

**Environment Protection Authority**

**Guidelines for the assessment and  
remediation of site contamination**

---

## **Guidelines for the assessment and remediation of site contamination**

For further information please contact:

Information Officer  
Environment Protection Authority  
GPO Box 2607  
Adelaide SA 5001

Telephone: (08) 8204 2004

Facsimile: (08) 8124 4670

Free call (country): 1800 623 445

Website: [www.epa.sa.gov.au](http://www.epa.sa.gov.au)

Email: [epainfo@sa.gov.au](mailto:epainfo@sa.gov.au)

ISBN 978-1-921495-55-7

Issued July 2018

Updated October 2018

Revised November 2019

### Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek appropriate advice regarding your obligations, including legal advice.

© Environment Protection Authority

This document may be reproduced in whole or part for the purpose of study or training, subject to the inclusion of an acknowledgment of the source and to it not being used for commercial purposes or sale. Reproduction for purposes other than those given above requires the prior written permission of the Environment Protection Authority.

# Contents

<b>Abbreviations</b> .....	<b>1</b>
<b>Summary</b> .....	<b>3</b>
<b>Part 1 Roles and responsibilities</b> .....	<b>5</b>
<b>1 Introduction</b> .....	<b>6</b>
1.1 Site contamination.....	6
1.2 Purpose.....	6
1.3 Application of the guideline.....	7
1.4 Application of national and international publications.....	7
1.5 Currency of this guideline.....	7
1.6 National Environment Protection (Assessment of Site Contamination) Measure 1999.....	8
1.7 Protection of the environment during assessment and remediation.....	8
<b>2 EPA regulation and administration of site contamination</b> .....	<b>10</b>
2.1 The role of the EPA.....	10
2.2 Selection and implementation of regulatory instruments.....	10
2.3 Site contamination auditors.....	11
2.4 Site contamination consultants.....	12
2.5 Landowners and occupiers.....	12
2.6 Developers.....	12
2.7 Planning authorities.....	12
2.8 Preparation of reports and honesty in reporting.....	13
<b>Part 2 Legislative and policy framework</b> .....	<b>15</b>
<b>3 Determination of site contamination</b> .....	<b>16</b>
3.1 Overview.....	16
3.2 Legislation.....	16
3.3 Site contamination at a site.....	17
3.4 Determination of site contamination.....	17
3.5 Application of EPA recognised criteria.....	18
<b>4 Groundwater and environmental values</b> .....	<b>20</b>
4.1 Definition of water.....	20
4.2 Environmental values of groundwater.....	20
4.3 Process to determine environmental values of groundwater.....	20
<b>5 Notification requirements</b> .....	<b>24</b>
5.1 Section 83A – Notification of site contamination of underground water.....	24
5.2 Hazardous circumstances.....	24
<b>Part 3 Assessment and auditing</b> .....	<b>27</b>
<b>6 Assessment and auditing</b> .....	<b>28</b>
6.1 Overview.....	28
6.2 Characterising the source.....	28

6.3	Conceptual site model .....	28
6.4	Tiered-risk assessment process .....	29
6.5	Reasons for a site contamination audit .....	32
6.6	Site sampling and site activities .....	33
<b>Part 4 Remediation .....</b>		<b>35</b>
<b>7</b>	<b>Framework for remediation .....</b>	<b>36</b>
7.1	Introduction .....	36
7.2	Legislation .....	36
7.3	Determining when remediation is necessary .....	36
7.4	Remediation of sources and chemical substances .....	37
<b>8</b>	<b>Development of a remediation strategy .....</b>	<b>38</b>
8.1	Overview and remediation hierarchy .....	38
8.2	Remediation goals .....	38
8.3	Remediation objectives .....	39
8.4	Optimisation of remediation strategy .....	40
8.5	Preparing a remediation options assessment .....	40
8.6	Practicability considerations .....	41
8.7	Remediation timeframes .....	42
<b>9</b>	<b>Remediation reporting framework .....</b>	<b>43</b>
9.1	Overview .....	43
9.2	Remediation options assessment (ROA) .....	43
9.3	Site remediation plan (SRP) .....	43
9.4	Remediation validation report (RVR) .....	43
9.5	Site management plan (SMP) .....	44
<b>10</b>	<b>Groundwater remediation technologies .....</b>	<b>46</b>
10.1	Application of remediation publications .....	46
10.2	Remediation of non-aqueous phase liquids (NAPL) .....	46
10.3	Management remediation option – monitored natural attenuation (MNA) .....	47
<b>11</b>	<b>Management and protection of the environment .....</b>	<b>48</b>
11.1	General environmental duty .....	48
11.2	Waste management hierarchy .....	48
11.3	Work health and safety .....	48
11.4	Surface waters .....	48
11.5	Aesthetics .....	49
11.6	Stockpiles .....	49
11.7	Asbestos .....	50
11.8	Acid sulfate soils .....	51
<b>Part 5 Community engagement and information .....</b>		<b>53</b>
<b>12</b>	<b>Community engagement and risk communication .....</b>	<b>54</b>
12.1	Introduction .....	54
12.2	Key principles of risk management .....	54

12.3	Informed consent .....	54
<b>13</b>	<b>Access to site contamination information.....</b>	<b>56</b>
13.1	EPA Public Register.....	56
13.2	Form 1 statements and Section 7 enquiries .....	57
13.3	Advice regarding reports.....	57
13.4	Currency of reports .....	57
13.5	EPA contact information .....	58
<b>14</b>	<b>Glossary.....</b>	<b>59</b>
<b>Appendix 1</b>	<b>Honesty in reporting declaration .....</b>	<b>63</b>
<b>Appendix 2</b>	<b>EPA recognised criteria.....</b>	<b>66</b>
<b>Appendix 3</b>	<b>Section 83A – Notification of site contamination that affects or threatens underground water .....</b>	<b>68</b>
<b>Appendix 4</b>	<b>Notification of hazardous circumstances .....</b>	<b>76</b>
<b>Appendix 5</b>	<b>Assessment reporting checklist .....</b>	<b>80</b>
<b>Appendix 6</b>	<b>Remediation reporting checklist.....</b>	<b>91</b>
<b>Appendix 7</b>	<b>Environmental aspects for consideration when undertaking remediation.....</b>	<b>95</b>
<b>Appendix 8</b>	<b>References for legislation and guidelines .....</b>	<b>101</b>
<b>Appendix 9</b>	<b>Electronic format of notifications and reports .....</b>	<b>103</b>

## List of figures

Figure 1	Key considerations for the determination of the existence of site contamination at a site.....	18
Figure 2	Process to determine environmental values of groundwater at a site .....	20
Figure 3	Summary of the site contamination tiered risk assessment process .....	30
Figure 4	Relevant schedules of the ASC NEPM documenting the tiered risk-based approach to assessment .....	31

## List of tables

Table 1	Application of the WQEPP to determine protected environmental values of groundwater .....	21
Table 2	Application of a buffer distance for protection of surface waters .....	21
Table 3	Application of WaterConnect (groundwater data) to determine environmental values of groundwater .....	22
Table 4	EPA recognised criteria and environmental values of groundwater .....	23
Table 5	Hazardous circumstances recommended notification, timeframes and emergency contact information .....	24
Table 6	Circumstances when the EPA may require an audit for a site.....	33
Table 7	Key considerations during site sampling and site activities for collection of reliable data .....	33
Table 8	Selection of the remediation options to inform the preparation of the ROA.....	41
Table 9	EPA recognised criteria for human health and ecological receptors .....	66
Table 10	Environmental values of waters and EPA recognised criteria .....	67



# Abbreviations

<b>ACM</b>	asbestos-containing materials
<b>ANZG</b>	Australian & New Zealand Guidelines for Fresh & Marine Water Quality (2018)
<b>ASC NEPM</b>	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
<b>AWQG</b>	Australian Water Quality Guidelines
<b>CEMP</b>	construction environment management plan
<b>COI</b>	chemicals (substance) of interest
<b>CSM</b>	conceptual site model
<b>CVI</b>	chlorinated hydrocarbon vapour intrusion
<b>DEW</b>	Department of Environment and Water
<b>DNAPL</b>	dense non-aqueous phase liquid
<b>DOM</b>	domestic registered groundwater wells/bores
<b>DQO(s)</b>	data quality objective(s)
<b>DSI</b>	detailed site investigation
<b>EIL</b>	ecological investigation level (refer to Schedule B1 of the ASC NEPM)
<b>EMP</b>	environmental management plan
<b>EPA</b>	South Australian Environment Protection Authority
<b>EP Act</b>	Environment Protection Act 1993
<b>EPO</b>	environment protection order
<b>EPP</b>	environment protection policy
<b>ERD Court</b>	Environment, Resources and Development Court (SA)
<b>ESL</b>	ecological screening level (refer to Schedule B1 of the ASC NEPM)
<b>EV</b>	environmental value
<b>GIL</b>	groundwater investigation level (refer to Schedule B1 of the ASC NEPM)
<b>GME</b>	groundwater monitoring event
<b>GMMP</b>	groundwater monitoring and management plan
<b>GMRRW</b>	Guidelines for Managing Risks in Recreational Water, 2008
<b>GPA</b>	groundwater prohibition area
<b>GR</b>	guideline recommendation
<b>HIL</b>	health investigation level (refer to Schedule B1 of the ASC NEPM)
<b>HSL</b>	health screening level (refer to Schedule B1 of the ASC NEPM)
<b>IND</b>	industrial registered groundwater well/bore
<b>INV</b>	investigation registered groundwater well/bore
<b>IRR</b>	irrigation registered groundwater well/bore
<b>ISO</b>	International Organisation of Standards

<b>ITRC</b>	Interstate Technology and Regulatory Council (US)
<b>LBSC Act</b>	Land and Business (Sale and Conveyancing) Act 1994
<b>LBSC Regulations</b>	Land and Business (Sale and Conveyancing) Regulations 2010
<b>LNAPL</b>	light non-aqueous phase liquid
<b>LOR</b>	limit of reporting
<b>ML</b>	management limit (refer to Schedule B1 of the ASC NEPM)
<b>MNA</b>	monitored natural attenuation
<b>MON</b>	monitoring registered groundwater well/bore
<b>NAPL</b>	non-aqueous phase liquid
<b>NHMRC</b>	National Health and Medical Research Council
<b>NRMCC</b>	Natural Resource Management Ministerial Council (Australia)
<b>PAHs</b>	polycyclic aromatic hydrocarbons
<b>PCA</b>	potentially contaminating activity
<b>PID</b>	photo-ionisation detector
<b>PSI</b>	preliminary site investigation
<b>PVI</b>	petroleum hydrocarbon vapour intrusion
<b>QA/QC</b>	quality assurance/quality control
<b>Regulations</b>	Environment Protection Regulations 2009
<b>ROA</b>	remediation options assessment
<b>RVR</b>	remediation validation report
<b>SAQP</b>	sampling and analysis quality plan
<b>SCAO</b>	site contamination assessment order
<b>SMA</b>	special management area
<b>SMP</b>	site management plan
<b>SRO</b>	site remediation order
<b>SRP</b>	site remediation plan
<b>SSRA</b>	site-specific risk assessment
<b>UCL</b>	upper confidence limit
<b>VI</b>	vapour intrusion
<b>VOC(s)</b>	volatile organic compound(s)
<b>VOCC(s)</b>	volatile organic chlorinated compound(s)
<b>VSCAP</b>	voluntary site contamination assessment proposal
<b>VSRP</b>	voluntary site remediation proposal
<b>WQEPP</b>	Environment Protection (Water Quality) Policy 2015

## Summary

The South Australian Environment Protection Authority (EPA) has issued this guideline to describe the legislative and policy approach to risk-based assessment and remediation of site contamination in South Australia.

This guideline has been prepared for site contamination consultants (consultants), certified practitioners and site contamination auditors (auditors) undertaking the assessment and remediation of site contamination.

This guideline supports the Objects of the *Environment Protection Act 1993* which requires the establishment of processes for carrying out assessments of known or suspected site contamination and, if appropriate, remediation of sites.

The purpose of this guideline is to provide information to assist consultants and auditors to adopt a consistent and compliant interpretation of relevant legislation, policy and guidance. This guideline also provides information to ensure the assessment and remediation of site contamination is conducted to an appropriate standard in South Australia.

The EPA has prepared information in this guideline to assist consultants and auditors to:

- determine of the existence of site contamination using EPA recognised criteria
- assess and identify the environmental values of water (groundwater) using a four-step process
- determine when to notify of site contamination that affects or threatens underground water (section 83A of the *Environment Protection Act 1993*)
- identify matters that represent hazardous circumstances, with respective timeframes for the management of such matters
- undertake the assessment of site contamination in general accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended in 2013)
- determine when a site contamination audit is required for a site based on the existence of site contamination and land use at a site, and offsite receptors
- prepare a remediation strategy to address remediation goals, objectives and endpoints for a site
- determine what type of remediation technology or method is appropriate for a site, using a process to assist in the preparation of a remediation options assessment
- manage and protect the environment when undertaking assessment and remediation
- undertake effective community engagement and risk communication for site contamination matters.

This guideline should be read in conjunction with the following EPA publications:

- [Guideline for the assessment of background concentrations \(2018\)](#)
- [Site contamination policy: certification of practitioners \(2018\)](#)
- [Site contamination: regulatory and orphan site management framework \(2017\)](#)
- [Guidelines for the site contamination audit system \(2019\)](#).



## **Part 1**

### **Roles and responsibilities**

---

# 1 Introduction

## 1.1 Site contamination

Site contamination can create complex social and economic issues. If not adequately recognised and addressed, site contamination can pose a significant risk to human health and/or the environment<sup>1</sup>. Site contamination can affect one or more media of the environment including (but not limited to) soil, groundwater and soil vapour. Subsequently via the vapour intrusion pathway, indoor air may also be affected by site contamination.

Assessment of site contamination at a site may be required as a result of various triggers. The triggers may include a change in land ownership, the proposed change of the use of a site for a more sensitive use<sup>2</sup>, a requirement of a development approval process, a regulatory requirement of the South Australian Environment Protection Authority (EPA), or a due diligence assessment. In any instance, the site contamination consultant (consultant)<sup>3</sup> and/or site contamination auditor (auditor)<sup>4</sup> are likely to be required to make a determination as to the existence of site contamination.

Robust scientific assessment of site contamination is essential to ensure adequate protection of human health and the environment. The assessment of site contamination should be undertaken in accordance with the framework provided in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended in 2013) (the ASC NEPM). If site contamination exists, the provisions of Part 10A of the *Environment Protection Act 1993* (the EP Act) apply.

When remediation is required, it is to be undertaken in accordance with this guideline and other relevant national and international publications<sup>5</sup>.

A range of other site contamination publications have been prepared by the EPA for the community and non-site contamination professionals, which are available on the [EPA website](#).

## 1.2 Purpose

The guideline has been prepared to reflect developments and learnings related to the regulation of site contamination in South Australia since 2009 and, in particular, legislative experience and knowledge developed through regulatory processes since the commencement of Part 10A of the EP Act (July 2009).

In addition, the guideline seeks to:

- align the framework for the assessment of site contamination with the amended ASC NEPM, and
- provide a framework for the remediation of site contamination in South Australia, by establishing policy that is risk-based, incorporates the Objects of the EP Act and provides a hierarchy for remediation options.

The purposes of this guideline are to provide consultants and auditors with a risk-based approach to the determination of site contamination and to clarify the EPA's expectations of consultants and auditors in the assessment and remediation of site contamination in South Australia.

In particular, this guideline has been developed to assist consultants and auditors to:

- adopt a consistent and compliant interpretation of relevant legislation, policy and guidance, and
- ensure the assessment and remediation of site contamination is conducted to an appropriate standard.

---

<sup>1</sup> Environment is defined in section 3(1) of the EP Act and refer also to the Glossary of this guideline

<sup>2</sup> Sensitive use is defined in section 3(1) of the EP Act and refer also to the Glossary of this guideline

<sup>3</sup> Site contamination consultant is defined in section 3(1) of the EP Act

<sup>4</sup> Site contamination auditor is defined in section 3(1) of the EP Act

<sup>5</sup> Refer to section 1.4 of this guideline for the application of national and international publications

It also details the responsibilities and roles of all persons involved in the assessment and remediation of site contamination.

### 1.3 Application of the guideline

The information in this guideline is provided for general assistance.

While it is expected that this guideline will provide assistance in understanding the regulation of site contamination in South Australia, you may need to seek your own advice in relation to your specific circumstances.

The guideline should be read in conjunction with the following EPA publications:

- [Guideline for the assessment of background concentrations \(2018\)](#)
- [Site contamination policy: certification of practitioners \(2018\)](#)
- [Site contamination: regulatory and orphan site management framework \(2017\)](#)
- [Guidelines for the site contamination audit system \(2019\)](#).

The EP Act and the [Environment Protection Regulations 2009](#) (the Regulations) include a range of different requirements for consultants, auditors, landowners, occupiers and others. Key legislative provisions and policy requirements have been highlighted throughout this publication in text boxes where appropriate. Legislative and policy requirements have been identified with the use of the word 'must' or 'required'. Key aspects and policy have been highlighted in text boxes as guideline recommendations referenced as 'GR'.

All South Australian legislation is available on the [South Australian legislation website](#).

Nothing in this document is intended to derogate from or fetter the powers of the EPA and authorised officers under the EP Act and the regulations made under the EP Act.

### 1.4 Application of national and international publications

There is a range of national and international publications that exist in relation to the assessment and remediation of site contamination that are not part of the legislative framework applied in South Australia.

Prior to use and application of such publications that are not specifically referred to in this guideline, the EPA recommends that consultants and auditors understand the legislative background informing the publication. Other relevant matters to consider include: the limitation of the publication to site-specific circumstances, the sources for the publication, the age of the publication and whether the publication is widely recognised as authoritative. Draft publications are generally not considered suitable for the purpose of risk-based decision making for the assessment and remediation of site contamination.

### 1.5 Currency of this guideline

This guideline supersedes and replaces the following guidelines and information sheets previously published by the EPA:

- *Site contamination: implementation of the National Environment Protection (Assessment of Site Contamination) Measure 1999* (2016)
- *Site contamination: guidelines for the assessment and remediation of groundwater contamination* (2009)
- *Site contamination: what is site contamination?* (2009)
- *Site contamination: responsibility for assessment and remediation of site contamination* (2009)
- *Site contamination: honesty in reporting* (2008)
- *Site contamination: how to determine actual or potential harm to water that is not trivial resulting from site contamination* (2008)
- *Notification of site contamination that affects or threatens underground water pursuant to section 83A of the Environment Protection Act 1993* (2008)

- *Environmental management of onsite remediation* (2006)
- *Composite soil sampling in site contamination assessment and management* (2005)
- *Soil bioremediation* (2005)
- *Pollutant management for water well drilling* (2004).

This guideline may be replaced, amended or updated periodically by the EPA. All persons should refer to the [EPA website](#) for details of the most recent version of this guideline and other EPA publications related to site contamination.

## **1.6 National Environment Protection (Assessment of Site Contamination) Measure 1999**

The [ASC NEPM](#) provides a national risk-based framework for the staged or tiered assessment of site contamination in Australia. Information collected at each stage or tier of assessment is used to inform and plan the scope of subsequent work. The framework provides the means for prioritising work and focusing on the higher risk issues associated with site contamination.

The purpose of the ASC NEPM is to establish a nationally consistent approach for the assessment of site contamination. Its framework promotes sound environmental management practices that should be adopted by the relevant stakeholders including regulators, site assessors, consultants, auditors, landowners, developers and industry parties.

The desired outcome of the ASC NEPM is to provide adequate protection of human health and the environment, where site contamination is found to exist, through the development of an efficient and effective national approach to the assessment of site contamination.

The ASC NEPM comprises a policy framework supported by two schedules. This guideline and other EPA documents in the site contamination series are intended to be consistent with the policy framework and guidance provided in the ASC NEPM.

The EPA expects the assessment of site contamination will be carried out in accordance with the guidance provided in the ASC NEPM and relevant EPA publications. The ASC NEPM provides some limited guidance on the remediation of site contamination. It provides details of environmental outcomes<sup>6</sup> for achieving remediation and/or management at a site.

The ASC NEPM (including any amendments and errata) is available for download from the ComLaw website. The website for the former [Standing Council on Environment and Water \(SCEW\)](#) provides supporting information about the ASC NEPM including frequently asked questions, errata and the [ASC NEPM Toolbox](#).

## **1.7 Protection of the environment during assessment and remediation**

There should be appropriate protection of the environment during site assessment and remediation. Schedule B2, section 15 of the ASC NEPM states minimum measures that should be adopted to ensure the protection of the environment during site assessment. Further information is provided in section 11 of this guideline.

Causing environmental harm<sup>7</sup> (including serious or material environmental harm or environmental nuisance) is an offence under the EP Act and regulatory action may be taken by the EPA where it occurs. For information relating to

---

<sup>6</sup> Principles to be observed in relation to the assessment of site contamination are contained in clause 6 of the ASC NEPM. Principle 16 provides a hierarchy of options for site clean-up and or management to achieve desired and site-specific environmental outcomes

<sup>7</sup> Refer to section 5 of the EP Act for the definition of environmental harm, and sections 79 and 80 of the EP Act for the offence provisions for causing serious environmental harm and material environmental harm, respectively

the EPA's regulation<sup>8</sup> of general environmental duty and the environmental harm provisions of the EP Act, refer to the EPA publication [\*Compliance and enforcement regulatory options and tools \(2009\)\*](#)<sup>9</sup>.

---

<sup>8</sup> Additional information on general environmental duty and environmental harm provisions of the EP Act are provided in section 3.1 of this guideline

<sup>9</sup> The publication referenced should be applied in its state of publication or as updated from time to time

## 2 EPA regulation and administration of site contamination

### 2.1 The role of the EPA

The EPA<sup>10</sup> is responsible for administering and enforcing the EP Act and the Regulations. Section 13 of the EP Act sets out the broad functions of the Authority (EPA). The functions include, but are not limited to, the following:

- prepare draft environment protection policies (EPPs), and conduct reviews of EPPs, regulations and other measures and practices to ensure that they are adequate and effective to secure the Objects<sup>11</sup> of the EP Act
- contribute to the development of national environment protection measures and ensure their effective application in South Australia
- authorise activities of environmental significance through authorisations
- conduct investigations for the purpose of assessing compliance<sup>12</sup> with the EP Act.

The EPA also undertakes the following activities:

- provides responses to development applications referred to it through the *Development Act 1993*
- contributes to Form 1 and 2 statements under the *Land and Business (Sale and Conveyancing) Act 1994*.

Specifically, Part 10A of the EP Act provides provisions and regulatory instruments in relation to site contamination. These provisions allow for:

- issuing site contamination assessment orders (SCAOs)<sup>13</sup> and site remediation orders (SROs)<sup>14</sup>
- agreement to voluntary site contamination assessment proposals (VSCAPs)<sup>15</sup> and voluntary site remediation proposals (VSRPs)<sup>16</sup>
- establishing and regulating the site contamination audit system<sup>17</sup>
- declaring of water restriction or prohibition areas (groundwater prohibition areas or GPAs)<sup>18</sup>
- declaring special management areas (SMAs)<sup>19</sup>.

For further information specific to the EPA's regulation of site contamination matters, refer to the EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#).

