did, or is doing, the remedial work that has been reviewed, or is being reviewed, and the titles of any of their reports that have been reviewed or are being reviewed.

In addition, site auditors must provide the following details for any revised site audit statements and amended site audit statements and/or site audit reports they have issued:

- the location of the site, including lot and DP numbers, street address, suburb and local government area
- the date the revised site audit statement or amended site audit statement and/or site audit report was issued

- the justification for issuing the revised or amended document.

3.10 Auditor meetings

The EPA holds meetings with auditors as required. Auditors are given written notice of these meetings. Attendance is highly recommended. An auditor's record of attendance is taken into account when considering whether to renew the accreditation of an auditor.

4 Contamination assessment, remediation and management

This section outlines some of the EPA's policies in relation to the assessment and remediation of contaminated sites and the management of any contamination remaining on site. The policies are relevant to auditors' decision-making about (among other things):

- systematic planning for data collection including the quality of the data used in the assessment of contamination
- issues encountered in the investigation of contamination
- remediation activities
- land-use suitability.

Site auditors must be able to demonstrate to the EPA's satisfaction that they have complied with the requirements in this section.

Where these guidelines state that a site auditor must 'check' something, for example an aspect of a consultant's work, it is also a requirement that they:

- state in the site audit report whether or not this checking has been done
- are able to provide evidence of such checking by, for instance, referring to sources
- document in the site audit report any instances where a consultant's work departs from policies or guidelines made or endorsed by the EPA, together with their reasons for accepting such departures.

4.1 Systematic planning for data collection

A systematic planning process must be used by consultants for defining the objectives of all site assessment and remediation programs and to develop sampling and validation plans for the collection and evaluation of representative data to achieve those objectives.

4.1.1 Data quality objective (DQO) process

The DQO process is used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site.

DQOs must be adopted for all assessment and remediation programs and the process must be commenced before any investigative works begin on the project. Site auditors must check that the consultant has properly addressed and adopted DQOs, as described in Appendix B of Schedule B2 of the NEPM, for the investigation or validation program. Further guidance documents are listed in Appendix F: Further reading. Site auditors must check the consultant's report includes the following:

- a statement of pre-determined DQOs for field and laboratory procedures, including quantitative DQOs
- a plan to achieve pre-determined DQOs
- procedures to be undertaken if the data does not meet the expected DQOs.

4.1.2 Sampling and analysis quality plans (SAQP)

Site auditors must check the consultant has a well-developed SAQP that includes the information listed in s.5.3 of Schedule B2 of the NEPM.

4.1.3 Assessing quality assurance and quality control

In the course of a site audit, an auditor must ensure the data from the site assessment is reliable and representative of the condition of the site. To achieve this objective, site auditors must check the reliability and fitness for purpose of both field sampling procedures and laboratory programs.

Appendix C of Schedule B2 and s.3 of Schedule B3 of the NEPM contain the essential issues which must be included in the quality assurance program conducted by the contaminated site consultant and laboratory respectively during site assessment and remediation processes. Site auditors must check that the consultant and laboratory have undertaken an assessment of the reliability of field procedures and analytical results using the data quality indicators, checklist and process outlined in the NEPM.

4.2 Assessment of site contamination

4.2.1 Soil investigation levels and screening levels

The decision-making process for assessing urban sites (Appendix A) aims to help site auditors satisfy themselves that soil investigation levels and screening levels have been used appropriately by contaminated site consultants to assess concentrations of contaminants in soil. Soil investigation levels and screening levels are the soil concentration levels above which further investigation and evaluation are required. They do not take account of all possible environmental impacts, but they are intended as a practical response to contaminated site issues dealt with in the NSW urban environment. Soil investigation levels include the health investigation levels (HILs) and ecological investigation levels (EILs) published in the NEPM. Screening levels include the health screening levels (HSLs) and ecological screening levels (ESLs) published in the NEPM.

The exposure scenarios on which the soil investigation and screening levels are based are published in Schedule B1 and B7 of the NEPM.

Site auditors must check that the soil investigation and screening levels used in the assessment of contaminated sites have been used in accordance with the NEPM.

Soil investigation and screening levels do not apply to land being, or proposed to be, used for agricultural purposes (consult NSW Department of Primary Industries and NSW Health for the appropriate criteria for agricultural land).

The decision-making process in Appendix A describes how the soil investigation and screening levels must be applied to different proposed land uses.

Soil investigation levels and screening levels do not address aesthetic issues or the potential for contaminants to migrate to groundwater, however, these matters also need to be addressed in a site assessment (see also Section 4.2.6).

For petroleum hydrocarbon compounds, the site auditor should also consider the management limits referred to in s.2.9 and Table 1B(7) of Schedule B1 of the NEPM. The management limits should be considered after consideration of the health screening levels and ecological screening levels for petroleum hydrocarbons.

4.2.2 Assessing groundwater and surface water

Groundwater and surface water assessment criteria

Site auditors must check that the potential for groundwater and surface water contamination has been adequately assessed. This includes checking that the relevant assessment criteria have been appropriately applied and discussed in the consultant's report in accordance with relevant guidelines approved by the EPA.

The site auditor must state in the site audit report whether or not the most appropriate groundwater and surface water assessment criteria have been applied. If they have not, the auditor must state the reasons why this is acceptable.

Plume delineation

If groundwater contamination is identified, the site auditor must check the lateral and vertical extent of the contaminant plume has been adequately delineated. Where this has not been done, this must be noted by the auditor in the site audit report and the auditor must justify in the site audit report they have sufficient information to draw a conclusion in relation to risks to human health, structures and the environment from contamination at the site.

Separate phase contaminants

Site auditors must ensure that the presence of separate phase contaminants has been adequately investigated where it is possible that separate phase may be present in groundwater.

4.2.3 Assessing hazardous ground gases

The term 'hazardous ground gas' is applied to both gases and vapours⁶ that may be present within the pore space of soils and rocks and may impact adversely upon human health and safety or the integrity of structures, and may consequently affect activities such as the construction and management of buildings. Such gases or vapours may be of natural or anthropogenic origin.

The site auditor must check that the potential for hazardous ground gases has been adequately assessed, including the potential for hazardous ground gases to migrate from the site. The auditor must also check that the relevant assessment criteria have been appropriately applied and discussed in the consultant's report in accordance with relevant guidelines made or approved by the EPA and relevant technical guidance documents, for example the *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases* (EPA 2012). See [Assessing and managing hazardous ground gases: www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/managing-hazardous-ground-gases](http://www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/managing-hazardous-ground-gases). This includes screening and investigation levels for soil vapour as published in Schedule B1 of the NEPM.

If an acute or explosive risk from hazardous ground gases is suspected then immediate action, including contacting relevant emergency services, should be taken to address the risk.

⁶ Vapours may exist in equilibrium with liquid or solid phases of the same material at the ambient temperature. Gases may only exist in the gas phase under the ambient conditions.

4.2.4 Assessing sediment quality

Guidance for assessing contamination of sediments is contained in *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*, CSIRO Land and Water Science Report 08/07 (Simpson, Batley & Chariton 2013). Where assessment of sediments has been undertaken, site auditors must check the consultant has applied these guidelines and any updates to these guidelines.

4.2.5 Site-specific risk assessments

A site-specific risk assessment (referred to as a Tier 2 and Tier 3 assessment in the NEPM) may have been undertaken by the contaminated site consultant:

- where investigation and screening levels are not available for particular contaminants
- where concentrations of contaminants exceed investigation and/or screening levels and indicate that further investigation and evaluation is required
- where further assessment is required to reduce uncertainties.

The auditor must check whether the site-specific risk assessment(s) has been undertaken in accordance with Schedules B4, B5, B6 and B7 of the NEPM and any relevant guidelines made or approved by the EPA. The auditor must also check that any human health risk assessment satisfied all the requirements in the checklist in Appendix E. Where these guidelines allow an auditor to endorse an approach that differs from policies made or approved by the EPA, the auditor must exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for doing this.

If an auditor is not a risk assessment expert themselves they must seek expert advice from their support team or provide appropriate justification in the site audit report why expert support was not sought.

The auditor must check that all site-specific risk assessments are scientifically valid and that the site-specific criteria recommended by the consultant are appropriate to protect public health and the environment including whether:

- site investigation data has been used correctly and is of suitable quality and is sufficient to support the assessment conclusions
- chemicals of potential concern have been identified correctly/appropriately
- appropriate exposure scenarios have been developed for the site based on the current and approved land use or proposed land use relevant to the scope of the audit, and the parameters used are appropriate
- appropriate exposure models have been used and they have been used correctly
- appropriate risk calculations have been undertaken and the calculations are correct
- conclusions correctly relate to the scenarios assessed and calculations that have been undertaken
- sufficient discussion of the uncertainties in the assessment is provided.

