CONTAMINATED SITES

Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report

NSW EPA
ENVIRONMENT PROTECTION AUTHORITY

Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report was prepared by the Contaminated Sites Section of the Environment Protection Authority.

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1. INTRODUCTION

Land contamination can arise from a range of industrial and other activities. The impact of some activities will be temporary only, while others have the risk of leaving a lasting legacy. In some instances, particularly when the land use has involved hazardous substances, that legacy may be threatening to humans or the environment, or may affect the current or future use of the land.

Not all contamination will affect the land in such a way that it cannot be used productively for industrial, commercial, agricultural, residential or other purposes. To manage contaminated land effectively it is necessary to distinguish between situations where EPA regulation is required to protect humans or the environment and situations where it is not required.

The *Contaminated Land Management Act 1997* (the CLM Act) specifies that the EPA can become involved where contamination **presents a significant risk of harm to human health or some other aspect of the environment**. The general objective set out in s. 3 of the CLM Act is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment.

The EPA has a general obligation under s. 6 of the CLM Act to respond within a reasonable time to a person who has furnished information about actual or possible contamination of land, and to state what the EPA has done and the reasons for doing it.

Determining in any particular case whether or not contamination presents a significant risk of harm can be complex and difficult. It involves considerations such as the type, nature, quantity and concentration of contaminants, how they manifest themselves, the characteristics they display and the nature of their impact in the particular medium. It also involves broader questions such as the current use of the land, who might be exposed to the contaminants under that use, and whether they would be exposed.

The Act does not attempt to define the nature or level of contamination that presents a significant risk of harm; this depends on the site-specific interplay between these factors.

These guidelines deal with two issues:

- the concept of contamination of land presenting a significant risk of harm

- the duty of land owners and persons who have contaminated land to the extent that it presents a significant risk of harm to public health or the environment, or both, to report contamination to the Environment Protection Authority (EPA). This duty is set out in s. 60 of the CLM Act, which is reproduced at Appendix A.

The guidelines cannot provide definitive advice on how to approach every situation of contamination that may arise. The variety of circumstances and different combinations of parameters that could arise make this impractical.

The guidelines seek, rather, to set out the range of considerations for those who encounter contamination, and outline a process for proceeding where there is uncertainty.

The following flowchart and checklist (Figures 1 and 2) provide an overview of the process for a site owner or occupier for assessing whether contamination presents a significant risk of harm and determining whether reporting under s. 60 of the CLM Act is required. There may be other reporting duties outside this process required by other legislation; for example, the *Protection of the Environment Operations Act 1997* and the *Road and Rail Transport (Dangerous Goods) Act 1997*. For more information on these matters, contact the EPA.

2 SIGNIFICANT RISK OF HARM

2.1 References in the *Contaminated Land Management Act 1997*

The critical concept under the *Contaminated Land Management Act 1997* (CLM Act) is whether contamination 'presents a significant risk of harm to human health or some other aspect of the environment'. This concept appears in a number of places in the CLM Act:

- There are general powers afforded to the EPA if the EPA 'has reasonable grounds to believe that land is actually or possibly contaminated in such a way as to present a significant risk of harm' (s. 7).
- There are requirements for matters to be considered by the EPA in its determination of significant risk of harm (s. 9(1)).
- There is a specific power for the EPA to declare land to be an investigation area 'if it has reasonable grounds to believe that the land is contaminated with a substance in such a way as to present a significant risk of harm' (s. 15(1)).

- There is a specific power for the EPA to declare land a remediation site, if the land 'has been found to be contaminated in such a way as to present a significant risk of harm' (s. 21(1)).

There are also obligations under s. 60 of the CLM Act for land owners and persons whose activities have contaminated land and who become aware that land is contaminated 'in such a way as to present a significant risk of harm'. These reporting obligations are considered in more detail in section 3 of these guidelines.

2.2 Current or approved use of the land

Under the CLM Act, contamination can be considered to present a significant risk of harm only where that risk occurs under the current or approved use of the land. For this purpose, 'approved use' means the use to which the land can be put without development consent (or further development consent) under the *Environmental Planning and Assessment Act 1979*. Where a risk would arise because of a proposed change in use, this risk is handled through the land-use planning process.

This means that the level or nature of contamination present at a site may pose a significant risk of harm for human health or the environment under one sort of use, but not under another use.