### 2.2 Selection and implementation of regulatory instruments

The EPA has a number of regulatory instruments available to ensure that risks to human health and/or the environment posed by site contamination, are addressed in a timely and effective manner.

In the course of the EPA's regulation of site contamination at a site, selection of an appropriate regulatory instrument is based on:

- the potentially contaminating activities that have taken place at the site or elsewhere

---

<sup>10</sup> Refer to section 11 of the EP Act for the establishment of the Authority

<sup>11</sup> The Objects of the EP Act are defined in section 10 of the EP Act

<sup>12</sup> Refer to the EPA publication *Compliance and enforcement regulatory options and tools (2009)*

<sup>13</sup> Refer to section 103H of the EP Act

<sup>14</sup> Refer to section 103J of the EP Act

<sup>15</sup> Refer to section 103I of the EP Act

<sup>16</sup> Refer to section 103K of the EP Act

<sup>17</sup> Refer to Division 4 of the EP Act

<sup>18</sup> Refer to section 103S of the EP Act

<sup>19</sup> Refer to section 103N of the EP Act

- the potential exposure pathways and risks that exist (based on the chemical substance and potentially affected media)
- the appropriate person who caused site contamination.

When site contamination exists, the EPA will regulate the appropriate person in accordance with the publication *Site contamination: regulatory and orphan site management framework (2017)* and guidelines issued by the EPA from time to time.

This publication describes the legislative instruments available for the regulation of site contamination. It provides information to appropriate persons to whom the EPA may issue a SCAO or SRO, agree to VSCAP or VSRP and/or regulate in non-statutory arrangements. In addition, the publication outlines and describes the EPA's management of orphan site matters<sup>20</sup>. An orphan site includes matters where: it is not practicable to regulate an appropriate person, the location of the source site cannot be determined, and a potential risk to public health exists.

### 2.3 Site contamination auditors

An auditor is an expert professional accredited by the EPA to undertake an independent review of assessment and/or remediation work carried out by consultants. Only a natural person (that is an individual and not a corporation) may be granted accreditation<sup>21</sup>. Only a person, accredited by the EPA, can carry out a site contamination audit. It is an offence for a person to hold himself or herself out as an auditor unless that person is accredited by the EPA.

For further information about auditors and audits, refer to the EPA publication [Guidelines for the site contamination audit system \(2019\)](#).

#### GR 1 Site contamination auditor – statements on the suitability of land for sensitive use

Site contamination auditors are the only persons considered by the EPA as appropriate to provide an opinion on the suitability of land for sensitive use<sup>22</sup> where site contamination exists or is suspected.

An auditor's role is to independently and objectively examine and review the accuracy and completeness of the assessment and/or remediation work carried out by others and to complete a site contamination audit report.

#### GR 2 Site contamination auditor – remediation endpoint

For a sensitive use site, only a site contamination auditor can provide an opinion on achieving a remediation endpoint that is reasonably practicable (where applicable) in accordance with Part 4 of this guideline.

The independence and integrity of the auditor are fundamental aspects of the audit system. The obligations of auditors with regard to conflict of interest and honesty are detailed in section 103X of the EP Act. Auditors must be able to demonstrate that the audits they carry out are not subject to a conflict of interest, that they have exercised their own professional judgment and the opinions they express in the audit documentation have been reached independently. Severe penalties exist for auditors in relation to conflicts of interest and providing false or misleading statements<sup>23</sup>.

For detailed guidance on the roles and responsibilities of an auditor, refer to the EPA publication *Guidelines for the site contamination audit system (2019)*.

<sup>20</sup> Refer to part 7 of the *Regulatory and orphan site management framework (2017)*

<sup>21</sup> Refer to section 103V of the EP Act

<sup>22</sup> Refer to section 3(1) of the EP Act for the definition of sensitive use

<sup>23</sup> Refer to sections 103X and 103ZB and divisional penalties and expiation fees of the EP Act

## 2.4 Site contamination consultants

The EPA publication [Site contamination policy: certification of practitioners \(2018\)](#) details the EPA’s policy on the certification of site contamination practitioner schemes (certification bodies), including the minimum standards for the EPA’s recognition of certification bodies. It describes the circumstances of when the EPA will require use of certified site contamination practitioners (certified practitioners).

### GR 3 Certified site contamination practitioner

In accordance with the EPA publications *Site contamination policy: certification of practitioners (2018)* and *Site contamination: regulatory and orphan site management framework (2017)*, the EPA is likely to require a certified site contamination practitioner to undertake assessment and/or remediation of site contamination at a site

The regulatory and orphan site management framework describes the circumstances when the appropriate person will be required to engage a certified practitioner to undertake assessment or remediation of site contamination. It also describes the circumstance when reports, prepared and endorsed by certified practitioners, are expected by the EPA.

### GR 4 Site contamination consultant – remediation endpoint

For a non-sensitive use site, a site contamination consultant can provide an opinion on achieving a remediation endpoint that is reasonably practicable (where applicable) in accordance with Part 4 of this guideline.

The EPA publication [Site contamination consultant \(2018\)](#) has been prepared for the community to assist in understanding the level of experience, qualifications and competency of consultants.

## 2.5 Landowners and occupiers

Landowners<sup>24</sup> and occupiers<sup>25</sup> (as well as others) may have liability for site contamination in certain circumstances and have specific notification and reporting obligations under the EP Act. Refer to section 5.1 of this guideline for further information on the duty to notify the EPA of site contamination that affects or threatens underground water pursuant to section 83A of the EP Act.

## 2.6 Developers

Developers or persons bringing about a change in the use of land may be liable for site contamination in certain circumstances. Refer to section 103D of the EP Act for circumstances in which persons may be liable for causing site contamination. Developers also have responsibilities for assessing the potential for site contamination (ie where a PCA has been undertaken), prior to the submission of applications for rezoning or development<sup>26</sup>. For further information on the EPA’s regulation of appropriate persons who caused site contamination, refer to *Site contamination: regulatory and orphan site management framework (2017)*.

## 2.7 Planning authorities

Planning authorities have an important role in reducing the risk of exposure to the public and the environment from site contamination when rezoning land and making development decisions under planning legislation. Appropriate consideration should be given to site contamination issues associated with land-use decisions and development matters, to ensure the adequate protection of public health and safety and the environment.

<sup>24</sup> Section 3(1) of the EP Act provides the definition of an owner

<sup>25</sup> Section 3(1) of the EP Act provides the definition of an occupier

<sup>26</sup> Refer to section 103D(2) of the EP Act for an appropriate persons who caused site contamination

## 2.8 Preparation of reports and honesty in reporting

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 conclusions by the consultant or auditor may be significantly incorrect or flawed.

Further to this, the EPA relies on the accuracy and completeness of reports to make decisions about risk to the human health and the environment. If the EPA becomes aware that a person has not or may not have complied with section 103ZB, the EPA will investigate the matter and will, where appropriate, commence regulatory action (which may include criminal prosecution).

Three sections of the EP Act (sections 103ZB, 119 and 120A) relate to honesty in reporting provisions. The EPA expects that consultants and auditors will make their clients aware of this provision before commencing assessment and/or remediation at a site. Consultants and auditors are advised to accurately record and retain information provided by relevant persons.

[Appendix 1](#) provides a template to assist those who receive site contamination assessment or remediation reports or other related information, which is relied upon for decision making or the preparation of other site contamination reports. It is expected that the use of this form will increase the reliability of the information provided to the relevant person.

The EPA recommends that consultants and auditors provide the form to relevant person(s) for completion prior to the commencement of an assessment and/or remediation program. It is recommended that consultants who provide information to auditors will complete this form in relation to the information they provide to the auditor.

### GR 5 Honesty in reporting declaration

The EPA expects that the [Honesty in reporting declaration](#)<sup>27</sup> be completed and included as part of any report that is provided to the EPA.

<sup>27</sup> A copy of the 'Honesty in reporting declaration' template is provided in Appendix 1 of this guideline



## **Part 2**

### **Legislative and policy framework**

---

### 3 Determination of site contamination

#### 3.1 Overview

In a number of circumstances, the timeframe within which harm to the environment has taken place may not be precisely known. Harm to the environment that has taken place prior to the commencement of the EP Act is considered 'historic' in nature. The site contamination provisions in the EP Act retrospectively<sup>28</sup> address harm that occurred before the commencement of the EP Act.

Further, in a contemporary sense environmental harm<sup>29</sup> is caused by the act of polluting. This typically relates to an incident<sup>30</sup> that takes place at a point in time. It is a criminal offence to cause (serious or material) environmental harm post commencement of the EP Act (1 May 1995). Additionally, the EP Act establishes a general environmental duty<sup>31</sup>, which creates an obligation on persons to avoid causing pollution, environmental nuisance and environmental harm. The EPA regulates environmental harm in accordance with the EPA publication [Compliance and enforcement regulatory options and tools \(2009\)](#).

The EPA acknowledges that there are a number of complexities associated with making a determination of the existence of site contamination. The EPA policy and interpretation of legislation, described in this guideline, are aimed at providing clear and consistent information to consultants and auditors for the determination, assessment and remediation of site contamination. Specifically, the guideline provides the EPA's interpretation of the definition of site contamination relevant to the EPA's regulation of the site contamination provisions of the EP Act.

#### 3.2 Legislation

Site contamination is defined in section 5B of the EP Act as follows:

Section 5B – site contamination
<p>(1) For the purposes of this Act, site contamination exists at a site if—</p> <ul style="list-style-type: none"> <li>(a) chemical substances are present on or below the surface of the site in concentrations above the background concentrations (if any); and</li> <li>(b) the chemical substances have, at least in part, come to be present there as a result of an activity at the site or elsewhere; and</li> <li>(c) the presence of the chemical substances in those concentrations has resulted in— <ul style="list-style-type: none"> <li>(i) actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; or</li> <li>(ii) actual or potential harm to water that is not trivial; or</li> <li>(iii) other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.</li> </ul> </li> </ul>

<sup>28</sup> Refer to section 103B of the EP Act

<sup>29</sup> Refer to section 5 of the EP Act for the definition of environmental harm

<sup>30</sup> Incident relates to a matter where harm to the environment occurs in the course of undertaking an activity, whether reckless/intentional or accidental

<sup>31</sup> Refer to section 25 of the EP Act

- (2) For the purposes of this Act, environmental harm is caused by the presence of chemical substances—
- (a) whether the harm is a direct or indirect result of the presence of the chemical substances; and
  - (b) whether the harm results from the presence of the chemical substances alone or the combined effects of the presence of the chemical substances and other factors.
- (3) For the purposes of this Act, site contamination does not exist at a site if circumstances of a kind prescribed by regulation apply to the site<sup>32</sup>.

### 3.3 Site contamination at a site

This guideline refers to assessment and remediation of site contamination being undertaken at a 'site'. Site is defined in section 3(1) of the EP Act as 'an area of land (whether or not in the same ownership or occupation)'.

An assessment of site contamination at a site, requires assessment of all potentially affected media at that site either above or below ground, or within existing buildings ie soil, water, soil gas (vapour) and air (environmental media). When assessment is undertaken within the boundaries of a relevant area of land, this is commonly described as 'onsite'.

When site contamination has migrated away from the relevant area of land, the site contamination is described as existing 'offsite'.

An assessment of site contamination requires the nature of the contamination to be well characterised to enable a determination of the spatial extent<sup>33</sup> of the contamination. Using the EPA recognised criteria<sup>34</sup> or a non-detection boundary approach<sup>35</sup> (as may be appropriate in the circumstance) assists in understanding the extent of the contamination, commencing with intrusive assessment at the likely source zone<sup>36</sup>. In doing so, the on and offsite locations of site contamination may be ascertained, to assist in identifying actual and potential receptors and the development of a conceptual site model<sup>37</sup>.

It is essential, for an adequate assessment of the nature and extent of site contamination, that consultants and auditors<sup>38</sup> consider the potential for site contamination to migrate offsite. Where offsite contamination is identified as an issue, the harm (actual or potential), to any media must be adequately assessed and documented. This can be used to determine the remediation required to address harm onsite and offsite.

### 3.4 Determination of site contamination

A determination of the 'existence' of site contamination should be able to be made during the early stages of site assessment work. Generally, consultants and auditors will make this determination using a robust scientific approach in accordance with the ASC NEPM. When identified, further assessment will usually be required post the initial assessment, to further characterise the 'nature and extent of the site contamination'.

<sup>32</sup> Section 5(3) of the EP Act enables the Regulations to prescribe that, in certain situations, site contamination will be taken not to exist at a site. Currently, there is nothing prescribed for this purpose

<sup>33</sup> 'Extent of contamination' refers to the aerial and vertical extent of contamination through the geological and hydrogeological profile

<sup>34</sup> Refer to section 3.5 of this guideline

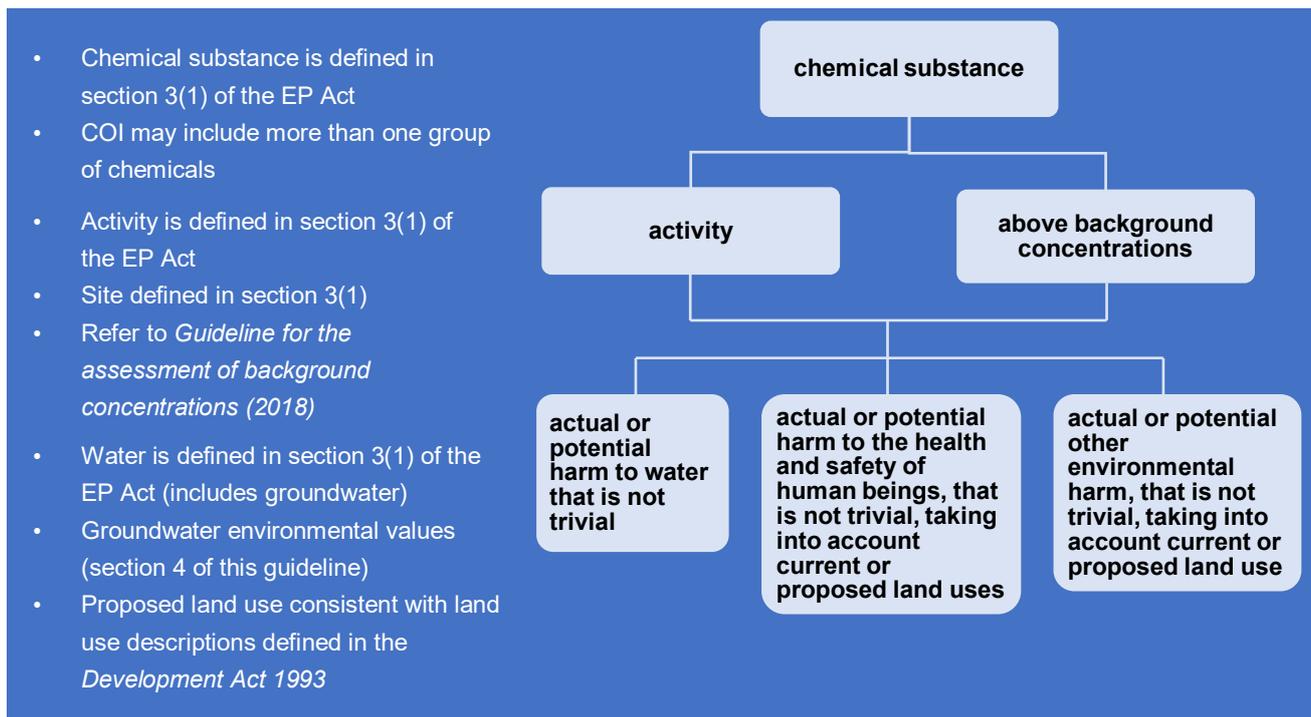
<sup>35</sup> Undertaking assessment to the point of non-detection or background concentrations (or chasing the site contamination) in any affected media. A robust yet cost-effective approach would involve the application of screening assessment technologies and/or modelling – a qualitative assessment. The qualitative data informs permanent sampling locations to adequately quantify the existence of site contamination

<sup>36</sup> Key indicators of the source area or 'source zone' at a site include, but are not limited to, the following: the location or area where the PCA was undertaken; the measured highest concentrations of the COI present within the environmental media; detection of NAPL (measured or dissolved phase); location where loss of containment or spill occurred; and waste disposal/storage area(s). For further information on the source zone refer to section 6.2 of this guideline

<sup>37</sup> Refer to section 6 of this guideline for information on preparing a conceptual site model

<sup>38</sup> The reasons for an audit are further described in section 6 are outlined in Figure 5 of this guideline

This guideline outlines the EPA’s policy and provides a clear yet scientifically robust approach to assist consultants and auditors when making determinations of the existence of site contamination at a site. The key considerations when determining the existence of site contamination are provided in Figure 1.



**Figure 1 Key considerations for the determination of the existence of site contamination at a site**

**GR 6 Background concentration assessment**

A background concentration assessment at a site is to be undertaken in accordance with the EPA *Guideline for the assessment of background concentrations (2018)*.

**3.5 Application of EPA recognised criteria**

To assist in determining ‘actual or potential harm’ and ‘not trivial’, as stated in each limb of section 5B(1)(c) of the EP Act, the application and use of published investigation criteria or trigger levels is considered appropriate. In assisting consultants and auditors to make consistent determinations of the existence of site contamination, the EPA has reviewed available national and international guidance and adopted published criteria. Those that are recognised as appropriate criteria by the EPA are specified in [Appendix 2](#) of this guideline.

Selection of the appropriate recognised criteria for interpretation of analytical data is an essential part of determining the existence of site contamination. This is a key component of the sampling and analysis quality plan (SAQP), which should be prepared in accordance with Schedule B2 of the ASC NEPM. The EPA recognised criteria should be consistently applied for any media that is subject to assessment, in particular groundwater from sensitive to less sensitive environmental values<sup>39</sup>.

<sup>39</sup> Refer to section 4 of this guideline for further information on determining environmental values of groundwater

**GR 7 Application of EPA recognised criteria (human health and ecological receptors)**

The application of the EPA recognised criteria relevant to sampling of soil, soil vapour and indoor air, should be undertaken in accordance with relevant schedules of the ASC NEPM. The EPA recognised criteria are specified in Table 9 of [Appendix 2](#) of this guideline.

It is acknowledged that during the early stages of a site assessment, environmental values for groundwater may not be well characterised or understood. A process for determining the environmental values of groundwater is presented in section 4.3 of this guideline.

**GR 8 Application of EPA recognised criteria (waters)**

The application of the EPA recognised criteria relevant to sampling of waters should be undertaken in accordance with the applicable publication, as arranged in hierarchical order from the most to least sensitive environmental values, provided in Table 10 of [Appendix 2](#) of this guideline.

**GR 9 Determination of the existence of site contamination**

If the concentration of the chemical substance exceeds the EPA recognised criteria<sup>40</sup> this is an indication that *site contamination is likely to be considered to exist*.

In addition, published criteria may not exist for all exposure (receptor) settings for each affected media of the environment. For such circumstances, the EPA considers the standard limit of reporting (LOR) for the particular chemical substance to be applicable. Alternatively, the application of other published national or international criteria may be appropriate. It is recommended that the EPA be consulted early on in such a case so as to ensure that the adopted criteria will be recognised by the EPA.

---

<sup>40</sup> Application of the 'relevant' recognised criteria relates to the most appropriate exposure setting for the potentially affected media specific to the site, using Tables 9 and 10 provided in [Appendix 2](#) of this guideline

## 4 Groundwater and environmental values

### 4.1 Definition of water

Section 3 of the EP Act defines water to have the following meaning:

- a water occurring naturally above or under the ground; or
- b water introduced to an aquifer or other area under the ground; or
- c an artificially created body of water or stream that is for public use or enjoyment.

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018* (ANZG) provides a nationally consistent approach to the protection of and management of water quality for Australia and New Zealand.

In this guideline water occurring under the ground has the same meaning as 'groundwater'.

### 4.2 Environmental values of groundwater

When determining whether there is actual or potential harm to water that is not trivial, environmental values of water will need to be considered. The EPA acknowledges the importance of being clear on the approach to make determinations of 'actual or potential harm to water that is not trivial'<sup>41</sup>.

The EPA has developed the following process in an attempt to simplify making determinations of environmental values of groundwater at a site. For conservatism, where multiple environmental values of groundwater are identified, the most sensitive environmental value should be used, as outlined in Step 4 of Figure 2 of this guideline. When determining environmental values of groundwater at a site, the EPA recommends that consultants and auditors follow the process detailed in Figure 2. Each step in this process is further described in section 4.3 of this guideline.

If choosing to apply the four-step process developed by the EPA, it is requested that each step of the process be applied to provide an accumulation of the environmental values of groundwater at a site. Application of Table 4 in step 4 of the process should identify the relevant environmental values of groundwater at a site. When applying the four-step process, it is recommended that Tables 1 to 4 be included as part of the reporting stage of work to document the application of the process.

If consultants and auditors choose not to apply the process established by the EPA, the determination of environmental values of groundwater for a site should be documented in any report.



Figure 2 Process to determine environmental values of groundwater at a site

### 4.3 Process to determine environmental values of groundwater

The first step in determining the environmental values of groundwater at the site, requires an initial groundwater assessment at the site. This will include assessment of the salinity, measured in total dissolved solids (TDS)<sup>42</sup> in milligrams per litre (mg/L), so as to apply the table to clause 3 of Schedule 1 of the WQEPP to ascertain the environmental values.

#### Step 1: Determination of protected environmental values of groundwater using the WQEPP

The WQEPP provides for the identification of protected environmental values of groundwater in TDS ranges, which is presented in the table to clause 3, schedule 1 of the WQEPP.

<sup>41</sup> Refer to section 5B(1)(c)(i) of the EP Act

<sup>42</sup> TDS can be determined from the electrical conductivity (EC – salinity)

**GR 10 Measurement of groundwater salinity at a site**

The EPA considers an appropriate approach to an adequate assessment of the salinity of groundwater at a site is a combination of field measurements and laboratory analysis, with results reported in TDS mg/L.

When making a determination of the environmental values of groundwater associated with a site, consultants and auditors should compare the TDS mg/L in groundwater at a site to the TDS ranges provided in the table to clause 3, schedule 1 of the WQEPP. It is recommended that Table 1 of this guideline be used as a checklist in the determination of protected environmental values of groundwater.

**Table 1 Application of the WQEPP to determine protected environmental values of groundwater**

Environmental value	Notes
Drinking water - human	Determination is based on TDS ranges shown in clause 3, Schedule 1 of the WQEPP: <ul style="list-style-type: none"> <li>field measurements reported in TDS mg/L</li> <li>salinity measured by an accredited analytical laboratory and reported in TDS mg/L</li> <li>combination of both measurements and selection of the most conservative salinity level.</li> </ul>
Primary industry – irrigation and general use	
Primary industry – livestock drinking water	
Primary industry - aquaculture	

Where groundwater is treated for a particular use at a site, this use should be taken into account in determining the protected environmental values of groundwater.

**Step 2: Application of a buffer distance for protection of surface waters**

Table 2 has been devised so as to offer a practical approach for the consideration of surface water impacts when making a determination of the environmental values of groundwater.

During the initial assessment of environmental values of groundwater at a site, it may be difficult to determine the potential for interconnectivity of the local and regional hydrogeology with nearby surface waters. This includes both fresh and marine waters.