The level of detail in any site-specific risk assessment should be appropriate to the complexity of the site and scenarios requiring assessment.

4.2.6 Aesthetic issues

The auditor must check that aesthetic issues have been considered in the assessment of contamination in accordance with s.3.6 of Schedule B1 of the NEPM. Aesthetic issues include the generation of odours from the site and any discolouration of the soil as a result of contamination.

4.2.7 Assessment of sites potentially contaminated by PFAS

The auditor must check that contamination by per- and poly-fluoroalkyl substances (PFAS) has been considered in the assessment of contamination. *Designing Sampling Programs for Sites Potentially Contaminated by PFAS* (EPA 2016) provides technical guidance for investigations of PFAS in soil, groundwater and surface water for contaminated land assessment and management. See [Sampling on sites contaminated by PFAS: www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/sampling-sites-pfas-contamination](http://www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/sampling-sites-pfas-contamination).

4.2.8 Off-site migration of contamination

Site auditors must consider the potential for contamination to migrate from the site which is the subject of the site audit. The auditor must discuss in the site audit report evidence for the occurrence of off-site migration of contaminants and give an opinion on the impacts on likely receptors. If the auditor believes the off-site migration of contamination should be addressed to protect human health or the environment, the auditor must state this explicitly in the site audit report and in the 'comments' section of the site audit statement.

Auditors should also be aware of the potential for off-site impacts, such as air quality, odour and aesthetics, in considering the appropriateness of remediation or the suitability of a site for a particular use.

The site auditor must take all reasonable steps to advise the site owner or occupier of any potential risk of off-site migration of contamination and draw their attention to the circumstances where they may have obligations under the CLM Act. The auditor should advise the site owner or occupier in writing of any obligations they may have under the CLM Act as soon as practicable after the auditor becomes aware of these. A copy of the written advice must also be provided to the EPA at the same time it is provided to the person who commissioned the site audit and the advice should be emailed to the EPA at nswauditors@epa.nsw.gov.au.

The site auditor's correspondence and any written responses to the auditor from the person concerned should be appended to the site audit report.

4.3 Remediation of contamination

4.3.1 General considerations

A site auditor must be satisfied that any proposed or completed remediation is technically feasible, environmentally justifiable and consistent with relevant laws, policies and guidelines. Where an auditor is satisfied of these matters, they must document the reasoning in the site audit report.

In reviewing remediation strategies proposed by the consultant or remediation actions already taken, site auditors must have regard to:

- national and NSW remediation policies

- the *Protection of the Environment Operations Act 1997* (POEO Act) and Regulations
- other legislation such as the *Environmentally Hazardous Chemicals Act 1985* (EHC Act) and the Environmental Planning and Assessment Act
- relevant technical guidance documents issued by the EPA.

4.3.2 Site remediation policy

The preferred hierarchy of options for site remediation and/or management is set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM; this hierarchy is followed in New South Wales.

The auditor should confirm that sustainability (environmental, economic and social) has been considered by the consultant when deciding which remediation option to choose, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option. For example, where it is not viable to remediate large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

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.

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.

4.3.3 On-site containment and capping

Site auditors must, where relevant, demonstrate in their site audit reports that they have considered the technical issues associated with on-site capping or the use of other physical barriers to contain contamination.

Such options should be considered only where other preferred approaches from the remediation hierarchy, set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM, are not applicable.

The capping and/or containment strategy must be appropriate for the contaminants of concern. Before endorsing any capping and/or containment proposal site auditors must check that it:

- maximises the long-term stability of the capping and/or containment system(s) and any proposed structures above it (from an engineering perspective) and, where applicable, minimises the potential for leachate formation and/or volatilisation
- does not include the erection of structures on the capped and/or contained area that may result in a risk of harm to public health or the environment
- recommends a notification mechanism to ensure that the capped and/or contained areas are protected from any unintentional or uncontrolled disturbance that could breach the integrity of the physical barrier, such as recommending placing a notation or covenant on the property title or a notation on a s.149 certificate or issuing an order or placing a covenant on the title to land under the CLM Act to require ongoing maintenance under the Act.

See also Sections 3.4.5 and 3.4.6 regarding conditions placed on site audit statements and reliance on environmental management plans.

4.3.4 Contamination at depth

As a general principle, contamination at a site must be remediated to meet the appropriate remediation criteria.

Remediation criteria for contaminated soils at depth may differ from the criteria for shallow soils due to differences in exposure opportunities. However, the inhalation of volatile contaminants and the need to protect groundwater require consideration, irrespective of depth. Where remediation criteria for contaminated soils at depth are different from those for shallower soils, an auditor must consider, in the site audit report, the need for any ongoing management of the contamination at depth in addition to any requirements for managing shallow soil contamination. An auditor must document in their report the rationale supporting the conclusion on this issue.

Irrespective of the depth of contamination, an auditor must not endorse any proposal to leave contamination which may pose an unacceptable human health or environmental risk in situ unless they have first checked that the following issues are satisfactorily addressed:

- Investigation has demonstrated the remaining contamination will not adversely affect the groundwater quality and that any contaminant vapours will not migrate to the surface and pose a risk to human health.
- An environmental management plan has been developed, will be implemented, and can be enforced under relevant laws to ensure that, if the contaminated soil is disturbed, it will be handled in an appropriate manner to avoid any increase in potential risks to human health or the environment.
- The local authority is notified that contamination remains at depth on the site, together with its location, nature and extent, details of the environmental management plan and any other regulatory requirements that relate to the contamination, thus allowing the local authority to record this information, as it considers appropriate, in its property information system for the site, such as s.149 certificates.

4.3.5 Vertical mixing or other mixing techniques

The technique of mechanically mixing the contaminated surface soil with cleaner soil found at greater depths ('vertical mixing') has been developed for use on broadacre agricultural land where there is no readily available or economically feasible method available for remediating large quantities of soil with low levels of contamination.

Vertical mixing must only be carried out where **all** prerequisites listed in *Guidelines for the Vertical Mixing of Soil on Former Broad-acre Agricultural Land* (EPA 2003) are satisfied. These guidelines are available from [Statutory guidelines: www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines](http://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines).

4.3.6 Bioremediation

Where relevant, site auditors must demonstrate in their site audit reports an awareness of the issues associated with the introduction of imported organisms for bioremediation. The EPA encourages the use of local species in bioremediation because this eliminates the risks associated with introducing foreign living organisms to the environment. However, where imported organisms are used, a site auditor must not endorse the use of those organisms unless they are satisfied that:

- for species imported from overseas, details of the relevant Biosecurity Import Conditions System Permit, including any conditions accompanying the permit, are contained in the consultant's report
- a certificate from a recognised laboratory identifying the species to be released is contained in the report
- an assessment of the human and animal health risks arising from the use of the imported organisms has been made and is presented in the report, and these risks are acceptable
- the distribution of the organisms in Australia and the dispersal mechanisms in air, water and soil are known
- the expected survival period of the organisms in the environment and the possible consequences of the release have been assessed and are acceptable
- an estimate of the number of organisms to be released and the frequency of release has been documented
- the survival of the organism in the environment has been monitored by appropriate methodologies
- contingency measures are in place to remove or destroy the organisms if a hazard becomes evident during the course of the release.

Landfarming

Landfarming is a form of bioremediation. The auditor must check that any proposal for landfarming demonstrates adequate safeguards for the protection of human health and the environment. The potential for uncontrolled emissions of, for example, volatile organic compounds, leachates and odours and any other adverse effects from treatment must be considered on a site-specific basis according to the nature of the contamination and the conditions of the site.

4.3.7 Waste management

When reviewing information relating to the management of waste, site auditors must have regard to the provisions of the NSW Government's framework for managing wastes. In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it, or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:

- in relation to disposal, they must ensure their waste is carefully classified in accordance with the *Waste Classification Guidelines – Part 1: Classifying Waste* (EPA 2014) as in force from time to time (the 'Waste Guidelines', available from www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines), and the waste is taken to a facility that is lawfully able to receive that waste; and
- in relation to re-use for land application purposes, they must ensure their waste meets the requirements of the resource recovery order and resource recovery exemption framework.