In terms of human health, the sensitivity of a permitted land use depends on the degree of exposure of persons to the contaminants that may occur under that particular use. For example, contamination that may be present on a site that is being used for an industrial purpose may not affect the use of the land for that purpose. This may be because, for example, the contamination present is on an isolated or contained part of the site and clear occupational health and safety requirements are in place to protect workers; because worker location is physically removed from the area of contamination; or because site use is not continuous.

If the land use of such a site were to be changed to residential use, the contamination might then present a significant risk of harm because, for example, children might be able to gain access to the contaminated area. Being resident, the children would potentially have longer periods within which to be exposed, they might not be aware of the danger, and site changes that did not require approval (such as landscaping) might increase the risk of exposure.

Land can be regarded as presenting a significant risk of harm even if the harm may exist only in certain circumstances of future occupation or use. However, this would only be the case if those circumstances were reasonably foreseeable and consistent with the current approved use of the land.

Figure 1

Significant risk of harm: A decision process for site owners or occupiers

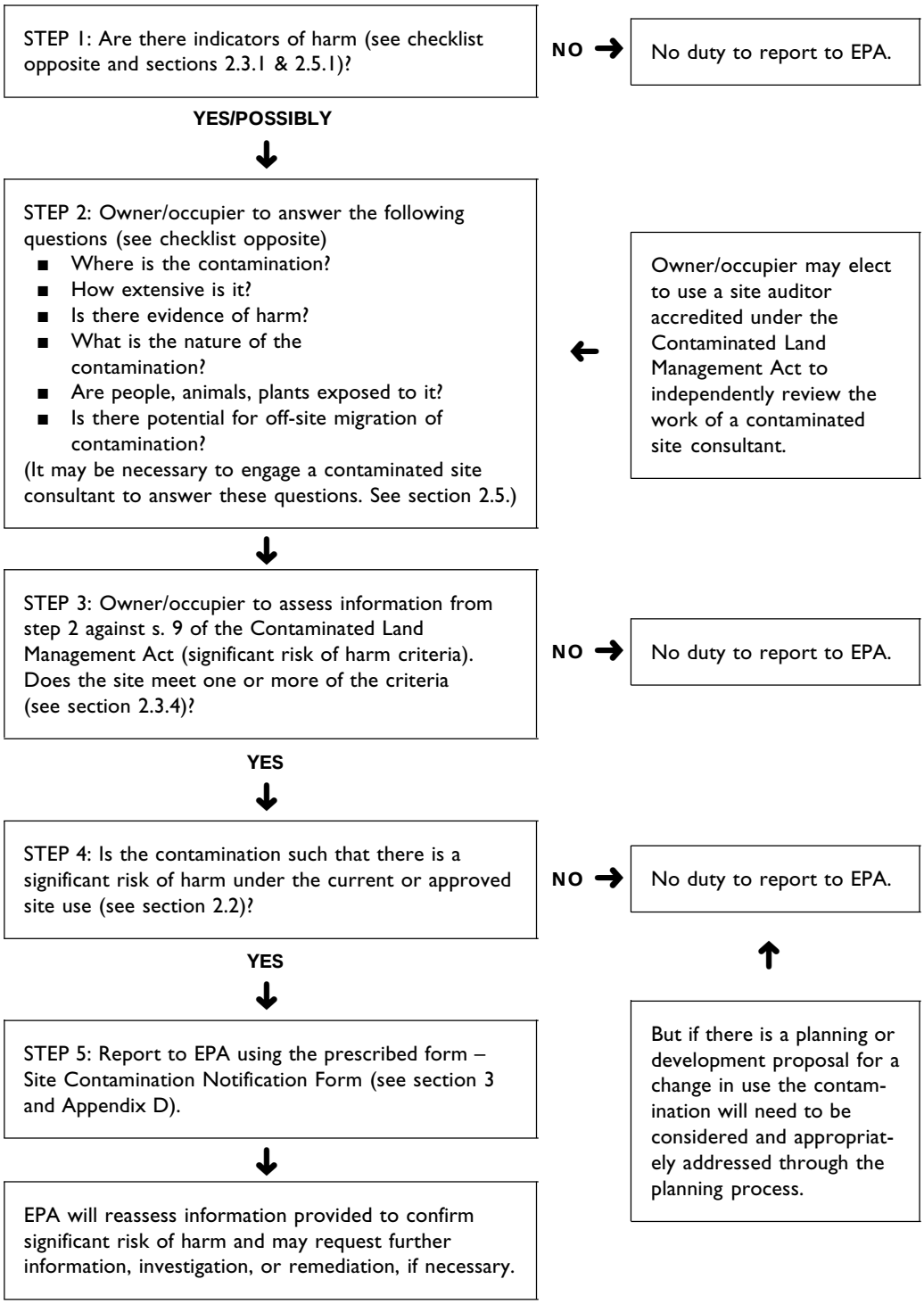

Figure 2

Significant risk of harm: A checklist for site owners or occupiers

STEP 1: Indicators of harm

Owner/occupier to check whether:

- ☐ the site and adjacent sites may be associated with potential contaminating activities
- ☐ the site and adjacent sites may be associated with complaints about pollution or illegal dumping of wastes
- ☐ there are gaps in, or doubts about, the site history
- ☐ there are any indicators of harm as per section 2.5.1.

If the answer to all of the above is 'No', reporting to the EPA is not required under s. 60 of the CLM Act.

STEP 2: Assessing the site

Once the questions have been clarified, check that:

- ☐ a comprehensive site assessment has been conducted
- ☐ site assessment and reporting follows *Contaminated Sites: Guidelines for Consultants Reporting for Contaminated Sites* (EPA NSW 1997a)
- ☐ checklist for Exposure Assessment in Appendix D of *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (EPA NSW 1998) has been addressed
- ☐ any evidence of, or potential for, migration of contaminants from the site and its adjacent sites has been appropriately addressed
- ☐ results of the assessment are assessed against criteria referenced in Appendix B: Guideline Values for Contaminants in Environmental Media.

If a contaminated land consultant is engaged to answer the questions, check that:

- ☐ the consultant has appropriate qualifications and is experienced in contaminated site assessment and remediation
- ☐ the consultant has a good understanding of the *Contaminated Land Management Act 1997*, in particular, the reporting obligations under s. 60 of the Act.

The following exposure scenarios are adopted from the National Environmental Health Forum*. They also appear in the prescribed form for a site audit statement (Form 1 in the Contaminated Land Management Regulation 1998).

- residential, including substantial vegetable garden and poultry
- residential, including substantial vegetable garden, excluding poultry
- residential with accessible soil, including garden (minimal home-grown produce, contributing less than 10% fruit and vegetable intake), excluding poultry
- residential with minimal opportunity for soil access, including units
- daycare centre, preschool, primary school
- secondary school
- park, recreational open space, playing field
- commercial/industrial use.

2.3 Elements of the significant risk of harm concept

The individual elements that make up the concept of contamination of land presenting a significant risk of harm are considered in detail below.

2.3.1 What is 'contamination'?

Contamination of land means the presence of a substance in, on or under the land at a concentration above the concentration at which the substance is normally found in that locality, such that there is a risk of harm to human health or some other aspect of the environment (see s. 5(1) of the CLM Act).

2.3.2 What is 'harm'?

'Harm' is defined in s. 4 of the CLM Act. In relation to contamination, harm means harm to human health or some other aspect of the environment. This includes any direct or indirect alteration of the environment that has the effect of degrading the environment whether in, on or under the land or elsewhere.

Generally speaking, harm involves some sort of detrimental or negative impact. In the case of humans, animals, birds, plants and other biota or matter usually recognised as 'living', detrimental impacts include death, illness, chronic health impairment, or other responses to toxins.

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* The National Environmental Health Forum: established by the Directors from each State and Terrritory and the Commonwealth with a secretariat provided by the Commonwealth Department of Health and Family Services.

In the case of soil, water, or air, detrimental impacts include negative impacts on the capacity to support life, impairment of use as a resource, or destroying or degrading an inherent quality (for example, an aesthetic feature such as odour and colour).

2.3.3 What is 'risk of harm'?

'Risk of harm' means whether it is probable that identified contamination will cause harm to human health or to the environment because of a combination of the following:

- where the contamination is
- how much contamination there is
- what the contamination is
- the amount of exposure people, animals or plants have to the contamination
- pre-existing evidence of harm.

