

## **Northern Territory Contaminated Land Guideline**

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### **Acknowledgement**

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### **Disclaimer**

The Northern Territory Environment Protection Authority (NT EPA) has prepared this document in good faith, exercising all due care and attention, but no representation or warranty, express or implied, is made as to the relevance, completeness or fitness for purpose of this document in respect of any particular user's circumstances. Users of this document should satisfy themselves concerning its application to their situation and, where necessary, seek expert advice.

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# 1 Introduction

Contaminated land<sup>1</sup> is land (i.e. soil and groundwater) that contains chemicals at levels that potentially pose a hazardous risk to human health and/or the environment. The chemicals are usually present in the land due to human activities, such as heavy industry or chemically intensive agriculture. As such, although contaminated land can occur anywhere, it is typically clustered in areas where humans undertake these activities.

Contaminated land can have major economic, legal and planning implications for the community and contamination may limit land use potential, or increase costs for developers, councils and businesses.

In certain cases, sites may be so contaminated that they present an unacceptable risk to human health or to the environment and must be dealt with as a priority. Their investigation and clean-up is important for the protection of human health and the environment. It is thus important that such sites are properly regulated, by a robust contaminated land regulatory regime.

In the Northern Territory, contaminated land is regulated by the Northern Territory Environment Protection Authority (NT EPA) through the *Waste Management and Pollution Control Act* and through input into the development approvals process controlled under the *Planning Act*.

## 1.1 What is the purpose of this guideline?

The NT EPA has prepared this guideline to:

- describe the legislative and policy framework for the assessment and remediation of contaminated land as it applies in the Northern Territory (NT)
- help people understand the *Waste Management and Pollution Control Act* (the WMPC Act), the *Waste Management and Pollution Control (Administration) Regulations*<sup>2</sup> (the WMPC Regulations) and the *Planning Act* as they apply to contaminated land
- promote the principle of ecologically sustainable development for the protection of human health and the environment in a manner consistent with the objectives as defined in section 5 of the WMPC Act
- promote the policy framework and guidance contained within the *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended in 2013
- provide information to:
  - site owners and persons identified as responsible (or liable) for contaminated land
  - contaminated land auditors
  - contaminated land consultants
  - persons with an interest in the determination, assessment, remediation and auditing of the contaminated land framework as it applies in the NT
- detail the responsibilities and roles of parties involved in the assessment and remediation of contaminated land
- explain obligations in a helpful and accessible way to assist relevant parties with adopting a consistent and compliant interpretation of relevant legislation, policy and guidance

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<sup>1</sup> The terms 'contaminated land' and 'contaminated site(s)' are used interchangeably in this guideline

<sup>2</sup> Copies of the NT Government legislation are available at:  
[http://dcm.nt.gov.au/strong\\_service\\_delivery/supporting\\_government/current\\_northern\\_territory\\_legislation\\_database](http://dcm.nt.gov.au/strong_service_delivery/supporting_government/current_northern_territory_legislation_database)

- ensure that the assessment and remediation of site contamination is conducted to the level expected by the NT EPA, and
- respond to the increasing number of inquiries relating to the contaminated site requirements for the NT.

This guideline presents information that is applicable to all contaminated land in the NT. However, there may be circumstances where the information contained within this guideline may not be applicable to a specific site or situation. In such circumstances it is important that advice is sought directly from the NT EPA.

Where appropriate, it is also recommended that persons seek their own legal advice.

## **1.2 Support**

If you would like more help in interpreting this guideline or want advice about contaminated land regulation in the NT, please contact the NT EPA on (08) 8924 4218 or via email to [pollution@nt.gov.au](mailto:pollution@nt.gov.au).

## **1.3 Feedback on a work in progress**

The NT EPA welcomes any feedback on this guideline and the framework within it, as well as any additional information that could help develop the guideline further.

Feedback can be provided via email to: [ntepa@nt.gov.au](mailto:ntepa@nt.gov.au)

## **1.4 Currency of this guideline**

This guideline may be replaced, amended or updated periodically by the NT EPA. All persons should refer to the NT EPA website for details of the most recent version of this guideline and other NT EPA publications related to contaminated land. When an update occurs, the NT EPA will notify as many relevant people as possible.

# **2 Guideline Objectives**

The objectives of this guideline are:

- to provide information to contaminated land practitioners and the community
- to minimise the risk of adverse impacts of land contamination on the environment and human health in the NT
- to ensure that the approved land use(s) can be conducted without contamination presenting, or being likely to present, a risk of harm to human health and/or a risk of material or serious environmental harm
- to establish a process for assessing and, where appropriate, remediating contaminated land which presents, or is likely to present, a risk of harm to human health and/or a risk of material or serious environmental harm
- to ensure that the NT meets its national obligations and plays its part in Australia meeting its international obligations under national and international agreements relating to contaminated land.

# **3 Overview - what is contaminated land?**

In the past, hazardous substances and chemicals have been manufactured, used and disposed of without full knowledge of the potential impacts of these activities on human health and/or the environment.

Contaminated land is created when these hazardous substances and chemicals are allowed to come into contact with land (including soil, air within soil pores and groundwater) causing the land to become contaminated. Contaminated land is of particular concern when the hazardous substances and chemicals are found in land at concentrations which pose an unacceptable risk to human health or the environment. Most contaminated land is as a direct result of human activities and poor management.

Examples of hazardous substances associated with human activities include: polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), heavy metals (for example, arsenic, lead, chromium, cadmium and mercury), asbestos, and hydrocarbons.

At present, although hazardous substances and chemicals are generally managed in a responsible manner, there is still the potential for land to become contaminated due to unforeseen circumstances, accidents or criminal acts.

In some cases, as hazardous substances and chemicals can migrate in soil and groundwater, land may be contaminated even through a potentially contaminating activity has not been undertaken on it. For example, petroleum products leaking from underground fuel storage tanks have been known to cause contamination of areas adjacent and downstream of fuel storage areas.

### 3.1 Definition and management of contaminated land

Contaminated land is land (including the water and air on, above or under the land)<sup>3</sup> which:

- contains a pollutant in a concentration above naturally occurring levels, which is causing a risk to human health or the environment; or
- contains a pollutant in a concentration above naturally occurring levels, which has the potential to cause a risk to human health or the environment in the future if not managed appropriately.

For the precise definition of the term 'land' please refer to section 4 of the WMPC Act.

### 3.2 Why is contaminated land a concern?

Contaminated land is a concern as the substances and chemicals that contaminate the land are toxic or hazardous to humans or the environment.

For humans these hazardous substances can cause skin irritations, breathing problems, poisoning, cancer and in some circumstances even death. These substances can have acute (immediate) or chronic (long term) impacts on human health.

If land (including soil, air within soil pores and groundwater) is contaminated, humans can be exposed to the hazardous substances through:

- ingestion – humans may:
  - directly ingest contaminated soil (such as if a baby or toddler eats soil, or for adults if soils is on food we eat)
  - directly ingest contaminated groundwater (if used as a drinking water supply)
  - indirectly ingest hazardous substances (such as vegetables grown in contaminated soil, or fish which have eaten contaminated plants)
- absorption – hazardous substances can absorb through skin into the human body if humans touch contaminated soil, surface water or groundwater

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<sup>3</sup> See section 4 of the WMPC Act



- inhalation – humans can inhale hazardous substances, such as asbestos fibres or toxic vapours from hydrocarbon spills.

Contaminated land can also impact on flora and fauna resulting in significant changes to natural ecosystems.

The processes and measures outlined in this guideline for the management of contaminated land are designed to minimise the risks contaminated land poses to human health and the environment.

### 3.3 Indicators of contamination

In some circumstances, you may be able to see signs that the land is contaminated. An inspection of a site and its surrounds, or its history, may provide indicators of contamination. Some examples include:

- discoloured or stained soil
- waste found in soil (such as old oil drums or asbestos)
- unusual odours emanating from the soil
- the presence of chemicals on or in surface water or groundwater – visible through abnormal colouration, or a sheen (i.e. free phase petroleum)
- unusual odours emanating from surface water or groundwater (such as chemical or petroleum odours evident during irrigation)
- peculiar taste in groundwater (i.e. where used for drinking water)
- visible signs of a toxic response to contaminants in flora and fauna (for example, unusual numbers of birds dying on or near a site, abnormal domestic animal or wildlife behaviour, dead vegetation within or adjacent to areas of otherwise normal growth)
- where excavation, construction or earthworks uncover the existence of an unauthorised disposal area or dump – such as leaking drums of waste oil or pesticides found buried in a gully or pit
- case(s) of a biologically plausible illness or health impairment among people who have had exposure to a particular contaminated site
- evidence that chemical spills have occurred
- where site history reveals that a potentially containing activity occurred on site.

Note that this list is not exhaustive and there may be additional indicators that are relevant to some sites.

A list of activities that can potentially create contaminated land is included Appendix A of this guideline.

## 4 How is contaminated land regulated in Australia?

In Australia, the *National Environment Protection (Assessment of Site Contamination) Measure* (ASC NEPM) has been developed at the Commonwealth level to establish a nationally consistent approach for the assessment of site contamination, in order to provide adequate protection of human health and the environment.

### 4.1 National Environment Protection (Assessment of Site Contamination) Measure

The ASC NEPM, made by the National Environment Protection Council under the *National Environment Protection Council Act 1994* (Commonwealth), applies in the NT.

The ASC NEPM provides a framework for assessing contaminated land and the risk it poses to human health and the environment.

The ASC NEPM:

- provides the framework for establishing the necessary competencies for environmental practitioners:
  - carrying out contaminated site assessments (i.e. environmental consultants), and
  - conducting independent or third party reviews of contaminated site assessments (i.e. registered qualified persons (auditors) in the NT)
- provides a minimum level of guidance about how the assessment of contaminated sites should be carried out
- is applicable to both small and large scale projects – there are no thresholds below which the ASC NEPM would not be relevant
- forms the basis of best practice and due diligence in terms of the assessment of site contamination.

For further information on the ASC NEPM, please refer to:

<http://www.scew.gov.au/nepms/assessment-site-contamination>

## 5 How is contaminated land regulated in the Northern Territory?

### 5.1 Role of the NT EPA

The NT EPA is the statutory body established under the *Northern Territory Environment Protection Authority Act* to:

- a) promote ecologically sustainable development
- b) protect the environment, having regard to the need to enable ecologically sustainable development
- c) promote effective waste management and waste minimisation strategies
- d) enhance community and business confidence in the environmental protection regime of the Territory.

The NT EPA is responsible for administering a number of Acts and associated subordinate legislation, including the WMPC Act.

The NT EPA regulates contaminated land in the NT through two pathways:

1. the WMPC Act (pathway one), and
2. input into the development process under the *Planning Act* (pathway two).

## 5.2 Regulation of contaminated sites by the NT EPA via the WMPC Act (regulatory pathway one)

The WMPC Act contains a number of provisions which the NT EPA uses to regulate contaminated land in the NT. Table 1 outlines these provisions.

Where the NT EPA has reasonable grounds for believing that a site is contaminated, the NT EPA may require:

- a **contaminated site assessment** to be undertaken for the site through:
  - a direction issued under section 72 of the WMPC Act, or
  - a pollution abatement notice issued under section 77 of the WMPC Act
- an **environmental audit program** to be undertaken for the site in accordance with section 48 of the WMPC Act. The environmental audit program will include a contaminated site assessment and an environmental audit.

If a Site Audit Statement or Statement or Certificate of Environmental Audit (see section 11.5) issued as part of an environmental audit includes conditions relating to the ongoing management of the site, the NT EPA may include these conditions in a pollution abatement notice issued under section 77 of the WMPC Act.

The WMPC Act makes it an offence to not comply with the conditions, requirements, or actions that are included in an authorised officer direction, pollution abatement notice, or environmental audit program.

**Table 1: Provisions of the WMPC Act relevant to contaminated land regulation**

Section	Description
Section 11	Requires the NT EPA to maintain and make available to the public a register of information including pollution abatement notices, section 14 notifications, and any other information the NT EPA seeks fit to include
Section 12	Specifies that all persons must take all reasonable and practicable measures to prevent pollution or environmental harm
Section 14	Specifies that all persons must notify the NT EPA of incidents causing or threatening to cause pollution
Sections 35 and 38	Allows the NT EPA to include conditions (such as a condition relating to the management of contamination at the site) into an environment protection approval/licence it issues
Section 48	Allows the NT EPA to require a person to carry out an environmental audit program for a site which is contaminated
Section 68	Allows the NT EPA to create a register of qualified persons who are permitted to perform environmental audits
Section 72	Allows an authorised officer of the NT EPA to require a person to prevent or clean up pollution or to treat a contaminant or waste
Section 77	Specifies that the NT EPA may issue a Pollution Abatement Notice to require a person to undertake action in relation to land that is contaminated
Section 83	Specifies that it is an offence if a person causes serious environmental harm, material environmental harm, or environmental nuisance
Section 101	Permits the NT EPA to carry out works necessary to prevent or clean up pollution or environmental harm

Appendix G covers more detailed information about how these instruments may be used by the NT EPA to reduce the potential impacts of land contamination on the environment.

### 5.3 Regulation of contaminated land via the planning process (regulatory pathway two)

The *Planning Act* is the legislation that provides for and regulates planning and development on zoned land in the NT.

The objects of the *Planning Act* inherently include consideration of the appropriate use of land having regard to its capabilities and limitations. Thus, the appropriate consideration of potential site contamination in development decisions is important to ensure that land is fit for its proposed use.

Planning authorities have an important role in reducing the risk of exposure to the public and the environment from site contamination. Principle 5 of the ASC NEPM states that, “*authorities that consent to developments, or changes in land use, should ensure a site that is being considered for development or a change in land use, and that the authorities ought reasonably know if it has a history of use that is indicative of potential contamination, is suitable for its intended use*”.

Under the *Planning Act*, on zoned land a person must submit a planning application to undertake certain development activities, such as a subdivision or change of land use. Under the NT planning process these planning applications are made available for public comment.

Where an application will result in a more sensitive or intensive use of the land (i.e. such as a subdivision or land use change where more people have the potential to be exposed to contaminated land, if it was present at the site), the NT EPA will conduct a review to determine if there is evidence of potential site contamination from current or historical land use(s).

Evidence that may be reviewed includes: the NT EPA Contaminated Land and Environmental Audit Results (CLEAR) register (see section 8.1); information documented on the Integrated Land Information System; aerial imagery; or notifications received or issued under WMPC Act; and any other relevant information available.

If the NT EPA’s review determines that there is the potential for land to be contaminated, it will make recommendations to the Development Consent Authority<sup>4</sup> (DCA) that a contaminated site assessment should be undertaken to ensure that the land is suitable for its intended use. The DCA may include these recommendations as conditions in the development permit.

To satisfy the requirements of the development permit condition, the proponent must submit the outcomes of the assessment to the NT EPA for review and for registration on the NT EPA Contaminated Land and Environmental Audit Results (CLEAR) register (if contamination was found through the assessment).

A flow chart detailing the contaminated site framework under the *Planning Act* is included as Appendix E, and is available at:

[http://www.ntepa.nt.gov.au/data/assets/pdf\\_file/0006/358035/factsheet\\_land\\_dev\\_assess\\_flowchart.pdf](http://www.ntepa.nt.gov.au/data/assets/pdf_file/0006/358035/factsheet_land_dev_assess_flowchart.pdf)

<sup>4</sup> Each of the seven divisions of the DCA (Darwin, Palmerston, Litchfield, Batchelor, Katherine, Alice Springs and Tennant Creek) has a total of five members appointed by the Minister for Lands and Planning. Two members representing the general community and two members nominated by the local authority and an alternate for these two members. The Chairman is appointed as Chairman for all divisions. All members (including the Chairman) are generally appointed for a term of 2 years. Outside of the DCA division areas the Minister for Lands and Planning is the consent authority.

### 5.3.1 Environmental audits

Where contamination is found through the contaminated site assessment, the assessment must be reviewed and audited by an environmental auditor in accordance with the ASC NEPM, which states:

*For land that has been identified as potentially contaminated land and:*

- *where a planning scheme amendment would have the effect of allowing that land to be used for a sensitive use, or*
- *when the use of land is changing to a more sensitive use*

*a consent authority must satisfy itself that the land is suitable for the use by:*

- a) *a Certificate of Environmental Audit*
- b) *a Statement of Environmental Audit, or*
- c) *a Site Audit Statement*

*issued by an environmental auditor stating that the environmental conditions of the site are suitable for the sensitive use (i.e. that the site is suitable for the proposed uses) with or without conditions on the use of the site.*

Generally an environmental audit should be provided as early as possible in the planning process. Where a site is known to be contaminated, a condition requiring an environmental audit to be undertaken may be included in a development permit for the site.

## 6 The duty to notify the NT EPA of contaminated land

### 6.1 Northern Territory legislative requirements

#### 6.1.1 General environmental duty under section 12 of the WMPC Act

The general environmental duty under section 12 of the WMPC Act states:

*a person who:*

- (a) *conducts an activity that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste; or*
- (b) *performs an action that causes or is likely to cause pollution resulting in environmental harm or that generates or is likely to generate waste,*

*must take all measures that are reasonable and practicable to:*

- (c) *prevent or minimise the pollution or environmental harm; and*
- (d) *reduce the amount of the waste.*

Essentially the general environmental duty applies to all persons undertaking activities in the NT or outside the NT that may affect the NT environment. The general environmental duty requires all persons to take all measures that are reasonable and practicable to prevent environmental harm.

Environmental harm is defined in the WMPC Act as or “any potential harm (including the risk of harm and future harm) to or potential adverse effect on the environment, of any degree or duration”.

In terms of contaminated land, the NT EPA considers ‘reasonable and practicable’ measures to be:

1. notifying the NT EPA when becoming aware that land is potentially contaminated
2. ensuring contaminated land is assessed, managed and remediated in accordance with this guideline, and

3. ensuring the proper regulatory approvals are sought when developing land that is contaminated land.

### 6.1.2 Duty to notify of incidents causing or threatening to cause pollution under section 14 of the WMPC Act

Section 14 of the WMPC Act states:

*Where:*

*(a) an incident occurs in the conduct of an activity; and*

*(b) the incident causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm,*

*the person conducting the activity must notify the NT EPA in accordance with subsection (3) as soon as practicable after (and in any case within 24 hours after) first becoming aware of the incident or the time he or she ought reasonably be expected to have become aware of the incident.*

This requirement applies even if reporting an incident might involve admitting to something unlawful. However, to encourage compliance with this provision, section 14 of the WMPC Act provides that this information submitted as part of the notification is not admissible in evidence against the person in a prosecution under the WMPC Act.

In terms of contaminated land, section 14 creates a requirement for a person to notify the NT EPA if they are undertaking an activity that may cause, spread or enhance contamination (such as a spill of a hazardous substance, or earthworks which disturb or expose contaminated soil).

Further details on the requirements for the duty to notify under section 14 of the WMPC Act can be found on the NT EPA website at: <http://www.ntepa.nt.gov.au/waste-pollution/compliance/incidents>

## 6.2 Who should be notifying the NT EPA of contaminated land?

The following people would be required to notify the NT EPA as soon as practicable after they become aware of the potential contamination:

- anyone whose activities have contaminated land
- anyone whose activities have spread or enhanced contamination
- an owner of land that has been contaminated.