For consultants who have been engaged to classify waste, or to assist their client in complying with the order and exemption framework, they must ensure their work complies with all of the requirements of the Waste Guidelines, and the relevant order and exemption. It is an offence to supply information about waste that is false or misleading.

Waste classification

Auditors must check the consultant or waste generator (or their representative) has classified the waste in accordance with the Waste Guidelines.

The Waste Guidelines set out six important steps for classifying waste. Auditors must check the consultant or waste generator (or their representative):

- has assessed the waste against the relevant step(s) of the Waste Guidelines
- has provided adequate justification for the determined classification of the waste.

Where a waste has **undergone chemical assessment** to determine its classification, auditors must check and review the consultant or waste generator (or their representative) has provided adequate justification for:

- sampling density
- sampling pattern and method used
- selection of contaminants of potential concern for laboratory analysis
- leachate analysis using the toxicity characteristics leaching procedure
- the determined classification of the waste based on chemical assessment.

Where an auditor is not satisfied with the classification of the waste, and **the waste is still on site**, the auditor must suggest that further work is undertaken by the consultant to ensure the waste is classified appropriately.

Where an auditor is not satisfied with the classification of the waste, and **the waste has already been moved off site**, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

Waste disposal and recycling

Auditors must check that waste generated from the audit site has been taken to a facility lawfully able to receive that waste. Auditors must check the consultant or waste generator (or their representative) has demonstrated the following:

- If the waste is taken to a facility licensed by the EPA for waste disposal, the facility's environment protection licence (EPL) must show it can lawfully receive that waste. A waste facility licensed by the EPA does not necessarily mean it can lawfully receive a class of waste for disposal.
- If the waste is taken for processing to a facility licensed by the EPA, that waste must meet the 'limit conditions' for that waste in the EPL.
- If the waste facility is not licensed by the EPA, the facility must have consent from the appropriate regulatory authority to receive that waste for its waste activities.

Where the above information has not been provided by the consultant or waste generator (or their representative), auditors must either request this information from the consultant, or check the relevant EPL or consent. Alternatively, auditors can obtain a written confirmation from the waste facility that they can lawfully receive that class of waste for the waste activities.

Auditors must check the consultant or waste generator (or their representative) has provided the following:

- the estimated volume of waste taken off site

- receipts verifying the facility has received that volume and class of waste from the waste generator (or its representative). This may include a valid consignment authorisation.
- reconciliation documents demonstrating the total volume of waste taken off site is consistent with the total volume of waste generated from the site.

Where the above information has not been provided by the consultant or waste generator (or their representative), auditors must request this information.

Where an auditor is not satisfied the waste has been taken to a lawful facility, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

Inappropriate use of investigation and screening levels for assessing fill material

The resource recovery order ('order') and resource recovery exemption ('exemption') framework facilitates the lawful re-use of waste received from off site, including for filling purposes. Auditors must check that fill material received, or that is intended to be received, has been assessed against the relevant order and exemption. Soil investigation and screening levels are not appropriate criteria for assessing incoming fill material. Soil investigation and screening levels may be used in addition to orders and exemptions to ensure incoming material does not pose an unacceptable risk to human health or the environment at the site and the site is suitable for the proposed use.

Receiving excavated natural material (ENM) or exempt waste from off site

Where a waste-derived material subject to an order and exemption has been applied to land, or is proposed to be applied to land on the audit site, auditors must check:

- the waste material meets the definition for that waste in the order and exemption
- the supplier of that waste has complied with the conditions of the order in relation to sampling, chemical and other attribute requirements, and the supply of a statement of compliance (where relevant)
- the waste has been applied, or will be applied, to land in accordance with the conditions of the exemption.

Where an auditor is not satisfied the waste has met the conditions of the order, and **the waste has not been applied to land on the audit site**, the auditor must advise the consultant or waste generator (or their representative) in writing not to supply the waste to the audit site.

Where an auditor is not satisfied the waste has met the conditions of the order, and **the waste has been applied to land on the audit site**, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

Receiving virgin excavated natural material (VENM) from off site

Auditors must check the consultant or waste generator (or their representative) has provided a VENM certificate along with adequate justification that demonstrates the waste applied, or proposed to be applied, to land at the audit site meets the definition of VENM as stated in the POEO Act.

Where an auditor is not satisfied the waste has met the definition of VENM, and **the waste has not been applied to land on the audit site**, the auditor must advise the consultant or waste generator (or their representative) in writing not to supply the waste to the audit site.

Where an auditor is not satisfied the waste has met the definition of VENM, and **the waste has been applied to land on the audit site**, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

Exporting ENM and exempt waste from the audit site

Where a material from the audit site is proposed to be transported off the audit site to another site for land application, auditors must check:

- the material meets the definition for that waste in the order and exemption
- the consultant or waste generator (or its representative) has complied with all conditions of the order, including sampling, chemical and other attribute requirements, and the supply of a statement of compliance (where relevant).

Where an auditor is not satisfied the waste has met the conditions of the order, and **the waste is still on site**, the auditor must suggest in writing that further work is undertaken by the consultant or waste generator (or their representative) to ensure the waste complies with the order.

Where an auditor is not satisfied the waste has met the conditions of the order, and **the waste has already been moved off site**, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

Exporting VENM from the audit site

Auditors must check the consultant or waste generator (or their representative) has generated a VENM certificate along with adequate justification to demonstrate the material proposed to be transported off the audit site to another site for land application meets the definition of VENM as stated in the POEO Act.

Where an auditor is not satisfied the waste has met the definition of VENM, and **the waste is still on site**, the auditor must suggest in writing that further work is undertaken by the consultant or waste generator (or their representative) to ensure the waste complies with the definition of VENM.

Where an auditor is not satisfied the waste has met the definition of VENM, and **the waste has already been moved off site**, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste, outlined below.

EPA notification policy for waste

Site auditors must notify in writing the person who engaged them to undertake the site audit, and the EPA, as soon as practicable under the following circumstances:

- where an auditor is not satisfied the waste has been taken to a lawful facility
- where an auditor is not satisfied with the classification of the waste, and the waste has been moved off site
- where the auditor suspects that waste received on the audit site from off site does not meet the definition of VENM, or the conditions of an order. This may include a statement of compliance, the definition of the waste, sampling, chemical and other attribute requirements in accordance with the order (where relevant), or a supplied VENM certificate.
- where the auditor suspects that waste from the audit site does not meet the definition of VENM or the conditions of an order, and has been supplied to another site for land application. This may include a statement of compliance, the definition of the waste,

sampling, chemical and other attribute requirements in accordance with an order (where relevant), or a supplied VENM certificate.

Notification to the EPA must be made to the Director of Waste Compliance at waste.operations@epa.nsw.gov.au and must include details of why the auditor is notifying the EPA.

Before notifying the EPA of the above, auditors should clarify or seek further information from the consultant or waste generator (or their representative) to assist in determining if the above circumstances have occurred. If the information provided does not satisfy the auditor, the notification requirements must be followed.

The written notification to the person who engaged the auditor to undertake the site audit and the EPA should be appended to the site audit report and also noted or summarised in the site audit statement.

Where a site has been notified under the EPA notification policy for waste but the circumstance does not or is unlikely to make the site unsuitable for use because it does not pose an unacceptable risk to users of the site, an auditor may issue a site audit statement certifying the land is suitable for a specific use despite the notification.

4.3.8 Chemicals and wastes controlled by chemical control orders

Chemical control orders (CCOs) are a primary regulatory tool under the EHC Act and are used by the EPA to selectively and specifically control particular chemicals of concern, and limit their potential or actual impact on the environment. CCOs complement other environmental legislation by providing a rapid and flexible mechanism for responding to emerging chemical issues.

CCOs can set controls on activities throughout the chemical's life cycle through general requirements and by requiring that certain things be subject to particular licence conditions. A CCO can be made in relation to single substances, groups of substances (e.g. scheduled chemicals) or particular waste streams (e.g. aluminium smelter wastes). The five CCOs currently in place in New South Wales are listed in Table 1.