2.3.4 What is 'significant risk of harm'?

'Significant risk of harm' refers to the status of a site where the contamination is considered to be serious and requires EPA regulatory intervention. The CLM Act defines a process for the EPA to determine whether or not a site presents a 'significant risk of harm' to human health or the environment, or both. It is a non-prescriptive approach that requires the EPA to consider the matters listed in s. 9(1) of the CLM Act and allows site-specific factors to be considered. Those matters requiring consideration are:

(a) whether the contamination of the land has already caused harm (for example, in the form of toxic effects on plant or animal life)

(b) whether the substances are toxic, persistent or bioaccumulative, or are present in large quantities or high concentrations or occur in combinations

(c) whether there are exposure pathways available to the substances (that is, the routes whereby the substances may proceed from the source of the contamination to human beings or other aspects of the environment)

(d) whether the uses to which the land and adjoining land are currently being put are such as to increase the risk of harm (for example, use for child care, dwellings or domestic food production)

(e) whether the approved uses of the land and adjoining land are such as to increase the risk of harm

(f) whether the substances have migrated or are likely to migrate from the land (whether because of the nature of the substances or because of the nature of the land)

(g) any guidelines made by the EPA on contamination and remediation (listed in the Bibliography)

(h) any guidelines approved by the EPA on contamination and remediation (listed in in the Bibliography).

In summary, significant risk of harm is probable where:

- contamination is located in a place where there will be an impact on human health or the environment
- there is a particularly toxic contaminant which is likely to cause harm, even in small quantities, to anything with which it has contact, even when there is limited exposure
- a contaminant is present at such concentrations or over such a large area as to present a high probability of harm
- the contaminant is already causing harm.

2.4 How does the EPA evaluate the significance of the risk of harm?

On the basis of information received from the land owner/occupier and any other information to which it has access, the EPA will determine whether or not a site presents a significant risk of harm. The determination will involve assessment of all available information in terms of the matters listed in s. 9(1) of the CLM Act.

In the case of soil contamination, the EPA would be likely to consider that contamination presents a significant risk of harm:

- where the contaminant concentrations in soil are analysed (in a statistically sound way) and are greater than the relevant guideline values for the current or approved land use, and/or the contaminants occur over a relatively large area, and
- where humans either on or off the site are exposed to these contaminants.

In cases of contamination of groundwater or surface water, sediment, air, flora or fauna, or any other aspect of the environment either on-site or off-site, the EPA would be likely to consider that contamination presents a significant risk of harm:

- where the contaminant concentration is greater than the relevant guideline values (see Appendix B for suggestions on how to find relevant guideline values), and

- where the contamination in these media can reasonably be linked to the contamination in question.

Note that in some circumstances, a site may contain contaminants at levels above the guideline values, but it may be that under the current or approved use of the land, and in view of limited pathways, the contamination will not be considered to present a significant risk of harm.

In cases where there are no guideline values for particular contaminants, the specific risk of harm would need to be considered. It is recognised that detailed site-specific human health or ecological risk assessment can be both complex and costly and these considerations will need to guide decisions as to the level of assessment required.

Sometimes the answer as to whether any particular contamination presents a significant risk of harm will be clear-cut. However, the question will often be one of degree, dependent on a consideration of all the relevant factors. In some cases, the harm posed will be self-evident, but in other cases careful review and sometimes further assessment will be required to form a clear view.

Hypothetical examples of sites that may or may not be considered to be presenting a significant risk of harm are attached in Appendix C.

2.5 What should a site owner or occupier do to decide if a site is presenting a significant risk of harm?

To assess whether the contamination of a site presents a significant risk of harm, one would normally start with a site history review and a site inspection to look for indicators of contamination or indicators of harm. There may also be a need for a further, more detailed, investigation.

2.5.1 Indicators of contamination or harm

The first step in a site assessment should be to review the site history to determine whether current or past activities may contribute to contamination of the site. Then follow with an inspection of the site and its surrounds to look for indicators of contamination or harm.

Examples of indicators of contamination or harm include:

- case or cases of a biologically plausible illness or health impairment among people who have had exposure to a particular contaminated site

- the presence of chemicals either on or in surface or groundwater at the site (for example, abnormal colouration of the water, chemicals floating on the watertable, odours emanating from the water)
- visible signs of responses to toxic contaminants in flora and fauna (for example, unusual numbers of birds dying on or near the site, abnormal domestic animal or wildlife behaviour, dead vegetation within or adjacent to areas of otherwise normal growth)
- liquid or solid chemicals or chemical wastes found on or in soil during site works
- unusual odours emanating from soil
- chemicals entering on- and/or off-site service trenches
- explosive materials discarded on-site
- on-site losses of dangerous goods
- illegal and/or uncontrolled landfills on-site
- evidence of off-site migration of contaminants into adjacent or nearby environments (for example, migration to residential areas, creeks, rivers, wetlands or groundwater).