Some chemical substances, such as chlorinated hydrocarbons, are highly mobile when present as a dissolved phase and can migrate in groundwater over large distances (aerially) and depths (vertically). The EPA recommends that a 2km radius of the site be set to establish a 'buffer distance'. This is illustrated in Table 2. The 2km buffer distance is considered a practical approach to provide a protection for surface waters but to also make adequate determinations of the environmental value of groundwater for the surface water receptors, as identified in Table 2 of this guideline.

**Table 2 Application of a buffer distance for protection of surface waters<sup>43</sup>**

Environmental value	Notes
Aquatic ecosystems (fresh)	The environmental value is determined based on proximity to the nearest surface water body as the receptor, where the 'buffer distance' is represented by a 2km radius of the site.
Aquatic ecosystems (marine)	
Recreational (non-domestic)	

<sup>43</sup> It is recommended that Table 2 of this guideline be used as a checklist in the determination of the environmental values of groundwater when identifying surface water bodies

### Step 3: Review of available groundwater data using WaterConnect (groundwater data)

[WaterConnect \(groundwater data\)](#) is an online database of registered groundwater wells (bores) for South Australia and is maintained by the Department for Environment and Water. It contains information on the age, construction, and in some cases, water quality data (ie pH, salinity). It is considered a useful tool in understanding how groundwater is being used by the community (actual use). This provides further information to consultants and auditors that may be relevant in determining the environmental value of groundwater at a site.

<b>GR 11 WaterConnect (groundwater data)</b>
The EPA recommends the use of WaterConnect to determine groundwater environmental values within a 2km buffer distance of the site.

Using the 2km buffer distance established in Step 2, it is recommended that consultants and auditors identify registered bore users via WaterConnect database. For further information on applying the data, refer to Table 3 of this guideline.

**Table 3 Application of WaterConnect (groundwater data) to determine environmental values of groundwater<sup>44</sup>**

Registered use <sup>45</sup>	Notes
Domestic (DOM)	The environmental value of groundwater should be determined based on registered groundwater wells (bore) for extractive uses, where the status is either active or unknown. Information and data from abandoned or decommissioned bores is not recommended.
Town water supply (TWS)	DOM registered bores can be used as a potable water supply by residential properties. Drinking water would be the applicable environmental value for domestic registered bores.
Recreational/aesthetics (IRR)	TWS bores are likely to be used for potable water supply. Drinking water would be the applicable environmental value for town water supply registered bores.
Industrial <sup>46</sup> (IND) (IRR)	Monitoring and investigation registered bores have no environmental value that requires protection; rather, the data associated with these registered bores may be useful in determining the environmental values of groundwater ie by using salinity information.

### Step 4: Actual or potential harm to water that is not trivial – application of EPA recognised criteria

Following the completion of the previous steps in this process, it is possible to identify the environmental values of groundwater at a site. It is likely that more than one environmental value of groundwater will be identified.

By applying Table 4, consultants and auditors can determine the most *sensitive environmental values* of groundwater at a site. The table has been prepared in hierarchical format for both environmental values and recognised criteria. It is recognised that in some circumstances the most sensitive environmental value and respective criterion may not

<sup>44</sup> It is recommended that Table 3 be used as a checklist in the determination of the environmental values of groundwater when identifying registered users in close proximity to the site

<sup>45</sup> The registered users of groundwater identified in Table 3 are arranged in a hierarchical format from most to least sensitive use

<sup>46</sup> The relevant environmental value of groundwater for a registered industrial use bore should be assessed on a case by case basis. In some circumstances, recreation and aesthetics may be the most relevant environmental value of groundwater

provide the highest level of protection for the site<sup>47</sup>. In such circumstances, it is considered appropriate, in accordance with the precautionary principle as described in the Objects<sup>48</sup> of the EP Act, to select the lowest recognised criteria for a chemical substance.

As such, the use of the most sensitive environmental value and application of the EPA recognised criteria should assist consultants and auditors in the determination of 'actual or potential harm to water that is not trivial'. Furthermore, it should assist in making a determination of the 'existence of site contamination' at a site.

**Table 4 EPA recognised criteria and environmental values of groundwater<sup>49</sup>**

Environmental value	Recognised criteria*
Drinking water	ADWG – NHMRC, NRMRC (2011), PFAS NEMP (2018), WHO (2017) <sup>***</sup>
Recreation and aesthetics	GMRRW – NHMRC (2008), PFAS NEMP (2018), WHO (2017) <sup>§</sup>
Aquatic ecosystems – marine and fresh	ANZG (2018) <sup>50</sup> , PFAS NEMP (2018)
Primary industries – agriculture and aquaculture	ANZG (2018)
Primary industries – irrigation and general water uses	ANZG (2018)

\* Specified hierarchy for the application of criteria for each environmental value of water.

\*\* Application of the most recent NHMRC (2011) criteria should be applied instead of the referenced NHMRC (2008) criteria in the GMRRW.

\*\*\* Application of the WHO (2017) criteria is recognised by the EPA, where no *recreational use* criteria is specified for chemical substances in GMRRW – NHMRC (2008).

§ For consistency with the application of the ADWG 2011, when chemical substances do not have a ADWG value for potable groundwater use, it is recommended that if other international/national criteria is to be adopted, the 'order of preference of acceptance' is undertaken in accordance with the recommendations from the NHMRC and enHealth. Refer to Section 6.5 of the ADWG 2011.

Note: Documents referenced for the relevant recognised criteria should be applied at the time of publication or as updated from time to time.

<sup>47</sup> An example of this may be for a site where hexavalent chromium [Cr (VI)] has been detected in groundwater and both drinking water and aquatic ecosystem (marine) environmental values have been identified at the site. The EPA recognised drinking water criterion is greater than the irrigation criterion. However, Table 4 identifies drinking water as the most sensitive environmental value. In such circumstances, the selection of the lowest recognised criterion for this chemical substance (aquatic ecosystems) is considered appropriate. This provides the highest level of protection for the site, safeguarding of both human health and the environment, and subsequently making a determination of the existence of site contamination

<sup>48</sup> In relation to the Objects of the EP Act, refer to section 10 of the EP Act

<sup>49</sup> Table 4 has been developed specific for determining the environmental values of groundwater at a site. In terms of hierarchy for selection of the appropriate recognised criteria from most to least sensitive, the table should be applied in a consistent manner as Table 9 in [Appendix 2](#) of this guideline

<sup>50</sup> <https://www.waterquality.gov.au/anz-guidelines>

## 5 Notification requirements

### 5.1 Section 83A – Notification of site contamination of underground water

Groundwater contamination can migrate and expand over large distances, which can pose a significant risk to human health and/or sensitive environmental receptors. In relation to risk to human health, exposure can occur via consumption of or irrigation from contaminated groundwater. Volatilisation of volatile chemicals in groundwater can also pose an inhalation risk in the form of vapour intrusion. Timely notification of groundwater contamination is essential as it allows the EPA to regulate the site to ensure that human health and the environment are adequately protected.

#### GR 12 Section 83A notification

Section 83A of the EP Act requires a specific person (owner, occupier, auditor and/or consultant) to notify the EPA in writing *as soon as reasonably practicable* after becoming aware of the existence of site contamination at a site or in the vicinity of a site, that affects or threatens water occurring naturally under the ground or introduced to an aquifer or other area under the ground.

The EPA considers that a notification may be required when the information previously notified *no longer accurately describes the current known nature and extent of the site contamination*. Failure to do so may result in the commission of an offence and the EPA commencing regulatory action.

If a person, with a duty to notify seeks to rely upon notification by another, then proof of notification should be obtained from that person. Such proof could include correspondence from the EPA acknowledging receipt of the notification.

For further information refer to the [Appendix 3](#) of this document, including details on submitting a section 83A notification pursuant to the EP Act.

### 5.2 Hazardous circumstances

A hazard that poses an imminent risk to human health and the environment, or a chronic risk to human health, is considered to be a 'hazardous circumstance'<sup>51</sup>. Where a hazardous circumstance is identified in the course of undertaking assessment or remediation at a site, the EPA considers that the appropriate authorities should be notified. The hazardous circumstance should be addressed as a priority above other assessment or remediation work. Table 5 provides examples of details that represent hazardous circumstances with relevant notification timeframes.

The recommended form for notifying the EPA of a hazardous circumstance is provided in [Appendix 4](#) of this document and is available from the EPA Website.

**Table 5 Hazardous circumstances recommended notification, timeframes and emergency contact information**

Type of circumstance	Notification timeframe	Emergency contacts
<b>Soils</b>		
Identification of asbestos as free asbestos fines or fibres in an uncontrolled environment, such that there is a significant risk that asbestos fibres may be released to the environment, and people on or offsite may be exposed to the asbestos	As soon as reasonably practicable	Relevant local council EPA via 24/7 pollution and environment incident reporting/complaints: 08 8204 2004 or 1800 623 445

<sup>51</sup> Notification of a hazardous circumstance is not based on a requirement under the EP Act, rather, it is a recommended action in order to safeguard human health and the environment

Type of circumstance	Notification timeframe	Emergency contacts
<b>Groundwater</b>		
Identification of contaminated groundwater impacting on surface waters, where concentrations are likely to pose adverse impacts on the environmental values of the water	As soon as reasonably practicable or within 24 hours of laboratory reporting	EPA via 24/7 pollution and environment incident reporting/complaints: 08 8204 2004 or 1800 623 445
NAPL <sup>52</sup> identified in groundwater at any site <sup>53</sup>	As soon as reasonably practicable	EPA Manager Site Contamination <a href="mailto:epasitecontam@sa.gov.au">epasitecontam@sa.gov.au</a> GPO Box 2607 Adelaide SA 5001 (08) 8204 2004
LNAPL identified in residential/private groundwater well where potential for uncontrolled explosion hazard exists	As soon as reasonably practicable	EPA via 24/7 pollution and environment incident reporting/complaints: 08 8204 2004 or 1800 623 445
<b>Ground gases/soil vapour</b>		
Landfill gas explosive limits (or greater)	As soon as reasonably practicable	Relevant emergency authority: police, fire or ambulance (000)  EPA via 24/7 pollution and environment incident reporting/complaints: 08 8204 2004 or 1800 623 445
Concentrations of soil vapour where chemical substances are likely to be present in above or below ground structures, exceeding relevant human health exposure levels for the land use setting	As soon as reasonably practicable	EPA Manager Site Contamination <a href="mailto:epasitecontam@sa.gov.au">epasitecontam@sa.gov.au</a> GPO Box 2607 Adelaide SA 5001 (08) 8204 2004
<b>Indoor air</b>		
Concentrations of chemical substances measured in indoor air that exceed relevant human health exposure levels for the land use setting	As soon as reasonably practicable or within 24 hours	EPA Manager Site Contamination <a href="mailto:EPASiteContam@epa.sa.gov.au">EPASiteContam@epa.sa.gov.au</a> GPO Box 2607 Adelaide SA 5001 (08) 8204 2004

<sup>52</sup> Refer to Glossary for the definition of NAPL

<sup>53</sup> Represents mandatory notification required pursuant to section 83A of the EP Act

Type of circumstance	Notification timeframe	Emergency contacts
<b>General</b>		
Identification of inappropriately controlled dangerous goods onsite, whether in below or above ground structures that present a significant risk to human health, environment or structures	As soon as reasonably practicable	Relevant emergency authority: police, fire or ambulance (000)  SafeWork SA  EPA via 24/7 pollution and environment incident reporting/complaints: 08 8204 2004 or 1800 623 445

**GR 13 Hazardous circumstances**

The EPA recommends that if a hazardous circumstance is identified by a consultant that the EPA be notified in writing in accordance with the relevant timeframes provided in Table 5 of this guideline in order to safeguard human health and the environment.

## **Part 3**

### **Assessment and auditing**

---

## 6 Assessment and auditing

### 6.1 Overview

Site contamination assessment may be required where site contamination exists at a site, or where it is suspected due to a potentially contaminating activity having taken place there<sup>54</sup>.

Assessment of site contamination at a site may be as a result of non-statutory or voluntary mechanisms, or via statutory requirements, such as an SCAO issued by the EPA. The nature of the trigger will determine the extent and duration of assessment, and remediation (if necessary). In some instances, this may include the requirement for a site contamination audit<sup>55</sup> (audit).

Where assessment of site contamination is required or reviewed by the EPA, the EPA requires that assessment to be undertaken in accordance with the ASC NEPM. The guidance set out in the ASC NEPM provides for a consistent approach to undertaking robust scientific investigations of site contamination. Schedules A and B2 of the ASC NEPM outline and provide direction on the tiered-risk approach for the assessment of site contamination.

Further guidance on the regulatory requirements for the assessment and remediation of site contamination is available in the EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#).

#### GR 14 Assessment in accordance with the ASC NEPM and EPA guidelines

The EPA expects the assessment of site contamination to be undertaken in accordance with the ASC NEPM and EPA guidelines.

### 6.2 Characterising the source

The source of contamination is commonly associated with an activity that is undertaken at a site. In some cases, the primary source<sup>56</sup> of contamination may be associated with an offsite location. In these circumstances, the identified contaminated environmental media, present at the investigation site, is the secondary source of contamination.

Secondary sources are commonly identified as one of the following:

- non-aqueous phase liquid (NAPL)
- dissolved-phase contamination in groundwater
- soil vapour contamination
- sorbed contamination in soil.

Characterisation of primary and secondary sources or the 'source zone' is undertaken as part of the assessment phase of work and is critical for development of any subsequent stage(s) of work that is likely to be required, such as further site characterisation or remediation. In addition, by determining the subsequent zone of influence associated with the secondary source, it is possible to adequately characterise the risk(s) associated with the site contamination.

### 6.3 Conceptual site model

A site-specific conceptual site model (CSM)<sup>57</sup> is developed to understand the relationship between the source, pathway, and receptor with respect to site contamination at a site. It is an essential tool that is expected to be

<sup>54</sup> Potentially contaminating activities are prescribed in regulation 50 of the Regulations

<sup>55</sup> The circumstances when an audit may be required are summarised in Table 6 of this guideline

<sup>56</sup> The term 'primary source' commonly refers to the location where the potentially contaminating activity or the activity causing the site contamination took place, such as a leaking underground storage system

<sup>57</sup> Refer to Schedule B2 of the ASC NEPM for information on the use and development of CSMs

prepared and included in the reporting phases for the stages of assessment and remediation work. A CSM may be presented in a written format or in visual representation.

The CSM assists in understanding the complexities of site contamination by outlining the essential elements and data gaps during the assessment phase of work. Additionally, applying multiple lines of evidence<sup>58</sup> (with appropriate weighting), to assess exposure to site contamination present in different environmental media, will also provide a robust and scientific understanding of the nature and extent of site contamination associated with a site.

The CSM assists with better characterisation of the various elements of the environment, to determine potential preferential pathways, the zone of influence (related to the assessment of vapour contamination) and identification of the various receptors (human health and the environment). For matters that require multiple stages of assessment work and remediation, the development of a CSM will be an iterative process.

The preparation of a well-characterised CSM, with consideration of known or potential primary and secondary sources of contamination and potential preferential pathways, will assist to ensure informed decisions are made when assessing risk and ultimately when remediation may be necessary.

## **6.4 Tiered-risk assessment process**

Assessment of site contamination should be carried out in a manner that is consistent with the processes described in Schedules A and B of the ASC NEPM.

A tier-1 qualitative risk assessment may comprise preliminary site investigations (PSI) and detailed site investigations (DSI).

The results of a tier-1 qualitative assessment are reviewed against generic screening and investigation levels, including management levels. An initial screen of the data is undertaken by consultants and auditors to determine whether further assessment is necessary. In some circumstances, sufficient intrusive information may have been collected to determine that no further work is necessary. Other complex site contamination matters may require subsequent stages of assessment to adequately inform risk-based decisions, which is likely to result in tier-2 quantitative risk assessments.

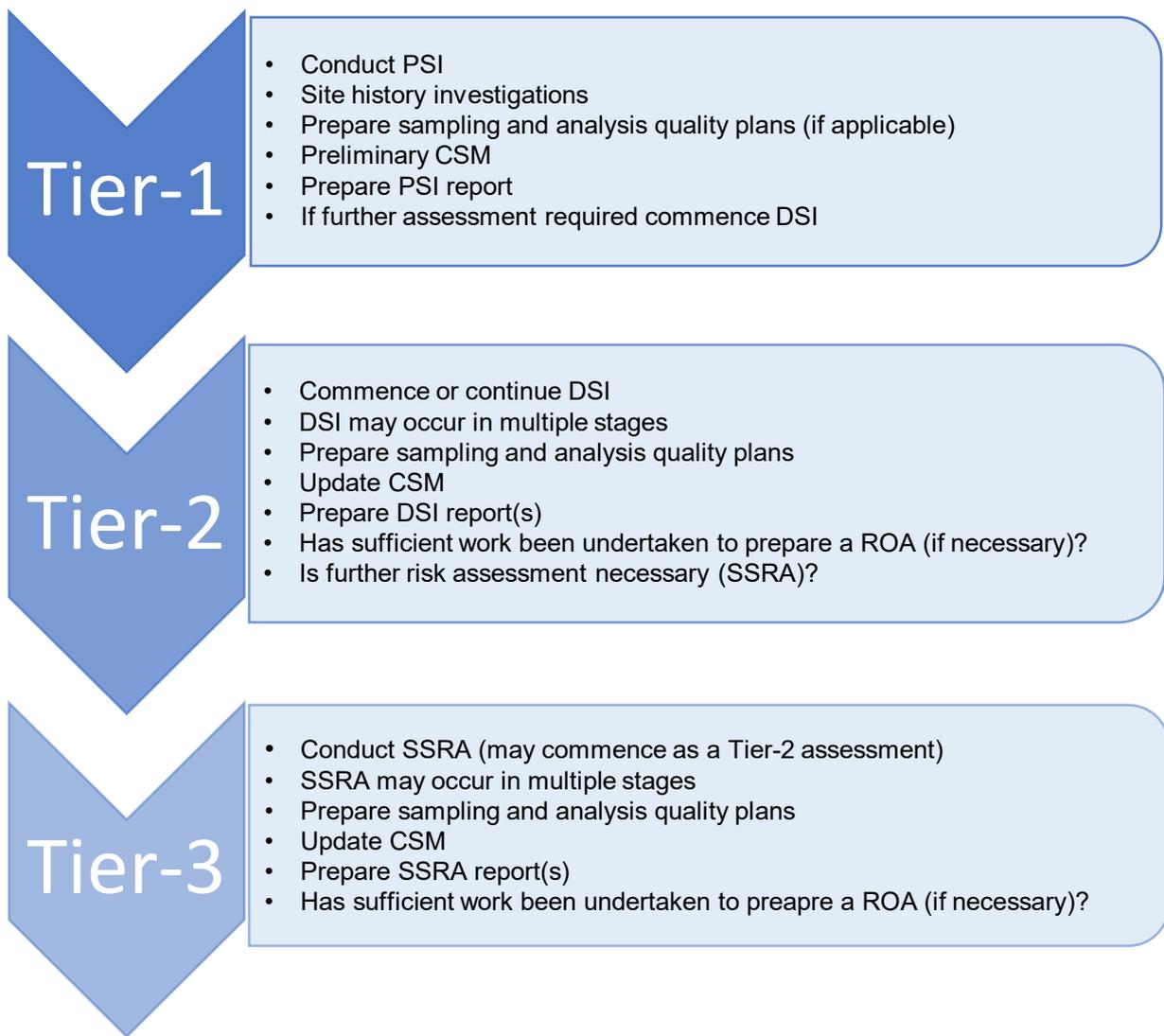
Quantitative risk assessments involve different reporting stages, such as the preparation of a DSI and/or site-specific risk assessments (SSRA). This can be undertaken at either the tier-2 or the tier-3 stage of the process. This work is likely to be undertaken in stages, which involves the collection of site-specific data, and is used to prepare the SSRA. As such the modification of Tier-2 criteria may be necessary, and may form part of the Tier-3 phase of work. Where an exceedance of this criteria is determined, it is likely to be concluded that there is an unacceptable risk to human health and/or the environment and remediation may be necessary.

The outcome of the tier-3 risk assessment and preparation of the CSM should inform the preparation of the remediation options assessment (ROA) when remediation is identified as necessary. The development of the ROA is to ultimately achieve the remediation goals and objectives, by selecting remediation technologies to effectively eliminate or prevent actual or potential harm to receptors. For further information in relation to remediation, refer to Part 4 of this guideline.

The key steps in the tiered-risk assessment process are summarised in Figure 3.

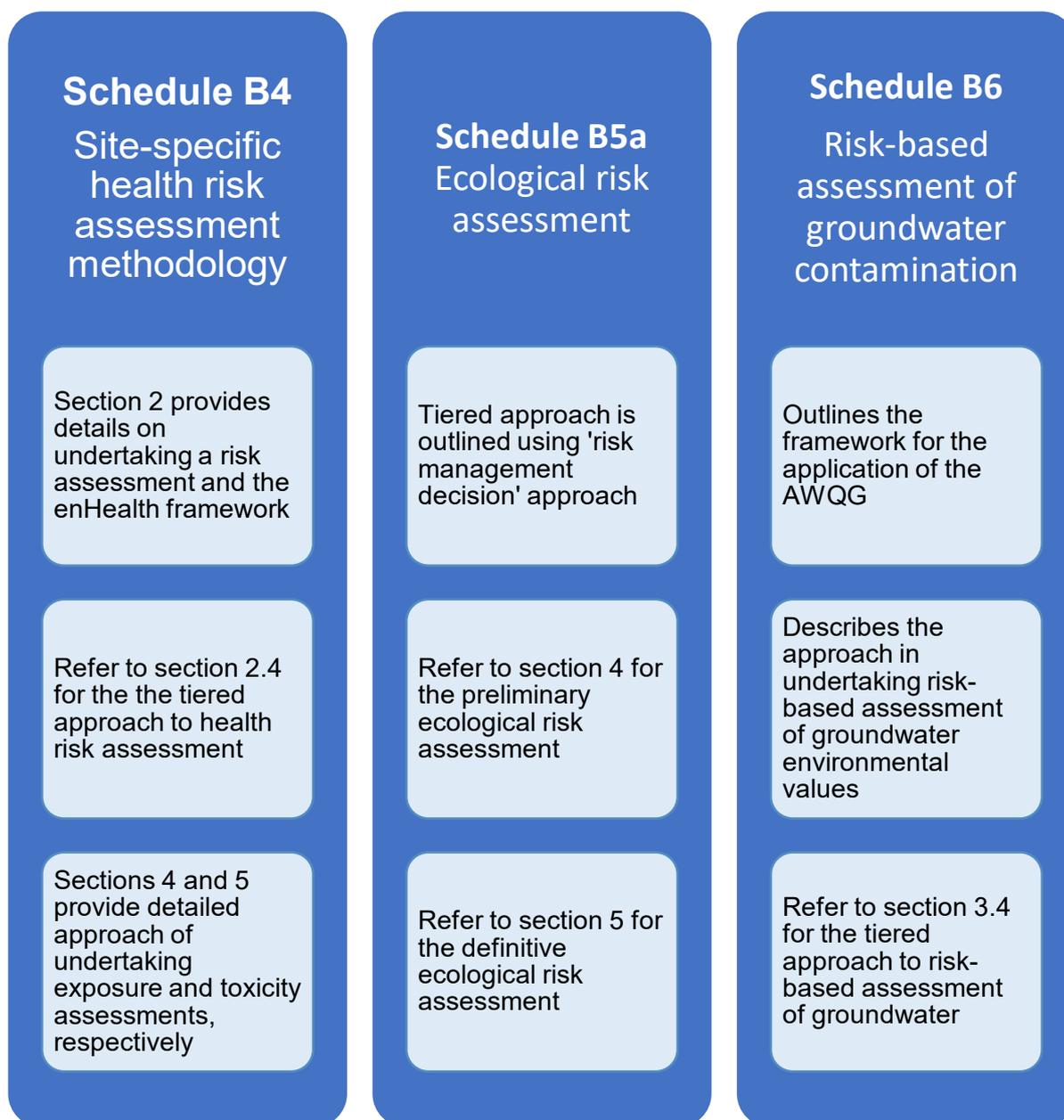
---

<sup>58</sup> Refer to Schedule B2 of the ASC NEPM for information on undertaking assessment of site contamination using a multiple-lines-of-evidence approach



**Figure 3 Summary of the site contamination tiered-risk assessment process**

Specific application of the tiered-risk based approach for each environmental media and receptors are set out in other Schedules of the ASC NEPM and summarised in Figure 4.