Table 1 Chemicals and declared chemical wastes controlled by chemical control orders in New South Wales

Chemical or declared chemical waste	Chemical control order
Aluminium smelter wastes	Chemical Control Order in Relation to Aluminium Smelter Wastes Containing Fluoride and/or Cyanide 1986
Dioxin-contaminated wastes	Chemical Control Order in Relation to Dioxin-contaminated Waste Materials 1986
Organotin wastes	Organotin Waste Materials Chemical Control Order 1989
Polychlorinated biphenyls (PCBs) and PCB wastes	PCB Chemical Control Order 1997

Chemical or declared chemical waste	Chemical control order
Scheduled chemical wastes (pertaining to certain chlorinated chemicals)	Scheduled Chemical Wastes Chemical Control Order 2004

Site auditors should be aware that CCOs may be revised by the EPA as part of the implementation of national management plans, and auditors must check the requirements of the current version of the CCO have been complied with by a consultant.

A site auditor must not endorse a management strategy proposed for a site which involves chemicals or chemical wastes subject to a CCO, unless they are satisfied it complies with the requirements set down in the CCO. For example, certain chemicals occurring above the prescribed concentrations are prohibited from being disposed of at any landfill.

There is a program of national management plans for Schedule X wastes (ANZECC 1994). Schedule X wastes are those associated with:

- hexachlorobenzene (HCB) (ANZECC 1996a)
- polychlorinated biphenyls (PCBs) (ANZECC 1996b)
- organochlorine pesticides (OCPs) (ANZECC 1999).

The national management plans set time lines for the destruction and disposal of Schedule X wastes. The EPA implements the regulatory aspects of those plans through CCOs. Various Australian Government agencies assess specific types of chemicals. These agencies evaluate potential risks to human health or the environment associated with chemicals and make recommendations about reducing these risks. Where a national assessment incorporates all the legislative requirements of the EHC Act, a CCO may be used to implement the national recommendations in New South Wales.

4.3.9 Asbestos and asbestos waste

Detailed guidance on how to deal with material containing asbestos is now available from a number of relevant sources. Schedules B1 and B2 of the NEPM contain details about the nationally agreed process for the assessment of asbestos in soils.

The NSW Heads of Asbestos Coordinating Authorities have also published guidance on [Managing asbestos in or on soils: www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/asbestos-in-soils](http://www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/asbestos-in-soils). Auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use in the light of evidence that asbestos may be a contaminant of concern. There are particular requirements for asbestos waste in the Protection of the Environment Operations (Scheduled Activities and Waste) Regulation 2014. Auditors must check that documentation is produced for the disposal of asbestos at appropriate waste facilities in accordance with the Regulation.

There are also specific laws about working with asbestos. Information about this is available from [Asbestos at work: www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/asbestos-at-work](http://www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/asbestos-at-work).

4.3.10 Unexploded ordnance

A site containing unexploded ordnance (UXO) represents a safety hazard and must only be assessed by someone qualified to manage UXO safely. Where it is not within an auditor's area of expertise to assess whether a site is safe or whether there has been an appropriate level of site investigation in relation to UXO, an auditor must obtain advice from someone qualified to draw conclusions on the presence of UXO or future likelihood of finding it on the site.

Where an auditor suspects that a site may contain ordnance, they should be satisfied that appropriate searches have been undertaken to ensure that the site's history has been adequately assessed. Land and Property Information holds records of lands affected by military activities. These records must be searched before the Department of Defence will provide additional details about the site. See [Unexploded ordnance \(UXO\) in Australia: www.defence.gov.au/UXO/default.asp](http://www.defence.gov.au/UXO/default.asp).

The Department of Defence is able to provide advice on suitably qualified experts who can assess the presence of UXO on the site. The expert should also be able to assess the risk of future finds of UXO and develop a management plan for addressing any risks associated with them.

4.3.11 Groundwater remediation and management

Guidelines for the Assessment and Management of Groundwater Contamination (DEC 2007), available from [Statutory guidelines: www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines](http://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines), outline a best practice framework for the assessment, remediation and management of contaminated groundwater in New South Wales. The guidelines are made under s.105 of the CLM Act and therefore auditors must consider these guidelines when finalising site audits.

Source removal

Site auditors must check that all primary sources of groundwater contamination (e.g. leaking infrastructure) and secondary sources (e.g. non-aqueous phase liquids and adsorbed phase product) have been removed or otherwise addressed appropriately.

If a source cannot be removed, the auditor must clearly state in the site audit report the reasons why and also the implications this has for groundwater quality.

Light non-aqueous phase liquid (LNAPL) must be cleaned up to such an extent that remaining LNAPL does not present an unacceptable risk to health or the environment. In any case, LNAPL clean-up should continue if the LNAPL is still spreading. The need for LNAPL clean-up would also be indicated by a dissolved phase plume that continues to spread.

Impacts of groundwater contamination

If groundwater beneath a site is contaminated, the site auditor should ensure the investigation and remediation reports have adequately considered:

- the nature and extent of contamination including:
 - the toxicity effects of the contaminants
 - all potential contaminant transport pathways
 - all potential biotic and abiotic receptors
- the risks which the contamination may be posing to human health and the environment.

If the auditor concludes groundwater contamination may be having an impact on human health or the environment by moving off site:

- this should be specifically discussed in the site audit report and noted on the site audit statement
- the auditor must as soon as practicable take reasonable steps clearly and in writing to advise the person who commissioned the site audit of the duty of site owners and polluters to notify the EPA of contamination under the CLM Act.

If a proposal to remediate groundwater is reviewed as part of a site audit, in the site audit report the auditor should comment on:

- the adequacy of the data available to support the proposed remedial design
- whether the remediation proposal has examined in detail the adequacy and practicability of other remedial options, not just the preferred option
- the technical feasibility of the proposed remediation in being able to meet the remediation objectives
- the likely time frame for remediation
- the monitoring requirements
- validation requirements.

Monitored natural attenuation (MNA)

EPA policy is that a natural attenuation proposal must be accompanied by an appropriate monitoring program. MNA should only be considered as a remediation methodology where the following conditions are met:

- the source of the contamination has been removed as far as practicable
- the lateral and vertical extent of the contamination has been defined
- the site and hydrogeology have been adequately characterised, and there is clear evidence that attenuation rates are sufficient to achieve the remedial goals at the site within a reasonable time frame
- the effects of the products of degradation have been considered.

Where MNA is proposed as part of an overall remedial strategy for ongoing management of groundwater contamination, the site auditor must assess whether or not the appropriateness of using MNA has been comprehensively examined by the proponent in the remediation plan and whether the proponent's conclusions are appropriate.

A proposal for MNA at a site must demonstrate an understanding of the particular attenuation processes relevant to the contaminants of concern under the conditions at the site. MNA proposals must be supported by sufficient and appropriate field data and an ongoing monitoring program.

The auditor's role is to critically review the evidence presented by the MNA proposal and assess the applicability of MNA to the site in accordance with Appendix 3 of Guidelines for the Assessment and Management of Groundwater Contamination (DEC 2007).

4.3.12 Hazardous ground gas remediation and management

If hazardous ground gases are identified as a potential concern at a site, the site auditor must ensure the investigation and remediation reports have adequately considered:

- the nature and extent of the hazardous ground gases including:
 - the toxic effects of the hazardous ground gases
 - all potential transport pathways
 - all potential biotic and abiotic receptors
- the risks which the hazardous ground gases may be posing to human health and the environment.

If the auditor concludes hazardous ground gases may be having an impact on human health or the environment on site, or, due to its presence off site, either due to the migration of hazardous ground gases or the movement of soil or groundwater contamination, this should be specifically discussed in the site audit report and noted on the site audit statement.

If the auditor concludes there are risks associated with the vapour inhalation pathway, the auditor must take reasonable steps clearly and in writing to advise the person who commissioned the site audit of the duty of site owners and polluters to notify the EPA of contamination under the CLM Act. A copy of the written advice must also be provided to the EPA at the same time it is provided to the person who commissioned the site audit and the advice should be emailed to the EPA at nswauditors@epa.nsw.gov.au.

If a proposal to remediate groundwater or soil to minimise the vapour concentrations is reviewed as part of a site audit, in the site audit report the auditor must comment on:

- the adequacy of the data available to support the proposed remedial design
- whether the remediation proposal has examined in detail the adequacy and practicability of other remedial options, not just the preferred option
- the technical feasibility of the proposed remediation in being able to meet the remediation objectives
- the likely time frame for remediation
- the monitoring requirements
- validation requirements.

Where vapour mitigation technologies are proposed, the site auditor must assess whether or not the appropriateness of using such mitigation measures has been comprehensively examined by the proponent in the remediation plan and whether the proponent's conclusions are appropriate. The site auditor must also assess whether or not the technology proposed has been appropriately explained and justified (including consideration of the duration required for the mitigation measures). Appropriate checks to ensure correct installation may be required and must be documented by the site auditor.