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

In some cases the indicators themselves will provide enough evidence to conclude that there is a significant risk of harm. The indicators may clearly suggest that contamination is present, but it may not be possible to decide whether the contamination presents a significant risk of harm. A more detailed investigation may be needed to make that determination.

2.5.2 Further investigation

Where one or more of the indicators listed in section 2.5.1 is present but there is uncertainty as to whether the contamination of the land presents a significant risk of harm, a further investigation should be undertaken to:

- detail all past and present activities that potentially contaminated the land
- identify potential contamination types
- discuss the site condition
- assess the nature and extent of the contamination
- assess any harm that has been caused or is being caused by the contamination

- assess the possible exposure routes and exposed populations and the nature of any risk presented by the contamination.

If a suitably qualified and experienced environmental consultant is engaged to undertake the assessment, the consultant should use the EPA's *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA 1997a), as well as the other guidelines listed in the Bibliography, as a reference in doing the investigation and preparing a report.

The result of this investigation should be an evaluation of the nature, level and extent of contamination, appropriateness of the uses of the site and adjacent sites, potential routes of exposures to human health and other aspects of the environment and a conclusion as to whether or not the contamination presents a significant risk of harm as discussed in section 2.4 above.

This evaluation should address the matters listed in s. 9(1) of the CLM Act.

In cases where a consultant's report does not draw a firm conclusion about significant risk of harm or there are uncertainties about the report, there may be a need to obtain further information identified by the consultant. Consideration could also be given to the option of engaging an accredited site auditor to review the consultant's report and help resolve any uncertainty.

The CLM Act provides for the accreditation of site auditors to provide independent reviews of the assessment and remediation work of contaminated land consultants and requires the use of a site auditor when a statutory site audit is required under:

- *Contaminated Land Management Act 1997*
- *Environmental Planning and Assessment Act1979*, including a requirement imposed by a planning instrument or development consent
- any other Act.

Auditors can be used in other circumstances at the discretion of the person(s) initiating a site investigation.

3 DUTY TO REPORT CONTAMINATION

Section 60 of the *Contaminated Land Management Act 1997* (CLM Act) sets out a duty that certain persons have to report to the EPA a significant risk of harm associated with contamination. This part of the guidelines details the nature of that duty, to whom it applies, and the process to be followed.

3.1 What is the duty?

The duty set out in s. 60 of the CLM Act (see Appendix A) is that certain persons must notify the EPA of contamination after they become aware that contamination is presenting a significant risk of harm.

3.2 To whom does the duty apply?

The duty applies to the person whose activities in, on or under the land have caused the contamination that presents a significant risk of harm.

The duty also applies to the owner of the land that has been contaminated so as to present a significant risk of harm. The duty applies to the owner regardless of whether the contamination that presents the significant risk of harm happened before or during their ownership of the land.

Although the duty to report contamination under s. 60 of the CLM Act applies to certain persons in specific circumstances as described in these guidelines, any person at any time can report to the EPA contamination that he/she suspects or is concerned may pose a significant risk of harm. Reports can be made by calling the EPA Pollution Line on 131 555. The interests of both affected individuals and the community at large are better served by the early consideration of the risk posed by contamination.

3.3 When must the report be made?

The notification must be made to the EPA **as soon as practicable** after the person becomes aware that contamination of the land presents a significant risk of harm to human health or the environment. Suspecting that there might be contamination that presents a significant risk of harm, or suspecting that known contamination may present a significant risk does not give rise to a duty to report. A person 'becomes aware' only when he/she has actual knowledge or evidence that contamination of which he/she is aware is presenting a significant risk of harm.

A situation where a person would be considered to 'become aware' may occur, for example:

- when that person receives a site audit statement or consultants' report stating that a site is posing a significant risk of harm
- when that person receives a report on samples in which contamination is found to be at a concentration well in excess of what is appropriate for the current or approved land use for the site

- where there is evidence that contamination is having a toxic effect (for example, obvious plant death in an area of affected soil).