**Notification triggers** can include instances of:

- on-site and off-site soil contamination
- contamination of neighbouring land
- asbestos in or on soil
- groundwater or surface water contamination
- vapour intrusion.

The site contamination notification form in Appendix F should be used to inform the NT EPA of contaminated land (including potentially contaminated land).

## 6.3 Determining whether to notify

In terms of potentially contaminated land, a person should notify the NT EPA if:

- an incident occurs that may cause, spread or enhance contamination at a site occurs (i.e. in accordance with section 14 of the WMPC Act)



- if the level of the contaminant in, or on, soil is equal to or above a level of contamination set out in Schedule B1 of the ASC NEPM or other approved guideline value with respect to a current or approved use of the land, and people have been, or foreseeably will be, exposed to the contaminant, or
- the contaminant or a by-product has entered, or will foreseeably enter land, neighbouring land, the atmosphere, groundwater or surface water, and is above, or will potentially be above, a level of contamination set out in Schedule B1 of the ASC NEPM or other approved guidelines, and will foreseeably continue to remain equal to or above that level.

## 6.4 Situations not intended to be captured by the duty to notify

The duty to notify for the purposes of contaminated land is not intended to capture the following:

- widespread diffuse urban pollution that is not attributed to a specific industrial, commercial or agricultural activity
- sites with contaminants that are at levels above the levels in the ASC NEPM but are equal to, or below, the ambient background concentration
- sites on the NT EPA Contaminated Land and Environmental Audit Results (CLEAR) Register
- stockpiles of waste that are subject to the WMPC Act.

## 6.5 Failure to notify

Failure to notify in accordance with section 14 of the WMPC Act is an offence and can lead to prosecution.

Failure to comply with the general environmental duty under section 12 of the WMPC Act does not of itself constitute an offence, however upon becoming aware of an activity that has caused or likely to cause pollution, the NT EPA may issue a pollution abatement notice under section 77 of the WMPC Act to gain compliance. Failure to comply with the requirements of a pollution abatement notice is an offence and can lead to prosecution.

# 7 NT EPA regulatory actions – after notification

## 7.1 NT EPA evaluation of notifications and determination of appropriate regulatory action

Where the NT EPA receives notification of contamination it will assess the information provided and other relevant information to determine whether the contamination or risk of contamination is significant enough to warrant NT EPA regulation i.e. that further action is necessary by invoking pathway one.

The NT EPA has an obligation to respond within a reasonable time to anyone who has provided information about actual or potential contamination of land and record what the NT EPA has done and the reasons for doing it.

## 7.2 Contamination significant enough to warrant NT EPA regulation

The following will be taken into account by the NT EPA in determining whether contamination of land is significant enough to warrant regulation:

- type, nature, quantity and concentration of contaminants, how they manifest themselves, the characteristics they display, and the nature of their impacts in a particular medium
- whether the substances have already caused harm or are likely to cause harm (for example, in the form of toxic effects on plant or animal life)

- whether the substances are toxic, persistent or bio-accumulative, or are present in large quantities or high concentrations, or occur in combinations
- whether there are exposure pathways available to the substances (that is, routes by which the substances may proceed from the source of the contamination to human beings or into the environment)
- current or future use of the land and receptors that might be exposed to the contaminants under that use, and the likelihood of exposure
- whether current any future land use (including any land adjoining it) increase the risk of harm from the substances (for example, using the land for the purposes of child-care, dwellings, or production of food for human consumption)
- whether the substances have migrated, or are likely to migrate, from the land because of the nature of the land or the substances themselves
- the ASC NEPM.

### 7.3 NT EPA decision made that a site warrants regulation

Once the NT EPA determines that the contamination of land is significant enough to warrant regulation, it may take any of a number of actions. These actions could include:

- regulating via the provisions of the WMPC Act as outlined in section 5.2 (pathway one)
- approving proposals from interested parties to manage the land voluntarily
- liaising and negotiating with landowners or land occupiers about appropriate solutions
- undertaking educational and public awareness programs and other measures to minimise the environmental and health implications of the contamination.

The actions taken by the NT EPA will depend on the nature of the site, the use to which it is put, the nature of the risk identified by the NT EPA and the management options available for addressing the risk.

The NT EPA's primary goal in managing contaminated land, where the contamination is significant enough to warrant regulation, is to ensure the risk posed by the contamination is reduced so that the existing land use may continue, or an approved land use may proceed.

### 7.4 Liability for site contamination, assessment and remediation

In certain circumstances, such as where the NT EPA intends to issue one of the instruments specified in section 5.2 of this guideline to require assessment/auditing of a contaminated site, it may be necessary for the NT EPA to determine who is liable for a contaminated site.

The NT EPA adopts the 'polluter pays principle'. This means the 'person' who caused the site contamination is primarily responsible for implementing and funding the assessment, and, if necessary, remediation and audit.

Site contamination is often historic in nature and the person or company that caused the site contamination may not be the same person or company who currently owns or occupies the site.

In order for the polluter pays principle to be successful, the determination of the appropriate person is retrospective in its application. This allows historic site contamination that occurred prior to the commencement of the WMPC Act, to also be addressed.

Where the NT EPA has identified the person who caused the site contamination, it can issue an instrument specified in section 5.2 (such as a pollution abatement notice, or notice to conduct an environmental audit program) to the person to require them to assess and/or remediate the site.



There are circumstances however, where it is not considered practicable to issue an instrument to the person who caused the site contamination. In such cases, the NT EPA may issue the instrument to the site owner<sup>5</sup>, or current or past occupiers of the site.

The WMPC Act also allows the NT EPA to issue an instrument to a person, a body corporate (i.e. a company) or the director of a body corporate if that is the appropriate 'person'.

If there are two or more appropriate 'persons' (for example, multiple polluters), the NT EPA may determine that the instrument be issued to any one, or more, appropriate persons. Two or more people issued with an instrument are jointly and severally liable to comply with the requirements of the order.

Instruments may also be served on a person who has accepted responsibility for the contamination.

Future purchasers of a site may be responsible for complying with an environmental management instrument if a site is subject to one. For example, some instruments are attached to the land title of the site and remain on the land title until all the conditions of the instrument have been complied with in full, or until the instrument is revoked.

Land title information is available to the public through the NT Land Titles Office [http://www.nt.gov.au/justice/bdm/land\\_title\\_office/](http://www.nt.gov.au/justice/bdm/land_title_office/).

### 7.5 Clean up and cost recovery

Under section 101 of the WMPC Act, the NT EPA may recoup the costs it incurs for works it initiates and carries out to prevent or clean up pollution (such as contaminated land) from the person(s) whose actions caused the pollution. Costs incurred by the NT EPA in carrying out action are a debt due and payable to the NT Government.

### 7.6 Requests for extension

Requests for extensions on the submission of reports required through an instrument issued by the NT EPA are to be made in writing to the NT EPA by the party or parties to whom the instrument was issued.

Such requests are to be made as soon as issues with meeting the date of submission are identified and sufficiently prior to the original date for submission to enable consideration of the request. The request must be supported by a reasonable explanation for the delay, and a suitable alternative date must be nominated.

Not all requests for extensions will be approved by the NT EPA. If the date for submission is not met, the party or parties to whom the instrument was issued will be deemed to be non-compliant with the instrument, which is an offence under the WMPC Act.

### 7.7 Review of decisions

In accordance with Part 12, Division 2 of the WMPC Act, a person on whom an instrument has been issued may appeal against the instrument, or against any requirement contained in the instrument. Refer to section 108 of the WMPC Act for timeframes for when an appeal must be lodged (i.e. within 7 or 28 days of the date of issue, depending on the type of instrument issued).

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<sup>5</sup> If the NT EPA cannot locate the person who caused the contamination or the person is unable to pay for works, an instrument may be served on the owner of a site and if, when purchasing it, the owner knew, suspected or should have reasonably suspected that the area of land was or was likely to be a contaminated site.

## 7.8 Where regulation is not warranted

In some circumstances a site may be contaminated, but the NT EPA considers that the contamination is not significant enough to warrant regulation. A site may contain contaminants at levels above the trigger levels but, because of the limited exposure pathways available, the contamination will not be considered significant enough to warrant regulation.

# 8 Contaminated land register and recording of land title

## 8.1 Contaminated land and environmental audit results (CLEAR) register

In accordance with the WMPC Act, the NT EPA must maintain and make available to the public a register of information specified in section 9 and Schedule 1 of the WMPC Act. The register is located on the NT EPA website and consists of the following:

- compliance plans
- pollution abatement notices
- Contaminated Land and Environmental Audit Results (CLEAR) register (included in accordance with subsection 9(1)(c) of the WMPC Act)
- list of qualified persons (in accordance with section 68 of the WMPC Act).

Information on the register can be downloaded from the website, or a request for a hardcopy of the document can be made to the NT EPA.

The NT EPA will keep on the Contaminated Land and Environmental Audit Results (CLEAR) register contaminated sites, including sites that have undergone assessments and/or environmental audits and any certificates or statements issued as a result of the audit.

There can be no guarantee that the NT EPA holds any or all information relating to a contaminated site. If the NT EPA holds no information about a site, this should not be interpreted as meaning that a site is not affected by contamination or pollution.

Persons with an interest in a site should always carry out their own enquiries and/or assessments to ensure that their interest in the site is not compromised by site contamination or pollution.

## 8.2 Information recorded on the land title

In the NT, the Land and Planning Services (within the Department of Lands, Planning and the Environment) maintain the NT Integrated Land Information Services (ILIS). The ILIS provides easy access via the internet to a range of information about land and property in the Northern Territory.

The data available covers the cadastre, land titles, land valuations, land use, planning and development assessment, building control, land administration and land acquisitions for Government purpose.

Factual information about actual or potential contamination at a site (such as outcomes of an environmental audit), will be recorded ILIS.

Information about sites recorded in the ILIS is generally available to the public through a due diligence search. In some cases the information is the intellectual property of the lessee and is only available with the written consent of the lessee. Consent is typically given as part of a conveyancing process (i.e. similar to a building file search).

General public access to the ILIS can be arranged by contacting ILIS Support at [ilis.support@nt.gov.au](mailto:ilis.support@nt.gov.au) or via (08) 8995 5322.

Further information can be accessed at: <http://www.lands.nt.gov.au/land-info/ntlis/support>

## 9 What about other legislation?

This guideline is complemented by other NT environmental programs and legislation aimed at protecting human health and the environment. More detailed information on these is available from Table 2.

**Table 2: Other relevant NT legislation**

Activity	Act	Contact
Handling and storage of dangerous goods	<i>Dangerous Goods Act</i>	NT WorkSafe on 1800 019 115
Land use and design & siting	<i>Planning Act</i>	Department of Lands, Planning and the Environment by calling Development Assessment Services on (08) 8999 6046, or Lands Planning on (08) 8999 8963
Protection of public health	<i>Public and Environment Health Act</i>	Department of Health on 1800 095 646
Protection of workers in the workplace	<i>Work Health and Safety (National Uniform Legislation) Act</i>	NT WorkSafe on 1800 019 115
Water extraction, work in waterways	<i>Water Act</i>	Department of Land Resource Management on (08) 8999 5511
Waste management	<i>Waste Management and Pollution Control Act</i>	NTEPA on (08) 8924 4218 or via the Pollution Hotline on 1800 064 567, or <a href="mailto:ntepa@nt.gov.au">ntepa@nt.gov.au</a>

## 10 The contaminated land assessment and remediation process

Generally, the process of managing contaminated land includes the following:

- site assessment
- site remediation
- audit of assessment and remediation.

### 10.1 What is a Contaminated Site Assessment?

As defined in the ASC NEPM, the purpose of a contaminated site assessment is to determine whether site contamination poses an actual or potential risk to human health and/or the environment, either on or off the site, of sufficient magnitude to warrant remediation appropriate to the current or proposed land use.

Contaminated site assessments may be invoked by both pathways (see sections 5.2 and 5.3).

The assessments should:

- be undertaken in accordance with the ASC NEPM, and
- be undertaken by professionals who have the relevant qualifications, competencies and experience for the site contamination issues relevant under investigation.

The ASC NEPM details a staged approach for the assessment of contaminated sites. It is critical that each stage of site assessment should include the relevant risk assessment (refer to section 10.4 of this guideline for a detailed discussion of the stages of the risk assessment process).

### 10.1.1 Stage 1 – Preliminary Site Investigation

The first stage of contaminated site assessment is the Preliminary Site Investigation (PSI). The PSI is undertaken to identify the characteristics of the site and investigate the site history to establish whether there is the potential for the site to be contaminated.

A PSI should be conducted by a suitably qualified and experienced consultant (see section 10.2).

A PSI usually involves:

- a desktop study to identify the site characteristics (site location, site layout, building construction, geological setting, historical/current land uses and activities at the site and on adjacent sites)
- site inspection
- interviews with site representatives, and
- identification of potential risks and any uncertainties or limitations.

Is it important that a PSI includes a site history review to identify if the site is likely to be contaminated by any potentially contaminating activities which occurred on site, or adjacent to the site. A site history should collate information, from various sources, to determine if the site is hosting or may have hosted a potentially contaminating activity.

Where a site history review **clearly demonstrates** that there is no potential that the site is contaminated, this information can be used to justify not progressing with further assessment.

Where a site history review demonstrates that a site has the potential to be contaminated, a PSI should then determine contaminants of concern and identify areas of potential contamination, including all potential contamination sources. The PSI may also include initial sampling to provide a preliminary assessment of site contamination and need for further investigation.

The information collected as part of the PSI should be used to develop an initial conceptual site model. A conceptual site model is a written or pictorial representation of an environmental system defining the contaminants, their source(s) and the possibly pathways of exposure to human and environmental receptors. Further guidance on conceptual site models can be obtained from the NT EPA web site at:

[http://www.ntepa.nt.gov.au/data/assets/pdf\\_file/0005/349943/guideline\\_pollution\\_conceptual\\_site\\_models.pdf](http://www.ntepa.nt.gov.au/data/assets/pdf_file/0005/349943/guideline_pollution_conceptual_site_models.pdf)

Where a PSI demonstrates that the land is not contaminated or the potential for risk to human health and the environment is limited based on current or intended future land use, there may be no need for further investigation. However, where contaminating activities are suspected or known to have occurred, or if the site history is incomplete, or where contamination requires full delineation to determine the risk as sampling indicates levels above guidelines, it may be necessary to undertake a Detailed Site Investigation.

#### Additional resources:

- for more information refer also to the ASC NEPM Schedule B2
- a property information request may form part of a site history review. A property information request can be made through the Land Titles Office [(08) 8999 6520], [AGD.RegistrarGeneral@nt.gov.au](mailto:AGD.RegistrarGeneral@nt.gov.au). Further details can be obtained on their website at: [http://www.nt.gov.au/justice/bdm/land\\_title\\_office/](http://www.nt.gov.au/justice/bdm/land_title_office/).

### 10.1.2 Stage 2 – Detailed Site Investigation

A Detailed Site Investigation (DSI) involves the taking of samples in the field (from air, soil, groundwater, or other water sources) to confirm the presence or absence of contamination identified or suspected in the PSI.

The ASC NEPM Field Checklist, which is part of the ASC NEPM Toolbox, provides details of the parameters that should be collected in the field based on the objectives of the investigation and the contaminants of concern.

The DSI should:

- involve the development of data quality objectives<sup>6</sup> (DQOs) based on an initial conceptual site model, and
- be undertaken in accordance with a Sampling & Analysis Quality Plan (SAQP).

The SAQP should be developed to generate data to meet the DQOs. A SAQP should set the sampling program and DQOs as well as the quality assurance and quality control methodologies to be employed to manage the field work stage of the assessment.

A number of sampling events may be required to delineate the contamination and determine the risks to human health and the environment. Any additional sampling events or changes to the sampling methodology should be reflected by amending the SAQP.

For more information about DQOs and SAQPs, including what a SAQP should contain, refer to section 5 of Schedule B2 of the ASC NEPM.

The DSI should be comprehensive enough to identify the nature of the contamination and delineate its lateral and vertical extent to a sufficient degree that:

1. an appropriate risk assessment (i.e. of risk to human health and the environment) may be undertaken, and
2. if necessary, to provide the basis for the development of an appropriate remediation or management strategy.

Information collected during the DSI should be used to update the conceptual site model for the site.

The ASC NEPM Toolbox includes a draft document on the 'Key Principles for Remediation and Management of Contaminated Sites' which may be of assistance in determining whether remediation and/or management will be implemented at a site, based on the findings of the DSI.

Where management is proposed for residual contamination and not remediation, the consultant should justify the approach and ensure the management measures are appropriate to the current and/or future use or development of the site.

Note that in accordance with the ASC NEPM (Schedule B6), “the assessment process for groundwater contamination differs from that of land contamination in that there is greater emphasis on suitability for current and realistic future uses, compared with the emphasis on current and intended uses for soil assessment”.

### 10.1.3 Stage 3 - Remediation

If site contamination is found to pose an actual or potential risk as determined by the risk assessment (see section 10.4) to human health and/or the environment, either on or off the site,

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<sup>6</sup> Data quality objectives are qualitative and quantitative statements that define the purpose of site assessment to be undertaken and the type, quantity and quality of data needed to inform decisions relating to the assessment of site contamination

and therefore the site may not be suitable for its current or proposed use, remediation and/or management should be considered.

The method of remediation or management should take into consideration the hierarchy of options for site clean-up and management as defined under Principle 16 (see Figure 1) of the ASC NEPM, and may vary depending on:

- the type and extent of contamination
- where the contamination is (soil, sediments or ground/surface water), and
- the risk that the material poses.

**Principle 16 of ASC NEPM**

**Attainment of environmental outcome**

In general, to achieve the desired environmental outcome, the process of the assessment of site contamination should be placed within the context of the broader site assessment and management process. In particular, in assessing the contamination, the site assessor and others should take into account the preferred hierarchy of options for site clean-up and/or management which is outlined as follows:

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

if the above are not practicable,

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

or,

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

When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.

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

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

**Figure 1: Principle 16 of the ASC NEPM**

Complex remediation should be supported by the development and implementation of a Remedial Action Plan (RAP). The key components of a RAP are:

- identification of the key stakeholders and responsibilities
- development of remediation goals and clean-up acceptance criteria
- assessment of the remediation options and determination of the preferred remediation option
- documentation of the remediation methodology including any regulatory permit/licensing requirements
- development of an Environmental Management Plan, and
- defining the validation program to demonstrate the successful completion of the remediation, including monitoring.



The primary goals of remediation in the NT are to:

1. eliminate or prevent actual or potential harm to health or safety of human beings that is not trivial
2. eliminate or prevent, **as far as reasonably practicable**, actual or potential harm to water that is not trivial
3. eliminate or prevent, **as far as reasonably practicable**, actual or potential environmental harm that is not trivial.

It should be noted that remediation goals 1 and 3 consider the current or proposed land uses for the site.

Refer to Appendix B of this guideline for more information on special cases of remediation.