**Figure 4** Relevant schedules of the ASC NEPM documenting the tiered risk-based approach to assessment

The purpose of using a tiered assessment process supports risk-based decision making. For most sites, the facts for each case will be site specific. However, applying a consistent strategy to assess the site will provide clear determinations and outcomes for the following:

- identification of relevant contamination issues
- identification of areas of potential contamination and the potentially affected environmental media (ie soil, water, soil vapour)
- identification of potential receptors
- determination of the nature and extent of site contamination (in any potentially affected environmental media)
- comparison of site data with generic investigation and screening levels
- modification of Tier-1 generic screening and investigation levels
- creation of modified Tier-2 site-specific criteria

- an indication of what remediation is or may be necessary<sup>59</sup>.

The tiered-risk approach, presented in the ASC NEPM, provides guidance on:

- the development of quality and systematic sampling programs of environmental media
- a process to support the collection of reliable data and selection of appropriate laboratory detection limits
- interpretation and comparison of data to investigation criteria to inform risk-based decisions
- a process for consistent scientific reporting.

## 6.5 Reasons for a site contamination audit

The EPA regulates the site contamination audit system in accordance with the EPA publication [Guidelines for the site contamination audit system \(2019\)](#). An audit may be required at a site for various reasons, including as part of a statutory requirement or associated with planning and/or land development.

In relation to a proposed sensitive use site<sup>60</sup>, the EPA expects that an audit of a site will be undertaken where site contamination exists or is suspected. An example of where site contamination is suspected to exist is where a potentially contaminating activity has taken place at the site.

Where the current land use is sensitive, and no potentially contaminating activity or known site contamination issues have been identified, an audit will generally not be required in relation to a change of land use.

In relation to a non-sensitive use or proposed non-sensitive use site, an audit will generally not be necessary unless required by the EPA in accordance with the *Site contamination: regulatory and orphan site management framework (2017)*. However, an audit may be required for such matters based on the complexity of the site, the nature and extent of the site contamination, and long-term management of any site contamination that remains post-remediation. Engagement with the EPA is likely to be necessary prior to completion of final reports so as to identify appropriate risk-based decision making.

The assessment, remediation and auditing of any site where site contamination extending offsite poses a risk to a sensitive receptor necessitates discussion with the EPA prior to completion of final reports. This is to ensure an appropriate risk-based approach. Other related key issues should be discussed with the EPA including project assessment and remediation milestones/timeframes, remediation objectives/goals/endpoints, vulnerable populations, and community and stakeholder engagement.

Where an audit is necessary, the EPA recommends that the engagement of an auditor be undertaken as early as possible. Early engagement provides a clear understanding of the objectives and endpoints for assessment and remediation of a site, for all stakeholders, including the EPA.

Given the complexity of some site contamination matters, in particular where site contamination extends beyond the site boundary, the EPA expects and may require an auditor to be engaged. Table 6 summarises the circumstances where the EPA considers it likely that an audit will be required based on the land use at the site subject to investigations. Table 6 assumes that site contamination exists or is suspected.

---

<sup>59</sup> If the site is subject to audit, the reasons for the audit will correspond to the audit purpose that may inform the appropriate level of remediation (in relation to land use). Refer to Table 1 of the [Guidelines for the site contamination audit system \(2019\)](#)

<sup>60</sup> Sensitive use is defined in section 3(1) of the EP Act

**Table 6 Circumstances when the EPA may require an audit for a site**

Sensitive use <sup>1</sup>	Audit requirement	Non sensitive use	Audit requirement
Site contamination exists or is suspected	Audit	Confined onsite	No audit <sup>3</sup>
Site contamination extends offsite	Audit <sup>2</sup>	Extending offsite to non-sensitive use	No audit <sup>3</sup>
		Extending offsite to sensitive use	Audit <sup>2</sup>

1 This would include a site where a change to a sensitive use is proposed. Auditor engagement is likely to be requested by the planning authority or the EPA. This may be associated with planning and development processes/approvals/consent.

2 Auditor to discuss with the EPA prior to completion.

3 Not necessary unless required by the EPA in accordance with the publications *Site contamination: regulatory and orphan site management framework (2017)* (eg complex, widespread contamination matters). Discussion to take place with the EPA prior to completion of final reports to identify appropriate risk-based decision making.

**GR 15 Auditor engagement**

When an audit<sup>61</sup> is required, the EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#) describes the approach that is likely to be taken by the EPA in regulation of the matter.

**6.6 Site sampling and site activities**

When undertaking assessment (and remediation) at a site, the EPA considers that the collection of quality samples and interpretation of reliable data is essential for decision making purposes. The weight of importance of collecting samples during field activities is sometimes neglected. However, poor quality sample collection results in low quality and, in some circumstances, unreliable data. SAQPs should be prepared in accordance with Schedule B2 of the ASC NEPM. In some circumstances, the EPA may require the use of certified practitioners to undertake site sampling activities.

Additionally, it is essential that persons using qualitative vs quantitative sampling techniques understand the reliability of the data for decision making purposes, especially for the preparation of a ROA. Table 7 provides a summary of some key considerations when undertaking site (field) work or activities relating to the assessment and remediation of site contamination.

**Table 7 Key considerations during site sampling and site activities for collection of reliable data**

Potentially affected media	Key considerations
Soils	Photo-ionisation detector (PID) and an appropriate lamp used for the chemicals of interest (COI) and instrument calibration
	Soil sample collection and timing for minimal loss of vapour phase chemical substances, including appropriate handling – quality assessment and quality control (QA/QC)

<sup>61</sup> Audit requirement will be determined in accordance with Table 6 of this guideline

Potentially affected media	Key considerations
	Geotechnical sampling and drilling methodology – collection of reliable samples for modelling purposes
	Laboratory analysis for waste disposal and appropriate comparison against waste criteria
<b>Groundwater</b>	Installation of groundwater wells for monitoring/investigation purpose – use of an appropriate drilling method to address site-specific hydrogeology. Appropriate logging of geology for site characterisation purposes. Appropriate selection of the well-screen to ensure the maximum protection of the environment and to avoid causing environmental harm. High resolution drilling techniques to accurately assess the site contamination and inform the remediation strategy
	Presence of NAPL <sup>62</sup> in groundwater ie measurable thickness or sheen, and appropriate documentation on field sheets
	Sampling of NAPL for characterisation purposes
	When quantifying and delineating the dissolved phase plume in groundwater, it is not appropriate to include the data from bores with the presence of NAPL (measurable or separate phase)
	Sampling approach/method/technique – an appropriate sampling method must be selected for the chemicals of interest and to avoid significant agitation of the sample ie sample collection using a bailer for volatile chemical substances is not an acceptable technique for the collection of reliable data.
	Drawdown – alternative sampling approaches to low flow sampling when aquifer does not support this
	Groundwater sampling is to be undertaken in accordance with the ASC NEPM and the EPA publication <i>Regulatory monitoring and testing: groundwater sampling (2007)</i> <sup>63</sup>
<b>Vapour, indoor air and modelling</b>	Bulk density and geotechnical data collected from an appropriate and representative depth ie consideration of vapour intrusion in below ground structures such as basements, where collection of samples from 3m below ground level is recommended
	Appropriate and reasonable leak testing for vapour sampling technique. In some circumstances it may be necessary to use more than one leak test technique to for QA/QC purposes
	Robust sensitivity analysis based on the collection of site-specific data

<sup>62</sup> The EPA does not consider it reasonable to sample a groundwater monitoring well with the presence of LNAPL, detected as a measurable thickness (or sheen), for the purpose of characterising and quantifying the dissolved phase concentrations (dissolved phase plume) present in the aquifer

<sup>63</sup> The publication referenced should be applied as per the date of publication or as updated from time to time

## **Part 4**

# **Remediation**

---

## 7 Framework for remediation

### 7.1 Introduction

Critical to the concept of remediation is the elimination or prevention of the harm to health or safety of human beings, the environment and to water<sup>64</sup>. The definition of remediation requires consideration of current and proposed land uses in relation to the health or safety of human beings and the environment. The definition also requires consideration of reasonable practicability of remediation measures to eliminate or prevent harm to the environment or harm to water.

An effective remediation strategy should be informed by adequate site contamination characterisation and assessment using the tiered risk-based approach, a well-developed CSM and multiple-lines-of evidence to support the proposed approach. A well-informed remediation strategy will prioritise what remediation is required to address any actual or potential harm to human health, the environment and water. The EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#) explains the general approach of the EPA in regulating remediation of sites.

The EPA will usually require remediation where a source<sup>65</sup> of contamination is present at a site. Remediation of the source of site contamination is likely to require treatment, containment and/or removal of chemical substances.

For further information in relation to the remediation considerations during the auditing of site contamination, refer to the EPA publication [Guidelines for the site contamination audit system \(2019\)](#).

### 7.2 Legislation

Remediation is defined in the EP Act as:

<b>Section 3(1) – Interpretation, remediate/remediation</b>
<p>Treat, contain, remove or manage chemical substances on or below the surface of the site so as to—</p> <ul style="list-style-type: none"> <li>(a) eliminate or prevent actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; and</li> <li>(b) eliminate or prevent, as far as reasonably practicable— <ul style="list-style-type: none"> <li>(i) actual or potential harm to water that is not trivial; and</li> <li>(ii) any other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.</li> </ul> </li> </ul>

The EP Act provides the EPA with regulatory tools, such as SROs and emergency SROs, to order appropriate persons to remediate a site. The EP Act also includes the ability to agree to a VSRP<sup>66</sup>.

For further information on the legislative instruments available to the EPA for the regulation of site contamination, refer to the EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#).

### 7.3 Determining when remediation is necessary

If site assessment identifies that site contamination poses unacceptable risks to human health, the environment or water, remediation will be necessary. In the case of human health, remediation *must* be undertaken to eliminate or prevent the actual or potential harm, taking into account the current or proposed land use. With respect to the harm to

<sup>64</sup> Refer to section 7.2 of this guideline for the definition of 'remediate' as it appears in section 3(1) of the EP Act

<sup>65</sup> Refer to section 6.2 of this guideline for further information on characterising sources of contamination

<sup>66</sup> Refer to section 2.2 of this guideline for additional information about orders and voluntary proposals

the environment<sup>67</sup> and water, remediation is to be undertaken to eliminate or prevent the harm as far as reasonably practicable. Refer to section 8.6 for additional information in relation to remediation and achieving practicability.

Prior to remediating a site, it is essential that site contamination is adequately characterised, including its source, exposure pathways and identification of receptors. If such matters are not adequately characterised, the remediation is less likely to be successful and may result in loss of capital, community frustration and possibly (further) legal or regulatory action.

In most cases, it is not considered appropriate that remediation commence post completion of PSI, except where a hazardous circumstance<sup>68</sup> is identified.

The importance of the preparation of a well-defined CSM is essential prior to the commencement of any remediation at a site. It is critical that the consultant and auditor determine the approach to remediation that will be most effective and appropriate for the site by identifying the appropriate remediation goals, objectives and preparation of the remediation strategy<sup>69</sup>.

The EPA will require remediation at sites where a vapour intrusion risk is suspected of posing an existing or imminent threat to human health.

## 7.4 Remediation of sources and chemical substances

In regulating the remediation of sources of site contamination, the EPA will review the remediation strategy to ensure that it addresses the following matters of importance:

- eliminate or prevent the migration of chemical substances in the environment
- reduce the number of future legacy issues<sup>70</sup> associated with site contamination in South Australia
- improve the quality of harmed environments and to ensure the protection of resources for future generations<sup>71</sup>.

It is possible to categorise chemical substances in terms of their behaviour in different environmental media, specifically focusing on their mobility, volatility and persistence. By categorising the chemical substance, using a site-specific hierarchical approach, the priority chemical substances that are posing the greatest risk will be addressed via remediation. This will assist in the selection of the remediation goals and objectives for the preparation of a remediation options assessment for the site.

### GR 16 Remediation of sources

Where a source of site contamination exists at a site, the EPA will regulate the appropriate person to remediate the source, in accordance with the EPA publication *Site contamination: regulatory and orphan site management framework (2017)* and EPA guidelines.

<sup>67</sup> In accordance with the definition in section 3(1) of the EP Act, actual or potential harm to the environment must take into account the current or proposed land use

<sup>68</sup> Refer to section 5.2 of this guideline for hazardous circumstances

<sup>69</sup> Refer to section 8 of this guideline for the development of a remediation strategy

<sup>70</sup> Refer to the EPA publication [Site contamination: regulatory and orphan site management framework \(2017\)](#) for information on legacy issues and EPA's management of orphan site matters

<sup>71</sup> Section 10(2) of the EP Act requires the EPA to have regard to, and seek to further, the Objects of the EP Act. Section 10(1)(a)(i)(A) of the EP Act promotes the principles of ecologically sustainable development and speaks of management of the environment for future generations

## 8 Development of a remediation strategy

### 8.1 Overview and remediation hierarchy

It is essential that a remediation strategy be prepared that is site-specific and addresses the source area(s) of site contamination, categorises the chemical substances and prioritises any identified risk.

From the EP Act, the four remediation options include to:

- treat
- contain
- remove, or
- manage.

Many remediation technologies and methodologies exist that can be selected to undertake remediation and successfully achieve the remediation endpoints for a site. When considering the legislative options in terms of hierarchy, the remediation options can be categorised as *active* or *passive*.

The EPA considers *active* remediation measures to include technologies that align with 'treatment', 'containment' and 'removal' of chemical substances at a site. All 'management' of chemical substances at a site is considered a *passive* type of remediation. Passive options are generally only suitable for sites where risk to the environment and/or water is low. Management options should not be considered where the risk of harm to human health must be eliminated or prevented<sup>72</sup>.

It is expected that a remediation strategy will comprise:

- **goals** – selection of overarching remediation goals, to address the identified harm, as reflected in the definition of 'remediate' in the EP Act (refer to section 8.2)
- **objectives** – identification of the site-specific remediation objectives to set the foundation of what remediation will be necessary to achieve the remediation endpoints (refer to section 8.3)
- **remediation options assessment** – selection of the appropriate remediation options to address the remediation goals and objectives, by identifying the specific technologies or methodologies suitable to remediate the chemical substances at the site (refer to sections 8.4 and 8.5)
- **endpoints** – identification of the key endpoints to demonstrate that remediation has been successfully completed, including the circumstances where reasonable practicability can be applied (refer to section 8.6)
- **reporting and engagement** – identification of stakeholders and the stages of reporting, including the preparation of risk communication and engagement plans (refer to sections 9 and 12)
- **timeframes** – identification of the key project milestones and respective timeframes for the stages of remediation, reporting, and engagement (refer to section 8.7)

### 8.2 Remediation goals

The primary goals for any remediation strategy in South Australia, as reflected in the definition of the term "remediate" in the EP Act, are to:

- eliminate or prevent actual or potential harm to health or safety of human beings that is not trivial, taking into account the current or proposed land use
- eliminate or prevent, as far as reasonably practicable, actual or potential harm to water that is not trivial

---

<sup>72</sup> If management options are identified as the only applicable remediation option of an ROA and a risk to human health exists, this must be endorsed by an auditor or agreed to by the EPA via a VSRP

- eliminate or prevent, as far as reasonably practicable, other actual or potential environmental harm that is not trivial, taking into account the current or proposed land use.

#### GR 17 Remediation of chemical substances

The EPA will likely require appropriate persons to undertake active remediation, when necessary, to eliminate or prevent actual or potential harm to health or safety of human beings that is not trivial, taking into account the current or proposed land use.

Remediation goals should only be determined based on site-specific considerations and an understanding of the objectives of the remediation strategy. It is acknowledged that it may not always be possible to eliminate actual or potential harm and, in some circumstances, prevention of harm is likely to be appropriate.

Generally, elimination of harm would be considered to have occurred when the site contamination, that poses the risk, no longer exists. For example, by physical removal of primary and/or secondary sources<sup>73</sup> or the treatment of the chemical substances.

Strategies to remediate chemical substances may involve active and/or passive remediation approaches and technologies. Consistent with other Australian environmental regulator guidance<sup>74</sup>, the EPA considers passive remediation strategies usually require minimal management and maintenance, and do not usually incorporate mechanical components. Active remediation strategies usually incorporate mechanical components and require monitoring, regular maintenance and inspection.

The EPA expects that active remediation of source areas of site contamination will be undertaken by persons liable for site contamination (refer to section 7.4 of this guideline).

#### GR 18 Carrying out remediation

Remediation should only be carried out by suitably experienced and qualified consultants and/or practitioners in accordance with the ASC NEPM and EPA guidelines. Any remediation report provided to the EPA, is generally expected to be endorsed by a certified site contamination practitioner.

### 8.3 Remediation objectives

Further to the remediation goals, it is important to establish the remediation objectives. Remediation objectives provide the foundation of what remediation will be necessary, including the likelihood for long-term management measures and stakeholder involvement and expectations. Consultants, auditors and remediation practitioners should consider the following factors when setting the remediation objectives for a site:

- benefit of remediation options (scale of impact a remediation approach would have on human health, the environment or water)
- technical success (physical ability to remove, treat, contain or manage the chemical substances within a reasonable time frame)
- logistics (site access, project schedules, availability of materials and infrastructure and disposal of wastes)
- financial and capital considerations (cost of remediation including waste treatment or ongoing management)
- social impacts and risk perceptions (stakeholder responsibilities, community engagement needs)

<sup>73</sup> Refer to section 7.5 of this guideline for remediation of sources

<sup>74</sup> NSW Environment Protection Authority 2017, Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme

- risk the site contamination poses to human health or the environment (including water), including the risks associated with the likely residual site contamination.

Furthermore, the key principles of ecologically sustainable development<sup>75</sup> should also be considered. The key principles that relate to protection of the environment include:

- sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations
- safeguarding the environmental value and/or beneficial use of water
- avoiding, remedying or mitigating any adverse effects of activities on the environment.

## 8.4 Optimisation of remediation strategy

To optimise the remediation strategy for the site, it is essential that a robust scientific site assessment has been completed. Using the tiered-risk based approach for assessment outlined in the ASC NEPM and in section 6 of this guideline, it is possible to address the remediation goals and objectives to achieve the remediation end-points to drive the status of the site to 'site closure'<sup>76</sup>. The stages of assessment work should address the following matters (as a minimum) prior to commencing the preparation of the remediation strategy for a site:

- identification of chemical substances and categorisation<sup>77</sup>
- identification of affected media, ie soils, groundwater, vapour or combination thereof
- investigation criteria: EPA recognised criteria or site-specific criteria derived using the ASC NEPM
- identification of protected environmental values including both surface water and groundwater
- well-developed and informed CSM that identifies the sources (primary and secondary), pathways of exposure and receptors
- consideration of potential (future) harm (such as future land use, migration of chemical substances)
- planning and/or development requirements and land use
- EPA regulatory requirements – in accordance with the EPA publication *Site contamination: Regulatory and orphan site management framework (2017)*.

## 8.5 Preparing a remediation options assessment

The ROA is the fundamental component of a remediation strategy. Using a risk-based approach, it is possible to prepare an ROA that is transparent and well prioritised for addressing harm. A well-characterised and developed CSM is essential in this process. The intent of developing a well-informed ROA, based on the findings of the assessment work completed for the site, is to reach a remediation endpoint that achieves the initial remediation goals and objectives for the site.

Table 8 outlines the remediation options, which align with the definition of remediate in the EP Act and has been prepared to assist consultants, auditors and remediation practitioners to prepare a remediation strategy. It summarises the circumstances when an audit<sup>78</sup> will be required for the purpose of remediation, and when considerations of practicability are relevant.

---

<sup>75</sup> Refer to section 10 of the EP Act

<sup>76</sup> Refer to the EPA publication *Site contamination: regulatory and orphan site management framework (2017)* for achieving remediation end-points and site closure, including the cessation of regulatory involvement

<sup>77</sup> Refer to section 7.4 of this guideline for categorisation of chemical substances for remediation purposes

<sup>78</sup> Refer to section 6.5 of this guideline for the reasons for an audit

When used to develop the ROA and select remediation technologies, Table 8 should assist with the preparation of an effective remediation strategy. In some cases, it may be beneficial to couple remediation techniques, commonly referred to as ‘remediation trains’ or ‘treatment trains’<sup>79</sup>.

**Table 8 Selection of the remediation options to inform the preparation of the ROA**

Remediation option <sup>#</sup>	Remediation goals*		
	Eliminate or prevent actual or potential harm to the health and safety of human beings that is not trivial	Eliminate or prevent actual or potential harm to water that is not trivial	Eliminate or prevent other actual or potential environmental harm that is not trivial
<b>Treat</b>	Yes (A+B)	Yes (C+D)	Yes (A+C+D)
<b>Contain</b>	Yes (A+B)	Yes (C+D)	Yes (A+C+D)
<b>Remove</b>	Yes (A+B)	Yes (C+D)	Yes (A+C+D)
<b>Manage</b>	Case by case**	Yes (C+D)	Yes (A+C+D)

**Notes:**

A = remediation purpose must consider the current or proposed land use

B = audit required in accordance with Table 6

C = audit requirement will be case by case (refer to Table 6 for reasons for an audit)

D = practicability considerations

\* Indicates CSM has been prepared for the site and receptors have been identified.

\*\* If management options are identified as the only applicable remediation technique of an ROA and a risk to human health exists, this must be endorsed by an auditor and/or agreed to by the EPA via a VSRP

# Consideration should be given to the selection of combination of remediation options to undertake effective remediation and achieve remediation endpoints, including active or passive technologies.

Validation<sup>80</sup> of the progress of remediation technologies is recommended. This will inform the efficacy of the remediation strategy to ensure that it will achieve the remediation goals, and ultimately remediation end-points for site closure. If remediation is being undertaken in stages, it is recommended that the remediation goals and objective be revised against Table 8 at each validation stage of reporting. Refer to section 9 of this guideline for the reporting stages of remediation.

### 8.6 Practicability considerations

As noted in section 7.1 of this guideline, the definition of ‘remediation’ in relation to water and other environmental harm, permits consideration of what is ‘reasonably practicable’.