4.4 Evaluating land-use suitability

4.4.1 Decision-making process

In assessing the suitability of a site for an existing or proposed land use in an urban context, site auditors must follow the decision-making process for assessing urban redevelopment sites, as presented in Appendix A.

Where more than one land use is proposed for the site to which the audit relates, an auditor's assessment of the suitability of the site must be related to the more sensitive of the proposed land uses (see Schedule B7 of the NEPM).

4.4.2 Assessing land-use suitability where groundwater contamination is present

Where groundwater contamination is present, an auditor must discuss its impact on the suitability of the site for a proposed use in the site audit report. This applies equally to contamination originating from the site and contamination sourced off site.

Where groundwater contamination under a site poses an unacceptable risk to users of the site for a proposed use, an auditor must indicate in the site audit statement that the site is unsuitable for that use.

Where groundwater contamination is present under a site but does not or is unlikely to make the site unsuitable for use because it does not pose an unacceptable risk to users of the site, an auditor may issue a site audit statement certifying that the land is suitable for a specific use despite the contamination, provided:

- the auditor has advised the person who commissioned the site audit in writing that groundwater contamination is present
- a copy of the advice to the person who commissioned the audit is appended to the site audit report and is also noted or summarised in the site audit statement
- the auditor has discussed with the EPA whether any remediation may be required to address off-site contamination and, if so, what regulatory mechanism may be required for this further work.

The auditor should explain that if future remediation is required this could interfere with activities on the site while remediation is carried out. The auditor should take reasonable steps to draw attention to any duty to report contamination under the CLM Act (see Section 3.8).

Impacts on buildings and structures

Where a site auditor considers that building structures on the site may be affected by the presence of contaminants in groundwater, they should recommend in the site audit report that specialist advice on possible impacts on structures is obtained.

4.4.3 Assessing land-use suitability where hazardous ground gases are present

Where hazardous ground gases are present, an auditor must discuss their impact on the suitability of the site for a proposed use in the site audit report. This applies equally to hazardous ground gases originating from the site and sourced off site.

Where hazardous ground gases under a site pose an unacceptable risk to users of the site for a proposed use, an auditor must indicate in the site audit statement that the site is unsuitable for that use.

Where hazardous ground gases are present under a site but do not or are unlikely to make the site unsuitable for use because they do not pose an unacceptable risk to users of the site, an auditor may issue a site audit statement certifying that the land is suitable for a specific use despite the ground gases, provided:

- the auditor has advised the person who commissioned the site audit in writing that hazardous ground gases are present
- a copy of the advice to the person who commissioned the audit is appended to the site audit report and is also noted or summarised in the site audit statement
- the auditor has discussed with the EPA whether any remediation may be required to address potential risks to off-site receptors and, if so, what regulatory mechanism may be required for this further work.

The auditor should explain that if future remediation is required this could interfere with activities on the site while remediation is carried out. The auditor should take reasonable steps to draw attention to any duty to report contamination under the CLM Act (see Section 3.8).

Appendix A: Decision-making process for assessing urban redevelopment sites

Note: Where investigation levels are not available, or assessment against them is inconclusive for the site, and either an abridged or detailed human health site-specific risk assessment has been undertaken, check all the requirements in Section 4.2.5 are satisfied.

Current or proposed land use		Procedure
<p>Is the current or proposed land use to be:</p> <p>Commercial or industrial?</p> <p>or</p> <p>Residential with minimal access to soil (e.g. high-rise apartments and flats)?</p> <p>or</p> <p>Residential with gardens and accessible soil (home produce contributing less than 10% fruit and vegetable intake; no poultry), including children's day care centres, preschools or primary schools, or town houses or villas?</p> <p>or</p> <p>Parks, recreational open space or playing fields, including secondary schools?</p>	<p>Yes</p>	<p>A. Check that:</p> <ul style="list-style-type: none"> – all site assessment, remediation and validation reports follow applicable guidelines – any aesthetic issues relating to site soils have been adequately addressed – soils have been assessed against relevant health-based investigation levels and potential for migration of contamination from soils to groundwater has been considered – groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered – hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values – any issues relating to local area background soil concentrations that exceed relevant investigation levels have been adequately addressed in the site assessment report(s) – the impacts of chemical mixtures have been assessed – any potential ecological risks have been assessed – any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier – the site management strategy (where relevant) is appropriate including post-remediation environmental plans. <p>B. Prepare a site audit report and site audit statement.</p>

Current or proposed land use		Procedure
<p>Is the current or proposed land use to be: Residential with substantial vegetable garden and/or poultry or A more sensitive land use?</p>	<p>Yes</p>	<p>A. Check that:</p> <ul style="list-style-type: none"> – all site assessment, remediation and validation reports follow applicable guidelines – any aesthetic issues relating to site soils have been adequately addressed – the consultant has undertaken a detailed site-specific human health risk assessment that satisfies all the requirements of NEPM Schedule B4 – any issues relating to local area background soil concentrations that exceed relevant investigation levels have been adequately addressed in the site assessment report(s) – any potential impacts to buildings and structures from the presence of contaminants considered – the impacts of chemical mixtures have been assessed – any potential ecological risks have been assessed – any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier – the site management strategy (where relevant) is appropriate including post-remediation environmental plans. <p>B. Prepare a site audit report and site audit statement.</p>

Appendix B: Recognition of applicants under other schemes under the *Mutual Recognition Act 1992 (Cth)*

Mutual recognition provisions and process

Part 3 of the Commonwealth *Mutual Recognition Act 1992* applies the principle of mutual recognition to occupations. It deals with the ability of a person who is registered in connection with an occupation in one Australian state to carry on an equivalent occupation in another state⁷. Registration includes accreditation.

The mutual recognition principle is that, subject to the provisions of Part 3 of the Mutual Recognition Act, if an individual is registered for an occupation in the first state, after notifying the local registration authority for the equivalent occupation in the second state, they are entitled:

- to be registered for the equivalent occupation in the second state
- pending their registration, to carry on the equivalent occupation in the second state.

Auditors registered/accredited in another state who wish to be accredited in New South Wales under the mutual recognition principle must lodge a written notice with the EPA. The written notice form and applicant declaration which must accompany the written notice are available on the EPA webpage [NSW site auditor scheme: www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme](http://www.epa.nsw.gov.au/your-environment/contaminated-land/site-auditor-scheme).

The notice must be accompanied by a document that is either the original or a copy of the instrument evidencing the existing registration in the other state (or if there is no such instrument, by sufficient information to identify them and their registration).

The notice must certify that the accompanying document evidencing the person's existing registration is the original or a complete and accurate copy of the original. The statements and other information in the notice must be verified by a statutory declaration.

The EPA may permit the notice to be amended after it is lodged.

The EPA must either grant, postpone or refuse to grant accreditation within one month of the notice being lodged with it. When granted, accreditation takes effect from the date of the lodgement.

If the EPA fails to grant, postpone or refuse accreditation within one month, the person concerned is entitled to accreditation immediately at the end of that period, and no objection may be taken to the notice on any of the grounds on which accreditation may be refused or postponed, except where fraud is involved.

Prior to being accredited, applicants must pay the appropriate accreditation fee.

Once accredited in New South Wales, an auditor's entitlement to accreditation continues, whether or not their accreditation continues in the other state. However, if accreditation in one state is cancelled or suspended or is subject to a condition on disciplinary grounds, or as a result of or in anticipation of criminal, civil or disciplinary proceedings, then accreditation in the other state is affected in the same way. The authority in the other state can choose to reinstate the auditor or waive the conditions.

⁷ All references to 'state' should also be read as including the Australian Capital Territory and the Northern Territory.

The EPA may impose conditions on accreditation, but may not impose conditions that are more onerous than would be imposed in similar circumstances (having regard to relevant qualifications and experience) if the accreditation were granted under the CLM Act instead of Part 3 of the Mutual Recognition Act. This is subject to the proviso that the EPA may attach the conditions that apply to the accreditation in the other state or that are necessary to achieve equivalence of occupations.

Once an individual is registered in New South Wales through mutual recognition, continuance of registration is subject to the laws of New South Wales.

Postponement of accreditation

The EPA may postpone the granting of accreditation if:

- any of the statements or information in the notice as required under the Mutual Recognition Act is materially false or misleading
- any document or information that must accompany the notice has not been provided or is materially false or misleading
- an auditor's circumstances have materially changed since the date of the notice or the date on which they lodged the notice
- the EPA decides that the occupation in which they are seeking accreditation is not an equivalent occupation.