#### 10.1.4 Stage 4 - Validation

Following remediation, it must be proven that remediation has met the remediation goals and that remnant contamination does not present an unacceptable risk to human health or the environment based on the current or proposed land use, through appropriate sampling of soil, vapour, groundwater, or other water sources. Validation of groundwater requires ongoing groundwater monitoring over a pre-determined period of time.

#### 10.1.5 Stage 5 – Monitoring

Where monitoring is necessary to demonstrate that remediation is occurring or has been successful, monitoring should take into account a range of factors that may affect results, including but not limited to seasonal changes in groundwater levels, artefacts from sampling and changes in conditions due to remediation.

A contingency plan is often required (i.e. a change in remedial method or further remediation) if the chemical levels identified during monitoring exceed a pre-determined trigger level.

### 10.2 Who can conduct a contaminated site assessment?

Contaminated site assessments can only be undertaken by specialist environmental consultants who can draw on a number of disciplines. The consultant must have a range of professional competencies consistent with the requirements of Schedule B10 of the ASC NEPM and must be able to recognise the need for supporting professional advice beyond their expertise when assessing contamination and its effects on human health and/or the environment<sup>7</sup>.

The use of professionals who have the relevant qualifications, competencies and experience is important as contaminated site assessments are inherently complex and usually present a wide range of issues requiring a multi-disciplinary approach (including scientific, technical and project management skills). Contaminated site assessments must also meet relevant standards, quality assurance and regulatory requirements.

In Australia, there are a number of contaminated land practitioner accreditation schemes. While the NT EPA supports these schemes, it does not currently require consultants to be accredited by any of the schemes.

One of these schemes, known as the Site Contamination Practitioners Australia (SCP Australia) aims to provide improved outcomes for all stakeholders involved in site contamination by ensuring, through a recognised certification process, that those dealing with site contamination issues have

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<sup>7</sup> It is accepted that one person may not have all the knowledge required to assess a complex site, therefore their access to relevant expertise in other fields (e.g. toxicology, hydrogeology etc.) is critical to a thorough site assessment. The extent to which these competencies apply depends on the complexity of the contamination issues and the particular site.

the necessary level of knowledge, expertise and skill. A person certified under the SCP Australia scheme may be used to conduct contaminated site assessments.

The list of SCP Australia certified practitioners are available at: <http://scpaustralia.com.au/scp-australia-directory>.

If you do not intend to use a certified practitioner, it is recommended that you refer to Schedule B9 of the ASC NEPM which provides guidance on engaging appropriate consultants to undertake the assessment of contaminated land and prepare assessment reports.

Please refer to section 13 of this guideline for other guidelines that may be useful when engaging a consultant to undertake a contaminated site assessment.

### 10.3 When is a site assessment triggered in the NT?

As discussed, in the NT, a contaminated site assessment can be triggered by:

- regulatory triggers
- planning and development triggers, or
- voluntary triggers.

In all cases, the person proposing to undertake a contaminated site assessment should discuss the proposal with a specialist environmental consultant familiar with contaminated site assessments.

#### 10.3.1 Regulatory triggers

The NT EPA may require that a contaminated site assessment is undertaken for a contaminated site through the WMPC Act (pathway one – see section 5.2 for more information about the regulation of contaminated land via the WMPC Act).

#### 10.3.2 Planning and development triggers

A contaminated site assessment may be required through the planning and development process regulated under the *Planning Act* (pathway two – see section 5.3 for more information about the regulation of contaminated land via the planning process)

#### 10.3.3 Voluntary triggers

The assessment, remediation and auditing of site contamination may also be carried out where there is no legislative requirement to do so. Landowners, occupiers or other interested persons may commission assessments for other purposes including due diligence, transfer of liability, lease hand back, insurance/financial purposes for land acquisition, or divestment and corporate requirements. A voluntary assessment may require an environmental audit depending upon the complexity of the issue(s) and any potential change of land use to a more sensitive use.

### 10.4 Risk Assessments - Overview

Where potential contamination has been identified on a site (as a result of a PSI/DSI), a risk assessment should be undertaken to determine if the contamination has the potential to affect human health or the environment. A risk assessment should be used to determine the appropriate management strategies for a contaminated site, depending on actual and potential risks to human health and the environment (i.e. it should be used to determine if contaminated material should remain on site, be remediated on site, or be removed from the site).

A risk assessment is required for all known contaminated sites in the NT.

Multiple risk assessments (or a number of revised assessments) may be developed for a site depending on:

- what stage of site assessment the site is up to



- the level of information available at the time (e.g. if new information becomes available)
- contaminants of concern found during assessment
- change in conditions (e.g. proposed change of land use)

The primary guidance for conducting health and ecological risk assessments is provided by the ASC NEPM. Contaminated site risk assessments require a high degree of objectivity and scientific skill and should only be carried out by suitably qualified and experienced professionals.

As discussed in section 10.1.1, a conceptual site model should be developed for all the tiers of risk assessment. A conceptual site model is a description of potential sources, pathways and receptors at a given site and is often shown using a diagram. As the risk assessment's complexity increases (higher tier) the conceptual site model's level of detail should also increase to reflect the knowledge of the site.

Depending on the scope of the risk assessment, it may be preferable to present the results in a separate report. All assumptions, input data and calculations should be documented and justified in the report. See also Appendix C of this guideline for a checklist of information that should be included when reporting is provided.

#### 10.4.1 Objectives of risk assessment

A risk assessment should:

- assess the likelihood of exposure to potential contaminants of concern and the severity of the effect of such exposure
- formalise the process of identifying the key issues requiring further consideration
- provide the basis for determining an appropriate management response to eliminate or mitigate the identified unacceptable risks in an appropriate timeframe.

#### 10.4.2 Tiered approach to risk assessment

The ASC NEPM details a tiered approach to risk assessment. Most contaminated site assessments begin with a Tier 1 risk assessment, and progress to Tier 2 or Tier 3 risk assessments if necessary. It is generally expected that Tier 1 and Tier 2 assessments should adequately define elements of risk at the majority of Northern Territory sites, and Tier 3 assessments will only be required at more complex sites.

**Schedule A of the ASC NEPM provides a flowchart (see Appendix I) which depicts the decision-making process for contaminated site assessment as well as the tiered approach to risk assessment and how it relates to the staged process for site assessment.**

Risk assessments involving petroleum hydrocarbons must consider the 'CRC Care Technical Report 10: Health screening levels for petroleum hydrocarbons in soil and groundwater. Application of the CRC CARE HSLs - Interim Guidance Note'.

##### 10.4.2.1 Tier 1 Risk Assessment

A Tier 1 risk assessment is the simplest form of risk assessment and involves comparing concentrations of substances found in soil, air or water against published risk-based criteria in guidelines (such as the investigation and screening levels detailed in Schedule B1 of the ASC NEPM). These guideline criteria are generally based on a wide range of assumptions and conditions. If concentrations of substances are below the accepted criteria, then further assessment of risk is not necessary. If substances exceed the criteria, then a Tier 2 risk assessment should be undertaken. If criteria for a chemical are not available, then a Tier 3 risk assessment may be required.

#### 10.4.2.2 Tier 2 Risk Assessment

A simple modification to published criteria may be required to ensure that the guideline criteria are relevant to a site-specific situation. This will often involve examining the underlying assumptions of the criteria and where appropriate, making simple adjustments to them. The ASC NEPM details the process to be used to adjust/modify guideline criteria. Tier 2 risk assessments may also include basic modelling, such as dispersion calculations. If substances fail these adjusted criteria, a Tier 3 risk assessment may be required.

#### 10.4.2.3 Tier 3 Assessment

A Tier 3 assessment may be required where exceedance of Tier 2 criteria is judged to represent a potentially unacceptable risk to human health. In the tiered approach, simple conservative assumptions are applied in the initial assessment to identify which issues are likely to present the greatest risk, allowing more detailed, site-specific risk assessment to focus on these issues. This allows resources to be focused on the most critical issues associated with a site in a prioritised and defensible manner.

A greater understanding of a site can be achieved by characterising the nature of substances on a site and the pathways where exposure to these substances may occur. This may involve specialised fate and transport modelling, or a detailed toxicity assessment of the specific chemicals. Site-specific criteria may be developed through these methods, however detailed justification of the development and use of any derived criteria must be developed in accordance with the ASC NEPM and be provided to the NT EPA when being relied upon in an assessment.

### 10.5 Minimum standards for reporting on contaminated sites

Contaminated site assessments and the preparation of assessment reports are to be undertaken:

- in accordance with the ASC NEPM (as varied from time to time)
- by appropriate professionals who have the qualifications, competencies and experience to a level appropriate to the contamination issues relevant to the site under investigation.

For example, the key components of site contamination investigations as described in Schedule B2 of the ASC NEPM are as follows:

- desktop studies
- site inspection
- site history
- development of a conceptual site model (CSM)
- identification of data gaps
- development of data quality objectives (DQO)
- design of a sampling strategy, and sampling and analysis quality plans (SAQP)
- data collection
- data validation, analysis and interpretation, including risk assessment and iterative development of the CSM
- coherent accurate and reliable reporting.

Appendix C of this guideline provides a checklist that can be used for assessment and remediation reporting.

Any deviations from the ASC NEPM must be appropriately justified. Reports may be rejected by the NT EPA where:

- the ASC NEPM has not been followed

- the use of appropriate standards and guidelines has not been demonstrated in undertaking the contaminated site assessment.

## 10.6 Quality Assurance and Quality Control

As detailed in Schedule B2 of the ASC NEPM, quality assurance and quality control (QA/QC) are essential elements of the systematic planning process and should be documented in the Sampling Analysis and Quality Plan (SAQP).

As advised by the ASC NEPM, chemical analyses should be performed using approved standard methods and should be performed by laboratories accredited for the analyses in the particular environmental medium (i.e. soil, water, gas). Field testing should be performed by appropriately skilled personnel using approved standard methods.

Please note that in accordance with AS 4482.1 - 2005 *Guide to the investigation and sampling of sites with potentially contaminated soil*, for every 20 samples taken, one set of blind duplicate samples should be taken. Therefore, even when a sample set is small, for instance one or two samples, a blind duplicate is required. These duplicate samples should be submitted to the laboratory as individual samples without any indication to the laboratory that they have been duplicated.

Sample handling and storage are also important elements of the QA/QC process. Holding times are the recommended maximum period of time a sample is stored before sample extraction. The holding times listed in Table 1 of Schedule B3 of the ASC NEPM are a guideline only – the integrity of the sample and reliability of results will depend not only on the length of time the sample has been stored, but also conditions of the sample handling, preservation and storage. All tests should be carried out as soon as practicable after sampling, and it is recommended that at least half the holding time remains when received by the laboratory.

Assessment reports should include a copy of QA/QC documentation, including those listed in section 14.9 and 19.9 of Schedule B2 of the ASC NEPM.

Further information on QA/QC is available in:

- Section 5.4 of Schedule B2 of the ASC NEPM
- Appendix C of Schedule B2 of the ASC NEPM, which includes a QA/QC checklist.

## 10.7 False or misleading information

Consultants and auditors are, in many cases, reliant on the accuracy and completeness of the information that is provided to them. The information is used to design and/or review assessment or remediation programs. If the information provided is misleading, incomplete or deficient, then the assessment/remediation outcomes and conclusions by the consultant or auditor may be significantly incorrect or flawed.

If the NT EPA becomes aware that a person has intentionally supplied misleading information in a contaminated land assessment, the NT EPA will investigate the matter in accordance with the WMPC Act and will, where appropriate, instigate regulatory action (which may include criminal prosecution).

Severe penalties exist for auditors in relation to conflicts of interest and providing false or misleading statements under the WMPC Act.

In addition, auditors are subject to the legislation in the jurisdiction where they are registered.

## 11 Environmental audits

### 11.1 What is an environmental audit?

An environmental audit is an independent review of the conditions of a site by an accredited environmental auditor (i.e. qualified person as defined in Part 9 of the WMPC Act) to determine the suitability of the site for its particular use(s), or proposed future use(s).

The auditor must assemble sufficient information to form a reliable opinion regarding the conditions of a site to determine any risks to human health or environment associated with any residual contaminants remaining at the site. Such information may include historical and current site use information and the results of sampling and analysis of soil, groundwater, surface water and soil vapour.

An audit can be conducted for the purpose of determining any one or more of the following matters:

- the nature and extent of any contamination of the land
- the nature and extent of the assessment and/or remediation
- what assessment and/or remediation remains necessary before the land is suitable for any specified use(s)
- the comprehensiveness of a RAP for contaminated land
- any on-going site management requirements (e.g. site environmental management plan or groundwater monitoring management plan).

In general, an auditor will review the site assessment work compiled by the environmental consultant.

### 11.2 Environmental audit and accreditation system

The NT does not have an environmental auditor and accreditation system in its own right. Instead, the NT relies heavily on the systems developed in New South Wales and Victoria. The two systems are slightly different, with differing terms and outcomes. This guideline uses the terms 'environmental audit' and 'environmental auditor' from the Victorian system rather than the terms 'site audit' and 'site auditor' used in the New South Wales system.

### 11.3 Who can undertake an environmental audit?

An environmental auditor is an expert professional registered by the NT EPA (in accordance with Part 9 of the WMPC Act) to undertake an independent review of contaminated site assessment and/or remediation work carried out by an environmental consultant to determine the suitability of a site for its current or future use(s). Only a person, registered by the NT EPA, can carry out an environmental (or contaminated site) audit.

Auditors are the only persons considered by the NT EPA as qualified to provide an opinion on the suitability of land for sensitive use where site contamination is suspected or known to exist.

Only a natural person (i.e. an individual and not a corporation) may be granted registration.

As the NT does not have its own environmental auditor accreditation scheme, the auditors accreditation through the schemes of New South Wales (under the *Contaminated Land Management Act 1997*) or Victoria (under the *Environment Protection Act 1970*), are considered to be registered in the NT in accordance with the WMPC Act.

A list of accredited auditors can be viewed on the NT EPA web site at:

<https://ntepa.nt.gov.au/waste-and-pollution/compliance-and-investigations/environmental-audits/register-of-qualified-persons>

Under the WMPC Act, it is a criminal offence for a person to hold himself or herself out as an environmental auditor unless that person is registered by the NT EPA.

In exercising their functions and duties under the WMPC Act, auditors owe a primary duty of care to the environment and to the health and safety of the people of the Northern Territory above all others (including any duty to the person who has commissioned them to conduct the audit).

The independence and integrity of the auditor are fundamental aspects of the audit system.

Auditors must be able to demonstrate that:

- the audits they carry out are not subject to a conflict of interest – **an auditor cannot carry out an audit if they were involved in the assessment and/or remediation of a particular site**
- they have exercised their own professional judgment, and
- the opinions they express in the audit documentation have been reached independently.

An auditor preparing an audit of an assessment and/or remediation must consider:

- the provisions of the WMPC Act and WMPC Regulations
- the permitted and approved uses of the land to which the assessment relates to so that it ensures compatibility with land use policy and legislative requirements in the NT
- the degree or extent of contamination
- the ASC NEPM, and
- any relevant guidelines, policies, standards and industry best practice.

Any conditions applying to a person accredited as a contaminated land auditor by another State or Territory applies to that person when conducting an audit in the NT. This includes any of the compliance requirements of the relevant legislation of those jurisdictions.

### 11.4 When is an environmental audit necessary in the NT?

Similarly to section 10.3, in the NT an environmental audit may be initiated by:

- **regulatory triggers** – the NT EPA may require that an environmental audit is undertaken for a contaminated site through the WMPC Act (pathway one).
- **planning and development triggers** – an environmental audit may be required through the planning and development process regulated under the *Planning Act* (pathway two).
- **voluntary triggers** – a voluntary contaminated site assessment may require an environmental audit, depending upon the complexity of the issue(s) and any potential change of land use to a more sensitive use.

In the Northern Territory it is a standard requirement for contaminated site assessment involving stages 2 – 5 (see section 10.1.2 to 10.1.5) to be reviewed by an environmental auditor.

Generally, the NT EPA will take a precautionary approach where past activities at a site may have resulted in land contamination, and will in most instances require that an environmental audit be conducted to ensure the accuracy of any assessment and/or remediation.

Where an audit is planned for site, the NT EPA recommends that an auditor is engaged as early as possible.

The NT EPA may, by notice in writing, require an auditor to provide further information relating to a specific assessment or remediation. This may be the case where the NT EPA wishes to verify the findings of the audit or where more information is required to satisfy community concerns.



If a change in lease purpose or land use for the site is proposed, then the proposal should be discussed with the Department of Lands, Planning and Environment [Development Assessment Services; email: das.dlpe@nt.gov.au or (08) 8999 6046] and the NT EPA.

## 11.5 Outcomes of an environmental audit

Table 3 outlines the reports that may be issued by an auditor, relevant to the state where the auditor is accredited. These reports/audits have been adopted for use in the NT.

**Table 3: Outcomes of an environmental audit relevant to the state where the auditor is accredited**

New South Wales	Victoria
<b>Site Audit Report</b> – is a summary of the information reviewed by the auditor. The Site Audit Report should provide the basis and rationale for the conclusions contained in the Site Audit Statement	<b>Final Audit Report</b> – is a summary of the information reviewed by the auditor. The Final Audit Report should provide the basis and rationale for the conclusions contained in the Certificate of Environmental Audit or the Statement of Environmental Audit.
<b>Site Audit Statement</b> – is a summary of the findings of the audit, including the auditor's evaluations and conclusions. A Site Audit Statement may include conditions relating to the ongoing management of the site.	<b>Certificate of Environmental Audit</b> – is a summary of the findings of the audit, and issued when the auditor is of the opinion that the site is suitable for any beneficial use and that there are no restrictions on use of the site due to its environmental condition.
	<b>Statement of Environmental Audit</b> – is a summary of the findings of the audit, and issued when the auditor is of the opinion that there is, or may be, some restriction on use of the site due to its environmental condition.  A Statement of Environmental Audit may include conditions relating to the ongoing management of the site.

Draft audit statement/certificates and audit reports must be submitted to the NT EPA for comment prior to the submission of the final documents.

The resultant audit certificates/statements serve as an assurance to owners/occupiers of the site, the community and the Government that the site is suitable for a particular land use or range of uses.

## 12 Issues to be considered during contaminated land assessment and remediation

### 12.1 Work health and safety

There should be appropriate work health and safety measures (including training) in place for any personnel involved in the assessment and remediation of site contamination in accordance with applicable work health and safety legislation (refer to the NT *Work Health and Safety (National Uniform legislation) Act*).

## 12.2 Protection of the environment during assessment and remediation

There should be appropriate protection of the environment during site assessment and remediation.

Guidance on minimum measures that should be adopted to ensure the protection of the environment during site assessment and remediation are provided in section 15 of Schedule B2 of the ASC NEPM.

Causing environmental harm is an offence under the WMPC Act and severe penalties may apply. The WMPC Act places a clear obligation on all persons to prevent pollution. For additional information, refer to the NT EPA *'Compliance and Enforcement Policy'*.

### 12.2.1 Site management during assessment and remediation

Careful planning and implementation of site management measures during the assessment and remediation phases, together with appropriate community engagement, are essential to ensure that disturbance of contamination does not result in a risk to human health or the environment, or cause a nuisance to the surrounding community.