<sup>79</sup> Using more than one remediation technique (option) is considered an effective approach to optimising the remediation strategy. This approach can be referred to as ‘remediation trains’. International guidance on using this approach and remediation trains is available on the [Interstate Technology Regulatory Council \(ITRC\) website](#). In addition, refer to the following publication [Interstate Technology Regulatory Council \(ITRC\), Technical/Regulatory Guideline, Remediation Process Optimization: Identifying opportunities for enhanced and more efficient site remediation \(2004\)](#)

<sup>80</sup> Refer to section 9.4 of this guideline for further information on remediation validation reporting

While the EP Act does not define what is meant by ‘reasonably practicable’ section 25 of the EP Act, which sets out the general environmental duty, provides a good guide as to what the relevant considerations may be in any given case.

<b>Section 25 – General environmental duty</b>	
(1)	A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.
(2)	In determining what measures are required to be taken under subsection (1), regard is to be had, amongst other things, to—
(a)	the nature of the pollution or potential pollution and the sensitivity of the receiving environment; and
i	(b) the financial implications of the various measures that might be taken as those implications relate to the class of persons undertaking activities of the same or a similar kind; and
ii	(c) the current state of technical knowledge and likelihood of successful application of the various measures that might be taken.

The EPA recognises that the question of what may constitute the elimination or prevention of relevant harm ‘as far as reasonably practicable’ will require consideration of technical, logistical, and financial limitations.

Where it is not reasonably practicable to undertake further active remediation at a site, where remediation goals and end-points have not been achieved and actual or potential harm may still remain, it is likely to be necessary to consider passive remediation options. For example, revising the remediation options against Table 8 may result in a change in focus from active to passive remediation options. In the case of chemical substances, this may mean a change in focus from treatment or removal to containment.

Where it is alleged that active remediation options are no longer reasonably practicable, the EPA will generally require an auditor to confirm that conclusion and that the passive remediation options proposed are capable of managing the residual chemical substances that present actual or potential harm at a site. This will be determined and required by the EPA on a case-by-case basis.

## 8.7 Remediation timeframes

The timing for remediation will be determined by the outcome of the risk assessment and in accordance with the EPA publication *Site contamination: regulatory and orphan site management framework (2017)*. The EPA will require remediation to be undertaken as soon as reasonably practicable if the risk of harm is unacceptable. The EPA expects that the key aspects of the remediation strategy reflect appropriate timeframes, including risk communication and engagement. When identified as a key stakeholder, early engagement with the EPA is recommended, including ongoing written and verbal updates outlining the progress of remediation against the remediation milestones.

## 9 Remediation reporting framework

### 9.1 Overview

The EPA has established a reporting framework for remediation in [Appendix 6](#) as a checklist of the information that is expected to be included in remediation reports. Further to this, the information presented in this section 9 summarises the process and framework for remediation reporting developed for consultants, auditors and remediation practitioners carrying out remediation at a site. In addition to this guideline, the EPA's regulation of remediation and expectations for remediation reporting is explained in the EPA publication *Site contamination: regulatory and orphan site management framework (2017)*.

### 9.2 Remediation options assessment (ROA)

Following the completion of the assessment stage of work at a site, it is possible to prepare an ROA to determine what remediation options and technologies will be applicable to the site. Table 8 of this guideline provides a checklist of the remediation options and sets out the EPA's policy of when an audit will be required based on the remediation goals and objectives for a site. The ROA should consider all appropriate technologies and include a description of the decision making process that led to the selection of the preferred remediation options. [Appendix 6](#) of this guideline provides the matters to be reported in the ROA report.

### 9.3 Site remediation plan (SRP)

Following the preparation of a ROA, it is recommended that a site remediation plan (SRP) be developed that documents the remediation option(s) that will be implemented to achieve the remediation goals and objectives for the site. The SRP should detail procedures and plans to reduce human health and environmental risks to acceptable levels for the proposed land use or for the environmental values of the affected water.

An SRP may incorporate the remediation action plan (RAP) and environment management plan (EMP). The SRP should also document the timeframes applicable to the remediation project, including if remediation will be undertaken as a staged approach and documentation of the key milestones of the remediation strategy.

### 9.4 Remediation validation report (RVR)

The remediation and validation reporting (RVR) stage is the process of demonstrating that the site has been successfully remediated, by achieving the goals and objectives of the ROA. Site validation requires some form of sample collection to demonstrate that the chemical substances no longer pose requisite harm to human health, the environment and water. The details of the validation work (and subsequent reporting) should be developed to address the remediation goals and objectives established in the SRP and ensure that an appropriately prepared SAQP, in accordance with the ASC NEPM, supports the validation work required.

Where RVR is undertaken in stages, the reporting process may also require a staged reporting approach to support the respective remediation objectives established for each stage of remediation work. Examples of validation reporting stages for the remediation project may include:

- groundwater monitoring events (GME)
- soil vapour monitoring events (SVME)
- revisions to the CSM
- revisions of the risk assessment post the staged RVR.

[Appendix 6](#) provides a checklist of information that should be included in an RVR.

[Appendix 7](#) provides matters that should be considered by the consultant, remediation practitioner and/or auditor when undertaking RVR at onsite or offsite locations.

## 9.5 Site management plan (SMP)

The development of a site management plan (SMP) is required where a site requires some form of management following remediation. The SMP is used to inform all stakeholders of the necessary steps required to manage the ongoing issues at a site. The SMP should be prepared with realistic and achievable timeframes and responsibilities and should not impose a significant burden on existing or future property owners and planning authorities.

Additionally, an SMP may be a requirement or outcome of the audit process and may be included as a condition of an audit report.

The EPA considers the development of an SMP is likely to be appropriate in the following circumstances (but not limited to):

- ongoing management of soils affected by chemical substances is required to ensure an acceptable level of risk to human health and/or the environment in an area where it is not practicable for that soil to be actively remediated (for example, chemical substances below an impermeable structure)
- chemical substances in soils are being retained under a final cap or fully contained on site within an engineered containment cell
- active remediation is likely to cause greater adverse environmental impact than would likely to be caused if the site were left undisturbed
- management measures are necessary to ensure the protection of worker health and safety
- there is residual risk of actual or potential harm that is not trivial in circumstances where all reasonable and practicable measures have been taken to eliminate or prevent harm.
- In these circumstances, a statement on the nature and extent of site contamination must be made clear in the SMP.

An SMP may be required to address each specific affected environmental media<sup>81</sup>.

For example, an SMP may include provisions for:

- a groundwater monitoring and management plan (GMMP)
- a construction environmental management plan (CEMP)
- a soil vapour monitoring and management plan (SVMMP)
- site maintenance and inspection.

The development of an SMP should ensure the effective management and monitoring of residual site contamination post active remediation.

The scope of management or monitoring work should be conducted in accordance with the endpoints identified in the SRP or audit conditions.

Where an SMP is proposed, it must accurately and clearly describe:

- the nature and location of chemical substances remaining on the site
- the objectives of the plan
- the manner in which chemical substances and/or the site will be managed
- the persons who will be responsible for implementation of the plan, their relevant qualifications and experience and relevant mechanisms to ensure that the plan will be implemented by those persons
- timeframe over which actions specified in the plan will take place

---

<sup>81</sup> An example where the preparation of an SMP is beneficial in the remediation strategy, is one which addresses management of soils at a site (such as onsite containment), including a groundwater monitoring and management plan to validate the progress of natural attenuation of groundwater contamination at a site

- timeframes for any reporting and community engagement
- contingency plans if the management and monitoring measures are not successful.

The length and contents of the SMP will depend on the complexity of the issues for the site. Sufficient detail should be included in the SMP to be readily understood by stakeholders and implementable.

Where a SMP is prepared to manage site contamination, the EPA is likely to require that the plans are implemented and that individuals affected by the SMP are aware of the issues<sup>82</sup>. This is particularly important when management of the site contamination, through maintaining barriers<sup>83</sup> or ongoing monitoring, is required for a significant period of time or in perpetuity.

[Appendix 6](#) of this guideline provides a checklist of information that should be included in an SMP.

---

<sup>82</sup> In some circumstances, the EPA may require that an SMP be implemented and regulated using an environmental performance agreement pursuant to section 59 of the EP Act, to ensure the safeguarding of human health and the environment

<sup>83</sup> Barriers can include any type of barrier to mitigate risk of exposure or to improve the quality of harmed environments. Examples of barriers can include paving/concreting to mitigate exposure to contaminated soils, permeable reactive barriers to improve harmed environment or cut-off walls to reduce and mitigate future harm

## 10 Groundwater remediation technologies

### 10.1 Application of remediation publications

A national approach<sup>84</sup> to the remediation of sites in Australia is being developed through the [Cooperative Research Centre for Contamination Assessment and Remediation of the Environment](#) (CRC CARE). The National Remediation Framework is intended to provide practical guidance to consultants, auditors, practitioners and regulators. It is acknowledged that legislative frameworks in Australia are different for each state and territory; however, alignment of the principles of remediation is important to ensure a consistent approach and to harmonise remediation objectives.

Differing policies for remediating sites have been established to support the legislation (where available) of each State. From a South Australian perspective, the EP Act defines the term 'remediate' differently, in particular as far as considerations of what is reasonably practicable.

When remediating sites, it is essential that the remediation technologies or options selected (as part of the ROA), are well researched to demonstrate successful application at a site. Pilot trials are beneficial and recommended, especially in complex geological and hydrogeological environments, built-up areas and when remediation is necessary as site contamination expands over a widespread area or in existing above ground structures. Applying the remediation framework established in this guideline, will assist consultants, auditors and practitioners to undertake effective remediation.

Other national and international guidance and publications on developing remediation strategies, remediation options and technologies, including useful case studies and remediation projects, is widely available. Prior to use of other publications and guidance, the EPA recommends that the publications are well researched and applicable to the affected environmental media at a site.

The EPA acknowledges that numerous technologies exist to remediate all affected environmental media, including soils, surface water, groundwater, indoor air and ambient air. This guideline provides policy associated with two approaches/options to remediate groundwater, specifically *active* remediation of NAPL in groundwater and *passive* remediation of dissolved phase plumes in groundwater using monitored natural attenuation.

### 10.2 Remediation of non-aqueous phase liquids (NAPL)

NAPL present in any form is considered a source at a site. The EPA likely to prioritise regulatory action towards appropriate persons where NAPL is present at a site to actively remediate sources. Section 7.4 of this guideline provides information on the EPA's regulation of primary and secondary sources at a site.

The extent to which risk may be reduced where NAPL mass is removed is a key consideration of the remediation objectives, as risks arise through NAPL constituents that partition into groundwater and soil vapour. The EPA considers that the assessment of risk associated with the presence of NAPL at a site should be based on the constituent flux at the point of receptor exposure. This is considered appropriate because it determines whether assimilative or natural attenuation capacity in the aquifer is sufficient to mitigate harm.

When developing the remediation strategy<sup>85</sup> for a site, it is recommended that specific remediation objectives be established to address any NAPL present at the site. As a minimum, consideration should be given to the following:

- reducing the NAPL saturation in the aquifer
- reducing the source of dissolved phase concentrations of chemical substances in the aquifer which are present in a NAPL or separate phase
- identification of the receptors and early mitigation of the pathways for risk of exposure
- the timeframes to address NAPL in association with the overall remediation strategy.

---

<sup>84</sup> Refer to the [National Framework for Remediation and Management of Contaminated Sites in Australia](#), publications are available from CRC CARE

<sup>85</sup> Refer to section 8.3 of this guideline for remediation objectives

Where active remediation of NAPL does not meet risk-based criteria and the remediation goals and objectives, other remediation options such as source control or isolation may be required to address further harm. This should be documented and reported through the stages of remediation, and if necessary, iterations of the ROA to address the remediation goals and objectives to achieve the remediation endpoint.

Specific information on the selection of light non-aqueous phase liquid (LNAPL) remediation options is available in the CRC CARE publication *Technical Report 18: Selecting and assessing strategies for remediating LNAPL in soils and groundwater (2010)*.

### 10.3 Management remediation option – monitored natural attenuation (MNA)

Monitored natural attenuation (MNA) is a natural process of the attenuation of concentrations of chemical substances in soil and groundwater. In particular, MNA is considered to be an affordable and less intrusive approach to site remediation. The EPA considers MNA to be a remediation option for sites where the source(s) of the site contamination has been actively remediated and residual chemical substances remain in soils and groundwater at a site. Additionally, the EPA expects that sufficient and relevant data will have been obtained to demonstrate that the groundwater conditions are favourable for natural attenuation of the chemical substances.

If MNA is the preferred remediation option<sup>86</sup> for a site where a health risk exists, the EPA is likely to require that the remediation strategy be endorsed by an auditor and/or agreed to by the EPA via a VSRP<sup>87</sup>. MNA (as the only selected remediation option) is unlikely to achieve the remediation goal of 'eliminate or prevent actual or potential harm to the health and safety of human beings that is not trivial, taking into account the current or proposed land use'. It is recommended that for such matters, the coupling of remediation options be undertaken to achieve the remediation goals and objectives<sup>88</sup>.

#### GR 19 Monitored natural attenuation

Where site contamination poses a health risk and a source exists at a site, the EPA is unlikely to accept MNA as the only remediation option for the site. For such matters, the EPA is likely to require the remediation strategy be endorsed by an auditor and/or agreed to by the EPA via a VSRP.

If MNA is identified as a remediation option for a site, the EPA will generally expect the remediation option to be undertaken in general accordance with the CRC CARE publication *Technical Report 15: A technical guide for demonstrating monitored natural attenuation of petroleum hydrocarbons in groundwater (2010)*.

Options to optimise the natural attenuation of chemicals in the environment can include coupling remediation options. This can significantly improve the environmental conditions by reducing chemical load, termed 'enhanced monitored natural attenuation'. The concept of enhanced attenuation of chemical substances in groundwater is a useful approach to achieving 'plume remediation'<sup>89</sup>, which has been successfully applied in many national and international cases.

<sup>86</sup> Following the outcome of a well-informed and prepared ROA

<sup>87</sup> Refer to Table 8 of this guideline for the preparation of a remediation options assessment and the circumstances of when an audit will be required by the EPA

<sup>88</sup> Refer to section 8.5 of this guideline for additional information on coupling remediation options to achieve remediation goals and objectives

<sup>89</sup> Refer to [Interstate Technology Regulatory Council publication – Enhanced Attenuation Fact Sheet \(2005\)](#)

## 11 Management and protection of the environment

### 11.1 General environmental duty

When undertaking remediation a person must not cause harm to the environment. In addition, a person must comply with the '*general environmental duty*'.

General environmental duty is detailed in section 25 of the EP Act. Information on general environmental duty, environmental nuisance and environmental harm is provided in section 3.1 of this guideline.

While non-compliance with the duty is not, in itself, an offence, the EPA may enforce the duty through the issuing of orders<sup>90</sup> and civil action in the Environment, Resources and Development Court (ERD Court).

Further guidance on key considerations to address one's general environmental duty when undertaking remediation at both on and offsite locations is provided in [Appendix 7](#) of this guideline.

### 11.2 Waste management hierarchy

Section 4B of the EP Act provides a waste management hierarchy defined as follows:

In this Act, a reference to the waste management hierarchy is a reference to an order of priority for the management of waste in which—

- 2 avoidance of the production of waste
- 3 minimisation of the production of waste
- 4 reuse of waste
- 5 recycling of waste
- 6 recovery of energy and other resources from waste
- 7 treatment of waste to reduce potentially degrading impacts
- 8 disposal of waste in an environmentally sound manner,

are pursued in order with, first, avoidance of the production of waste, and second, to the extent that avoidance is not reasonably practicable, minimisation of the production of waste, and third, to the extent that minimisation is not reasonably practicable, reuse of waste, and so on.

The Objects of the EP Act includes ensuring that as far as is reasonably practicable, measures are taken to prevent, reduce, minimise and, where practicable, eliminate harm to the environment by programs to encourage and assist industry, public authorities and the community to apply the waste management hierarchy.

### 11.3 Work health and safety

There should be appropriate work health and safety measures in place for any personnel involved in the remediation of site contamination in accordance with applicable work health and safety legislation (refer to the *Work Health and Safety Act 2012*). For sites that are subject to an audit, refer to the EPA publication [Guidelines for the site contamination audit system \(2019\)](#).

### 11.4 Surface waters

If a CSM identifies surface waterbodies (including fresh and marine) as potential receptors, any environmental values of those waterbodies (described in the WQEPP) must be considered and addressed. In particular, appropriate measures must be taken to protect all surface waterbodies during the stages of assessment especially identification and management of a hazardous circumstance, and appropriately managed during remediation to prevent harm.

A process for identifying environmental values for groundwater at a site is provided in section 3.5 of this guideline.

---

<sup>90</sup> Such orders include environment protection orders (EPOs) and clean up order (CUOs), additional information is provided in section 2.1 of this guideline

Matters to consider for the protection of fresh and marine surface waterbodies during any remediation activity are provided in [Appendix 7](#) of this guideline.

The selection of an appropriate mitigation measure for managing surface water runoff should be made with reference to the waste hierarchy<sup>91</sup>. If possible, preference should be given to management measures that prevent pollution of surface water. Disposal options should only be considered after other measures have been exhausted in accordance with the waste hierarchy. Care must be taken to ensure that chemical substances are not dispersed into the environment as a result of any selected mitigation measure.

Examples of mitigation measures to avoid or reduce the generation of runoff of contaminated water to surface waterbodies include (but are not limited to):

- using temporary rainproof covers
- temporary bunding around stockpiles, or location of stockpiles on waterproof surfaces such as asphalt or concrete, or under cover where available
- minimising the area being treated at any one time
- installing temporary barriers (for example hay bales, geo-fabric or similar)
- excavating drainage or runoff water diversion trenches
- collection or absorption pits
- ponds to capture and treat the runoff (for example remove sediment).

## 11.5 Aesthetics

Aesthetic issues generally relate to the presence of non-hazardous inert foreign material in soil at a site. The presence of these materials alone at a site would not generally result in site contamination. However, sites that may have been adequately assessed and/or remediated to address potential human health and environmental issues arising from site contamination may still contain residual foreign inert materials that require management.

Materials that are likely to result in aesthetic issues include waste materials that may present no health hazard (eg concrete or brick fragments), have some soil discolouration from a relatively inert chemical waste (eg ferric metals) or have a residual odour (eg natural sulfur odour).

General considerations and circumstances that would trigger an assessment of aesthetics and the assessment process for aesthetic issues are described in section 3.6 Schedule B1 of the ASC NEPM and additional information is provided in [Appendix 7](#) of this guideline.

While inert, caution should be exercised when proposing the retention of large quantities of fill material, such as demolition rubble, on the site subject to remediation. It may have an impact on the question of whether it is suitable for a proposed sensitive use, particularly where reasonable use of the land may result in these materials being exposed and having to be disposed of post remediation completion. If the site is subject to an audit, the matter of aesthetics will be endorsed by the auditor, where an audit recommendation may be included in the audit report and the preparation of a SMP may be necessary to manage such aesthetic issues.

## 11.6 Stockpiles

Soil stockpiles, if not correctly managed, can represent a source of dust, relative to their height, uncompacted nature and proximity to sensitive receptors.

The EPA expects the following issues to be considered by the consultant, remediation practitioner and/or auditor when stockpiling soil at a site:

- stockpiles should have a maximum height of about 3 m, or equal to or lower than the average height of surrounding structures. Stockpile height should reduce as it approaches the site boundary

---

<sup>91</sup> Refer to section 11.2 of this guideline for information on the waste hierarchy

- stockpile heights should be below fence lines when within about 5m of the boundary
- stockpiles should be covered with an effective dust and/or odour mitigation covering. The contents of the stockpile will dictate the level of cover ie complete enclosure or the formation of a crust layer
- stockpiles should have sufficient moisture content before being handled.

Water can be applied prior to soil 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. When applying water to manage and reduce dust emissions from stockpiles, all reasonable and practicable measures should be undertaken to prevent runoff or leaching of potentially impacted water at the site.

In all cases, it is recommended that an appropriate level of community engagement is undertaken at all stages of the remediation 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. Refer to section 12 of this guideline for additional information on community engagement and risk communication.

A failure to control dust may constitute an environmental nuisance<sup>92</sup> under the EP Act. As such, it is likely to result in regulatory action by the EPA.

For further information about key considerations for soil stockpile management during remediation, refer to [Appendix 7](#) of this guideline and the EPA publication [Guideline for stockpile management: Waste and waste derived products for recycling and reuse \(2017\)](#).

## 11.7 Asbestos

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. There are particular requirements for removal, transport and disposal of asbestos-containing materials (ACM) in legislation, including the EP Act and relevant EPA guidelines<sup>93</sup>.

The assessment of asbestos should be undertaken by a competent person<sup>94</sup>. 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 and risk-based assessment of presumed asbestos contamination may avoid the need for a detailed site investigation (DSI) where there is a high degree of confidence that the asbestos contamination is confined to bonded ACM in superficial soil. Where site circumstances are favourable, bonded ACM in sound condition can be used as the primary means of estimating contamination by subjecting soil samples to on-site sieving and gravimetric procedures. The determination of asbestos in soil should follow the procedures in section 4 of Schedule B1 and Schedule B2 of the ASC NEPM.

Asbestos-specific communication skills may also be necessary to address potential concerns of workers and the community. To provide assistance on community engagement and risk communication, if requested, it is recommended that the EPA be consulted early-on in such cases.

For further information about key considerations for the management of asbestos during assessment and remediation, refer to Appendix 7 of guideline.

---

<sup>92</sup> Environmental nuisance is defined in section 3(1) of the EP Act

<sup>93</sup> Refer to the EPA publication: [Wastes containing asbestos: Removal, transport and disposal \(2009\)](#)

<sup>94</sup> Guidance on a competent person in the context of asbestos is provided in Schedule B2 of the ASC NEPM

## 11.8 Acid sulfate soils

Acid sulfate soils (ASS) are described in the EPA guideline [Acid sulfate soil materials \(2007\)](#). This guideline outlines the requirements related to onsite management of acid sulfate soils, and any off-site disposal or reuse<sup>95</sup>. Acid sulfate soils may, in some circumstances, be detrimental to the current or proposed use of a site. This would occur following oxidation. Once these soils are disturbed as a result of an activity, actual or potential ASS may result in site contamination.

---

<sup>95</sup> Refer to prescribed condition of accreditation under regulation 56(2)(c) of the Regulations



## **Part 5**

### **Community engagement and information**

---

## 12 Community engagement and risk communication

### 12.1 Introduction

The assessment and remediation of site contamination may cause a range of community concerns relating to the potential or actual human health and environmental impacts associated with the contamination and/or the impacts and nuisance arising from the remediation process. Early effective risk communication and community engagement are key components of risk management<sup>96</sup> when dealing with site contamination matters.

Community engagement and risk communication in relation to site contamination should be conducted in accordance with the principles and approach provided in Schedule B8 of the ASC NEPM.

The underlying principles to the approach taken in the ASC NEPM are that:

- an evaluation regarding the probable need for and nature and extent of community engagement should be carried out at the early stages of assessment
- interaction with the community must be an open, two-way engagement process
- engagement with the community is considered to be essential for sites with contentious issues.