If the EPA postpones the granting of accreditation, it may subsequently either grant accreditation or refuse to grant it, provided that the postponement is for not longer than six months. At the end of this period, unless registration has been refused, auditors are entitled to be accredited immediately.

Refusal of accreditation

The EPA may refuse accreditation if:

- any of the statements or information given in the notice is materially false or misleading
- any document or information that must accompany the notice has not been provided or is materially false or misleading
- the EPA decides that the occupation in which accreditation is being sought is not an equivalent occupation, and equivalence cannot be achieved by imposing conditions.

If the EPA refuses accreditation on the last ground above, that decision takes effect at the end of a specified period (not less than two weeks) after an auditor is notified of the decision, unless in the meantime the decision is revoked or they make an application for review of decision under the provisions of the Mutual Recognition Act. If they apply for review, the review body (the Administrative Appeals Tribunal) can make whatever orders it considers appropriate.

Deemed accreditation

The mutual recognition principle includes provision that once a person seeking accreditation as a site auditor in New South Wales under the Mutual Recognition Act has notified the EPA in accordance with the requirements of the Act, that person is entitled to carry on that occupation pending notice of the EPA's decision. This is called 'deemed accreditation'. Note, however, that deemed accreditation in one state cannot itself provide the basis for accreditation or registration in another state.

If an auditor has deemed accreditation in New South Wales, that deemed accreditation ceases if:

- they are granted substantive accreditation in New South Wales
- the EPA refuses to grant substantive accreditation (subject to determination of any application for review of that decision)
- they cease to be registered in every other state on the basis of which the notice seeking accreditation in New South Wales has been lodged
- they request cancellation.

Deemed accreditation is not affected if the EPA decides to postpone the grant of substantive accreditation.

If an auditor has deemed accreditation in New South Wales, they may carry on the activities of a site auditor, but only:

- within the limits of their registration/accreditation in another state, and subject to any conditions that apply to it in that state (unless the EPA in New South Wales has waived those conditions)
- within the limits conferred by the deemed accreditation in New South Wales and subject to any conditions that the EPA imposes on that deemed accreditation.

Note that, so far as deemed accreditation in New South Wales is concerned, the EPA has the power to waive any conditions that apply to a registration/accreditation in another state.

However, the EPA may impose conditions on deemed accreditation in New South Wales, provided those conditions are not more onerous than those that would be imposed in similar circumstances (having regard to relevant qualifications and experience) if the accreditation were effected under the CLM Act. This is subject to the proviso that the EPA may attach conditions that apply to the accreditation in another state or that are necessary to achieve equivalence of occupations.

Note also that the EPA imposes the following conditions on deemed accreditation in New South Wales:

- the site auditor must comply with insurance requirements specified by the EPA, which are designed to protect the public, clients, customers or others
- the site auditor is subject to any disciplinary provisions and arrangements that apply to accredited site auditors
- the site auditor must comply with all laws of New South Wales that apply to accredited site auditors.

Appendix C: Activities eligible for site auditor continuous professional development

Site auditors must undertake a minimum of 50 hours of continuous professional development (CPD) per calendar year.

Type of CPD	Hours eligible for site auditor CPD per year
Formal post-graduate study or individual tertiary course units not undertaken for award purposes	No limit
Short courses, workshops, seminars and discussion groups, conferences, technical tours and technical meetings	No limit
Learning activities in the workplace	A maximum of 25 hours
Private study of relevant journals, texts etc.	A maximum of 10 hours
Service to the contaminated land industry profession, for example membership of relevant committees and boards	A maximum of 12 hours
The preparation and presentation of material for courses, conferences, seminars and symposia	No limit but a maximum of 15 hours per presentation may be claimed
Publication of technical or research papers	No limit
Tertiary teaching or academic research	No limit
Other structured activities which an auditor can justify to the EPA as eligible for CPD	No limit provided justification is provided

Appendix D: Examples of consent, licence, notification and other requirements

Regulatory consent, licences, notifications and other requirements may apply for some aspects of contaminated site investigation, remediation and validation work. These may include:

- a licence from WaterNSW to establish a groundwater bore where required
- a controlled activity approval (under the *Water Management Act 2000*) from DPI Water, where necessary, for undertaking a controlled activity (building work, removal or deposition of material or any other activity affecting a water source) on waterfront land (the bed of any river, lake [including wetlands] or estuary, and 40 metres from the top of bank).
- approval from Sydney Water, or the relevant local water authority, for the discharge of contaminated water to sewer
- approval from Sydney Water for groundwater remediation injection works
- some classes of demolition work to be undertaken by contractors licensed by SafeWork NSW, for example licensed asbestos removalists
- development consent or building approval for some classes of demolition work from the relevant consent authority
- notifications of SafeWork NSW when an underground, partially underground or fully mounded tank that has previously contained a flammable liquid or a flammable gas has been abandoned or removed
- notifications of the consent authority of, and in some cases seeking consent for, remediation activities in accordance with the requirements of *State Environmental Planning Policy No. 55 – Remediation of Land* (NSW Government) (SEPP 55)
- remedial works that:
 - are classed as Category 1 works under SEPP 55 and require development consent
 - can constitute a ‘designated development’ under schedule 3 of the Environmental Planning and Assessment Regulation 2000 requiring development consent by the consent authority
 - must comply with the requirements of any relevant state environmental planning policies, and local environmental plans
 - must comply with guidelines made or approved by the EPA under the CLM Act or any other legislation
- EPA and/or consent authority licences or approvals for the discharge of chemicals into the environment, such as the release of chemicals to air, or discharge of potentially contaminated waters to surface water bodies and stormwater drains
- EPA licences for the operation of scheduled activities under the POEO Act or application for the surrender of such a licence
- EPA licences for the transportation, treatment and disposal of wastes under the POEO Act
- sites subject to EPA regulatory control, where written consent must be obtained before prescribed actions are commenced, such as notices issued under s.35 of the EHC Act and s.28 of the CLM Act.

Appendix E: Human health risk assessment checklist

The following is a checklist that must be used by an auditor to review any human health risk assessments undertaken by a consultant. Where the auditor's check reveals the consultant's risk assessment has omitted one or more of the points specified in this checklist, the auditor must document this in the site audit report and take this into account in reaching their site audit conclusions.

Hazard identification

- Have all appropriate sources of information regarding chemicals of potential concern been identified and assessed?
- Has justification been given for the selection of the chemicals of potential concern?

Toxicological information

- Have the critical toxic effects been identified?
- Have the effects on each body system (for example renal, hepatic, cardiovascular and developmental) and the types of effects (for example genotoxic and carcinogenic) been summarised?
- Has the dose–response relationship for chemicals of potential concern been discussed?
- Have all relevant toxicological data been considered and checked for accuracy?
- Has the adequacy of the available toxicological database been commented on?
- Have relevant primary toxicological resources been considered?
- Have different toxicity data from different resources been assessed and discussed?
- Have the selected toxicity data been adequately justified?

Exposure assessment

- Has a comprehensive and appropriate conceptual site model been presented that indicates all potential pathways and receptors?
- Have all potential receptors been identified?
- Have the estimated or measured exposure concentrations for each exposure route and chemical of potential concern been quantified?

Risk characterisation

- Has the acceptable risk level been identified and justified?
- Have all potential receptors and pathways been considered?
- Has the relative significance of each exposure pathway, based on the risk analysis, been discussed?
- Has a sensitivity/uncertainty analysis been presented?

Equations

- Have all equations used in the risk assessment been presented in the report?
- Are all equations consistent?
- Have all parameters and values used in each equation been clearly defined?
- Have the correct units been allocated to each parameter?
- Are all equations dimensionally correct?
- Have all unit conversion factors, where applicable, been included in the equations?
- Has all pertinent information been provided to enable calculations to be checked through in a step-wise process?

Data evaluation

- Have the data collection objectives been stated and are they consistent with the requirements of the risk assessment?
- Have the laboratories that did the chemical analyses been noted, and do they have NATA accreditation (or equivalent) to perform each chemical analysis?
- Has laboratory quality assurance/quality control (QA/QC) been reported and analysed?
- Has field QA/QC been reported and analysed?
- Have statements of the accuracy of the laboratory data for each contaminant been made and have these been considered in the risk assessment?