The site management measures to be adopted should be documented in the SAQP, the RAP, or in a stand-alone Site Management Plan (SMP) report, as appropriate for the scale of the operation. A SMP should only outline management measures to be adopted during assessment and remediation, as opposed to measures required for ongoing management of the site, which are to be included as conditions in the Site Audit Statement/Statement/Certificate of Environmental Audit.

For further information about key considerations for the management of the site during assessment and remediation, refer to Appendix D of this guideline.

Schedule B8 of the ASC NEPM should also be consulted for guidance on community engagement and risk communication.

### 12.2.2 Dust and odours

Dust and odours generated during the contaminated land assessment or remediation works need to be managed at their source. Both odours (which may be hazardous vapour) and dust (which may be contaminated with a hazardous chemical) pose a risk to human health and the environment. Non-hazardous odours and dust can also create nuisance impacts for the local community.

Air quality monitoring at the site boundary should be undertaken if the risks associated with potential odour and dust emissions are significant.

The WA DoH (2009) asbestos guidelines provide guidance on dust monitoring methods and principles, including where the contaminant of concern at a site is asbestos.

Odour management should include the use of contemporary odour mitigation measures, such as odour suppressants, foggers and biodegradable foams.

Additional information on managing dust and nuisance/noxious odours can be found in the document titled, *'A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities'* WA Department of Environment and Conservation (available via [www.der.wa.gov.au/contaminatedsites](http://www.der.wa.gov.au/contaminatedsites)).

### 12.2.3 Water management

Water management should be considered during the planning stage of site assessment/remediation and appropriate measures should be implemented to ensure that potential run-off, leachate or wastewater generated at the site does not enhance or spread contamination – within or off the site.

A discharge of contaminated soil and/or water to the environment, either directly or indirectly (such as via the stormwater or drainage system), may be considered an offence under the WMPC Act.

Recycling water for dust suppression of stockpiles is considered acceptable where it can be demonstrated that it will not cause unacceptable risks to human health or the environment.

Wastewater/leachate from a site should be treated on-site where possible. Where this is not possible, potential options for wastewater/leachate disposal or treatment include:

- disposal to sewer (Power and Water Corporation need to be consulted to gain approval for this option)
- off-site treatment and/or disposal (subject to the requirements outline in section 12.2.6 below).

### 12.2.4 Noise and vibration

Noise and vibration generated at a site can pose a potential health risk to workers, cause a nuisance to the local community and cause damage to infrastructure and property. Potential sources of noise and vibration include earthmoving and drilling equipment, trucks and other mobile equipment, as well as fixed plant such as pumps and generators.

Potential noise issues should be addressed to ensure they do not cause an offence (such as environmental nuisance) under the WMPC Act.

The use of broad-band beepers or non-acoustic warning systems on mobile plant should be considered.

### 12.2.5 Stockpile management during assessment/remediation

Contaminated soil may need to be stockpiled while awaiting results of laboratory analysis for its characterisation, or before transport to another site for re-use, treatment or disposal. Soil stockpiles, if not correctly managed, can represent a considerable source of dust, due to their height, uncompacted nature and close proximity to sensitive receptors such as residential properties, child care centres, schools or public open spaces.

Guidance on the characterisation of stockpiled materials is provided in section 7.5 of Schedule B2 of the ASC NEPM.

To prevent potential re-contamination of the site or adverse impacts to the surrounding environment the NT EPA expects the following issues to be considered by the consultant, remediation practitioner and/or auditor when stockpiling soil at a site:

- maintaining a log of stockpile locations, their origins, relevant sample locations and sample results, and transport details off site
- use of an effective liner or sealed surface in combination with bunding to prevent run-off or soil erosion
- restricting the maximum height of a stockpile to be generally less than 3 metres, or lower than boundary fence heights when within about 5 metres of the boundary
- avoiding locating stockpiles:
  - adjacent to, or in close proximity to, site boundaries
  - in close proximity to sensitive receptors
- ensuring stockpiles remain on site for the shortest amount of time
- maintaining an effective dust and/or odour mitigation cover
- maintaining appropriate soil moisture content to reduce dust emissions (particularly during handling).



Water can be applied to soil to minimise dust prior to excavation or handling activities, and sufficient time should be allowed for water to infiltrate the soil or stockpile.

Consultants, remediation practitioners and auditors should consider the efficacy of using water jets or sprays to manage airborne dust, especially when handling stockpiles in open areas and in the vicinity of sensitive receptors.

#### 12.2.6 Transportation

Transportation of contaminated materials may be required when materials are to be moved around a site, or moved off-site for treatment, re-use or disposal. Whatever level of contamination is present, materials should be transported in a manner that ensures there is no spillage from the vehicle and contamination is not spread to uncontaminated areas.

If contaminated material is a 'listed waste' (as defined under WMPC Regulations), then the material can only be:

- transported off-site by a person/company who holds an environment protection licence issued by the NT EPA to transport listed waste, and
- accepted by a person/company who holds an environment protection licence issued by the NT EPA to dispose or treat listed waste.

Documentation of the volumes taken off site, the nature of the materials, licences (such as environment protection licences) and acceptance receipts from the receiving facility should be included in the relevant audit report.

## 13 Additional helpful references

There are numerous other policies, guidelines, standards and general reference documents available that deal with contaminated land assessment and remediation. Some of these are of a general nature while others refer to specific types of activities known to cause contamination.

Currently, there are no policies, guidelines, standards or procedures prescribed under the WMPC Act. Nonetheless, the guidelines and references listed below constitute a good reference source and should be used, as appropriate, for contaminated land assessment or remediation.

*Note: the ASC NEPM only deals with the assessment of site contamination and does not provide guidance on the remediation and management of contaminated land. The ASC NEPM was developed to provide a nationally consistent approach to the assessment of site contamination.*

### ACT publications:

[http://www.environment.act.gov.au/environment/environment\\_protection\\_authority/business\\_and\\_industry/contaminatedsites](http://www.environment.act.gov.au/environment/environment_protection_authority/business_and_industry/contaminatedsites)

- Contaminated Sites Environment Protection Policy, 2009
- ACT's Environmental Standards: Assessment and Classification of Liquid and Non-liquids Wastes, June 2000

### Australian Standards: <http://www.standards.org.au/Pages/default.aspx>

- AS 4482.1 – 2005 Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds
- AS 4482.2 – 1999 Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile substances
- AS 4361.2-1998 : Guide to lead paint management - Residential and commercial buildings
- AS/NZS 5667.11:1998 Water quality – Sampling, Part 11: Guidance on sampling of groundwaters
- AS/NZS 5667.1:1998 Water quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
- AS 4897 – 2008 The design, installation and operation of underground petroleum storage systems
- AS 4976 – 2008 The removal and disposal of underground petroleum storage tanks

### ANZECC, ARMCANZ, enHealth and NHMRC publications

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Paper No. 4, October 2000
- Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council, January 1992
- Financial Liability for Contaminated Sites Remediation: A Position Paper, Australian and New Zealand Environment and Conservation Council, 1994
- Guidelines for Groundwater Protection in Australia, Agriculture and Resources Management Council of Australia and New Zealand & Australian and New Zealand Environment and Conservation Council, 1995
- National Water Quality Management Strategy, Australian Drinking Water Guidelines 6, 2004, National Health and Medical Research Council, Natural Resources Management Ministerial Council, 2004

- Guidelines for the Assessment of On-Site Containment of Contaminated Soil, Australian and New Zealand Environment and Conservation Council 1999
- Management of Asbestos in the Non-occupational Environment, enHealth 2005

**Victorian publications:** <http://www.epa.vic.gov.au/your-environment/land-and-groundwater/contaminated-site-management>

- Environmental Auditing of Contaminated Land, Publication 860.1, EPA Victoria 2007
- State Environment Protection Policy (Prevention and Management of Contaminated Land), EPA Victoria 2002
- State Environment Protection Policy (Groundwaters of Victoria), EPA Victoria 2002
- Guidelines on the Design, Installation and Management Requirements for Underground Petroleum Storage Systems (UPSSs), Publication 888.2, EPA Victoria 2013
- Guidelines on the Design, Installation and Management Requirements for Underground Petroleum Storage Systems (UPSSs), Publication 888.2, EPA Victoria 2013
- Potentially Contaminated Land General Practice Note, Victoria Department of Sustainability and Environment, 2005

**NSW publications:** <https://www.epa.nsw.gov.au/clm/>

- Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report, NSW EPA, 1999
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), NSW DEC, 2006
- Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land, NSW EPA, 1997
- Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land, NSW EPA, 1995
- Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW EPA, 2005
- Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA 1997
- Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008
- Technical Note: Investigation of Service Station Sites, NSW EPA 2014
- Waste Classification Guidelines Part 1: Classifying waste, NSW EPA 2014

**NT EPA publications:** <http://www.ntepa.nt.gov.au/waste-pollution/guidelines>

- Asbestos Disposal in the Northern Territory
- Conceptual Site Models
- Consultants Reporting on Contaminated Sites
- Guideline for the Preparation of an Environmental Management Plan
- Noise guidelines for development sites
- Fact Sheet: How to avoid the dangers of accepting illegal fill onto your land

- Compliance and enforcement policy

**South Australian Publications:** [http://www.epa.sa.gov.au/environmental\\_info/site\\_contamination](http://www.epa.sa.gov.au/environmental_info/site_contamination)

- Guideline for the assessment and remediation of site contamination
- EPA Guidelines for assessment of underground storage systems

**Tasmanian Publications:** <http://epa.tas.gov.au/regulation/contaminated-sites>

- Environmental Management and Pollution Control (UPSS) Regulations 2010
- Information Bulletin 101 – Notification of a Contaminated Site
- Information Bulletin 112 – The ‘Sign –off’ Process
- Information Bulletin 114 – Guide to Engaging an ESA Consultant

**Western Australian publications:** <https://www.der.wa.gov.au/your-environment/contaminated-sites/61-contaminated-sites-guidelines>

- Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (joint publication with DoH), 2009
- Identification, reporting and classification of contaminated sites in Western Australia (Draft 2015)
- Assessment and management of contaminated sites, 2014
- Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), 2016
- Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, WA Department of Health, 2009
- A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities, WA Department of Environment and Conservation, January 2011.

#### **Further reading and reference documents**

- Other reference guidelines and documents may be relevant to and useful for the assessment and remediation of site contamination assessment and remediation. It is the responsibility of consultants and auditors to identify and utilise such documents where relevant. The ASC NEPM includes references to documents that provide supporting or further information. Consultants and auditors are expected to have regard to these references as appropriate.
- The CRC CARE (Cooperative Research Centre for Contamination Assessment and Remediation of the Environment) has published a series of technical reports. Several of these technical reports are referenced in the ASC NEPM. The technical reports are available through the CRC CARE website: <http://www.crccare.com/publications/technical-reports>. Other national publications considered relevant are also referenced as appropriate in this and other EPA guidelines.

## 14 Glossary of terms and abbreviations

The definitions of the terms listed in this glossary terms and abbreviations are provided to assist in reading this guideline.

Term	Definition
ASC NEPM	<i>National Environment Protection (Assessment of Site Contamination) Measure 1999</i>
Auditor	In relation to an environmental audit program, means a person who carries out an environmental audit for the purposes of the program.
Authorised officer	Means an authorised officer appointed under section 70 of the WMPC Act.
Compliance plan	A compliance plan approved under section 61 of the WMPC Act.
Contaminant	A solid, liquid or gas or any combination of such substances and includes: <ul style="list-style-type: none"> <li>(a) noise, odour, heat and electromagnetic radiation</li> <li>(b) a prescribed substance or prescribed class of substances; and</li> <li>(c) a substance having a prescribed property or prescribed class of properties.</li> </ul>
DQO	Data quality objectives
Environment	Means land, air, water, organisms and ecosystems and includes: <ul style="list-style-type: none"> <li>(a) the well-being of humans;</li> <li>(b) structures made or modified by humans;</li> <li>(c) the amenity values of an area; and</li> <li>(d) economic, cultural and social conditions.</li> </ul>
Environment protection approval	An approval granted under section 34 of the WMPC Act.
Environment protection licence	Means: <ul style="list-style-type: none"> <li>(a) an environment protection licence granted under section 34 of the WMPC Act; or</li> <li>(b) a licence that is to be taken to be an environment protection licence by virtue of section 44(3) of the WMPC Act.</li> </ul>
Environmental audit	Has the meaning given in section 47 of the WMPC Act.
Environmental audit program	An environmental audit program specified in a notice under section 48 of the WMPC Act or an order under section 49 of the WMPC Act.
Environmental harm	Means: <ul style="list-style-type: none"> <li>(a) any harm to or adverse effect on the environment; or</li> <li>(b) any potential harm (including the risk of harm and future harm) to or potential adverse effect on the environment, of any degree or duration and includes environmental nuisance.</li> </ul>

Term	Definition
Environmental nuisance	Means: <ul style="list-style-type: none"> <li>(a) an adverse effect on the amenity of an area that:               <ul style="list-style-type: none"> <li>i. is caused by noise, smoke, dust, fumes or odour; and</li> <li>ii. unreasonably interferes with or is likely to unreasonably interfere with the enjoyment of the area by persons who occupy a place within the area or are otherwise lawfully in the area; or</li> </ul> </li> <li>(b) an unsightly or offensive condition caused by contaminants or waste.</li> </ul>
Environment protection objectives	An environment protection objective under Part 4 as amended and in force from time to time.
Land	Includes water and air on, above and under land.
Licence	Means a licence granted under the WMPC Act.
Listed waste	A waste prescribed for the purposes of this definition.
Material environmental harm	Environmental harm that: <ul style="list-style-type: none"> <li>(a) is not trivial or negligible in nature;</li> <li>(b) consists of an environmental nuisance of a high impact or on a wide scale;</li> <li>(c) results, or is likely to result, in not more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or</li> <li>(d) results in actual or potential loss or damage to the value of not more than \$50,000 or the prescribed amount (whichever is greater).</li> </ul>
NT EPA	The Northern Territory Environment Protection Authority (established in accordance with the <i>Northern Territory Environment Protection Authority Act</i> ).
Occupier	Means: <ul style="list-style-type: none"> <li>(a) in relation to premises – a person who occupies or controls the premises, whether or not he or she owns them; or</li> <li>(b) where different parts of premises are occupied by different persons, in relation to a part of premises – the person who occupies or controls that part of the premises, whether or not he or she owns the premises,</li> </ul> but does not include a mortgagee in possession of the premises unless the mortgagee assumes active management of some or all activities on the premises.
Owner	In relation to premises, does not include a mortgagee in possession of the premises unless the mortgagee assumes active management of some or all activities on the premises
Performance Agreement	A performance agreement entered into under section 66 of the WMPC Act.
Pollute	Means:



Term	Definition
	<ul style="list-style-type: none"> <li>(a) emit, discharge, deposit, or disturb, directly or indirectly, a contaminate or waste; or</li> <li>(b) cause, permit or fail to prevent, directly or indirectly, the emission, discharge, deposition, disturbance or escape of a contaminant or waste.</li> </ul>
Pollution	<p>Means:</p> <ul style="list-style-type: none"> <li>(a) a contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes; or</li> <li>(b) a contaminant or waste, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance of a contaminant or waste.</li> </ul>
Pollution abatement notice (PAN)	A notice issued under section 77 or 78 of the WMPC Act.
Premises	Includes equipment, plant and structures, whether stationary or portable, and the land on which premises are situated.
Qualified person	See section 69(1) of the WMPC Act
QA/QC	Quality assurance and quality control
RAP	Remedial Action Plan
Residential premises	In relation to premises that are used for both residential and non-residential purposes, only includes that part of premises that are used only for residential purposes.
SAQP	Sampling and analysis quality plan
Serious environmental harm	<p>Environmental harm that is more serious than material environmental harm and includes environmental harm that:</p> <ul style="list-style-type: none"> <li>(a) is irreversible or otherwise of a high impact or on a wide scale;</li> <li>(b) damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance;</li> <li>(c) results or is likely to result in more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or</li> <li>(d) results in actual or potential loss or damage to the value of more than \$50,000 or the prescribed amount (whichever is greater).</li> </ul>
Waste	<p>Means:</p> <ul style="list-style-type: none"> <li>(a) a solid, a liquid or a gas; or</li> <li>(b) a mixture of such substances,</li> </ul> <p>that is or are left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.</p>
WMPC Act	<i>Waste Management and Pollution Control Act</i>

Term	Definition
WMPC Regulations	<i>Waste Management and Pollution Control (Administration) Regulations</i>

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## APPENDIX A: LIST OF POTENTIALLY CONTAMINATING ACTIVITIES

The list provided is not exhaustive and it may be necessary to consider whether other contaminants could be present as a result of the activities carried out at or near the site or whether other contaminants could be present at the site. The exact level of risk of site contamination associated with any particular industrial, commercial or agricultural practice will depend upon the standard of management, including the past regulatory framework and safety procedures employed at individual sites.