In order to assist consultants, site owners and appropriate persons responsible for site contamination, the EPA has published [Site contamination: guideline for community engagement \(2018\)](#). It is recommended that the guideline be used when undertaking risk management and engagement with the community for all site contamination matters.

The EPA considers that the responsibility for primary community consultation and engagement lies with the person responsible for the site contamination. When regulating the appropriate person responsible for site contamination, the EPA may require community engagement and risk communication to be undertaken in accordance with *Site contamination: guideline for community engagement (2018)*. In some circumstances, the EPA may also engage with the community and stakeholders to ensure effective risk communication is well managed.

### 12.2 Key principles of risk management

The ASC NEPM provides the key principles of 'why, who, what and how' for an approach to the preparation of an effective communication plan. The EPA recommends that consideration is given to when and who needs to be engaged to ensure open, clear and transparent communication.

Any engagement with the community should be planned, prepared and implemented in accordance with an appropriate community engagement plan. Information used for the purposes of community engagement should be presented in a way that translates scientific information into an understandable language for the relevant audience. The EPA publication *Site contamination: guideline for community engagement (2018)* provides templates and practical guidance, and outlines the EPA's expectations in this regard.

In addition, a step-by-step approach to community engagement and risk communication is presented in sections 4 and 5 of Schedule B8 of the ASC NEPM.

### 12.3 Informed consent

Prior to consultants and auditors undertaking work on third-party land, the EPA expects that informed consent will be obtained from the landowner.

Where there is an occupier of a site, written consent should be obtained from both the owner and occupier of the land. Before undertaking a site contamination assessment on third-party land, the owner/occupier should be made aware of related implications.

The following information is provided as guidance, and the EPA strongly recommends that consultants and auditors obtain legal advice about the risk to themselves in carrying out the work, before undertaking sampling on private land.

---

<sup>96</sup> For additional information on risk management in relation to site contamination, refer to ITRC publication *Decision making at contaminated sites: Issues and options in human health risk assessment (2015)*

The nature, concentration and extent of chemical substances and site land use will have an effect on how contamination is managed on third-party land.

The EPA is required to record certain details of site contamination on the EPA Public Register pursuant to section 109 of the EP Act.

The EPA advises that where contamination on third-party sites is identified, the landowners should be informed and an appropriate risk management strategy be implemented in accordance with this guideline as soon as reasonably practicable, to ensure the protection of human health and the environment.

Once recorded, this information will be made available on the Public Register Index of the EPA website and to interested parties upon written enquiry to the Public Register Administrator of the EPA.

The existence of this information in relation to the land will also be identified by the EPA when responding to enquiries under the *Land and Business (Sale and Conveyancing) Act 1994* (LBSC Act) and the subordinate *Regulations* (LSBC Regulations) (via the 'statement of environmental particulars' contained within the statement under section 7).

This will typically occur at the time of sale of the property. There are also requirements for vendors in relation to identifying whether environmental assessments of the land have been carried out.

The EPA advises consultants of the need to ensure that any sampling in relation to site contamination on private property should include a process whereby the landowners are informed by the consultant of the likelihood of the results having to be provided to the EPA and recorded on the EPA Public Register. It is recommended that discussion about any subsequent obligations (for both the EPA and the landowner) require relevant information to be passed on under the Form 1 statement of the Regulations and the LSBC Act.

## 13 Access to site contamination information

### 13.1 EPA Public Register

The EP Act requires the EPA to create and maintain a Public Register. The EPA must record a variety of information in the Public Register pursuant to section 109(3) of the EP Act and as prescribed in Regulation 16.

Information specific to site contamination includes:

- details of serious or material environmental harm caused or threatened in the course of an activity
- details of site contamination of underground water notified to the EPA
- details of transfer of liability for site contamination agreements
- details of EPA approved voluntary site contamination assessment and remediation proposals and any reports associated with the approved proposal
- details of special management areas
- details of prohibition or restrictions on taking water
- notification of commencement or termination of site contamination audits
- site contamination audit reports
- details of each environmental assessment report<sup>97</sup> carried out by or on behalf of the EPA
- reports prepared on behalf of the former South Australian Health Commission in relation to pollution of land or contamination of land by chemical substances
- non-statutory site audit reports completed prior to 1 July 2009<sup>98</sup>
- significant information about environmental authorisations (licences)
- development authorisations
- incidents of environmental harm
- details of environment protection orders, clean-up orders and clean-up authorisations, site contamination assessment orders and site remediation orders.

Information that has been placed in the Public Register is available on request from the EPA. Reports can be copied or inspected.

A listing of selected site contamination information is available through the Site Contamination Index on the EPA [Public Register Directory](#). Requests for copies of electronic documents listed on the index may be provided at no charge.

There can be no guarantee that the EPA holds any or all information relating to a site. If the EPA holds no information about a site, this should not be interpreted as meaning that a site is not affected by site contamination or pollution. Persons with an interest in a site should always carry out their own enquiries and/or assessments to ensure that their

---

<sup>97</sup> Environmental assessment, in relation to land, means an assessment of the existence or nature or extent of—(a) site contamination (as defined in the EP Act) of the land; or (b) any other contamination of the land by chemical substances, and includes such an assessment in relation to water on or below the surface of the land

<sup>98</sup> Prior to 1 July 2009, site audit report means a detailed written report that sets out the findings of a site audit. A site audit, in relation to land, means a review (carried out by a person recognised by the Authority as an environmental auditor) that examines environmental assessments or remediation of the land for the purposes of determining—(a) the nature and extent of contamination of the land by chemical substances present or remaining on or below the surface of the land; and (b) the suitability of the land for a particular use; and (c) remediation that is or remains necessary for a particular use, but does not include a site contamination audit (as defined in the EP Act) completed on or after 1 July 2009.

interest in the site is not compromised by site contamination or pollution. Information held in the EPA Public Register may assist this process.

For further information about viewing or obtaining information, contact the EPA by telephone on 08 8204 2004 or 1800 623 445 (freecall for country users) or email [epainfo@sa.gov.au](mailto:epainfo@sa.gov.au).

### 13.2 Form 1 statements and Section 7 enquiries

The LBSC Act and the *Land and Business (Sale and Conveyancing) Regulations* (the LBSC Regulations) are set in place to provide consumer protection for those buying property in South Australia.

Sections 7 and 8 of the LBSC Act provide that all mortgages, charges and prescribed encumbrances affecting the land and particulars of certain prescribed matters be provided by a vendor or their agent to a prospective buyer of land or small business before settlement. The LBSC Regulations prescribe that a Form 1 must be provided to prospective buyers that includes those particulars.

The EPA is required by the LBSC Regulations to provide certain information relating to property. In relation to site contamination, this includes questions set out in Schedule 1 of the LBSC Regulations, incorporating the section: 'Particulars relating to environment protection' and certain information relating to mortgages, charges and prescribed encumbrances affecting the land. This information is included in the 'Form 1 Statement' which forms part of the contract of sale documents for property sales.

Appropriate persons under the LBSC Act can make a direct enquiry to the EPA with payment of a fee for a Section 7 search, which includes the information that the EPA is required to provide to assist with the preparation of the Form 1 statement. The request must be made in writing with the current certificate of title reference of each parcel of land.

Those particulars may include information relating to site contamination, in response to the questions relating to the prescribed encumbrances or the 'Particulars relating to environment protection' set out in the LBSC Regulations. The EPA provides that information directly in the form of a 'Section 7–EPA response' letter.

Any person can make an enquiry – called a Section 7 direct enquiry – to the EPA upon payment of a fee. The EPA will then provide a response to these questions, as previously described, where this information is held.

To make a Section 7 enquiry, contact the EPA's Senior Administration Officer–Section 7 on telephone 08 8204 2179 or [email](#). For further information, see the relevant EPA publication: [Section 7. Land and Business \(Sale and Conveyancing\) Act 1994 and the role of the EPA \(2018\)](#).

### 13.3 Advice regarding reports

It is important to note that information viewed or obtained from the EPA may only represent an extract of the information, for example, an executive summary from a larger, more detailed report.

Also, records held by the EPA may represent only a portion of information that has been produced for a site, and may only cover a subset of the environmental issues present at the site. Where this is the case, interested persons should be aware that further detailed information may exist in a report and that the extract(s) may not fully or accurately represent this information. Consideration should also be given to any appendices or referenced documents in a report that may provide further information.

Site contamination reports vary in their scope and detail. This must be taken into account when interpreting the information contained in reports.

It is recommended that where the information obtained suggests that ongoing responsibilities exist for site contamination, appropriate advice be sought from an environmental professional (for example, consultant or auditor) and the EPA.

### 13.4 Currency of reports

Consultant and audit reports provide information useful to land owners and occupiers, planning authorities, local councils, the EPA and the community. Reports may contain information relating to the existence of site contamination, provide a history of site development and identify requirements for site management.

Reports are based on the condition of the site at the time the report is completed. They do not represent any changes that may have occurred to the condition of the site or site contamination since the date of report completion. In many instances, more than one report will be prepared for a site over time. Interested persons are advised to check the dates of all available reports to ensure the most recent and most relevant information has been obtained for the site.

All persons who rely on consultant and audit reports are advised to check the currency and details of the documents. If a person is unsure of the currency, they should contact the EPA for advice. Persons relying on reports are also advised to ensure that any extracts or pages of a report are read in the context of the complete report.

### **13.5 EPA contact information**

Persons can contact the EPA for enquiries or advice in relation to site contamination:

Manager Site Contamination

Environment Protection Authority

GPO Box 2607

Adelaide SA 5001

Telephone: (08) 8204 2004

Free call (country): 1800 623 445

Email: [epasitecontam@sa.gov.au](mailto:epasitecontam@sa.gov.au)

## 14 Glossary

The following definitions are relevant to site contamination. Where a definition is amended in the source document, the definition in the source document takes precedence over the definition presented below. Definitions taken from the EP Act or the Regulations are identified by an asterisk (\*)<sup>99</sup>.

audit	refer to site contamination audit
auditor	refer to site contamination auditor
audit report	refer to site contamination audit report
audit statement	refer to site contamination audit statement
background concentrations*	in relation to <b>chemical substances</b> on a site or below its surface, means results obtained from carrying out assessments of the presence of the substances in the vicinity of the site in accordance with guidelines from time to time issued by the Authority. Refer to the EPA publication <i>Guideline: background concentrations (2018)</i>
chemical substance*	any organic or inorganic substance, whether a solid, liquid or gas (or combination thereof), and includes waste
(the) client	the person who commissions a scope of works by a consultant or an audit.
Contamination	the condition of land or water where any chemical substance has been added at above background level and represents, or potentially represents, an adverse health or environmental impact. This definition of contamination is provided in the ASC NEPM.
element	in relation to the <b>environment</b> any of the principal constituent parts of the environment (land, air, water, organisms and ecosystems) that may be impacted by <b>site contamination</b> and includes amenity values (such as aesthetic impacts) and human-built structures.
environment*	land, air, water, organisms and ecosystems, and includes: <ul style="list-style-type: none"> <li>(a) human-made or modified structures or areas; and</li> <li>(b) the amenity values of an area.</li> </ul>
groundwater contamination	site contamination of underground water.
groundwater restriction or prohibition of use area	an area declared under section 103S of the EP Act.
hazardous circumstance	a state of danger to human beings or the environment, whether imminent or otherwise, resulting from the location, storage or handling of any substance having toxic, corrosive, flammable, explosive, infectious or otherwise dangerous characteristics.
land*	land as a physical entity, including land covered with water.
NAPL	non-aqueous phase liquid – an organic or inorganic liquid that is not miscible with water and can exist in groundwater in numerous forms; is commonly present as a measureable thickness (phase-separated) and is detectable using an inter-face probe; may be identifiable analytically when solubility has been reached.
occupier*	in relation to land— <ul style="list-style-type: none"> <li>(a) has the meaning assigned to the term by section 3 of the EP Act; and</li> </ul>

<sup>99</sup> Information described in **bold text** indicates a meaning defined by the EP Act

	(b) if, in accordance with the regulations, a person of a particular kind is to be taken to be an occupier of the land in the circumstances of the case— includes a person of that kind.
potentially contaminating activity*	an activity prescribed in regulation 50 of the Regulations.
remediate*	to remediate a site means treat, contain, remove or manage <b>chemical substances</b> on or below the surface of the site so as to— <ul style="list-style-type: none"> <li>(a) eliminate or prevent actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; and</li> <li>(b) eliminate or prevent, as far as reasonably practicable—             <ul style="list-style-type: none"> <li>(i) actual or potential harm to water that is not trivial; and</li> <li>(ii) any other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.</li> </ul> </li> </ul>
remediation*	has the corresponding meaning to <b>remediate</b> .
residential purposes	land currently used or proposed for any form of residential use, including single lot, medium density and high density, and includes residential portions of mixed use.
sensitive use*	means— <ul style="list-style-type: none"> <li>(a) use for residential purposes; or</li> <li>(b) use for a pre-school within the meaning of the Development Regulations 1993. (Note: under the Regulations of the Development Act 1993, the definition of pre-school includes a nursery, kindergarten or childcare centre); or</li> <li>(c) use for a primary school; or</li> <li>(d) use of a kind prescribed by regulation (note: no uses are currently prescribed).</li> </ul>
site*	an area of <b>land</b> (whether or not in the same ownership or occupation).
site contamination*	exists at a site if: <ul style="list-style-type: none"> <li>(a) chemical substances are present on or below the surface of the site in concentrations above the background concentrations (if any); and</li> <li>(b) the chemical substances have, at least in part, come to be present there as a result of an activity at the site or elsewhere; and</li> <li>(c) the presence of the chemical substances in those concentrations has resulted in—             <ul style="list-style-type: none"> <li>(i) actual or potential harm to the health or safety of human beings that is not trivial, taking into account current or proposed land uses; or</li> <li>(ii) actual or potential harm to water that is not trivial; or</li> <li>(iii) other actual or potential environmental harm that is not trivial, taking into account current or proposed land uses.</li> </ul> </li> </ul>
site contamination assessment order*	issued under Part 10A of the EP Act

site contamination audit*	<p>a review carried out by a person that—</p> <p>(a) examines assessments or remediation carried out by another person in respect of known or suspected site contamination on or below the surface of a site; and</p> <p>(b) is for the purpose of determining any one or more of the following matters:</p> <ul style="list-style-type: none"> <li>i. the nature and extent of any site contamination present or remaining on or below the surface of the site;</li> <li>ii. the suitability of the site for a sensitive use or another use or range of uses;</li> <li>iii. what remediation is or remains necessary for a specified use or range of uses</li> </ul>
site contamination audit report*	<p>a detailed written report that—</p> <p>(a) sets out the findings of the audit and complies with the guidelines from time to time issued by the authority; and</p> <p>(b) includes a summary of the findings of the audit certified, in the prescribed form, by the site contamination auditor who personally carried out or directly supervised the audit.</p>
site contamination audit statement*	<p>a copy (that must comply with the regulations) of the summary of the findings of the audit certified, in the prescribed form, by the site contamination auditor who personally carried out or directly supervised the audit.</p>
site contamination auditor*	<p>a person accredited under Division 4 of Part 10A of the EP Act as a site contamination auditor.</p>
site contamination consultant*	<p>a person other than a <b>site contamination auditor</b> who, for fee or reward, assesses the existence or nature or extent of <b>site contamination</b>.</p>
site remediation order*	<p>issued under Part 10A of the EP Act.</p>
soil vapour probes*	<p>soil vapour probes may be installed in open ground or via holes drilled through sealed surfaces, such as driveways or parking areas ('near slab') or beneath foundations (sub-slab). Sampling installations may be permanent, semi-permanent or temporary, depending on access and the need to re-sample.</p>
source site	<p>an area of land where a chemical substance was released to the environment and remains there in soil, soil vapour or groundwater. A source site typically continues to discharge chemical substance/s to the surrounding environment.</p>
special management area*	<p>a declaration under section 103N of the EP Act.</p>
suspicion of site contamination	<p>site contamination is suspected to exist at a site because a potentially contaminating activity has taken place there. (Note: refer section 103H(1)(b) of the EP Act)</p>
Tier-1 assessment*	<p>a risk-based analysis comparing site data with generic published screening criteria (Tier 1 criteria) for various environmental values.</p>
Tier-2 assessment*	<p>a site-specific assessment in which risks to potentially exposed populations are assessed using site-specific data on pathways, and the characteristics of the exposed populations. In Tier 2, site data is compared with generic criteria modified for site-specific conditions.</p>

Tier-3 assessment*	is a further step from a Tier 2 evaluation and examines the specific risk-driving factors in more detail. This often involves additional data collection and may incorporate more sophisticated modelling techniques. In Tier 3, site data is compared with site-specific target levels.
volatile	physical property of a chemical that indicates its potential to transform from an adsorbed, dissolved or liquid phase into a vapour phase under standard atmospheric conditions. Highly volatile substances have a low boiling point or subliming (high vapour) pressure.
water*	Includes: <ul style="list-style-type: none"><li>(a) water occurring naturally above or under the ground; or</li><li>(b) water introduced to an aquifer or other area under the ground; or</li><li>(c) an artificially created body of water or stream that is for public use or enjoyment.</li><li>(d) water restriction and prohibition area (GPA)</li><li>(e) an area where a declaration has been made by the EPA under section 103S of the EP Act.</li></ul>
well	a hole drilled into an aquifer for the purpose of monitoring or extracting groundwater. This generic term includes groundwater bores, water wells and tubewells.

## Appendix 1 Honesty in reporting declaration

### 1 Site contamination consultant/site contamination auditor contact details

*This section is to be completed by the consultant or auditor*

---

Form completed while engaged as a consultant [ ] or auditor [ ] (tick only one box)

---

Consultant/auditor company:

---

Auditor accreditation number (if applicable):

---

Postal address:

---



---



---

Telephone: ( )                      Facsimile: ( )

---

Email:

---

Consultant/auditor reference:

---

EPA reference number (if applicable):

---

**Declaration:**

I understand that it is an offence to provide false or misleading information to the Authority (section 120A of the *Environment Protection Act 1993*).

I understand that I must clearly qualify any statement of my opinion as to the existence of site contamination at the site by specifying the land uses that were taken into account in forming that opinion (section 103ZA of the *Environment Protection Act 1993*).

Maximum penalties range from \$30 000 for individuals to \$60 000 for corporations.

---

Name:

---

Signature:

---

Position of signatory:

Date:

---

**2 Site information**

*This section is to be completed by the consultant or auditor*

---

Site name (if applicable):

---

Site address:

---

---

---

Certificate of Title number(s):

---

---

---

Date(s) of assessment:

---

---

Site owner and contact details:

---

---

---

Site occupier and contact details *(if applicable)*:

---

---

---

Name, address and position of person requesting report:

---

---

---

Existing or proposed land use:

---

---

Consultant/auditor reference:

---

---

---

**3 Person(s) providing information to site contamination consultants or auditors**

*This section is to be completed by each person who provides information to a consultant or auditor)*

Section 103ZB of the *Environment Protection Act 1993* states that:

A person must not make a statement that the person knows to be false or misleading in a material particular (whether by reason of the inclusion or omission of any particular) in any information furnished to a site contamination auditor or site contamination consultant that might be relied on by the auditor or consultant in preparing a report relating to site contamination (whether or not required under this or any other Act).

Maximum penalties range from \$30 000 for individuals to \$60 000 for corporations.

**Declaration:**

I hereby declare I have read and that I understand section 103ZB of the *Environment Protection Act 1993* printed above.

Name:

Signature:

Position of signatory:

Date:

## Appendix 2 EPA recognised criteria

**Table 9 EPA recognised criteria for human health and ecological receptors**

Sampling media	Recognised investigation and screening levels
Soils*	ASC NEPM – health investigation levels (HILs) ASC NEPM – soil health screening levels (soil HSLs) ASC NEPM – interim health investigation levels (interim HILs) ASC NEPM – health screening levels for asbestos contamination in soil ASC NEPM – management limits for TPH Fractions F1-F4 in soil ASC NEPM – health screening levels for direct contact PFAS National Environmental Management Plan, January 2018 (PFAS NEMP)
Ecological	ASC NEPM – ecological investigation levels (EILs) ASC NEPM – ecological screening levels (ESLs) PFAS National Environmental Management Plan, January 2018 (PFAS NEMP)
Vapour**	ASC NEPM – vapour health screening levels (vapour HSLs) ASC NEPM – interim soil vapour health investigation levels (interim HILs) Government SA 2014 TCE Action Levels <sup>100</sup>
Groundwater***	ASC NEPM – groundwater health screening levels (groundwater HSLs)
<p>* The recognised soil investigation levels and screening levels are applicable to samples obtained from the subsurface, and must be applied in accordance with the ASC NEPM.</p> <p>** The recognised investigation levels and screening levels are applicable to vapour samples collected from subsurface, sub-floor and indoor air. Investigation and screening levels are to be applied in accordance with the ASC NEPM.</p> <p>*** The recognised groundwater screening levels are applicable to samples obtained from groundwater samples and must be applied in accordance with the ASC NEPM.</p> <p>Note: Documents referenced for the relevant recognised criteria should be applied at the time of publication or as updated from time to time.</p>	

<sup>100</sup> The *Government SA 2014 TCE Action Levels* are applicable for the assessment of the vapour inhalation pathway for sensitive land uses

**Table 10 Environmental values of waters and EPA recognised criteria**

Environmental value	Recognised criteria/trigger level*
Drinking water	ADWG – NHMRC, NRMCC (2011) PFAS NEMP (2018) WHO (2017) <sup>§</sup>
Recreation and aesthetics	GMRRW – NHMRC (2008)** PFAS NEMP (2018) WHO (2017)***
Aquatic ecosystems – marine and fresh	ANZG (2018)PFAS NEMP (2018)
Primary industry – agriculture and aquaculture	ANZG (2018)
Primary industry - Primary industries – irrigation and general water uses	ANZG (2018)
<p>* Specified hierarchy for the application of criteria for each environmental value of water.</p> <p>** Application of the most recent NHMRC (2011) criteria should be applied instead of the referenced NHMRC (2008) criteria in GMRRW.</p> <p>*** Application of the WHO (2017) criteria is recognised by the EPA, where no <i>recreational use</i> criteria is specified for chemical substances in GMRRW – NHMRC (2008).</p> <p>§ For consistency with the application of the ADWG 2011, when chemical substances do not have a ADWG value for potable groundwater use, it is recommended that if other international/national criteria is to be adopted, the ‘order of preference of acceptance’ is undertaken in accordance with the recommendations from the NHMRC and enHealth. Refer to Section 6.5 of the ADWG 2011.</p> <p>Note: Documents referenced for the relevant recognised criteria should be applied at the time of publication or as updated from time to time.</p>	

## Appendix 3 Section 83A – Notification of site contamination that affects or threatens underground water

### Introduction

Underground water (groundwater) is utilised extensively throughout South Australia for a wide variety of purposes ranging from potable (drinking) use to the restoration of ecosystems. Chemical substances present in groundwater as a result of site contamination can migrate over time with the potential to impact on groundwater users, receiving surface water bodies and surrounding properties.

When reported, the EPA can assist in managing health and ecological risks associated with the site contamination that affects or threatens groundwater via regulation of the appropriate person and effective engagement with the community and stakeholders.

### Legislation

The requirement for notification of site contamination that affects or threatens groundwater is prescribed by section 83A of the EP Act as follows.