Assessment and report presentation

- Has information been presented coherently and in an appropriate sequence to enable efficient appraisal of the report?
- Have the objectives and scope been clearly stated?
- Has information from previous reports on the site been appropriately selected and incorporated into this report?
- Has the analysis been based on up-to-date literature?
- Have all assumptions and data been identified and justified?
- Have all tables and figures been referred to correctly in the text of the report?
- Has adequate data been presented to support the conclusions?

Appendix F: Further reading

NSW EPA documents

- DEC 2005, *Information for the Assessment of Former Gasworks Sites*, Department of Environment and Conservation NSW, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/former-gasworks-sites
- DECCW 2009, *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*, Department of Environment and Climate Change and Water NSW, Sydney available at www.epa.nsw.gov.au/your-environment/contaminated-land/preventing-contaminated-land/upss
- DECCW 2010, *UPSS Technical Note: Site Validation Reporting*, Department of Environment and Climate Change and Water NSW, Sydney available at www.epa.nsw.gov.au/your-environment/contaminated-land/preventing-contaminated-land/upss/upss-implementing-guideline
- DECCW 2010, *UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS*, Department of Environment and Climate Change and Water NSW, Sydney available at www.epa.nsw.gov.au/your-environment/contaminated-land/preventing-contaminated-land/upss/upss-implementing-guideline
- EPA 1997, *Technical Report: Bananalands Contaminant Distribution Study*, NSW Environment Protection Authority, Sydney
- EPA 2012, *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*, NSW Environment Protection Authority, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/managing-hazardous-ground-gases
- EPA 2014, *Best Practice Note: Landfarming*, NSW Environment Protection Authority, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/landfarming-best-practice-note
- EPA 2014, *Technical Note: Investigation of Service Station Sites*, NSW Environment Protection Authority, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/preventing-contaminated-land/upss/upss-implementing-guideline
- EPA 2015, *Technical Note: Light Non-Aqueous Phase Liquid Assessment and Remediation*, NSW Environment Protection Authority, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/light-non-aqueous-liquid

ANZECC documents

- ANZECC 1994, *Financial Liability for Contaminated Site Remediation: A Position Paper*, Australian and New Zealand Environment and Conservation Council, Canberra
- ANZECC 1999, *Guidelines for the Assessment of On-Site Containment of Contaminated Soil*, Australian and New Zealand Environment and Conservation Council, Canberra, available at www.nepc.gov.au/resource/anzecc-reports
- Australian Government 2013, *Guidelines for Groundwater Quality Protection in Australia*, Australian Government, Canberra available at www.agriculture.gov.au/water/quality/groundwater-quality-protection

enHealth documents

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

enHealth 2012, *Australian exposure factor guide*, Environmental Health Subcommittee (enHealth) of the Australian Health Protection Principal Committee, Canberra available at www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publicat-enviro.htm

CRC CARE documents

Available at www.crccare.com/publications/technical-reports

Beck P & Mann B 2010, *A technical guide for demonstrating monitored natural attenuation of petroleum hydrocarbons in groundwater*, Technical report no. 15, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Clements L, Palaia T & Davis J 2009, *Characterisation of sites impacted by petroleum hydrocarbons – National guideline document*, Technical report no. 11, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

CRC CARE 2013, *Petroleum hydrocarbon vapour intrusion assessment: Australian guidance*, Technical report no. 23, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

CRC CARE 2015, *A practitioner's guide for the analysis, management and remediation of LNAPL*, Technical report no. 34, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Davis GB, Nerrick N & McLaughlan R 2006, *Protocols and techniques for characterising sites with subsurface petroleum hydrocarbons – a review*, Technical report no. 2, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Davis GB, Patterson BM & Trefry MG 2009a, *Biodegradation of petroleum hydrocarbons vapours*, Technical report no. 12, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Davis GB, Wright J & Patterson BM 2009b, *Field Assessment of vapours*, Technical report no. 13, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Davis GB, Trefry MG & Patterson BM 2009c, *Petroleum vapour model comparison*, Technical report no. 9, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Friebel E & Nadebaum P 2011, *Health Screening Levels for petroleum hydrocarbons in soil and groundwater*, Technical report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Johnston CD 2010, *Selecting and assessing strategies for remediating LNAPL in soils and aquifers*, Technical report no. 18, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Ng JC, Juhasz AL, Smith E & Naidu R 2010, *Contaminant bioavailability and bioaccessibility Part 1: A scientific and technical review*, Technical report no. 14, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

Ng JC, Juhasz AL, Smith E & Naidu R 2009, *Contaminant bioavailability and bioaccessibility Part 2: Guidance for industry*, Technical report no. 14, CRC for Contamination Assessment and Remediation of the Environment, Adelaide

South Australian Health Commission contaminated sites monographs

- Edwards JW, Van Alphen M & Langley A (eds) 1994, *Identification and Assessment of Contaminated Land: Improving Site History Appraisal*, South Australian Health Commission, Adelaide
- El Saadi O & Langley A (eds) 1991, *Workshop Proceedings of the National Workshop on the Health Risk Assessment and Management of Contaminated Sites*, South Australian Health Commission, Adelaide
- Langley A 1991, *The Health Risk Assessment and Management of Contaminated Sites*, Contaminated Sites Monograph Series, No.3, South Australian Health Commission, Adelaide
- Langley A, Imray P & Hill H (eds) 1998, *The Health Risk Assessment and Management of Contaminated Sites, Proceedings of the Fourth National Workshop on the Health Risk Assessment and Management of Contaminated Sites*, Contaminated Sites Monograph Series, No.7, South Australian Health Commission, Adelaide
- Langley A, Markey B & Hill H (eds) 1996, *The Health Risk Assessment and Management of Contaminated Sites, Proceedings of the Third National Workshop on the Health Risk Assessment and Management of Contaminated Sites*, Contaminated Sites Monograph Series, No.5, South Australian Health Commission, Adelaide
- Langley A & Van Alphen M (eds) 1993, *The Health Risk Assessment and Management of Contaminated Sites, Proceedings of the Second National Workshop on the Health Risk Assessment and Management of Contaminated Sites*, Contaminated Sites Monograph Series, No.2, South Australian Health Commission, Adelaide
- Olszowy H, Torr P & Imray P 1995, *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia*, Contaminated Sites Monograph Series, No.4, South Australian Health Commission, Adelaide

Quality assurance/quality control methodologies

- American Public Health Association, American Water Works Association & Water Environment Federation 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th edition, Washington DC
- AS 4482.1—2005, *Guide to the investigation and sampling of sites with potentially contaminated soil, part 1: non-volatile and semi-volatile compounds*, Standards Australia
- AS 4482.2—1999, *Guide to the sampling and investigation of potentially contaminated soil, part 2: volatile substances*, Standards Australia
- AS/NZS 5667.11—1998, *Water quality – sampling, part 11: Guidance on sampling of groundwater*, Standards Australia
- Department of Water Resources (NSW) 1992, *A Practical Guide to Groundwater Sampling*, 1st edition, Technical Service Division, Sydney
- USEPA 1987, *Data Quality Objectives for Remedial Response Activities*, USEPA 540/G-87/003, United States Environmental Protection Agency Office of Emergency Response and Office of Waste Programs Enforcement, Washington DC
- USEPA 1992, *Guidance for Data Useability in Risk Assessment (Parts A and B)*, USEPA 9285.7–09A&B, PB92–963356, United States Environmental Protection Agency Office of Emergency and Remedial Response, Washington DC

- USEPA 1992, *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods SW–846*, 3rd Edition, United States Environmental Protection Agency Office of Solid Waste and Emergency Response, Washington DC
- USEPA 2000a, *Guidance for the data quality objective process*, EPA/QA/G-4, United States Environmental Protection Agency, Washington, DC
- USEPA 2000b, *Data quality objectives process for hazardous waste site investigations*, EPA/QA/G-4HW, United States Environmental Protection Agency, Washington, DC
- USEPA 2002a, *Guidance on choosing a sampling design for environmental data collection*, EPA/QA/G-5S, United States Environmental Protection Agency Office of Environmental Information, Washington, DC
- USEPA 2002b, *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 EPA/240/R-02/009, United States Environmental Protection Agency Office of Environmental Information, Washington DC
- USEPA 2006a, *Guidance on systematic planning using the data quality objectives process*, EPA QA/G-4, United States Environmental Protection Agency Office of Environmental Information, Washington DC
- USEPA 2006b, *Data quality assessment: statistical methods for practitioners*, EPA/QA/G-9S, United States Environmental Protection Agency Office of Environmental Information, Washington, DC
- USEPA 2006c, *Data quality assessment: A Reviewer’s Guide*, EPA/QA/G-9, United States Environmental Protection Agency Office of Environmental Information, Washington, DC