Industry, activity or land use	Common contaminant types
<b>Abattoirs and animal processing works</b>	<ul style="list-style-type: none"> <li>• Also refer to tannery and associated trades</li> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Biological oxygen demand</li> <li>• Total suspended solids</li> <li>• Oil and grease</li> <li>• Pesticides and metals (by-products of rendering)</li> </ul>
<b>Abrasive blasting</b>	<ul style="list-style-type: none"> <li>• Dependent on material being removed</li> <li>• Metals (e.g. iron, lead)</li> <li>• Tributyltin (boat yards/boat maintenance)</li> </ul>
<b>Acid/alkali plant, formulation and bulk storage</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. mercury)</li> <li>• Acids (e.g. hydrochloric, nitric, sulfuric sodium)</li> <li>• Alkalis (e.g. sodium and calcium hydroxide)</li> </ul>
<b>Airports, airstrips, aerospace facilities</b>	<ul style="list-style-type: none"> <li>• Also refer to firefighting/training (use of foams)</li> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene and xylene)</li> <li>• Metals (e.g. aluminium, chromium, lead, magnesium)</li> <li>• Solvents (e.g. trichloroethene)</li> <li>• Also refer firefighting/training (use of foams)</li> </ul>
<b>Analysts, analytical laboratory sites (e.g. research, commercial, mine site)</b>	<ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethene)</li> <li>• Acids</li> <li>• Metals</li> </ul>
<b>Asbestos production or disposal</b>	<ul style="list-style-type: none"> <li>• ACM</li> <li>• Asbestos fibres</li> </ul>
<b>Asphalt or bitumen manufacture or bulk storage</b>	<ul style="list-style-type: none"> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene and xylenes)</li> <li>• Polycyclic aromatic hydrocarbons (e.g. creosote)</li> <li>• Metals (e.g. chromium, lead)</li> </ul>
<b>Automotive repair, engine works and spray painting</b>	<ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethene)</li> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. toluene, xylenes,</li> </ul>

Industry, activity or land use	Common contaminant types
	<ul style="list-style-type: none"> <li>white spirit)</li> <li>• Phenol</li> <li>• Chlorofluorocarbons</li> <li>• Metals (e.g. copper, chromium, lead, zinc)</li> <li>• Alkalis</li> <li>• Acids (e.g. sulfuric, phosphoric)</li> </ul>
<b>Battery manufacturing, recycling, disposal</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. antimony, cadmium, cobalt, lead, manganese, nickel, mercury, silver, zinc)</li> <li>• Acids (e.g. sulfuric, hydrochloric)</li> </ul>
<b>Biosolids application, muck spreading, organic fertiliser application</b>	<ul style="list-style-type: none"> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Metals (aluminium, arsenic, cadmium, chromium, cobalt, lead, nickel, potassium, zinc)</li> <li>• Phenols</li> <li>• Pathogens (e.g. E. coli, Enterococci)</li> </ul>
<b>Boat building and maintenance</b>	<ul style="list-style-type: none"> <li>• Also refer to Automotive repair</li> <li>• Metals (e.g. copper, chromium, lead, mercury, zinc)</li> <li>• Antifouling paints (e.g. organotin, tributyltin)</li> </ul>
<b>Brake lining manufacturer</b>	<ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Copper</li> </ul>
<b>Breweries/distilleries</b>	<ul style="list-style-type: none"> <li>• Alcohol (e.g. ethanol, methanol, esters)</li> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Biological oxygen demand (BOD)</li> </ul>
<b>Brickworks</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. ammonium, arsenic, cadmium, mercury, lead)</li> <li>• Polycyclic aromatic hydrocarbons (e.g. coke, tars)</li> </ul>
<b>Cement/concrete/lime manufacturing or batching</b>	<ul style="list-style-type: none"> <li>• Lime, calcium hydroxide, alkalis</li> <li>• Hydrocarbons Asbestos</li> <li>• Metals (e.g. nickel, zinc)</li> </ul>
<b>Cemeteries</b>	<ul style="list-style-type: none"> <li>• Nitrates</li> <li>• Heavy metals, lead</li> <li>• Formaldehyde</li> <li>• Biological hazards</li> </ul>
<b>Chemical manufacturing, blending, mixing, handling or storage</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. mercury)</li> <li>• Acids (sulfuric, hydrochloric, nitric)</li> <li>• Sodium and calcium hydroxides</li> </ul>
	<ul style="list-style-type: none"> <li>• Polyvinyl acetate (e.g. adhesives)</li> <li>• Phenol</li> <li>• Formaldehyde (e.g. resins)</li> <li>• Phthalate esters</li> <li>• Polychlorinated biphenyls</li> </ul>

Industry, activity or land use	Common contaminant types
<b>Dyes/inks</b>	<ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethene)</li> <li>• Metals (e.g. cadmium, chromium, cobalt, lead, titanium, zinc)</li> <li>• Solvents (e.g. trichloroethene)</li> <li>• Cresols</li> <li>• Chlorinated hydrocarbon (e.g. 1,1,1-trichloroethane, cis1, 2-dichloroethene)</li> </ul>
<b>Fertilisers</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. boron, cadmium, cobalt, copper, magnesium, molybdenum, zinc)</li> <li>• Calcium phosphate, calcium sulfate, nitrates, ammonium sulfate, carbonates, potassium</li> <li>• Pentachlorophenol</li> </ul>
<b>Flocculants</b>	<ul style="list-style-type: none"> <li>• Aluminium</li> </ul>
<b>Foam (e.g. polyurethane)</b>	<ul style="list-style-type: none"> <li>• Urethane</li> <li>• Formaldehyde</li> <li>• Styrene</li> </ul>
<b>Fungicides</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. chromium, copper chloride/sulfate, zinc)</li> <li>• Carbamates</li> <li>• Organochlorine pesticides (e.g. Pentachlorophenol)</li> <li>• Chlorinated hydrocarbons (e.g. trichloroethene)</li> </ul>
<b>Herbicides</b>	<ul style="list-style-type: none"> <li>• Ammonium thiocyanate</li> <li>• 2,4,5-T and 2,4-D</li> <li>• Dioxins</li> <li>• Herbicides (e.g. triazine, atrazine, MCPA, bipyridyls, sulfonyl ureas, chlorophenoxys)</li> <li>• Metals (e.g. arsenic, mercury)</li> </ul>
<b>Paints</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. arsenic, barium, cadmium, chromium, cobalt, lead, manganese, mercury, selenium, titanium, zinc)</li> <li>• Boron</li> <li>• Solvents (e.g. toluene oils natural or synthetic)</li> <li>• Resins</li> <li>• Chlorinated hydrocarbons</li> <li>• Polychlorinated biphenyls</li> </ul>
<b>Pesticides</b>	<ul style="list-style-type: none"> <li>• Wide range of insecticides, herbicides and fungicides</li> <li>• Metals (e.g. arsenic, lead, mercury, tin, chromium)</li> <li>• Organochlorine pesticides</li> <li>• Organophosphate pesticides</li> <li>• Carbamates</li> <li>• Solvents (e.g. xylenes, kerosene)</li> <li>• Chlorinated hydrocarbons</li> <li>• Polychlorinated biphenyls</li> <li>• Synthetic pyrethroids</li> <li>• Acid herbicides</li> </ul>

Industry, activity or land use	Common contaminant types
<b>Pharmaceutical</b>	<ul style="list-style-type: none"> <li>• Chlorinated hydrocarbons (e.g. mirex)</li> <li>• Solvents (e.g. acetone, ethyl acetate, butyl acetate, methanol, ethanol, isopropanol, butanol)</li> <li>• Carbamates</li> <li>• Metals (e.g. selenium)</li> </ul>
<b>Photography</b>	<ul style="list-style-type: none"> <li>• Potassium bromide</li> <li>• Metals (e.g. chromium, selenium, silver)</li> <li>• Thiocyanate</li> <li>• Ammonium compounds</li> <li>• Sulfur compounds</li> <li>• Phosphate</li> <li>• Ethanol</li> <li>• Formaldehyde</li> </ul>
<b>Plastics</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. cadmium)</li> <li>• Carbonates</li> <li>• Solvents (e.g. trichloroethene)</li> <li>• Styrene</li> <li>• Sulfates</li> <li>• Phthalate esters</li> <li>• Chlorinated hydrocarbons (e.g. 1,1,1 - Trichloroethane)</li> <li>• Polychlorinated biphenyls</li> <li>• Polybrominated diphenyl ethers</li> </ul>
<b>Rubber processing</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. lead, zinc)</li> <li>• Sulfur compounds</li> <li>• Reactive monomers (e.g. isoprene, isobutylene)</li> <li>• Acid (e.g. sulfuric, hydrochloric)</li> <li>• Monocyclic aromatic hydrocarbons (e.g. xylenes, toluene)</li> <li>• Solvents (e.g. trichloroethene)</li> <li>• Carbon Black</li> <li>• hexachlorobenzene</li> <li>• Chlorinated hydrocarbons (e.g. mirex, cis 1,2-dichloroethene)</li> </ul>
<b>Soap/detergents</b>	<ul style="list-style-type: none"> <li>• Potassium compounds</li> <li>• Phosphates</li> <li>• Ammonia</li> <li>• Alcohols</li> </ul>
<b>Soap/detergents continued</b>	<ul style="list-style-type: none"> <li>• Esters</li> <li>• Sodium hydroxide</li> <li>• Surfactants</li> <li>• Silicate compounds</li> <li>• Acids (e.g. sulfuric, stearic)</li> <li>• Oils</li> </ul>

Industry, activity or land use	Common contaminant types
<b>Solvents</b>	<ul style="list-style-type: none"> <li>• Ammonia</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene and xylenes)</li> <li>• Chlorinated organics (e.g. carbon tetrachloride, trichloroethane)</li> <li>• Natural oils (e.g. pine, tee tree, palm)</li> </ul>
<b>Chemical treatment/destruction facilities</b>	<ul style="list-style-type: none"> <li>• As per substances being treated</li> <li>• Polycyclic biphenyls (PCBs)</li> <li>• Dioxins (refer to Schedule B2 of the NEPM for specific guidance on the occurrence of dioxins and guidance on circumstances where analysis is recommended)</li> </ul>
<b>Clandestine drug manufacture/laboratories</b>	<ul style="list-style-type: none"> <li>• Drug residues (various)</li> <li>• Acids (e.g. hydrochloric, hydriodic, sulfuric)</li> <li>• Metals (mercury, lithium, aluminium, nickel)</li> <li>• Solvents (e.g. methanol, acetone, diethyl ether, methylated spirits)</li> <li>• Anhydrous ammonia</li> <li>• Nitrates</li> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene and xylenes)</li> </ul>
<b>Compost manufacturing</b>	<ul style="list-style-type: none"> <li>• Nutrients (e.g. phosphorus, nitrogen)</li> <li>• Metals (e.g. aluminium, iron, potassium, zinc)</li> </ul>
<b>Defence works and defence establishments</b>	<ul style="list-style-type: none"> <li>• Also refer fire fighting training (use of foams)</li> <li>• Metals (e.g. aluminium, beryllium, copper, lead, mercury, silver)</li> <li>• Explosives (e.g. TNT, 2,4, DNT, 2,6 DNT, RDX)</li> <li>• Petroleum hydrocarbons</li> <li>• Solvents (e.g. trichloroethene)</li> </ul>
<b>Drilling</b>	<ul style="list-style-type: none"> <li>• Drilling fluid additives</li> </ul>
<b>Drum or tank re-conditioning or recycling facility</b>	<ul style="list-style-type: none"> <li>• Dependent upon contents of drums</li> <li>• Solvents (e.g. methylene chloride, ortho-dichlorobenzene)</li> <li>• Petroleum hydrocarbons</li> </ul>
<b>Dry cleaning establishments</b>	<ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethylene, ethane, 1,1,1-trichloroethane, carbon tetrachloride perchlorethylene)</li> <li>• Volatile organic compounds (VOCs)</li> </ul>
<b>Electrical substations/transformers</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. copper, lead, mercury, tin)</li> <li>• Polychlorinated biphenyls</li> <li>• Solvents (e.g. trichloroethene)</li> </ul>
<b>Electricity generation/power stations</b>	<ul style="list-style-type: none"> <li>• Fly ash (can comprise of sulfates, metals, total dissolved solids, selenium)</li> <li>• Petroleum hydrocarbons</li> <li>• Polycyclic aromatic hydrocarbons (e.g. tars,</li> </ul>

Industry, activity or land use	Common contaminant types
	benzo(a)pyrene) • Asbestos • Polychlorinated biphenyls (PCBs) • Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene & xylenes) • Metals (e.g. copper, lead)
<b>Explosives production/bulk storage pyrotechnics</b>	• Acids (e.g. acetone, nitric, ammonium nitrate, sulfuric) • Ammonia • Solvents (e.g. methanol, PCP) • Chlorinated hydrocarbons Metals (e.g. aluminium, copper, lead, manganese, mercury, silver) • Explosives (e.g. TNT, 2,4 DNT, 2,6 DNT, RDX) • Petroleum hydrocarbons (fuel) • Hexachlorobenzene
<b>Fertiliser manufacture or storage</b>	• Also refer Chemical manufacturing – fertiliser • Calcium phosphate, calcium sulfate, copper chloride • Sulfur, sulfuric acid • Metals (e.g. boron, cadmium, cobalt, copper, magnesium, molybdenum, potassium, selenium) • Nitrates, ammonia
<b>Fibreglass reinforced plastic manufacturing</b>	• Solvents (e.g. trichloroethene) • Resins • Styrene • Boron
<b>Fill material/ fill importation</b>	• Establish historical potentially contaminating land use, industry or activity of source site and consider naturally occurring contaminants, e.g. asbestos
<b>Fire fighting and training (use of foams)</b>	• Solvents (e.g. glycol ethers) • Surfactants (hydrocarbon and fluorinated) • Fluorotelomers • Perfluorochemicals (e.g. PFOS, PFOA) Boron
<b>Foundry operations</b>	• Metals and chlorides/fluorides/sulfates of metals (e.g. iron, aluminium, cadmium, chromium and oxides, copper, lead, magnesium, tin, nickel, zinc) • Acids (e.g. sulfuric and phosphoric) • Polycyclic aromatic hydrocarbons (e.g. coke residues) • Petroleum hydrocarbons (e.g. fuel oil)
<b>Furniture restoration</b>	• Solvents (e.g. trichloroethene)
<b>Gasworks</b>	• Cyanide • Nitrate • Sulfide/sulfate • Metals (e.g. aluminium, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese,



Industry, activity or land use	Common contaminant types
	<ul style="list-style-type: none"> <li>mercury, nickel, selenium, silver, vanadium, zinc)</li> <li>• Boron</li> <li>• Thiocyanates</li> <li>• Petroleum hydrocarbons</li> <li>• Polycyclic aromatic hydrocarbons (e.g. creosote)</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> <li>• Phenols</li> </ul>
<b>Glass manufacturing</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. cobalt)</li> </ul>
<b>Iron and steel works</b>	<ul style="list-style-type: none"> <li>• Also refer Gasworks</li> <li>• Metals (e.g. chromium VI, cobalt, copper, lead, magnesium, manganese, nickel, selenium, zinc)</li> <li>• Acids (e.g. sulfuric, hydrochloric)</li> <li>• Mineral oils</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene, and xylenes)</li> <li>• Polycyclic aromatic hydrocarbons (e.g. coke residues)</li> </ul>
<b>Intensive agriculture (including feedlots and saleyards)</b>	<ul style="list-style-type: none"> <li>• Carbamates</li> <li>• Organochlorine pesticides (e.g. Endrin, Methoxychlor, Pentachlorophenol)</li> <li>• Organophosphate pesticides Herbicides (e.g. Triazine, Atrazine, 2,4,5-T 2,4-D, MCPA, Picloram)</li> <li>• Insecticides DDT, DDE and DDD, Bifenthrin</li> <li>• Aldrin and Dieldrin</li> <li>• Nitrates</li> <li>• Salinity</li> <li>• Metals (e.g. aluminium, arsenic, cadmium, copper, iron, lead, magnesium, potassium)</li> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Toxaphene</li> </ul>
<b>Landfill sites (and associated activities)</b>	<ul style="list-style-type: none"> <li>• Dependent on landfill type and waste disposed</li> <li>• Polychlorinated biphenyls</li> <li>• Alkanes</li> <li>• Sulfides</li> <li>• Metals</li> <li>• Asbestos</li> <li>• Organic acids</li> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Petroleum hydrocarbons</li> <li>• Polycyclic aromatic hydrocarbons (e.g. benzo(a)pyrene)</li> <li>• Ammonia</li> <li>• Landfill gases (e.g. methane)</li> <li>• Total Dissolved Solids (TDS)</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene,</li> </ul>

Industry, activity or land use	Common contaminant types
	ethyl benzene & xylenes) • Phenols
<b>Livestock dips or spray races</b>	• Metals (e.g. arsenic) • Carbamates • Organochlorine pesticides • Organophosphate pesticides • Herbicides • Synthetic pyrethroids
<b>Market garden, orchards, poly-tunnels, plant nurseries</b>	• Metals (e.g. aluminium, arsenic, cadmium, copper, lead, mercury, magnesium, iron) • Organochlorine pesticides (e.g. DDT, Dieldrin, Endosulfan, Mirex) • Organophosphate pesticides (e.g. Azinphos ethyl, Diazinon, Fenthion) • Carbamates • Petroleum hydrocarbon (fuel) • Monocyclic aromatic hydrocarbons (e.g. Benzene, toluene, ethyl benzene & xylenes)
<b>Metal finishing and treatments (e.g. electroplating/carburizing baths)</b>	• Metals (e.g. aluminium, barium, cadmium, chromium, copper, lead, nickel, tin, zinc) • Acids (e.g. sulfuric, hydrochloric, nitric, phosphoric) • Paint residues • Alkalis • Solvents (e.g. 1,1,1-trichloroethane, tetrachloroethylene) • Plating salts • Monocyclic aromatic hydrocarbons (e.g. Benzene, toluene) • Cyanide
<b>Metal smelting or refining</b>	• Metals (e.g. aluminium, copper, gold, lead, mercury, selenium, silver, tin) and their chlorides, fluorides and oxides
<b>Mineral processing and extractive industries, including mining, screening, crushing and tailing dams or storage facilities, but not voids where no other potentially contaminating activity has occurred</b>	• Acids, alkalis • Total Dissolved Solids (TDS) • Organic flocculants (e.g. sulfate, cyanide) • Metals (e.g. aluminium, arsenic, chromium, cobalt, copper, iron, lead, manganese, mercury, zinc) • Petroleum hydrocarbon • Monocyclic aromatic hydrocarbons (e.g. Benzene, toluene, ethyl benzene & xylenes) • Radioactive materials • Polycyclic aromatic hydrocarbons asbestos pesticides • Solvents (e.g. trichloroethene) • Caustic
<b>Motor vehicle manufacture, workshops, facilities, race</b>	• Petroleum hydrocarbons • Monocyclic aromatic hydrocarbons (e.g. Benzene, toluene,

Industry, activity or land use	Common contaminant types
<b>venues</b>	ethyl benzene & xylenes) Solvents (e.g. trichloroethene) <ul style="list-style-type: none"> <li>• Resins</li> <li>• Heavy metals</li> <li>• Polycyclic aromatic hydrocarbons</li> </ul>
<b>Oil/gas exploration, production, refining and storage</b>	<ul style="list-style-type: none"> <li>• Monocyclic aromatic hydrocarbons (e.g. Benzene, toluene, ethylbenzene &amp; xylenes)Acids (e.g. sulfuric)</li> <li>• Alkalis</li> <li>• Insulation lagging (e.g. asbestos)</li> <li>• Metals should be determined through assessment of deposit composition and known impurities (e.g. arsenic, barium, cadmium, chromium, cobalt, copper, mercury, nickel)</li> <li>• Methyl tertiary-butyl ether</li> <li>• Cyanides</li> <li>• Drilling fluid additives, petroleum hydrocarbons</li> </ul>
<b>Pest control depots</b>	<ul style="list-style-type: none"> <li>• Carbamates</li> <li>• Organochlorine and organophosphate pesticides (e.g. Diazinon)</li> <li>• Herbicides (e.g. Atrazine)</li> <li>• Insecticides (e.g. Fenamiphos)</li> <li>• Fungicides</li> </ul>
<b>Printing shops</b>	<ul style="list-style-type: none"> <li>• Also refer to Photography</li> <li>• Acids</li> <li>• Alkalis</li> <li>• Solvents (e.g. trichloroethene)</li> <li>• Metals (e.g. chromium)</li> </ul>
<b>Port/wharf/dock activities (including dredge spoil)</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. copper, tin, chromium, lead, mercury, zinc)</li> <li>• Antifouling paints (e.g. organotin, tributyltin)</li> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> <li>• Polycyclic aromatic hydrocarbons</li> </ul>
<b>Railway yards/marshalling yards and transport corridors</b>	<ul style="list-style-type: none"> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> <li>• Phenolics (creosote)</li> <li>• Metals (e.g. arsenic, cadmium, chromium, iron, lead, zinc)</li> <li>• Nutrients (e.g. nitrates, ammonia)</li> <li>• Carbamates</li> <li>• Organochlorine pesticides (e.g. pentachlorophenol)</li> <li>• Organophosphates pesticides</li> <li>• Herbicides</li> <li>• Asbestos</li> <li>• Additional contaminants according to what has been</li> </ul>