#### 83A Notification of site contamination of underground water

- 1 This section applies to—
  - (a) an owner or occupier of a site; or
  - (b) a site contamination auditor or a site contamination consultant engaged for the purposes of making determinations or assessments in relation to site contamination on or below the surface of a site.
- 2 A person to whom this section applies must notify the Authority in writing as soon as reasonably practicable after becoming aware of the existence of site contamination at the site or in the vicinity of the site (whether arising before or after the commencement of this section) that affects or threatens water occurring naturally under the ground or introduced to an aquifer or other area under the ground.

Penalty:

If the offender is a body corporate – \$120 000.

If the offender is a natural person – Division 1 fine<sup>101</sup>.
- 3 The notification must—
  - (a) describe the location of the site contamination sufficient to identify it; and
  - (b) include the information known to the person about the nature and extent of the site contamination.
- 4 For the purposes of this section—
  - (a) a person is not required to notify the Authority of a matter if the person has reason to believe that the matter has already come to the notice of the Authority or an officer engaged in the administration or enforcement of this Act; but
  - (b) a person is required to notify the Authority of a matter despite the fact that to do so might incriminate the person or make the person liable to a penalty.
- 5 Any notification given by a person in compliance with this section is not admissible in evidence against the person in proceedings for an offence or for the imposition of a penalty (other than proceedings in respect of the making of a false or misleading statement).

<sup>101</sup> Division 1 fine is currently a maximum of \$60,000

## Site contamination that affects or threatens groundwater

The EPA considers that groundwater is affected or threatened by site contamination when:

- actual or potential harm to groundwater has been identified, or
- remediation is required to prevent harm to groundwater occurring.

Examples of such site contamination include (but are not limited to):

- identification of anthropogenic chemical substances in groundwater that have no known natural sources (not trivial)
- identification of a non-aqueous phase liquid (NAPL) within an aquifer
- identification of chemical substances in soil (or where the depth of the chemical substances cannot be fully delineated) where there is a potential for the chemical substances to enter groundwater and result in harm to groundwater<sup>102</sup>.

### Duty to notify

The following people have a legal responsibility to notify the EPA of site contamination that affects or threatens groundwater pursuant to section 83A of the EP Act:

- an owner or occupier of a site, or
- a site contamination auditor or a site contamination consultant engaged for the purposes of making determinations or assessments in relation to site contamination on or below the surface of a site.

A notification is only required to be submitted by *one* of the responsible persons for a site.

The duty to notify is prescribed in the EP Act and should be discussed with all responsible persons so that there is no confusion in reporting obligations. A person cannot contract out of their obligation to comply with the legislation.

A person who has responsibility must notify the EPA:

- regardless of when the activity that caused the site contamination occurred, and
- even when to do so might incriminate the person or make the person liable to penalty.

A person is not required to notify the EPA if they have reason to believe that the matter has already come to the notice of the EPA or an officer engaged in the administration or enforcement of the EP Act. For example, where monitoring data has been submitted to the EPA pursuant to licence (or other statutory) conditions, a separate notification may not be required if the site contamination that affects or threatens groundwater has been appropriately described.

A list of sites for which the EPA holds a section 83A notification is available on the EPA website. Alternatively, you can contact the EPA directly to determine if the EPA is aware of a matter.

### Timing of notification

A person who has responsibility to notify the EPA **must do so** as soon as reasonably practicable after becoming aware of the existence of site contamination at the site or in the vicinity of the site, that affects or threatens groundwater.

The EPA considers that it is up to the notifier to determine what is 'as soon as reasonably practicable' based on individual circumstances.

---

<sup>102</sup> Where insufficient evidence is available to determine that chemical substances in soil will *not* enter groundwater (resulting in harm to groundwater), the EPA considers that groundwater to be threatened

Examples of situations where a person may become aware of the existence of site contamination that affects or threatens groundwater include (but are not limited to):

- receipt of laboratory analysis results from site investigations that identify harm to groundwater that is not trivial (where laboratory and field data have been assessed as reliable)
- identification of anthropogenic chemical substances in groundwater that have no known natural sources in concentrations greater than EPA recognised criteria (where field data has been assessed as reliable)
- identification of a measurable thickness of a non-aqueous phase liquid within an aquifer during field investigations
- receipt of laboratory analysis results that identify chemical substances in soil (where laboratory and field data has been assessed as reliable) where remediation is required to prevent harm to groundwater occurring
- a review of data or a report (regardless of when it was completed) that identifies site contamination that affects or threatens groundwater that has not been notified to the EPA.

The EPA recognises that there will be instances where it is considered likely that the identification of elevated naturally occurring chemical substances represent background concentrations<sup>103</sup>. However, site contamination may be determined to exist due to insufficient information being available to assess background concentrations at the site.

Where this is the case, and further assessment to determine background concentrations<sup>104</sup> is proposed, this should be clearly identified in the notification. Where site contamination has been determined to exist based solely on chemical substances likely to represent background concentrations, the EPA may defer processing the notification for up to three months<sup>105</sup> (from the date of receipt of the notification) or until a background concentration assessment has been provided (whichever occurs first).

## Provision of information

The EP Act states that a notification of site contamination that affects or threatens groundwater **must**:

- describe the location of the site contamination sufficient to identify it, and
- include the information known to the person about the current nature and extent of the site contamination.

The EPA considers the provision of the following information necessary (where available) to address this requirement:

- Location of site contamination
- The location of any information used to determine the existence of site contamination (eg sampling locations) should be clearly identified in the notification using:
  - geographic coordinates (survey data or GPS coordinates), and
  - certificate(s) of title(s), and
  - an accurate scaled site plan.
- Nature of site contamination
- The type, concentration, speciation and phase of chemical substances present should be used to describe the nature of site contamination.
- A notification should include the results of any field measurements or laboratory analyses that were used to determine the existence of site contamination that affects or threatens groundwater.
- Extent of site contamination

---

<sup>103</sup> Refer to the EPA *Guideline for the assessment of background concentrations (2018)*

<sup>104</sup> Refer to the EPA *Guideline for the assessment of background concentrations (2018)*

<sup>105</sup> Refer to section 109(4) of the EP Act

- The results of assessment at locations where site contamination is not identified may provide important information about the lateral extent of site contamination, and consideration should be given to include this information with a notification.
- The vertical extent of site contamination that affects or threatens groundwater should be described using:
  - the aquifer targeted for the identification of harm to groundwater, and/or
  - the depth of chemical substances identified in soil.

Where preliminary information about the nature and extent of site contamination is available at the time of notification (eg identification of a measurable thickness of non-aqueous phase liquid during field investigations), a preliminary notification to the EPA in the form of an email or verbal communication is considered acceptable. This should be followed up with a subsequent, more detailed notification, when further information describing the nature and extent of site contamination is available, ie after the receipt of results from laboratory analysis.

## Change in location, nature or extent

Where new information is obtained that identifies a change in the location, nature or extent of site contamination previously reported, a new notification **must** be submitted. The EPA considers this to represent the identification of site contamination that affects or threatens water that has *not* already come to the notice of the Authority.

The EPA expects to be notified when the following circumstances are identified:

- site contamination that affects or threatens groundwater at a new sampling location (whether onsite or offsite)
- new (or previously unidentified) chemical substances at concentrations assessed to represent site contamination that affects or threatens groundwater (whether at a previous or new sampling location).

When making determinations whether notification to the EPA is required pursuant to section 83A of the EP Act, this is a requirement of the relevant responsible parties. This may include more than one of the following persons: a consultant, an auditor, an owner or an occupier of the site. The EPA recommends that the relevant parties discuss the matter and seek written confirmation that a notification by one of the responsible persons has been submitted to the EPA.

## Submitting a notification

Notification of the existence of site contamination that affects or threatens groundwater must be provided to the EPA in writing using the EPA website or via email. Notifications can also be made by post. The EPA prefers the submission of electronic notifications for improved efficiency in maintaining the EPA Public Register. Verbal notifications can also be made to the EPA, however a subsequent written notification must be provided within 48 hours.

To ensure all required information is provided to the EPA to meet the requirements of section 83A of the EP Act, it is recommended that notifications are submitted using the [Section 83A notification form](#). The form can also be accessed and submitted directly from the EPA website.

Notifications should be submitted to the EPA using the following contact details:

Manager Site Contamination  
Environment Protection Authority  
GPO Box 2607  
Adelaide SA 5001

Email: [epasitecontam@sa.gov.au](mailto:epasitecontam@sa.gov.au)

Tel: (08) 8204 9934

## Electronic data

In addition to the written statutory notification, the EPA requests that the following information is provided electronically at the time of notification (where possible):

- monitoring well data (including location and elevation)
- field data (including sampling method and depth to groundwater)
- laboratory data (from chemical analyses)
- quality assurance data (including parent sample identification).

Where information is not available, the relevant field should be left blank. The monitoring well data can also be left blank where the information has not changed from a previous notification submitted electronically in the standard data format.

Data quality indicators for laboratory and field data relevant to the objectives of the assessment should be assessed prior to submitting electronic data to the EPA.

The data received will populate the EPA groundwater database, providing a valuable resource to the EPA, consultants and the public to easily access groundwater data held by the EPA in the future.

To ensure the unique identification of groundwater monitoring wells in the database, the EPA requires that each well is assigned a unique number using the Well Construction Permit Number issued by the Department for Environment and Water (DEW). This may be in addition to the monitoring well identification used by the consultant for each site/job. Where a Well Construction Permit Number is not available, the unique unit number assigned by DEW (available on [WaterConnect](#)) should be used instead.

## EPA assessment of notifications

The EPA will assess all information included with a notification to determine if it complies with the requirements of section 83A of the EP Act. It will provide correspondence to the notifier, site owner (if not the notifier), site occupier (if not the notifier), consultant (if engaged) and auditor (if applicable), informing them of the outcome of this determination. The EPA will endeavour to make a determination within three months of receipt of the notification.

Where a notification is determined to comply with the requirements of section 83A of the EP Act, the EPA **must** record details of the notification in the EPA Public Register in accordance with section 109(3)(i) of the EP Act. This information will be made available to interested parties upon written enquiry to the EPA Public Register Administrator, and will be included in the [Site Contamination Index](#) on the EPA website. This information will also be identified by the EPA when responding to enquiries under the LBSC Act.

The EPA will only record details of site contamination that affects or threatens groundwater for parcels of land where direct evidence (eg intrusive investigation) exists, even though the notifiable site contamination may be inferred to exist on other parcels of land (eg through groundwater contours or groundwater modelling).

Following review of a received notification, the EPA will determine the person who is responsible for assessment and/or remediation of the identified site contamination<sup>106</sup>. The EPA may provide input into any assessment and/or remediation strategies which are implemented at a site to ensure compliance with relevant legislation and EPA publications.

---

<sup>106</sup> The EPA regulates site contamination in accordance with the EPA publication *Site contamination: regulatory and orphan site management framework (2017)*

## Site contamination – Section 83A notification form



Site contamination that affects or threatens underground water notification form pursuant to section 83A of the <i>Environment Protection Act 1993</i>		
<b>Notifier details</b>		
Name:	Telephone:	
Company:	Email:	
Address:	<input type="radio"/> the site owner <input type="radio"/> the site occupier <input type="radio"/> the site contamination consultant <input type="radio"/> the site contamination auditor	
<b>Site details</b>		
Site or establishment name (if appropriate):		
Owner(s) (please include contact details where known):	Occupier(s) (where different to owner):	
Street address(es) (include lot or street number):	Certificate(s) of title (current):	
<b>Location, nature and extent</b>		
Has a potentially contaminating activity been undertaken at the site, please describe.....		
Does this notification relate to a change in the location, nature or extent of site contamination that has previously been notified to the EPA? <span style="float: right;"><input type="radio"/> Yes <input type="radio"/> No</span>		
If yes, please provide the date(s) of previous notification(s):.....		
Which group(s) do the chemical substance(s), identified as site contamination that affects or threatens groundwater, belong to?		
<input type="checkbox"/> Metals & metalloids	<input type="checkbox"/> Non-metallic inorganics	<input type="checkbox"/> Organic alcohols/other organics
<input type="checkbox"/> Petroleum hydrocarbons	<input type="checkbox"/> Anilines	<input type="checkbox"/> Chlorinated alkanes
<input type="checkbox"/> Chlorinated alkenes	<input type="checkbox"/> Chlorinated benzenes	<input type="checkbox"/> Polychlorinated biphenyls
<input type="checkbox"/> Other chlorinated compounds	<input type="checkbox"/> Monocyclic aromatic compounds	<input type="checkbox"/> Polycyclic aromatic compounds
<input type="checkbox"/> Phenols	<input type="checkbox"/> Phthalates	<input type="checkbox"/> Pesticides/herbicides/fungicides
<input type="checkbox"/> Surfactants	<input type="checkbox"/> Other (please specify):.....	

Has an assessment of the environmental values of groundwater been undertaken?  Yes  No

If yes, what is the TDS range in mg/L (lowest concentration for the site)? .....

What are the environmental values of groundwater for the site?

Drinking water  Primary industries (irrigation and general water uses)

Recreation and aesthetics

Aquatic ecosystems (marine)

Aquatic ecosystems (fresh)

Primary industries (aquaculture)

Primary industries (agriculture)

---

Where has the site contamination that affects or threatens groundwater been identified?

Soil/soil vapour  Groundwater

Maximum depth:.....m bgl Targeted aquifer(s):.....

---

What is the depth to groundwater (where known)? .....m bgl

---

Has a non-aqueous phase liquid been identified or inferred?  Yes  No

If yes, please provide details of measured thickness (in metres):.....

---

Has site contamination that affects or threatens groundwater been identified<sup>1</sup> offsite?  Yes  No

If yes, please specify offsite certificate(s) of title or address(es):.....

---

An accurate scaled site plan showing sampling locations has been included.

---

This notification provides the following information to determine the existence of site contamination and the support notification of site contamination that affects or threatens groundwater at the site?

Monitoring well data <sup>2</sup>	<input type="radio"/> Yes <input type="radio"/> No	Soil lithological data	<input type="radio"/> Yes <input type="radio"/> No
Groundwater field data	<input type="radio"/> Yes <input type="radio"/> No	Soil vapour bore data	<input type="radio"/> Yes <input type="radio"/> No
Analytical laboratory data	<input type="radio"/> Yes <input type="radio"/> No		
Quality assurance data	<input type="radio"/> Yes <input type="radio"/> No		

---

Has the electronic data been assessed as reliable in meeting the objectives of the assessment?  Yes  No

<sup>1</sup> Using direct evidence and not inferred information

<sup>2</sup> Not required where electronic information has previously been provided to the EPA and the data has not changed

Further assessment details	
Have chemical substances been identified that may represent background concentrations? <input type="radio"/> Yes <input type="radio"/> No	
If yes, will a background concentration <sup>3</sup> assessment be undertaken within the next 3 months? <input type="radio"/> Yes <input type="radio"/> No	
Is any further assessment being undertaken? <input type="checkbox"/> Preliminary site investigation <input type="checkbox"/> Detailed site investigation <input type="checkbox"/> Groundwater monitoring event <input type="checkbox"/> Other:.....	Is the site subject to a current site contamination audit? <input type="radio"/> Yes <input type="radio"/> No If yes, please specify the EPA reference number for the audit: .....
Declaration	
<i>It is an offence to provide false or misleading information to the Authority. Maximum penalties range from \$30,000 for a natural person, to \$60,000 for a body corporate, pursuant to section 119 of the Environment Protection Act 1993.</i>	
I/We declare that the information provided in this form and any accompanying documents is not false or misleading in any material particular:	
Name:	Name:
Position:	Position:
Signature:	Signature:
Date:	Date:

<sup>3</sup> Carried out in accordance with the EPA Guideline for the assessment of background concentrations (2018)

## Appendix 4 Notification of hazardous circumstances

### Introduction

The identification of a hazard which poses an imminent risk to human health and the environment or a chronic risk to human health in relation to site contamination, is considered to be a hazardous circumstance.

Site contamination auditors (auditors) must notify<sup>110</sup> the Environment Protection Authority (EPA) as soon as reasonably practicable if a hazardous circumstance is identified in the carrying out of a site contamination audit.

Site contamination consultants are recommended to notify the EPA in writing in accordance with the relevant timeframes provided in the EPA publication *Guidelines for the assessment and remediation of site contamination* (2019), if a hazardous circumstance is identified.

It is recommended that notification of a hazardous circumstance by site contamination consultants and auditors be made in accordance with the timeframes provided in the EPA publication *Guidelines for the assessment and remediation of site contamination* (2019)<sup>111</sup>. If there is an imminent risk to life or property, contact the relevant emergency authority (000).

### Provision of information

Notification of a hazardous circumstance is to be supported by the provision of relevant information which demonstrates the hazardous circumstance. This information is expected to include: relevant field/analytical data, site plans, identification of sources, receptors and exposure pathways, and any proposed and/or completed actions and associated timeframes.

The EPA recommends submitting the [Hazardous circumstance notification form](#).

Notifications should be submitted to the EPA using the following contact details:

Manager Site Contamination  
Environment Protection Authority  
GPO Box 2607  
Adelaide SA 5001

Email: [epasitecontam@sa.gov.au](mailto:epasitecontam@sa.gov.au)

Tel: (08) 8204 9934

---

<sup>110</sup> In accordance with the EPA publication *Guidelines for the site contamination audit system* (2019), MGR 11.

<sup>114</sup> Refer to section 109 of the EP Act for requirements of the EPA Public Register

## Site contamination – Hazardous circumstance notification form



Notification of hazardous circumstances (site contamination)	
<b>Notifier details</b>	
Name:	Telephone:
Company:	Email:
I am notifying as a:	<input type="radio"/> site contamination auditor Accreditation number: .....  <input type="radio"/> site contamination consultant
<b>Site details</b>	
EPA reference number/s (if known):	
Site name (if appropriate):	
Owner(s) (please include contact details where known):	
Occupier(s) (where different to owner):	
Street address (include lot or street number):	
Certificate(s) of title (current):	
<b>Details of the hazardous circumstances</b>	
Date identified:	
Does this notification relate to a change in a hazardous circumstance that has previously been notified to the EPA?	<input type="radio"/> Yes <input type="radio"/> No
If yes to the above, please provide the date(s) of any previous notification(s):	
What is the trigger for this notification:	<input type="checkbox"/> Risk to human health <input type="checkbox"/> Risk to the environment <input type="checkbox"/> Other
If there is a risk to human health, what is the nature of the risk:	<input type="checkbox"/> Imminent risk <input type="checkbox"/> Chronic risk

Where do the hazardous circumstances exist <sup>1</sup> ?	<input type="radio"/> Onsite <input type="radio"/> Offsite
If off-site, please specify affected offsite certificate(s) of title or address(es):	
Sensitive human receptors are likely or are known to be affected offsite?	<input type="radio"/> Yes <input type="radio"/> No
Is the circumstance current and/or ongoing:	<input type="radio"/> Yes <input type="radio"/> No
Which media does the circumstance relate to? Tick all that apply.	<input type="checkbox"/> Soils Shallowest depth:.....m bgl <input type="checkbox"/> Groundwater Shallowest depth:.....m bgl Targeted aquifer(s):..... <input type="checkbox"/> Ground gases/soil vapour Shallowest depth:.....m bgl <input type="checkbox"/> Indoor air <input type="checkbox"/> General <input type="checkbox"/> Other
Describe the nature of the circumstance:	
Which group(s) do the chemical substance(s), identified as presenting a hazardous circumstance, belong to?	
<input type="checkbox"/> Metals & metalloids <input type="checkbox"/> Petroleum hydrocarbons <input type="checkbox"/> Chlorinated alkenes <input type="checkbox"/> Other chlorinated compounds <input type="checkbox"/> Phenols <input type="checkbox"/> Surfactants	<input type="checkbox"/> Non-metallic inorganics <input type="checkbox"/> Anilines <input type="checkbox"/> Chlorinated benzenes <input type="checkbox"/> Monocyclic aromatic compounds <input type="checkbox"/> Phthalates <input type="checkbox"/> Bulk ground gas (including flow)
<input type="checkbox"/> Organic alcohols/other organics <input type="checkbox"/> Chlorinated alkanes <input type="checkbox"/> Polychlorinated biphenyls <input type="checkbox"/> Polycyclic aromatic compounds <input type="checkbox"/> Pesticides/herbicides/fungicides <input type="checkbox"/> Other (please specify):.....	
Has a non-aqueous phase liquid been identified or inferred?	<input type="radio"/> Yes <input type="radio"/> No
If yes, please provide details of measured thickness:	(m) <input type="text"/>
An accurate scaled site plan showing relevant sampling locations has been included. <input type="checkbox"/>	

<sup>1</sup> Using direct evidence and not inferred information

The following information relevant to the media affected should be provided to support notification of a hazardous circumstance:	
Monitoring well data <sup>2</sup> <input type="checkbox"/>	Soil lithological data <input type="checkbox"/>
Groundwater field data <input type="checkbox"/>	Soil vapour bore data <input type="checkbox"/>
Analytical laboratory data <input type="checkbox"/>	Other data <input type="checkbox"/>
Quality assurance data <input type="checkbox"/>	
Has the data been assessed as reliable? <input type="radio"/> Yes <input type="radio"/> No	
<b>Further investigations/actions details</b>	
Is any further assessment being undertaken to investigate the nature and extent of the contamination presenting the hazardous circumstance?	<input type="checkbox"/> Preliminary site investigation <input type="checkbox"/> Detailed site investigation <input type="checkbox"/> Groundwater monitoring event <input type="checkbox"/> Soil vapour monitoring event <input type="checkbox"/> Other (specify).....
If yes, when are the results of the further assessment expected to be available?	
What control measures have been implemented to eliminate or mitigate the hazardous circumstance?	
Has community engagement with any affected sensitive human receptors in relation to the hazardous circumstance been undertaken?	<input type="radio"/> Yes <input type="radio"/> No
<b>Declaration</b>	
<i>It is an offence to provide false or misleading information to the Authority. Maximum penalties range from \$30,000 for a natural person, to \$60,000 for a body corporate, pursuant to section 119 of the Environment Protection Act 1993.</i>	
I/We declare that the information provided in this form and any accompanying documents is not false or misleading in any material particular:	
Name:	Name:
Position:	Position:
Signature:	Signature:
Date:	Date:

<sup>2</sup> Not required where electronic information has previously been provided to the EPA and the data has not changed

## Appendix 5 Assessment reporting checklist

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
<b>Executive summary</b>				
Background		✓	✓	✓
Objectives of investigation		✓	✓	✓
Scope of work		✓	✓	✓
Determination of site contamination	Part 2 of this guideline	✓	✓	✓
Notifications (eg S83A, audit)	Part 2 of this guideline	If applicable	If applicable	If applicable
Risk to human health and/or environment		✓	✓	✓
Summary of conclusions and recommendations		✓	✓	✓
<b>Site information</b>				
Site identification (include address, allotments and plans, certificate(s) of title, coordinates, maps, etc)	NEPM B2, section 3.1	✓	✓	✓
Site owner/site occupier		✓	✓	✓
Site plan (layout, scale, north arrow, other site features)		✓	✓	✓
Local government authority and zoning	NEPM B2, section 3.2	✓	✓	✓
Current and proposed site use and identification of site users		✓	✓	✓
<b>General information</b>				
Name of person requesting work		✓	✓	✓
Clear statement of the scope of work	NEPM B2, section 8.1.2	✓	✓	✓
List of previous reports and brief description of works previously undertaken		If previous works completed	✓	✓
Site contamination audit details (if site contamination auditor engaged)		If applicable	If applicable	If applicable