Other documents

- ARMCANZ 1997, *Minimum Construction Requirements for Water Bores in Australia*, Agriculture and Resource Management Council of Australia and New Zealand, Canberra
- AS 4964—2004, *Method for the qualitative identification of asbestos in bulk*, Standards Australia.
- AS/NZS 5667.12:1999 Water quality – sampling, part 12: *Guidance on sampling of bottom sediments* Standards Australia
- ASTM D5092 2004, *Standard practice for design and installation of groundwater monitoring wells*, ASTM International
- ASTM D5753–05 2010, *Guide for planning and conducting borehole geophysical logging*, ASTM International
- ASTM E1689–95 2008, *Standard guide for developing conceptual site models for contaminated sites*, ASTM International
- Department of Health (WA) 2009, *Guidelines for the assessment, remediation and management of asbestos-contaminated sites in Western Australia*, Western Australian Department of Health and Western Australian Department of Environment and Conservation, Perth, available at ww2.health.wa.gov.au/Articles/A_E/Asbestos-contaminated-sites
- Department of Land and Water Conservation (NSW) 1997, *The NSW State Groundwater Policy Framework Document*, Sydney, available at www.water.nsw.gov.au/water-management/law-and-policy/key-policies

- Department of Land and Water Conservation (NSW) 1998, *The NSW Groundwater Quality Protection Policy: A Component Policy of the NSW State Groundwater Policy*, Sydney, available at www.water.nsw.gov.au/water-management/law-and-policy/key-policies
- Department of Land and Water Conservation (NSW) 2002, *The NSW State Groundwater Dependent Ecosystems Policy: A Component Policy of the NSW State Groundwater Policy*, Sydney, available at www.water.nsw.gov.au/water-management/law-and-policy/key-policies
- EnRiskS 2016, *Proposed Decision Tree for Prioritising Sites Potentially Contaminated with PFASs*, NSW Environment Protection Authority, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/prioritising-potential-pfas-contamination
- Langley A, Gilbey M & Kennedy B (eds) 2003, *Health and Environmental Assessment of Site Contamination*, Proceedings of the Fifth National Workshop on the Assessment of Site Contamination, National Environment Protection Council Service Corporation, Adelaide
- Ministry of Housing (Netherlands) 1994, *Environmental Quality Objectives in the Netherlands*, Risk Assessment and Environmental Quality Division, Directorate for Chemicals, External Safety and Radiation Protection, Spatial Planning and the Environment, The Hague
- Murray–Darling Basin Commission 1997, *Murray–Darling Basin Groundwater Quality Sampling Guidelines*, Technical Report No.3, Groundwater Working Group, Canberra
- NEPC 2000, *National Environment Protection (Ambient Air Quality) Measure: Report of the risk assessment task force*, National Environment Protection Council, Canberra
- NRC 2008, *Science and decisions: advancing risk assessment*, National Research Council, Washington DC
- Simpson SL & Batley GE 2016, *Sediment Quality Assessment: A Practical Guide*, CSIRO, Bangor, NSW
- Simpson SL, Batley GE & Chariton AA 2013, *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*, CSIRO Land and Water Science Report 08/07, Bangor, NSW, available at <https://publications.csiro.au/rpr/pub?pid=legacy:965>
- Simpson SL, Batley GE, Chariton AA, Stauber JL, King CK, Chapman JC, Hyne RV, Gale SA, Roach AC, Maher WA 2005, *Handbook for Sediment Quality Assessment*, CSIRO, Bangor, NSW
- USEPA 1989, *Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media*, EPA 230/02–89–042, United States Environmental Protection Agency, Washington DC
- USEPA 1989, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part A)*, United States Environmental Protection Agency, Washington DC
- USEPA 1991a, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part B) Development of risk-based preliminary remediation goals*, United States Environmental Protection Agency, Washington DC
- USEPA 1991b, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part C) Risk evaluation of remedial alternatives*, United States Environmental Protection Agency, Washington DC
- USEPA 1991c, *Summary Report on Issues in Ecological Risk Assessment*, United States Environmental Protection Agency, Washington DC

- USEPA 1998, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, Osver Directive 9355.3–0, United States Environmental Protection Agency Office of Emergency and Remedial Response, Washington DC
- USEPA 1998b, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part D) Standardising planning, reporting and review of Superfund risk assessments*, United States Environmental Protection Agency, Washington DC
- USEPA 1999, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Supplement to Part A) Community involvement in Superfund risk assessments*, United States Environmental Protection Agency, Washington DC
- USEPA 2004, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part E) Supplemental guidance for dermal risk assessment*, United States Environmental Protection Agency, Washington DC
- USEPA 2009, *Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation Manual (Part F) Supplemental guidance for inhalation risk assessment*, United States Environmental Protection Agency, Washington DC
- WorkCover 2014, *Managing asbestos in or on soil*, NSW WorkCover, Sydney, available at www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/asbestos-in-soils
- WHO 2004, *IPCS Risk assessment terminology, Harmonisation project, Document no. 1*, World Health Organization, Geneva
- WHO 2005, *Principles of characterising and applying human exposure models, Harmonisation Project, Document no. 3*, World Health Organization, Geneva
- WHO 2008, *Part 1: Guidance document on characterising and communicating uncertainty in exposure assessment, and Part 2: Hallmarks of data quality in chemical exposure assessment, Harmonisation project, Document no. 6*, World Health Organization, Geneva

Abbreviations

CCO	chemical control order
CLM Act	<i>Contaminated Land Management Act 1997</i>
CPD	continuous professional development
DQO	data quality objective
EHC Act	<i>Environmentally Hazardous Chemicals Act 1985</i>
EMP	environmental management plan
ENM	excavated natural material
EPA	NSW Environment Protection Authority
EPL	environment protection licence
LNAPL	light non-aqueous phase liquid
MNA	monitored natural attenuation
NEPM	national environment protection measure
OEH	Office of Environment and Heritage
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
SEPP 55	<i>State Environmental Planning Policy No. 55 – Remediation of Land</i>
UXO	unexploded ordnance
VENM	virgin excavated natural material

References

- ANZECC 1994, *National Protocol Approval Licensing of Commercial-scale Facilities for the Treatment/Disposal of Schedule X Wastes*, Australian and New Zealand Environment and Conservation Council, Canberra
- ANZECC 1996a, *Hexachlorobenzene Waste Management Plan*, Australian and New Zealand Environment and Conservation Council, Canberra
- ANZECC 1996b, *Polychlorinated Biphenyls Waste Management Plan*, Australian and New Zealand Environment and Conservation Council, Canberra
- ANZECC 1999, *Organochlorine Pesticides Waste Management Plan*, Australian and New Zealand Environment and Conservation Council, Canberra
- DEC 2007, *Guidelines for the Assessment and Management of Groundwater Contamination*, NSW Environment Protection Authority, Sydney; available at www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines
- EPA 2003 *Guidelines for the Vertical Mixing of Soil on Broad-acre Agricultural Land*, NSW Environment Protection Authority, Sydney; available at www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines
- EPA 2012, *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases*, NSW Environment Protection Authority; available at www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/managing-hazardous-ground-gases
- EPA 2014, *Waste Classification Guidelines*, NSW Environment Protection Authority, Sydney; available at www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines
- EPA 2016, *Designing Sampling Programs for Sites Potentially Contaminated by PFAS*, NSW Environment Protection Authority, Sydney; available at www.epa.nsw.gov.au/your-environment/contaminated-land/assessment-and-remediation/sampling-sites-pfas-contamination
- NEPC 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council, Canberra; available at www.nepc.gov.au/nepms/assessment-site-contamination
- NSW Government, *State Environmental Planning Policy No. 55: Remediation of Land*, compiled and maintained in a database of legislation by the Parliamentary Counsel's Office and published on the NSW legislation website: www.legislation.nsw.gov.au/#/view/EPI/1998/520/full
- OEH 2011, *Guidelines for Consultants Reporting on Contaminated Sites*, Office of Environment and Heritage, Sydney; available at www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines
- Simpson SL, Batley GE & Chariton AA 2013, *Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines*, CSIRO Land and Water Science Report 08/07, Bangor, NSW; available at <https://publications.csiro.au/rpr/pub?pid=legacy:965>