Industry, activity or land use	Common contaminant types
transported by rail	
<b>Recycling (building materials)</b>	<ul style="list-style-type: none"> <li>• Asbestos</li> <li>• Metals (e.g. lead, zinc)</li> </ul>
<b>Rifle ranges and pistol clubs</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. lead)</li> <li>• Polycyclic aromatic hydrocarbons</li> </ul>
<b>Scrap metal recovery</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. cadmium, lead, magnesium)</li> <li>• Solvents</li> <li>• Polychlorinated biphenyls</li> <li>• Oil and grease</li> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> <li>• Polycyclic aromatic hydrocarbons</li> </ul>
<b>Service stations and fuel storage facilities</b>	<ul style="list-style-type: none"> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> <li>• Polycyclic aromatic hydrocarbons</li> <li>• Methyl tertiary-butyl ether and other oxygenates</li> <li>• Metals (e.g. barium, cadmium, copper, lead, nickel, zinc)</li> <li>• Oil and grease Solvents (e.g. trichloroethylene)</li> </ul>
<b>Sewage/wastewater treatment plant</b>	<ul style="list-style-type: none"> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Metals (aluminium, arsenic, cadmium, chromium, cobalt, lead, manganese, nickel, potassium, zinc)</li> <li>• Phenols</li> <li>• Pathogens (e.g. E. coli, Enterococci)</li> </ul>
<b>Tannery (and associated trades)</b>	<ul style="list-style-type: none"> <li>• Acids (e.g. hydrochloric)</li> <li>• Metals (e.g. aluminium, chromium, copper, manganese)</li> <li>• Formaldehyde</li> <li>• Phenols</li> <li>• Salts Solvents (e.g. trichloroethene)</li> <li>• Petroleum hydrocarbons</li> <li>• Oil and grease</li> <li>• Cyanide</li> <li>• Ammonia</li> </ul>
<b>Textile operations</b>	<ul style="list-style-type: none"> <li>• Metals (e.g. aluminium, cadmium, chromium, titanium, tin, zinc)</li> <li>• Carbon</li> <li>• Acid (e.g. sulfuric)</li> <li>• Alkalis (e.g. caustic soda)</li> <li>• Salts</li> <li>• Solvents (e.g. perchloroethylene)</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethyl benzene &amp; xylenes)</li> </ul>

Industry, activity or land use	Common contaminant types
	<ul style="list-style-type: none"> <li>• Organochlorine pesticides (e.g. Dieldrin, Aldrin)</li> <li>• Dyestuff residues</li> <li>• Sodium hypochlorite</li> <li>• Phenols</li> </ul>
<b>Timber preserving/storage/saw mills wood product manufacturing</b>	<ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethene)</li> <li>• Polycyclic aromatic hydrocarbons (e.g. creosote, naphthalene)</li> <li>• Organochlorine pesticides (e.g. chlordane, endosulfan, pentachlorophenol)</li> <li>• Aldrin and dieldrin</li> <li>• Metals (e.g. arsenic, copper, chromium VI, zinc)</li> <li>• Boron</li> <li>• Ammonia</li> <li>• Cresols</li> </ul>
<b>Wool scouring</b>	<ul style="list-style-type: none"> <li>• Nutrients (e.g. phosphorus, nitrogen)</li> <li>• Total Dissolved Solids (TDS)</li> <li>• Oil and Grease</li> <li>• Detergents</li> <li>• Pesticides</li> <li>• Bleaching agents (e.g. hydrogen peroxide)</li> </ul>

## APPENDIX B: SPECIAL CASES OF REMEDIATION

### Soil bioremediation

Bioremediation is the use of either naturally occurring or deliberately introduced microorganisms to consume and break down environmental pollutants, in order to clean a polluted site

Bioremediation generally requires considerable time and careful planning to achieve successful outcomes. Bioremediation, when properly managed, is an environmentally sound and cost-effective method of treating soils containing organic chemicals. Bioremediation may enable appropriate reuse of the treated soil and minimise disposal of waste soil to landfill, whilst providing for adequate protection of human health and the environment.

The NT EPA supports and encourages the controlled use of bioremediation to assist with the remediation of site contamination in the Northern Territory, particularly when the treated soil is suitable for reuse, thus reducing disposal of waste soil to landfill.

This guideline does not provide direction on the methods of bioremediation. Instead, it outlines appropriate management measures that can minimise environmental impacts arising from the process.

There are two types of bioremediation: **ex situ** (remove and treat); and **in situ** (treat in place—generally underground). Both methods can be carried out on soil and groundwater. However, the focus of this guideline applies only to the **ex situ** treatment of soils.

The NT EPA provides the hierarchy of its preferred approaches to soil bioremediation as follows:

- on-site treatment of the chemical substances to reduce risk to an acceptable level
- off-site treatment of excavated soil to reduce risk to an acceptable level, after which the treated soil is returned to the site
- containment of soil on site with a properly designed barrier for disposal of affected soil to an approved landfill.

Prior to the commencement of a soil bioremediation project, the nature and extent of the chemical substances in the soil must be assessed.

The bioremediation strategy should include laboratory or pilot-scale studies to show the efficacy and timing of the treatment process.

It is important to recognise that contaminated soils may also contain chemical substances that are not suitable for bioremediation.

### Land farming

Land farming is a form of bioremediation. It is an above-ground process that involves placing contaminated soil on a prepared surface and aerating it by regular turning. Soil amendments may be added to enhance the efficacy and timing of the remediation process. The movement of oxygen through the soil stockpile promotes aerobic degradation of organic chemicals.

Land farming is a passive form of bioremediation, generally requires an extended timeframe and is only successful for soils contaminated with volatile and semi-volatile chemical substances. As land farming will probably release emissions directly to the atmosphere, it should not be used where it may have an adverse effect on sensitive receptors, particularly in built-up or residential areas.

As a remediation option, land farming is ineffective in treating certain substances such as metals and complex Polycyclic Aromatic Hydrocarbons (PAHs).

The NT EPA considers that land farming may be an acceptable form of bioremediation only:

- on large isolated sites that are remote from potentially susceptible receptors, or
- within approved NT EPA licensed facilities where conditions are included in the NT EPA authorisation.



Care should be taken to ensure that additional pollutants are not introduced during the land farming process.

### On-site retention

In some instances, on-site retention of chemical substances in soils may be considered the only appropriate remediation option at a site.

If on-site retention of chemical substances in soils is considered an appropriate remediation option at a site, consultants, remediation practitioners and/or auditors must consult with the NT EPA prior to the commencement of remediation.

Key steps of on-site retention include:

1. identifying the environmental values and receptors that need to be protected
2. assessing the scenarios for risk exposure
3. analysing and evaluating the risk exposure, and determining if remediation goals, objectives and endpoints are likely to be achieved
4. preparing an appropriate Site Management Plan to manage the risks and achieve the endpoints for remediation
5. carrying out the remediation in accordance with the Remedial Action Plan, and
6. implementing the Site Management Plan.

Section 5 of the CRC CARE *Technical Report 16: Safe onsite retention of contaminants Part 2: A risk-based approach* (2013) provides an example of an approach to establishing the Remedial Action Plan for the retention of chemical substances in soils at a site.

The NT EPA recommends that consultants, remediation practitioners and auditors consider the factors affecting the acceptability of any on site retention that may be proposed at a site.

Section 6 of CRC CARE Technical Report 16 provides some key factors related to the on-site retention of chemical substances in soils.

### Asbestos

Asbestos contamination is a significant issue in the Northern Territory, particularly as a result of the Second World War bombings, cyclone Tracy (1974) and illegal dumping. There are numerous known and suspected asbestos contaminated sites in and around Darwin and elsewhere in the NT.

Guidance on the assessment of asbestos is provided in Schedule B2 of the ASC NEPM. The guidance is not applicable to asbestos materials in current buildings or structures, including operational pipelines and fences. It also does not apply to asbestos materials that are wastes, such as planned demolition materials present on the surface of land awaiting removal.

In addition to the ASC NEPM the Western Australian Department of Health's document titled 'Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia May 2009' provides the expected framework when remediating asbestos contaminated sites in the Northern Territory.

There are particular licensing and safety requirements for removal, transport and disposal of asbestos-containing materials (ACM) in the NT which are regulated by agencies such as NT WorkSafe, The Department of Health and the NT EPA.

The assessment of asbestos must be undertaken by a competent person (as defined in Schedule B2 of the ASC NEPM). Asbestos found at a site requires specialist skills and care in handling, removal and transportation to prevent the likelihood of asbestos fibres becoming air-borne.

Depending on site-specific circumstances and the proposed remediation approach, conservative management of presumed asbestos contamination may avoid the need for a Detailed Site Inspection where there is a high degree of confidence that the asbestos contamination is confined to bonded ACM in superficial soil.

The determination of asbestos in soil should follow the procedures in Section 4, Schedule B1 of the ASC NEPM.

If adequate asbestos contamination investigations and risk assessments have taken place, it should be possible to narrow down the most likely remediation options and to select one or a combination of them. The main remediation options include: management *in situ*, treatment on-site, and removal of the contaminated soil from the site.

In undertaking the selection process, it is important that all options are considered and the preferred one should be supported by strong arguments when compared with the others. Consideration should also be given to change the final intended use, in order to manage the risk better.

The presence of other contaminants may affect the approach taken to or the timing of asbestos remediation.

Asbestos-specific communication skills may also be needed to address potential concerns of workers and the community. The NT Department of Health (DoH) will provide advice on this subject on a case-by-case basis when requested, or as appropriate.

The DoH, NT Worksafe and NT EPA should be notified of any potentially asbestos as free fibres in an uncontrolled environment.

See Appendix H of this guideline for more important information on the responsibilities of the different NT agencies with regard to asbestos.

### Acid sulfate soils and other naturally occurring substances

Naturally occurring chemical substances, such as acid sulfate soils methane, can pose a risk of harm to human health and the environment if disturbed. If disturbed, as the result of an activity undertaken at or in the vicinity of a site, the consequent elevated concentration of the naturally occurring chemical substance may result in site contamination. For example, the release of a naturally occurring chemical substance through its mobilisation in soils and/or groundwater, as a result of a change in pH.

Where there are naturally occurring chemical substances in soils, surface water, groundwater and soil gas (vapour) that pose a risk of harm to human health or the environment, assessment or management may be required to mitigate or prevent the risk.

Acid sulfate soils may, in some circumstances, be detrimental to the current or proposed use of a site if disturbance causes oxidation. Acid sulfate soils are described in the NT EPA document 'Environmental Guidelines for Reclamation in Coastal Areas' (2006). This guideline outlines techniques related to on-site management of acid sulfate soils.

### Former mango farms, other orchards and market gardens

Recent rapid development in the NT has seen former mango farms (and other similar activities which have used pesticides and other chemicals of concern in the past) being developed into intensive residential living. The development of these sites can pose a risk to human health. As such developers/proponents planning to develop these sites should contact the NT EPA for guidance on how to minimise risks to human health. The following publications provide guidance when assessing contamination on horticultural land:

- Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA 1997
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995, and
- Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW EPA, 2005.

## APPENDIX C: ASSESSMENT AND REMEDIATION REPORTING CHECKLIST

### Assessment reporting checklist

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Executive summary			
Background including identification of the client and the reasons the report was commissioned		Yes	Yes
Statement as to whether the site (list land parcels) has been reported to the NT EPA as a known or suspected contaminated site and the current classification(s)			
Contaminated sites auditor details if a mandatory auditor's report is required			
Objectives of investigation and/or remediation			
Summary of work undertaken			
Summary of the conceptual site model and risks to human health, the environment and environmental values			
Summary of conclusions and recommendations			
Introduction			
Background including identification of the client and the reasons the report was commissioned		Yes	Yes
Statement as to whether the site has been reported to the NT EPA as a known or suspected contaminated site under the WMPC Act and the current classification(s)			
Contaminated sites auditor details if a mandatory auditor's report was required			
License details if licensed as a prescribed premises under the WMPC Act			
Objectives of the scope of work—investigation and/or remediation			
Clear statement of the scope of work carried out			
Site identification and general information			
Site identification <ul style="list-style-type: none"><li>address—street number and/or lot number, street name and suburb</li><li>common name of site (e.g. local business or landmark)</li><li>certificates of title (copies of documents including survey plan)</li></ul>	B2 s 3.1 - 3.3	Yes	Yes
Location map(s)			
Coordinates of site boundaries (Northings/Eastings—specify datum)			
Land area (m <sup>2</sup> or ha as appropriate)			
Current ownership and occupant/lessee details and any proposed changes			
Current site plan with scale bar and north arrow showing site infrastructure and environmentally significant features			
Current use and status of the site (e.g. vacant, operating service station operating paint factory, market garden etc.); if non-operational state if infrastructure is decommissioned/ <i>in situ</i> as applicable			
Local government authority and relevant town planning scheme			
Current zoning and any proposed changes			
Proposed future use including site plans showing the proposed new boundaries and/or buildings			
Previous environmental investigations and remediation			
List of previous reports and summary of previous environmental investigations, risk assessment and remediation ( include appropriate site plans, diagrams and/or tables)	B2 s 3.3	Yes	Yes

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
List of previous site contamination audit reports (if contaminated sites auditor engaged)		Yes	Yes
Site history			
Land ownership (copies of historical certificates of title to be included)	B2 s 3.3	Yes	Summary
Previous occupiers such as lessees, franchisees, managers, users			
Land uses (including any periods where the land was unoccupied or not in use) highlighting past and current potentially contaminating activities and land uses			
Past and current aerial photographs at sufficient frequency and scale to show activities/changes over time, with the site boundary identified			
Building and infrastructure—location, construction and demolition/decommissioning waste disposal (soak wells, sumps, lagoons, landfills)			
Earthmoving activities			
Location and extent of imported and locally derived fill			
Documentation for material imported to the site (source of clean fill)			
Documentation for material disposed off-site (e.g. transport dockets, landfill receipts)			
Description of manufacturing processes Inventory of chemicals, wastes and by-products used at the site and associated potential contaminants			
Details and locations of past and present underground and aboveground storage tanks, transfer lines and dispensing locations			
Site, state and local government records - <ul style="list-style-type: none"><li>relevant licences, approvals and trade waste agreements</li><li>product spills, losses and incidents including fire at the site or in the vicinity of the site</li><li>discharges to land, water and air (authorised and unauthorised)</li><li>complaints</li></ul>			
Information obtained from site representatives, residents, staff and neighbours (both present and former)			
Summary of local literature about the site e.g. newspaper articles			
Heritage matters (Aboriginal and other)			
Summary of the above information and presentation as a chronology or timeline from initial site use to present day and indicating gaps in information			
Data evaluation (gaps in knowledge, uncertainties/unsubstantiated information)			
Site Inspection and interviews with site personnel			
Site inspection date(s) and personnel	B2 s 3.4, s3.6	Yes	Summary
Site photographs (with date, location indicated on site plan, direction photo was taken)			
Access to areas of the site /inaccessible areas and reasons why inaccessible			
Topography and elevation (m AHD), flood potential, surface drainage			
Nature and condition of site boundary such as type and condition of fencing, soil stability, evidence of soil erosion			
Visible signs of contamination, such as discolouration or staining of soil, bare soil patches—both on site, and off site adjacent to site boundary			
Visible signs of vegetation stress			
Presence of drums, wastes and fill material			

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Type and conditions of buildings, roads, site infrastructure e.g. ASTs			
Aesthetic issues including presence/intensity of odours			
Nature of site surface - sealed and unsealed, integrity of seal, e.g. is the concrete hardstand cracked?			
Location and types of stockpiled materials			
Presence/absence of asbestos and asbestos containing materials (ACM) e.g. fragments of ACM on the site surface			
Information obtained from site occupants, residents and neighbours			
Local use of ground/surface waters, and location of groundwater bores			
Presence and condition of surface water bodies / groundwater bores			
Location and nature of potential preferential pathways for contaminant migration e.g. location of underground services and drains			
Surrounding land uses			
Location of receptors on and within 500m of the site boundary including sensitive receptors such as child care centres, schools, aged care, residential and relevant local sensitive environments e.g. surface water, wetlands and reserves			
Geology and hydrogeology (regional and site-specific)			
Surface elevation and topography (also identify any man-made features controlling surface water)	B2 s3.5	Yes	Yes
Regional and site-specific soil and geological records - <ul style="list-style-type: none"><li>• stratigraphy</li><li>• potential for acid sulfate soils / risk ranking</li><li>• location of water bodies, springs and bores within 500m of the site</li><li>• drilling logs/well logs</li><li>• aquifer type (confined, unconfined, perched etc.) and properties (e.g. clay content, permeability, known karst/potential for karstic conditions)</li><li>• groundwater elevation, flow direction, flow rate</li><li>• groundwater discharge locations / surface water interactions (e.g. tidal effects, saline intrusion)</li><li>• seasonal effects on groundwater (fluctuations in elevation and flow direction)</li><li>• groundwater quality and use/potential for use</li></ul>	B2 s3.5	Yes	Yes—include summary of previously reported data
Location, construction and condition of on-site wells (NB cross-contamination of aquifers may occur if multi-layered aquifer conditions are not taken into account when designing and installing bores)	B2 s3.5	Desk top	Yes
Background soil and groundwater quality			
Background soil quality e.g. literature/ reference site	B1 s2.5.7	Desk top	Yes
Ambien and up-gradient groundwater quality	B6 s3.3	Desk top	Yes
Conceptual site model (CSM)			
The initial CSM is based on desktop information supplemented with information gathered from site inspections and interviews which is refined with the results of site-specific investigation and assessment.	B2 s2 and s9	Initial desk top	Yes
Known and potential sources of contamination (areas of concern, potential contaminants, toxicity, mobility, volatility, potential for degradation, potential media affected)			
Potential and complete contaminant migration pathways (including preferential migration pathways) and exposure routes			

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Potential receptors (human, ecological and environmental values)			
Data gaps and uncertainties			
Tabulation of potential source-pathway-receptor linkages			
CSM graphic			
Assessment levels			
Identification and rationale for the assessment levels selected (discuss assumptions and limitations in the context of the site)	B1	Initial desk top	Yes
Table(s) listing all assessment levels and reference (e.g. NEPM)			
Sampling and analysis quality plan (SAQP)			
Objectives of the sampling program	B2 s 5-6 Appendix B and B3		Yes
Specific data gaps that have been identified and limitations on sampling, such as the presence of infrastructure (e.g. location of underground storage tanks, fuel lines and buildings)			
Define data quality objectives (DQO)			
Media to be sampled (soil, groundwater, surface water, vapour, NAPL etc.)			
Analyte selection and analysis methods			
Sampling design and justification <ul style="list-style-type: none"><li>sample locations, depths and frequency (with rationale)</li><li>field screening methods and purpose</li><li>samples for laboratory analysis</li></ul>			
Sampling methods and procedures <ul style="list-style-type: none"><li>sampling procedures</li><li>sample containers</li><li>preservation of samples</li><li>storage and transport</li><li>quality assurance and quality control procedures (see below)</li></ul>			
Field procedures including QA/QC			
Completed standardised forms for recording relevant field data (copies to be included in the report) <ul style="list-style-type: none"><li>sample logs (primary samples, trip and field blanks, rinsate samples, replicate samples, decontamination events etc.)</li><li>soil bore, groundwater bore / vapour probe installation logs (fill, lithology, grain size, clay content, odours, staining etc.)</li><li>sampling logs (field screening results, depths to water/LNAPL, purging details, observations etc.)</li><li>field instrument calibration records</li><li>field instrument detection limits (e.g. field XRF analysis)</li><li>chain of custody form identifying (for each sample) the sampler, media, collection date and time, sample preservation method, analyses to be performed, sender signature and departure date and time</li><li>summary of field QA/QC outcomes</li></ul>	B2 s5	Yes	Yes
Laboratory analysis including QA/QC			
Chain of custody form as above with laboratory signature, receipt date and time and comment on condition of samples (e.g. chilled, warm, damaged/missing samples etc.)	B2 s5 B3		Yes
Laboratory analytical certificates			



Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Laboratory QA/QC report <ul style="list-style-type: none"><li>analytical methods and laboratory accreditation for methods used</li><li>holding and extraction times for each analysis/sample</li><li>sample splitting techniques</li><li>surrogates, spikes and recoveries</li><li>instrument/method detection limits and matrix/practical quantification limits</li><li>standard and reference solution results</li><li>certified reference material results</li></ul>			
Data evaluation			
Comparison of field and laboratory data with the DQO, including <ul style="list-style-type: none"><li>deviations from the SAQP</li><li>acceptability of field QA/QC sample results</li><li>acceptability of laboratory QA/QC results</li><li>evaluation of factors which may materially affect the results (such as the collection and analysis of samples by different personnel, different methodologies, spatial and temporal variations)</li></ul>	B2 Appendix C	Yes	Yes
Implications for decision-making—precision, accuracy, representativeness, completeness and comparability of the data			Yes
Site plans			
Detailed site plans should include, as a minimum: drafting date and date(s) of the information shown <ul style="list-style-type: none"><li>north arrow</li><li>scale and ratio bar</li><li>site boundaries including legal, lease and location of fences/walls</li><li>excavation boundaries and date of excavation/fill</li><li>stockpile locations and dates of sampling</li><li>adjacent land uses</li><li>relevant site features such as current and historical above and below ground infrastructure, topography, surface finishes, fill</li><li>areas of concern (source locations and extent) and direction of groundwater flow</li><li>legend</li></ul>	B1 s 3.3.1 and B2 s 14.4	Yes	Yes
Simplified site plans may be used as a basis for showing relevant information and results relevant to the site assessment and/or remediation: <ul style="list-style-type: none"><li>hydrogeological information such as groundwater elevation, elevation contours, direction of groundwater flow and estimated seepage velocity</li><li>geological and hydrogeological cross-sections</li><li>sampling locations, depth and results</li><li>exceedances of assessment levels</li></ul> All site plans should contain a legend, north arrow, scale, units of measurement			
Results			
Tabulation of field and laboratory results including sample identification, sampling dates and times, depths (if applicable), laboratory detection limits, relevant assessment criteria and exceedances (incorporate previous results as appropriate)	B1 and B2 s 13 s14.5-14.7	Yes	Yes
Descriptive statistics for known and potential contaminants			
Summary of the vertical and lateral extent of contaminated areas			

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Tables of historical results to support discussion of temporal trends—raw data and calculations used in graphs or statistical analysis should be included in the report			
Tier 1 and/or 2 risk assessment (human health and ecological)			
Objectives and scope of the risk assessment with reference to the CSM, identification of exposure risks that cannot be assessed in a Tier 1 assessment (e.g. no generic criteria)	B1, B2, B4, B5, B6 and B7		
Comparison with generic/adjusted assessment levels including <ul style="list-style-type: none"><li>identifying any adjustments and the rationale for each receptor</li><li>the nature of any exceedances in the context of the descriptive statistics and more detailed statistical analysis as appropriate</li></ul>			
Attach supporting information—e.g. HSLs checklist (Friebel & Nadebaum, 2011)			
Risk characterisation including uncertainties (data gaps) and material changes in conditions that would alter the reliability of the risk assessment undertaken			
Revised CSM and conclusions regarding risks requiring management or further assessment			
Tier 3 risk assessment (human health and ecological)			
Documented in a separate report if appropriate	B4, B5, B6, B7		
Objectives and scope of the risk assessment			
Exposure assessment			
Toxicity assessment			
Sensitivity analysis			
Limitations, assumptions and uncertainties (data gaps, changes in conditions that would alter risk scenarios)			
Risk characterisation with regard to each receptor evaluated			
Revised CSM and conclusions/recommendations regarding risks requiring management or further assessment			
Fate and transport modelling			
Documented in a separate report if appropriate	B2 s10 and B4 s 4		Yes
Uncertainties in the CSM and the objectives for contaminant fate and transport modelling			
Scope of work and rationale for model selection			
Model validation and model results			
Evaluation of modelling results and sensitivity analysis including the limitations, assumptions and uncertainties			
Revision of the CSM and conclusions/recommendations regarding risks requiring management or further assessment			
Community engagement			
Documented in a separate report if appropriate	B8	Yes	Yes
Community engagement plan <ul style="list-style-type: none"><li>stakeholders (individuals and groups) invited to participate (personal contact details not required)</li><li>details of how stakeholders were contacted</li><li>where and when engagement events took place</li><li>summary of information provided to stakeholders (provide copies of flyers, letters etc. in an appendix)</li></ul>			

Report section and recommended information to be included if relevant	ASC NEPM Reference*	PSI	DSI
Outcomes of community engagement <ul style="list-style-type: none"> <li>summary of input and comments received</li> <li>number of stakeholders/community members who participated</li> <li>how stakeholder input was taken into account</li> <li>document agreements reached and their effect on further investigation and/or remediation to be carried out</li> </ul>			
<b>Conclusions and recommendations</b>			
Conclusions arising from the site assessment and the implications for decision-making with regards to the management of unacceptable and/or potentially unacceptable risks	B2 s14	Yes	Yes
Recommendation on whether the site (including additional parcels of land) require reporting to the NT EPA as a known or suspected contaminated site under s 14 of the WMPC Act			
Recommendations on any limitations and constraints on the use of the site as relevant			
Recommendations for further investigation, risk assessment, remediation, validation and/or management as relevant			

## Remediation reporting checklist

Report section and recommended information to be included if relevant	ASC NEPM Reference*	RAP	SRV	SMP
Executive summary				
Background including identification of the client and the reasons the report was commissioned		Yes	Yes	Yes
Date site was reported to the NT EPA as a known or suspected contaminated site and the current classification (list land parcels)				
Contaminated sites auditor details if a mandatory auditor's report was required				
Brief summary of the CSM and risks to human health, the environment and environmental values				
Remediation objectives and remedial targets to be achieved				
Summary of the work undertaken				
Conclusions and recommendations				
Introduction				
Background including identification of the client and the reasons the report was commissioned		Yes	Yes	Yes
Objectives of the scope of work and clear statement regarding the scope of work undertaken				
Site identification and general information (as for assessment)				
Confirmation of when the site (list land parcels) was reported to the NT EPA as a known or suspected contaminated site and the current classification				
Contaminated site auditor details if a mandatory auditor's report was required				
Summary of previous work, the CSM and risks to human health, the environment and environmental values				
Extent of remediation/management required - summary of the risks to be mitigated, stakeholder views and time frame available to achieve the desired outcomes				
Remediation objectives				
Remediation objectives and remedial targets to be achieved		Yes	Yes	Yes
Table of remedial targets and derivation details (reference to site-specific risk assessment report or other document(s) detailing their derivation)				
Remedial options				
Identify potential remedial options that could achieve the remediation objectives within the available time frame		Yes		
Discuss the results of case studies or pilot studies/trials undertaken that support or do not support particular remedial options				
Evaluate viable remedial options with reference to the preferred remediation hierarchy	NEPM Principle 16			
Summarise the rationale for the selected remediation approach <ul style="list-style-type: none"><li>active remediation and/or</li><li>management measures</li></ul>				
Remedial action plan				
Description of remedial method including design and construction details/plans as appropriate		Yes		
Discussion of limitations associated with the proposed remedial approach and the potential for additional clean-up and/or long-term site management				
Identification of regulatory compliance requirements such as licences and approvals (local and state government)				
Documentation of discussions with stakeholders and copies of relevant agreements(e.g. regarding remediation objectives/remedial targets)				
Site preparation requirements (fencing, erection of warning signs, stormwater diversion)				

Report section and recommended information to be included if relevant	ASC NEPM Reference*	RAP	SRV	SMP
Site management plan (operational phase), including management of stormwater, stockpiles, waste soil, sediment and water, excavations, noise, dust, odour, decontamination procedures, site security, incidents, chemical/equipment storage				
Detailed SAQP for any sampling required during or after remediation				
Key personnel and contact details as applicable (HSEP should be prepared but is not required in the report)				
Remediation schedule and hours of operation				
Location/source of any clean fill material to be used, validation requirements				
Details of decommissioning and infrastructure removal when remediation objectives/remedial targets are achieved (as applicable)				
Progress reporting format and recipients (as applicable)				
<b>Site remediation and validation</b>				
Document remediation work undertaken				
Evaluate validation results and compare with the remedial objectives and remedial targets				
Discussion of the revised CSM and any uncertainties in the remediation outcomes				
Provide recommendations for any further site clean-up or management and any restrictions on the use of the site			Yes	
Document off-site disposal of all wastes e.g. transport dockets, landfill or treatment facility receipts				
Document sources and quality of fill imported to the site				
Document approvals and licences obtained from regulatory authorities				
<b>Site management plan</b>				
Time frame for site management e.g. 1 year, 5 years, in perpetuity				
Identification of the relevant stakeholders who have specific interests, roles and responsibilities in relation to the ongoing management of the site				
Documentation of stakeholder agreement to management roles and responsibilities				
Details of maintenance and/or monitoring requirements including trigger levels and an SAQP if applicable		Yes		Yes
Contingency actions (e.g. repeat sampling, increased monitoring frequency, revision of the SMP, risk assessment) that will be carried out if trigger levels are exceeded				
Notification procedures if trigger levels are exceeded				
Format and frequency of reporting, and who will be provided with copies of the reports				

## APPENDIX D: SITE MANAGEMENT CHECKLIST DURING ASSESSMENT AND REMEDIATION

Environmental aspect	Significance	Guidance and references
<b>Air quality</b>	<p>Many chemical substances, particularly those associated with petroleum hydrocarbons, gasworks wastes, organic solvents or putrescible wastes, may generate offensive odours or noxious vapours.</p> <p>The release of these to the air can cause varying types and degrees of impact, such as explosive conditions, toxic environments, unacceptable health risks (either acute or chronic) and objectionable odours.</p>	<p>ASC NEPM B2, section 15.2.1</p> <p><i>National Environment (Ambient Air Quality) Protection Measure (Air Quality NEPM)</i></p> <p>Local Government Air Quality Toolkit NSW EPA</p>
<b>Odour and gases (volatile emissions)</b>	<p>Odours may also cause community concern because the public is likely to perceive odours as posing a health risk to the potentially affected community.</p>	<p>enHealth 'Environmental health risk assessment: guidelines for assessing human health risks from environmental hazards', 2002</p> <p>'Technical framework: assessment and management of odour' from stationery sources in NSW' DEC 2006</p> <p>'Technical Notes: Assessment and Management of odour from stationery sources in NSW' DEC 2006</p>
<b>Dust (particulate) emissions</b>	<p>Dust may cause concerns about potential health and environmental impacts if generated at unacceptable levels near sensitive receptors (e.g. remediation workers, surrounding community).</p> <p>Meteorological conditions (e.g. wind currents) or human activities (e.g. traffic, earth moving during site clearing or remediation) may generate dust and result in dust emissions travelling off site. Dust can also be a cause for community concern due to impacts on lifestyle and amenity of the area, and potential health risks posed by chemicals within the dust.</p> <p>Small particles can travel much greater distances than larger particles. Small particles can cause health problems by entering the lungs, whilst larger particle sizes are generally caught in the respiratory tract and might result in sinus congestion, sneezing or coughing</p>	
<b>Dust (stockpile management)</b>	<p><b><u>Stockpiles</u></b></p> <p>Stockpiles, if not correctly managed, can represent a considerable source of dust due to their height, uncompacted nature and (frequently) close proximity to sensitive receptors.</p>	



	<p>Stockpiles should have a maximum height of about 3 m, or equal to or lower than the average height of surrounding structures.</p> <p>Stockpile height should reduce as it approaches the site boundary. Stockpile heights should be below fence lines when within about 5 m of the boundary.</p> <p>Stockpiles should be covered with an effective covering. The contents of the stockpile will dictate the level of cover, i.e., complete enclosure or the formation of a crust layer.</p> <p>Stockpiles should have sufficient moisture content before being handled. Water can be applied the night before and allowed to infiltrate the stockpile. Applying water to a stockpile during handling has little effect on reducing dust emissions. Using water jets or sprays has minimal effect in capturing airborne dust, especially when out in the open.</p> <p>In all cases, it is important that an appropriate level of community consultation is undertaken at all stages of the project. Local residents and stakeholders should be advised in advance about the likely duration, impacts, potential health risks and mitigation measures to be undertaken, followed by updates during the remediation period.</p>	
<b>Dust (asbestos management)</b>	<p><b><u>Asbestos</u></b></p> <p>Various forms of asbestos, such as bonded asbestos (fibro-cement products) or free fibres (such as insulation or lagging), may be identified on sites being treated. The greatest risk to human health from asbestos is through inhalation.</p> <p>It should be noted that asbestos products have different physical and chemical properties, resulting in different potential risks to human health, depending on the likelihood of asbestos fibres becoming air-borne.</p> <p>Therefore, asbestos found on a site requires specialist skills and care in handling, removal and transportation to prevent the likelihood of asbestos fibres becoming air-borne.</p> <p>Asbestos-specific communication skills may also be needed to address potential concerns of workers and the community. There are specific legislative requirements relating to the handling of materials containing asbestos</p>	<p>ASC NEPM, B2, section 11</p> <p>Government of Western Australia 'Department of Health: Guidelines for the assessment, remediation and management of asbestos-contaminated sites in Western Australia' (2009)</p> <p>NT EPA Guideline 'Asbestos disposal in the Northern Territory'</p> <p>National Occupational Health and Safety Commission 'Code of practice for the safe removal of asbestos' (2nd edn) (2005)</p> <p>enHealth Council, 'Management of asbestos in the non-occupational environment' (2005)</p>
<b>Noise</b>	<p>Noise from earthmoving, compaction activities, pumps, blowers, machinery, sirens and vehicles can be a health risk to workers and a nuisance for neighbouring properties.</p> <p>Failure to adequately address noise issues associated with remediation activities may also</p>	<p>ASC NEPM B2, section 15.2.7</p> <p>NT EPA 'Noise guideline for development sites'</p>

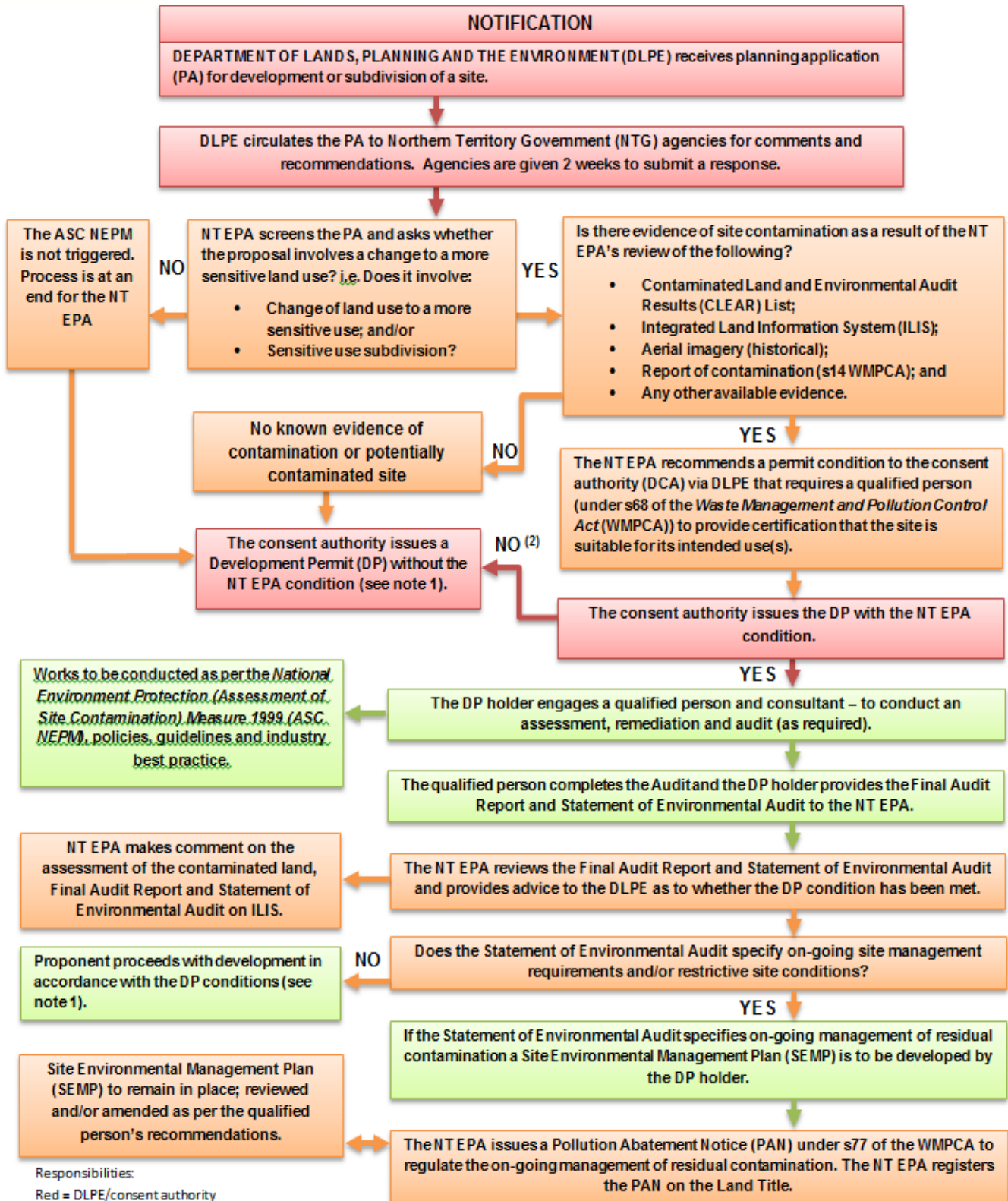
	have legislative implications.	
<b>Surface water</b>	<p>Surface waterbodies receive stormwater, which runs directly into waterways, lakes and, ultimately, oceans. Runoff from rainfall and natural site drainage may carry with it leachate or suspended solids containing chemical substances.</p> <p>Management of surface waters during remediation activities is an important part of protecting the health of our waterways and preventing the spread of pollution. The South Australia <i>Environment Protection (Water Quality) Policy</i> 2003 (Water Quality Policy) contains stringent controls for the management of water quality.</p>	ASC NEPM B2, section 15.2.3
<b>Soil quality (including acid sulfate soils)</b>	<p>Taking care to prevent cross-contamination of nearby clean soils is important so as to avoid the spread of chemical substances, and to minimise the amount of soil needing to be treated and the resources required to undertake the project. Similarly, care should be exercised so that polluted surface water does not affect clean soils.</p>	<p>ASC NEPM B2, section 15.2.6</p> <p>ASC NEPM B2, section 15.2.8</p> <p>NT EPA factsheet 'How to avoid the dangers of accepting illegal fill onto your land'</p>
<b>Groundwater</b>	<p>The WMPC Act imposes stringent obligations to not pollute groundwater and to take all reasonable and practical measures to prevent or minimise environmental harm. When undertaking remediation, specific obligations must be complied with to ensure that water quality is not degraded.</p> <p>Non-compliance with a mandatory provision of the WMPC Act is an offence. Depending on the seriousness of the offence, the NT EPA may choose to prosecute through the Court or pursue other options, such as issuing relevant directions or notices (refer to Appendix D) to gain compliance with the WMPC Act. Fines may apply if a person has been shown to be negligent, even if the offence was accidental.</p> <p>For some remediation projects, off-site groundwater monitoring may be necessary to assess the effectiveness of remediation activities or the extent of remediation required. It is important to ensure that the community is informed about and understands the purpose of monitoring and is not alarmed by such off-site activity.</p> <p>Some projects may necessitate a substantial amount of groundwater remediation as part of the project. Groundwater remediation is generally complex and time consuming. Numerous technologies are available and the effectiveness of the technology will depend on many (generally site-specific) factors. Often trials are necessary to assist with the selection</p>	ASC NEPM B2, section 15.2.2