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)	
<b>Site history</b>					
Past and current ownership and occupier details	NEPM B2, section 3.3	✓	Summary	Summary	
Past and current aerial photography					
Past and current certificate(s) of title back to original deeds					
State and local government records					
Other information sources (local residents, historical societies, etc)					
Past and current potentially contaminating activities (PCA) undertaken at or in the vicinity of the site					
Chemical substances associated with past and current PCAs					
Localised PCAs at the site or in the vicinity of the site (product spills, storage areas, stockpiling or filling, asbestos, etc)	NEPM B2, section 3.4				
Identification of ecological receptors within 500-m radius (surface waters, wetlands, etc)					
<b>Local geology and hydrogeology</b>					
Surface elevation and topography	NEPM B2, section 3.5	Desktop review, or intrusive if required	✓	Summary	
Regional and site-specific soil and geological records		✓			
Geophysical data		If required		✓	✓
Drilling logs/well logs (including soil strata, construction details, water level and quality)		Desktop review, or intrusive if required		✓	Summary or refer to DSI
Aquifer types (confined, unconfined, etc)		Desktop review, or intrusive if required		✓	Summary
Groundwater flow direction, flow rate, quality and current or potential future use		Desktop review, or intrusive if required		✓	Summary

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
Survey of existing groundwater wells and registration details	WaterConnect (groundwater database)	✓		Summary or refer to DSI
Other geological and hydrogeological properties	NEPM B2, section 3.5	Desktop review, or intrusive if required		Summary
<b>Site inspection</b>				
Current site use and surrounding site use			✓	✓
Visual evidence/other observations of site contamination (discoloured soil, bare soil patches, odours, etc)			✓	✓
Condition of existing groundwater wells (if present)	NEPM B2, section 3.6	✓	Summary or refer to PSI	Summary or refer to PSI
Presence and condition of site structure and improvements (roads, buildings, storage tanks, etc)				
Potential for asbestos containing materials (ACM)				
Any other environmentally significant features				
<b>Background concentrations</b>				
Determine background soil quality	NEPM B1, section 2.5.7 Guidelines: Background concentration (2018)	✓	✓	✓
Determine area not affected by activities at or in the vicinity of the site for background groundwater quality	NEPM B6, section 3.3 Guidelines: Background concentration (2018)	Desktop review, or intrusive is required	✓	✓
Sufficient collection of up-gradient groundwater quality data	NEPM B6, section 3.3 NEPM B2, section 8.1.2	Desktop review, or intrusive if required	✓	✓

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
	Guidelines: Background concentration (2018)			
<b>Investigation levels</b>				
Determine appropriate soil criteria taking into account current or proposed land use	Part 2 of this guideline	✓	✓	✓
Environmental value assessment	NEPM B1 Part 2 of this guideline	✓	✓	✓
Determine existence of actual or potential harm to water	Part 2 of this guideline	Based on field sampling or laboratory analysis	✓	✓
Details of s83A notification	<a href="#">Appendix 3</a> of this guideline	If applicable	If applicable	If applicable
<b>Conceptual site model (CSM)</b>				
Known and potential sources of contamination	NEPM B2, sections 4.3 and 8.1.2 Part 3 of this guideline	Preliminary CSM	✓	✓
Potentially affected media of environment	NEPM B2, section 4.3 Part 3 of this guideline	Preliminary CSM	✓	✓
Human and ecological receptors		Preliminary CSM	✓	✓
Potential and complete exposure pathways		Preliminary CSM	✓	✓
Chemicals of concern / interest		Preliminary CSM	✓	✓
Nature of chemical substances (mobility, toxicity, volatility etc)	NEPM B2, sections 4.8.1.2 and 9.2.3 Part 3 of this guideline	Preliminary CSM	✓	✓



Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
Identifying and assessing data gaps for CSM refinement	NEPM B2, section 4.4 Part 3 of this guideline	Preliminary CSM	✓	✓
Written presentation of CSM (illustration to support if required)	NEPM B2, section 4.1 Part 3 of this guideline	Preliminary CSM	✓	✓
<b>Sampling plan methodology</b>				
Define data quality objectives (DQO)	NEPM B2, section 5 and Appendix B	If intrusive investigations are required	✓	✓
Number, locations, depth, frequency and patterns of sampling points	NEPM B2 section 5.3 and 6.4			
Sampling and analysis quality plans (SAQP)	NEPM B2, section 5.3			
Elements of environment to be sampled (soil, groundwater, vapour, NAPL etc)				
Analyte selection and analysis methods				
Sampling methods and procedures				
Assessment and interpretation of field data				
<b>Soil assessment and results</b>				
Soil sampling technique	NEPM B2, section 7.2	If applicable	✓	Summary or refer to DSI
Field description of soils (with logs)	NEPM B2, section 7.3			
Field testing	NEPM B2, section 7.4			
Stockpile sampling	NEPM B2, section 7.5			
Soil leachability to groundwater and surface water	NEPM B2, section 7.6			

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
Comparison of results with appropriate criteria	NEPM B1 and B2			
<b>Groundwater assessment and results</b>				
Monitoring well establishment (including screen length and depth, bore logs etc)	NEPM B2, section 8.2.1  EPA guidelines – Regulatory monitoring and testing: groundwater sampling (2007)	If applicable	✓	Summary or refer to DSI
Groundwater sampling methods (consideration of sample methods, field filtration, sample bottles, etc)	NEPM B2, section 8.2.3.1			
Groundwater parameters measured in field	NEPM B2, section 8.2.5			
Aquifer properties (groundwater depth, flow direction, velocity, hydraulic conductivity etc)	NEPM B2, sections 8.2.6, 8.2.7			
Delineation of contamination (lateral and vertical)	NEPM B2, sections 8.3.1, 8.3.2			
Potential for attenuation of contaminants	NEPM B2, section 8.3.4			
Comparison of results with appropriate environmental values	Section 4 of this guideline			
<b>Vapour assessment and results</b>				
<b>Preliminary and screening VI assessment</b>				
Soil vapour probe installation (including depth, bore logs)	NEPM B2 section 9 and B7 Appendix A6  CRC CARE TR23	N/A	✓	Summary or refer to DSI
Soil vapour sampling methods (including leak testing)				
Ambient air/geotechnical parameters				
Comparison of results with appropriate assessment criteria				

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
<b>Detailed VI assessment</b>				
Soil vapour probe installation (including depth, bore logs)	Section 9 NEPM B2 and B7 Appendix A6 CRC CARE TR23	N/A	✓	Summary or refer to DSI
Delineation (lateral and vertical)				
Potential for attenuation of contaminants				
Assessment of preferential pathways				
Comparison of results with appropriate assessment criteria				
<b>Field QA/QC</b>				
Field quality assurance and quality control (including sampling methods, storage, preservation, handling of samples, decontamination of equipment, calibration of instruments, etc) and documentation	NEPM B2, section 5.4, Appendix C	If required	✓	Summary or refer to DSI
Completed chain of custody (COC) documentation and information	NEPM B2, section 5.4.5			
Comparison of field screening methods with laboratory results	NEPM B2, Appendix C			
Appropriate QA/QC samples (blanks, duplicates etc)	NEPM B2, Appendix C			
<b>Laboratory QA/QC</b>				
Comparison of QA/QC information with DQO's	NEPM B2, Appendix C	If required	✓	Summary or refer to DSI
Copies of completed COC documentation from laboratory				
Laboratory method accreditation and holding times for analyses				
Summary of QA/QC				
Appropriate limits of reporting (LOR) for analytes				
Laboratory QC (relative percentage difference, recoveries, spikes)				

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
<b>Data presentation</b>				
Results table of all chemicals of interest (include sample numbers, assessment criteria and highlighted results above criteria)	NEPM B2, sections 14.5, 14.6	If required	✓	Summary or refer to DSI
Summary of all previous results				
Site plan with sample locations and results (include highlighting results above criteria)	NEPM B2, section 14.5			
Concentration contours, cross sections, statistical diagrams				
<b>Contaminant fate and transport modelling</b>				
Select appropriate model and define objectives of modelling	NEPM B2, section 10	N/A	✓	Summary or refer to DSI
Validate model				
Sensitivity analysis				
Limitations, assumptions and uncertainties of model				
Assessment of results and reporting				
<b>Health risk assessment</b>				
Identification of chemicals of concern	NEPM B4, section 9.3.2–9.3.6	N/A	✓	✓
Data collection and evaluation				
Tier 1 – comparison of results with appropriate screening criteria				
Tier 2 – inclusion of site-specific data			If required	If required
Tier 3 – inclusion of more detailed site specific data				
Exposure assessment				
Toxicity assessment			✓	✓
Sensitivity analysis				
Limitations, assumptions and uncertainties				

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
<b>Ecological risk assessment (ERA)</b>				
<i>Preliminary ERA</i>				
Problem identification	NEPM B5a, section 4	✓	Summary of refer to PSI	Summary of refer to DSI
Receptor identification		✓		
Exposure assessment		✓		
Toxicity assessment		✓		
Risk characterisation		✓		
<i>Detailed ERA</i>				
Problem identification	NEPM B5a, section 5	N/A	✓	✓
Receptor identification		N/A	✓	✓
Exposure assessment		N/A	✓	✓
Toxicity assessment		N/A	✓	✓
Risk characterisation		N/A	✓	✓
Uncertainty analysis	NEPM B5a, sections 6 and 7.7	✓	✓	✓
Risk management decision and ERA outcomes	NEPM B5a, section 5.6	✓	✓	✓
<b>Community engagement and risk communication</b>				
Details of stakeholders consulted/ engaged	NEPM B8, section 4.1.3	✓	✓	✓
Summary of information provided to stakeholders (correspondence, informed consent, etc)	Section 5 of this guideline			

Report section and information to be included where relevant	Reference: guideline, NEPM Schedule	Preliminary site investigation (PSI)	Detailed site investigation (DSI)	Site-specific risk assessment (SSRA)
<b>Reporting</b>				
Signed copy of reports				
Appendices may be provided in electronic format	<a href="#">Appendix 9</a>	✓	✓	✓
Searchable Adobe®PDF file of report (must be an accurate copy of the original)				
Electronic files unlocked				
Related documents may be included as an electronic appendix				
Where available, laboratory analytical data to be provided in an electronic format acceptable by the EPA				

## Appendix 6 Remediation reporting checklist

Report section and information to be included where relevant	Remediation options assessment (ROA)	Site remediation plan (SRP)	Remediation and validation reporting (RVR)	Site management plan (SMP)
<b>Executive summary</b>				
Background			Summary or refer to ROA	Summary or refer to ROA
Summary of risk conclusions (from DSI/SSRA)				
Scope of work	✓	✓	✓	✓
Environmental value (EV)				
Determination of harm to human health, water or the environment				
Remediation goals and objectives			✓	✓
Summary of remediation conclusions and recommendations	N/A	✓	✓	✓
<b>Site information</b>				
Site identification (include address, allotments and plans, certificate(s) of title, coordinates, maps etc)				
Site owner/occupier	✓	✓	✓	✓
Site plan (layout, scale, north arrow, other site features)				
Current and proposed site use and identification of site users				
<b>General information</b>				
Name of person requesting work			✓	
Summary of previous works undertaken (include triggers for remediation, risk conclusions from DSI or SSRA)	✓	✓	Summary or refer to ROA	✓
Site contamination audit details (if site contamination auditor engaged)			✓	
<b>Remediation options and issues</b>				
Define remediation approaches (technical, logistical, financial, value or	✓	✓	✓	✓

Report section and information to be included where relevant	Remediation options assessment (ROA)	Site remediation plan (SRP)	Remediation and validation reporting (RVR)	Site management plan (SMP)
water resource and ability to restore, threat to human health or environment)				
Discuss impracticability considerations			Summary or refer to ROA	
Evaluate available and viable remediation options to achieve goals				
Document rationale for selected remediation option				
Document management measures to prevent/reduce additional harm to human health, water or environment			✓	
Determine timeframe for remediation completion				
Review by EPA or site contamination auditor				
Evaluate remediation completion (validation sampling may be required)	N/A	N/A		If required
Update CSM with validation/additional data				
Update SSRA (human health risk assessment or environmental risk assessment) with validation/additional data				✓
Determine whether remediation goals, objectives, endpoints have been met				✓
Stakeholder engagement				✓
Determine whether post-remediation work is required (SMP, water restriction or prohibition area, special management area)	N/A	N/A		
<b>Reporting</b>				
Signed copy of reports	✓	✓	✓	✓
Appendices may be provided in electronic format				

Report section and information to be included where relevant	Remediation options assessment (ROA)	Site remediation plan (SRP)	Remediation and validation reporting (RVR)	Site management plan (SMP)
Searchable Adobe®PDF file of report (must be an accurate copy of the original)				
Electronic files unlocked				
Related documents may be included as an electronic appendix				
Where available, laboratory analytical data to be provided in an electronic format acceptable by the EPA				



## Appendix 7 Environmental aspects for consideration when undertaking 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>National Environment (Ambient Air Quality) Protection Measure (Air Quality NEPM)</p> <p>EPA Guideline: Air quality impact assessment using design ground level pollutant concentrations (2006)</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 Council: Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards (2002)</p> <p>Hazardous circumstances – section 5.2 of this guideline</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 (eg remediation workers, surrounding community).</p> <p>Meteorological conditions (eg wind currents) or human activities (eg 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>	

Environmental aspect	Significance	Guidance and references
<p><b>Dust (stockpile management)</b></p>	<p><b>Stockpiles</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 3m, 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 5m of the boundary.</p> <p>Stockpiles should be covered with an effective covering. The contents of the stockpile will dictate the level of cover ie complete enclosure or the formation of a crust layer.</p> <p>Stockpiles should be at optimum 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>	<p>Part 4 of this guideline</p>

Environmental aspect	Significance	Guidance and references
<p><b>Dust (asbestos management)</b></p>	<p><b>Asbestos</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 airborne.</p> <p>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>Part 4 of this guideline</p> <p>EPA Guideline: Wastes containing asbestos – removal, transport and disposal (2013)</p> <p>National Occupational Health and Safety Commission: Code of practice for the safe removal of asbestos (2005)</p> <p>enHealth Council, Management of asbestos in the non-occupational environment (2005)</p>
<p><b>Noise</b></p>	<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 have legislative implications under specific legislation and policies.</p>	<p>ASC NEPM B2, section 15.2.7</p> <p>EPA Information Sheet: Environmental Noise (2013)</p> <p>Environment Protection (Noise) Policy 2007</p> <p>EPA Information Sheet: Construction Noise (2014)</p> <p>Handbook for Pollution Avoidance on Building Sites (2004) (2<sup>nd</sup> edn)</p>

Environmental aspect	Significance	Guidance and references
<p><b>Surface water</b></p>	<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 <i>Environment Protection (Water Quality) Policy 2015</i> (Water Quality Policy) contains stringent controls for the management of water quality.</p>	<p>Part 4 of this guideline</p> <p>ASC NEPM B2, section 15.2.3</p> <p>Environment Protection (Water Quality) Policy 2015</p> <p>Code of practice for industrial, retail and commercial stormwater management (in draft at date of publication)</p>
<p><b>Soil quality (including acid sulfate soils)</b></p>	<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>Part 4 of this guideline</p> <p>ASC NEPM B2, section 15.2.6</p> <p>ASC NEPM B2, section 15.2.8</p> <p>EPA brochure: Illegal Dumping: It will cost you (2012)</p> <p>EPA Guideline: Standard for the production and use of waste derived fill (2013)</p> <p>EPA Guideline: Current criteria for the classification of waste—including industrial and commercial waste (listed) and waste soil (2010)</p>
<p><b>Groundwater</b></p>	<p>The <i>Environment Protection (Water Quality) Policy 2015</i> (WQEPP) 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 WQEPP is an offence. Depending on the seriousness of the offence, the EPA may choose to prosecute through the ERD Court or pursue other options,</p>	<p>Parts 2, 3 and 4 of this guideline</p> <p>ASC NEPM B2, section 15.2.2</p>

Environmental aspect	Significance	Guidance and references
	<p>such as issuing relevant orders (environment protection order, clean-up order or site contamination order) to gain compliance with the WQEPP. 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 offsite 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 process.</p> <p>Regardless of the selected technology, the requirements of this guideline should be met ie project management plans should be prepared and implemented for groundwater remediation projects.</p>	
<p><b>Flora and fauna</b></p>	<p>Areas of sensitive vegetation and significant trees have substantial environmental value and should be protected, even where site contamination may exist.</p> <p>Significant trees are specifically protected from tree-damaging activities under the <i>Development Act 1993</i>. Threatened flora and fauna are also protected under federal environment protection and biodiversity conservation legislation.</p> <p>Threatened species schedules are found in the <i>National Parks and Wildlife Act, 1972</i> and referred to under the <i>Native Vegetation Act, 1991</i>.</p>	<p>ASC NEPM B2, section 15.2.10</p> <p><i>Development Act 1993</i>, and the relevant development plan for the location</p> <p><a href="#"><u>National Parks and Wildlife Act 1972</u></a></p> <p><a href="#"><u>Native Vegetation Act 1991</u></a></p> <p>Federal legislation: <a href="#"><u>Environment Protection and Biodiversity Conservation Act 1999</u></a></p> <p>It should be noted that this aspect falls outside the EPA's jurisdiction. It is recommended that the relevant authority be contacted if additional information or advice is required.</p>

Environmental aspect	Significance	Guidance and references
	<p>Compliance with all legislation covering sensitive or threatened species of flora and fauna is required.</p>	
<p><b>Heritage</b></p>	<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 earthmoving 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>Development Act 1993</p> <p>Heritage Places Act 1993</p> <p>Federal legislation</p> <p>It should be noted that this aspect falls outside the EPA's jurisdiction.</p> <p>It is recommended that the Department for Environment and Water (responsible for the Native Vegetation Act) be contacted if additional information/advice is required.</p> <p>For Aboriginal heritage the appropriate agency is the Department of the Premier and Cabinet.</p>

## Appendix 8 References for legislation and guidelines

Consultants and auditors should refer to published national and state legislation, and guidelines relevant to the assessment, remediation and auditing of site contamination. A list of publications considered relevant to the assessment and remediation of site contamination is provided below. The list is not exhaustive and consultants and auditors are expected to refer to other published guidelines or standards as appropriate.

This list of guidelines/documents is correct at the time of issue of this guideline.

### Legislation

Copies of the EP Act and Regulations, and all other South Australian legislation are available from the [South Australian legislation website](#).

### National environment protection measures

National environment protection measures are made under section 14 of the *National Environment Protection Council Act 1994* and the equivalent section of the *National Environment Protection Council (South Australia) Act 1994*. Consultants and auditors should have regard to any relevant national environment protection measure, in particular the [National Environmental Protection \(Assessment of Site Contamination\) Measure 1999](#) (ASC NEPM), amended in 2013.

The purpose of this measure is to establish a nationally consistent approach to the assessment of site contamination. South Australia is a participating state in the Intergovernmental Agreement on the Environment made on 1 May 1992, and is a participating jurisdiction in relation to the ASC NEPM, which was made on 10 December 1999 and amended in 2013. The ASC NEPM is required to be implemented by the state through the *National Environment Protection Council (South Australia) Act 1995*.

Other NEPMs likely to be relevant include:

- National Environmental Protection (Air Toxics) Measure, prepared in 2011
- National Environment Protection (Ambient Air Quality) Measure, prepared in 2003.

Refer to the [National Environment Protection Council \(NEPC\) website](#) for details.

### Environment protection policies

Environment protection policies (EPPs) are a second level of environment protection legislation under the EP Act to secure the aims of the Act. EPPs may contain mandatory provisions that are enforceable under the EP Act, either in response to offences or by way of preventing an offence from occurring such as the issuing of an EPO. EPPs may also refer to, or require compliance with codes of practice:

- Environment Protection (Water Quality) Policy 2015
- Environment Protection (Air Quality) Policy 2016
- Environment Protection (Waste to Resources) Policy 2010.

Refer to the [EPA website](#) for all EPPs.

### Guidelines issued by the EPA

Guidelines issued by the EPA considered relevant in relation to site contamination in South Australia include this guideline and all publications in the site contamination series. A summary is included in section 1.3 of this guideline.

Other relevant guidelines issued by the EPA include the following waste guidelines:

- [Standard for the production and use of waste derived fill \(2013\)](#)
- [Landfill gas and development near landfills – advice for planning authorities and developers \(2012\)](#)

- [\*Current criteria for the classification of waste—including industrial and commercial waste \(listed\) and waste soil \(2010\).\*](#)

All publications issued by the EPA are available from the [EPA website](#). Hard copies can be obtained by contacting the EPA.

### **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](#).

Other national publications considered relevant are also referenced as appropriate in this and other EPA guidelines.

## Appendix 9 Electronic format of notifications and reports

### Notifications and reports

#### File format

Information regarding site contamination that is provided to the EPA is required to be placed on the Public Register by the EPA<sup>114</sup>. Notifications and reports require ongoing preservation by the EPA to support access and use over time.

Electronic versions of notifications and reports are requested to be provided to the EPA as PDF files (Portable Document Format®), which are regarded as suitable for long-term record preservation. The electronic files may be provided to the EPA on CD or DVD or other acceptable digital format.

All pages within the PDF file should be numbered and the page size set to the ISO 216 A-series Standard, for example, A4, A3, A0, and so on. In addition, the resolution of the file should not be any lower than 300 dots per inch. Any attachments, such as photos, figures and maps, should also be included within the PDF, as discussed under: 'Other issues' in this Appendix. A notification or report may include colour, and black and white information. This information should be appropriately reproduced within the electronic copy.

#### File naming

File name conventions ensure that notifications and reports can be stored and retrieved in an efficient manner. All notifications recorded and administered by the EPA are assigned a reference number. The reference number is unique and is provided by the EPA following receipt of a notification. All reports subsequently submitted to the EPA should be named using the assigned reference number followed by the report completion date in the format YYYYMMDD, for example: 60000 20140130.

#### Searchability and copy protection

All submitted PDF files **should** be text searchable. The EPA will request enabled electronic files of notifications or reports that are not able to be searched or that are copy protected. Appendices provided as PDF files should also support searchable text and copying of text and images.

#### Encryption, passwords and copy protection

PDF files submitted to the EPA should not be locked with any form of password. The EPA will request electronic copies of reports that are not encrypted or require passwords to access, display, copy, search or print.

#### Printing options

PDF files should include printing permissions that allow unrestricted printing. The EPA will request enabled electronic copies of reports where these functions are restricted.

#### Other issues

Any file attachments, sound files, movie files, plug-in extensions or Javascript actions should be removed or disabled. Such features are difficult to preserve in the long term and may alter the way a file is displayed in the future. PDF files should be self-contained. There are several options in the PDF specification that allow components of a PDF document to be external to the PDF file. Such components are most likely to be lost during long-term preservation, so externally linked objects or referenced content should be removed or embedded in the PDF file.

---

<sup>114</sup> Refer to section 109 of the EP Act for requirements of the EPA Public Register