	<p>process.</p> <p>Regardless of the selected technology, the requirements of this guideline should be met—i.e., project management plans should be prepared and implemented for groundwater remediation projects.</p>	
<b>Flora and fauna</b>	<p>Areas of sensitive vegetation and significant trees have substantial environmental value and should be protected, even where site contamination may exist.</p> <p>Threatened flora and fauna are protected under federal environment protection and biodiversity conservation legislation.</p> <p>Compliance with all legislation covering sensitive or threatened species of flora and fauna is required.</p>	<p>ASC NEPM B2, section 15.2.10</p> <p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)</p> <p>It should be noted that this aspect falls outside the NT EPA's jurisdiction. It is recommended that the relevant authority be contacted if additional information or advice is required.</p>
<b>Heritage</b>	<p>The area designated for remediation may have structures, landscape elements, archaeological deposits or vegetation of heritage significance that could, themselves, contain chemical substances or waste, or are located above soils or groundwater that may be contaminated.</p> <p>It is also possible that excavation or earth-moving activities may uncover artefacts of cultural or historical significance. Such artefacts may have substantial heritage value and should be protected.</p>	<p>ASC NEPM B2, section 15.2.9</p> <p>Federal legislation</p> <p>It should be noted that this aspect falls outside the NT EPA's jurisdiction.</p> <p>It is recommended that the Department of Lands, Planning and the Environment (responsible for the Heritage Act) be contacted if additional information/advice is required. Indigenous Heritage is also covered by the Heritage Act.</p>

# APPENDIX E: PLANNING FRAMEWORK FOR CONTAMINATED SITES



## Framework for Contaminated Sites Assessment, Remediation and Audit Involving Planning Applications Under the Planning Act in the Northern Territory<sup>1</sup>



NT EPA makes comment on the assessment of the contaminated land, Final Audit Report and Statement of Environmental Audit on ILIS.

Last updated 29 February 2016

<sup>1</sup> Responsibility for the historic, present and future land contamination of a property remains the responsibility of the land owner and / or occupier.

<sup>2</sup> The consent authority makes a decision to not incorporate the NT EPA recommended condition.

## APPENDIX F: CONTAMINATED LAND NOTIFICATION FORM



## CONTAMINATED LAND NOTIFICATION FORM

<b>1. Where to send completed forms</b>		<b>IMPORTANT PRINT CLEARLY</b>
NT Environment Protection Authority GPO Box 3675 Darwin, NT 08 Fax: 08 8942 6554 Email: <a href="mailto:pollution@nt.gov.au">pollution@nt.gov.au</a> Pollution Hotline: 1800 064 567		
<b>2. Lessee or Occupier details</b>		
Name:		Telephone Numbers: (business hours): Email:
Address:		I am: <input type="checkbox"/> the lessee of the site <input type="checkbox"/> the occupier of the site
<b>3. Site Details</b>		
Site or Establishment Name (if appropriate): Street Address: Suburb: Post Code:		
Block(s):		Section:
Owners(s) / Lessee(s):		Occupier(s):
<b>4. Cause of Contamination</b>		
<b>5. Contamination</b>		
Contaminants of concern:		Source of information on contamination:

6. What aspects of the environment are/may be affected?	7. Who/what is potentially at risk?
<b>Tick all that apply:</b> <input type="checkbox"/> Air <input type="checkbox"/> Stormwater <input type="checkbox"/> Groundwater <input type="checkbox"/> Drinking water <input type="checkbox"/> Surface water <input type="checkbox"/> Wetlands <input type="checkbox"/> Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Others (please specify) <hr/>	<b>Tick all that apply:</b> <input type="checkbox"/> Residents <input type="checkbox"/> Aquatic Life <input type="checkbox"/> Workers <input type="checkbox"/> Plants <input type="checkbox"/> School/kindergarten children <input type="checkbox"/> Animals <input type="checkbox"/> Threatened species <input type="checkbox"/> Others (please specify) <hr/>

**8. Are any other sites effected or at risk? (i.e. outside the lease/sub lease boundary)**

Tick appropriate box:

☐

No

☐

Yes

If "Yes" is ticked, indicate which of the matters listed in item 6 and 7 apply to other sites:  
 Details of other sites affected:

**9. Additional pages attached (e.g. Results of sampling, photographs, environmental reports, etc.)**

If you have attached additional pages to this notification, indicate the number of pages.  
 When the notification is certified, the person(s) who certify the notification must initial each page attached. Number of pages attached:

**10. Certification (in the case of a notice lodged on behalf of a body corporate)**

I certify that:

- I have personally examined and am familiar with the information contained in this notification; and
- to the extent they are within my knowledge, the matters contained in this notification are true, accurate and complete.

Name:

Position:

Signature:

Date:

Name:

Position:

Signature:

Date:

**CORPORATE SEAL AFFIXED IN  
 ACCORDANCE WITH  
 CONSTITUTION OF BODY  
 CORPORATE**

**11. Signature (in the case of a notice lodged by one or more individuals)**

The matters contained in this notification are, to the best of my knowledge, true, accurate and complete.



<b>Name:</b> <b>Signature:</b> <b>Date:</b>	<b>Name:</b> <b>Signature:</b> <b>Date:</b>
<p>If the notification is made by one or more individuals, the form must be signed by each individual concerned.</p> <p>If the notification is made by a corporation, the form must be signed:</p> <ul style="list-style-type: none"> <li>a) by affixing the common seal of the corporation; or</li> <li>b) personally by a person authorised to do so by the corporation</li> </ul>	

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## APPENDIX G: ENVIRONMENTAL MANAGEMENT INSTRUMENTS

### Environment protection approvals and licences

An environmental protection approval or licence is an authorisation to conduct an activity which has a potential to cause environmental harm (Part 5 of the WMPC Act), and sets out conditions under which the activity must be conducted.

Examples of activities which have the potential to adversely impact on human health and the environment which require an environmental protection approval or licence under the WMPC Act, are:

- disposal of wastes by burial
- waste transfer stations (where waste oils, batteries, paints and chemicals and other listed waste are collected)
- listed waste handlers and transporters
- hydrocarbon (gas) processing.

Environmental approvals and licences can be issued for activities involving contaminated land, such as landfarming and bioremediation of listed waste.

### Performance agreements

A performance agreement is a formal agreement under Part 8 of the WMPC Act between the NT EPA and a person. The performance agreement may provide that the person is to undertake or cause to have undertaken a program specified in the agreement. A program may include:

- the protection, restoration or enhancement of the environment,
- to improve waste management
- the prevention, reduction, control, rectification or clean-up of pollution or environmental harm.

Where the NT EPA enters into a performance agreement with a person, the agreement has effect as a contract binding on the Northern Territory and the person with whom the agreement is entered into.

The performance agreement would include the requirements for the assessment, remediation (if required) and independent audit (if required) to ensure the site is suitable for the intended and approved use(s).

### Pollution abatement notice

A pollution abatement notice (PAN) is an instrument issued by the NT EPA under section 77 of the WMPC Act, where the NT EPA is satisfied that the person has committed or may commit an offence against section 83 of the WMPC Act, or has contravened or failed to comply with section 12 of the WMPC Act, or is the owner or occupier of land that is polluted.

If a Site Audit Statement or Statement of Environmental Audit issued as part of the environmental audit includes conditions relating to the ongoing management of the site. The NT EPA may include these conditions in a pollution abatement notice issued under section 77 of the WMPC Act

This option may be adopted where:

- the site would not present, or would not be likely to present, a risk of harm to human health and/or a risk of material or serious environmental harm
- the site would not present, or would not be likely to present, a risk of harm to human health and/or a risk of material or serious environmental harm while measures for its containment continue.

The PAN may require a person, within a specified time:

- to comply with a code of practice or to otherwise comply with the general environmental duty specified in section 12 of the WMPC Act
- to comply with a requirement of a provision of the WMPC Act, other than such a provision that the person is not required to comply with under a compliance plan

- to prevent an action occurring or continuing to occur, where that action has caused or may cause pollution resulting in environmental harm
- to take remedial action to return polluted land as far as possible to a specified condition that the NT EPA thinks appropriate for the protection of the environment or the use of the land.

The NT EPA must, as soon as practicable after issuing a PAN in relation to land, lodge a copy of the PAN with the Registrar-General. The Registrar-General must record a PAN in the register kept by him or her under the *Land Title Act*.

### Notice to Conduct an Environmental Audit

A notice to conduct an environmental audit is an instrument issued by the NT EPA under section 48 of the WMPC Act, where the NT EPA is satisfied that pollution of land has occurred. A notice to conduct an environmental audit is an assessment to prevent, reduce, control, rectify or clean up pollution or environmental harm resulting from pollution. This may also include an assessment of the types, amount, distribution or mobility of contaminants or waste present in the environment.

A notice to conduct an environmental audit to assess land contamination will be issued in writing and specify:

- the environmental audits to be performed under the program
- the activities, operations, premises or locations to which the environmental audits are to relate
- the date or dates by which the environmental audits are to be performed or the frequency with which and the period during which the environmental audits are to be performed
- the date or dates by which results of the environmental audits performed under the program are to be submitted to the NT EPA or the frequency with which or the period in which the results are to be submitted
- conditions or other matters relating to the conduct of the environmental audit program that the NT EPA thinks fit
- the reasons for the requirements to carry out the environmental audit program.

A person to whom a notice to conduct an environmental audit to assess the land has been served must:

- conduct, within the time period specified in the notice, the assessment in accordance with the prescribed standards and procedures for carrying out the assessment or remediation, including standards and procedures specified in a relevant National Environment Protection Measure
- commission a 'qualified person' (under Part 9 of the WMPC Act) as part of the assessment and/or remediation
- provide to the NT EPA a notification form (in the form of the jurisdiction the auditor is qualified) of the 'qualified person' who will conduct an independent audit of the assessment and/or remediation (such an audit can only be conducted by an auditor accredited for this purpose under section 67 of the WMPC Act).

Where a person is found guilty of an offence against the WMPC Act, the Court may, on the application of the prosecutor, order a person to carry out an environmental audit program specified in the order.

### Compliance plans

A compliance plan is an instrument used by the NT EPA under Part 7 of the WMPC Act. The purpose of a compliance plan is to enable a person who, for reasons satisfactory to the NT EPA, is or will be unable to comply with a provision of the WMPC Regulations or of an environment protection objective. They may enter into a compliance plan that – through requiring the implementation in stages of improvement in waste management and the prevention, reduction, control, rectification or clean-up of pollution or environmental harm resulting from pollution – will enable at the conclusion of the program the person to comply with the provision.

Where a person is found guilty of an offence against the WMPC Act, the Court may, on the application of the prosecutor, order the person to prepare and submit to the NT EPA, before the date specified in

the order, a draft compliance plan in relation to a provision of the WMPC Regulations or of an environment protection objective specified in the order.

**Authorised officer direction**

An authorised officer direction is an instrument used by the NT EPA under section 72 of the WMPC Act. Under this provision of the WMPC Act, an authorised officer may direct a person to prevent, reduce, control, rectify or clean up pollution or environmental harm resulting from pollution. Or, to manage waste on or in land or premises by the method, and within the time, specified in the direction.

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## APPENDIX H: ASBESTOS REGULATORS IN THE NORTHERN TERRITORY

**Remember:** Asbestos exposure is potentially harmful. However when asbestos is properly regulated and managed, it poses minimal human risk.

### So who do you call?

Please refer to the table below for regulatory or other points of contact relating to specific asbestos issues. Contacts are in order of relevance.

Issue	Contact
Analysis of samples	Laboratories accredited with National Association of Testing Laboratories (NATA) Phone: (08) 8179 3400
Damaged asbestos (due to fire, hail, storms)	Your insurer for owners. The asbestos owner or landlord for tenants. Possibly local government ( <a href="http://www.lgant.asn.au/">www.lgant.asn.au/</a> ) or Department of Health (08) 8922 7152 – if you have additional concerns.
Diseases and support	Asbestos Diseases Society (08) 9344 4077 or Cancer Council (131 120)
Disposal	Local government ( <a href="http://www.lgant.asn.au/">www.lgant.asn.au/</a> ) or NT EPA (08) 8921 4218
Dumped Material	The property owner, local government ( <a href="http://www.lgant.asn.au/">www.lgant.asn.au/</a> ) or NT EPA (08) 8924 4218
Licensing (removal)	NT WorkSafe (1800 019 115) or

Issue	Contact
Licensing (transport and disposal)	NT EPA (08) 8924 4218
Identification	Check the Yellow Pages under “Asbestos testing” or contact Department of Health (08) 8922 7152
Mines and mine sites	NT Department of Mines and Energy (1300 308 144)
Removalists	Check the Yellow Pages under “Asbestos removals”, NT WorkSafe (1800 019 115) or NT EPA (08) 8924 4218.
Safety at work	NT WorkSafe (1800 019 115)
Safety for home/public	Local Government ( <a href="http://www.lgant.asn.au/">www.lgant.asn.au/</a> ) or NT Department of Health (08) 8922 7152
Schools	The school principal or Department of Education (08) 8999 5659
Soil contamination	NT EPA (08) 8924 4218 or NT WorkSafe (1800 019 115)
Transportation	NT EPA (08) 8924 4218
Workplace	NT WorkSafe (1800 019 115)



### Asbestos regulators and information sources in the Northern Territory



[www.ntepa.nt.gov.au](http://www.ntepa.nt.gov.au)

Tel: (08) 8924 4218

Asbestos was used extensively in building products in the Northern Territory between 1940 to 1990. Although its use has now ceased, there is still a widespread presence of asbestos in the community.

Asbestos may be found at home, in public places or at work – depending on the age of the building or fencing. As asbestos exposure is potentially harmful, there are a range of regulations regarding its handling and removal.

This document provides contact details for asbestos regulators and information sources.

### Asbestos regulators

#### NT Environment Protection Authority

Regulates and provides advice on handling, transport and disposal of asbestos materials and potentially contaminated land.

Phone: (08) 8921 4218  
[www.ntepa.nt.gov.au](http://www.ntepa.nt.gov.au)

#### NT Department of Health – Environmental Health

Oversees major asbestos complaints in the non-occupational environment. Asbestos may be treated as a public health nuisance.

Phone: (08) 8922 7152  
[www.nt.gov.au/health/envirohealth](http://www.nt.gov.au/health/envirohealth)

#### NT Department of Mines and Energy

Regulates safe asbestos practices in the resources industry.

Phone: 1 300 308 144  
[www.nt.gov.au/d/Minerals\\_Energy/](http://www.nt.gov.au/d/Minerals_Energy/)

#### NT WorkSafe

Regulates the licensing for asbestos removal work and asbestos assessor work. NT Worksafe inspectors carry out inspections of work sites to ensure activities are being carried out safely.

Phone: 1800 019 115  
[www.worksafe.nt.gov.au/](http://www.worksafe.nt.gov.au/)

#### Other Government Agencies

Several other government agencies have responsibility for management of asbestos in government owned buildings, facilities and land. Contacts are as follows:

#### NT Department of Education

Manages asbestos issues in school buildings and other facilities under its control.

Phone: (08) 8999 5659  
[www.education.nt.gov.au/](http://www.education.nt.gov.au/)

#### NT Department of Housing

Manages asbestos issues associated with its properties.

Phone: (1800 104 076 (maintenance issues)  
[www.housing.nt.gov.au/](http://www.housing.nt.gov.au/)

#### NT Department of Infrastructure

Prepares asbestos management plans and asbestos register for assets under the department's direct management and control.

Phone: (08) 8999 5511  
[www.nt.gov.au/infrastructure/services/asbestos/doi-internal/](http://www.nt.gov.au/infrastructure/services/asbestos/doi-internal/)

#### Local Governments—Councils

Manage licensed waste disposal facilities for the acceptance of asbestos. Your local council should be contacted to enquire if there facility is licensed for asbestos. Additionally, manages asbestos in council managed parks.

See Local Government Directory for your local contact details at  
[www.lgant.asn.au/](http://www.lgant.asn.au/)

#### NT Parks and Wildlife

Manages asbestos issues under the department's direct management and control.

Phone: (08) 8999 5659  
[www.education.nt.gov.au/](http://www.education.nt.gov.au/)

#### Crown Land Management

Manages asbestos issues under the department's direct management and control.

Phone: (08) 8999 6886  
Email: [landadmin.dlpe@nt.gov.au](mailto:landadmin.dlpe@nt.gov.au)

#### Other sources of asbestos assistance

#### Asbestos Diseases Society of Australia

ADSA is a charitable organisation providing support to people with asbestos-related diseases.

Phone: (08) 9344 4077 or 1 800 646 690  
[www.asbestosdiseases.org.au](http://www.asbestosdiseases.org.au)

#### Asbestos Safety and Eradication Authority

ASEA provides a national focus on asbestos issues, including providing a register for personal asbestos exposures.

Phone: 1300 326 148  
Email: [enquiries@asbestossafety.gov.au](mailto:enquiries@asbestossafety.gov.au)  
[www.asbestossafety.gov.au](http://www.asbestossafety.gov.au)

#### Australian Asbestos Network

Provides a wide range of information on asbestos issues.  
[www.australianasbestosnetwork.org.au](http://www.australianasbestosnetwork.org.au)



# APPENDIX I: ASC NEPM SCHEDULE A RECOMMENDED PROCESS FOR ASSESSMENT OF SITE CONTAMINATION