If the person became aware that contamination of land presents a significant risk of harm before commencement of s. 60 of the CLM Act, then he or she should notify the EPA as soon as practicable after the commencement of s. 60. The duty applies even if the contamination occurred before the commencement of s. 60 of the CLM Act.

Even where a person has previously been in contact with the EPA before the commencement of s. 60 of the CLM Act in relation to contamination that presents a significant risk of harm, it is recommended that he/she make a report in the prescribed form once the s. 60 commences.

3.4 How is the report made to the EPA?

The Contaminated Land Management Regulation 1998 sets out a prescribed form in which a report must be made. A copy of this form is attached at Appendix D. Any relevant additional information in support of the conclusion that the contamination from a particular contaminant or contaminants presents a significant risk of harm should be attached.

3.5 Failure to report in accordance with the duty

A person who is required to notify a significant risk of harm to the EPA but fails to do so will be liable to prosecution. If convicted, the CLM Act provides for a maximum penalty of 1,250 penalty units (currently $137,500) in the case of a corporation, and 600 penalty units (currently $66,000) in the case of an individual.

3.6 What if a site is contaminated but doesn't present a significant risk of harm?

As noted above, there may be situations where although the land is contaminated, the contamination does not present a significant risk of harm. Such circumstances might occur if a site were contaminated during its past land use(s), but the contaminants are appropriately contained on the site, or the site has otherwise been sufficiently remediated, to allow the current land use.

If a contaminated site that does not present a significant risk of harm is subject to a proposed change of land use or some other planning decision, the contamination issue should be addressed by the proponent and the planning consent authority as part of the development approval process. If the proposed new land use is more

sensitive than the current use, the planning authority may require the site to be remediated to a level suitable for the proposed new use.

3.7 What will the EPA do when it receives a report?

When the EPA receives a report under s. 60 of the CLM Act, it will assess the information supplied to determine whether it agrees that the contamination presents a significant risk of harm. The matters that the EPA must consider in its assessment are as listed in s. 9(1) of the CLM Act and referred to in section 2.3.4 above.

The EPA has a general obligation under s. 6 of the CLM Act to respond within a reasonable time to a person who has furnished information about actual or possible contamination of land, and to state what the EPA has done and the reasons for doing it.

If the EPA agrees that the contamination presents a significant risk of harm, it may take any of a number of actions under Part 3 of the CLM Act. These actions could include:

- declaring the land to be an Investigation Area or a Remediation Site
- issuing Investigation Orders or Remediation Orders
- accepting proposals from interested parties to investigate or remediate the land voluntarily
- liaising and negotiating with land owners or land occupiers on appropriate solutions
- undertaking community-based strategies to minimise the contamination risk or harm through education and public awareness (see s. 104 of the CLM Act).

The information provided by a person in complying with the duty to report under s. 60 of the CLM Act is not admissible as evidence in any proceedings against that person for an offence under any environment protection legislation administered by the EPA.

3.8 What will the EPA do with sites posing a significant risk of harm?

Once the EPA determines that there are reasonable grounds to believe the contamination presents a significant risk of harm, it may require further investigation or remediation to define or address the harm posed by the contamination. Tools that the EPA may use to address the risk of harm include issuing declarations and orders or agreeing to voluntary proposals and can be found in Part 3 of the CLM Act. The action required will depend on the nature of the site,

the use to which it is put, the nature of the threat identified by the EPA and the options available for removing or controlling that threat. Sections 18 and 23 of the CLM Act provide examples of actions that may be required for investigation and remediation respectively.

The EPA's primary goal in relation to sites found to present a significant risk of harm will be to ensure removal or reduction of the risk such that the existing land use may continue or the use for which there is a current approval may proceed.

APPENDIX A
Section 60 of the *Contaminated Land Management Act 1997*

1) A person who becomes aware that the person's activities in, on or under land have contaminated the land in such a way as to present as significant risk of harm must, as soon as practicable after becoming so aware, notify the EPA in writing that the land has been so contaminated.

   Maximum penalty:

   - in the case of a corporation – 1,250 penalty units, or
   - in the case of an individual – 600 penalty units.

2) An owner of land who becomes aware that the land has been contaminated (whether before or during the owner's ownership of the land) in such a way as to present a significant risk of harm must, as soon a practicable after becoming so aware, notify the EPA in writing that the land has been so contaminated.

   Maximum penalty:

   - in the case of a corporation – 1,250 penalty units, or
   - in the case of an individual – 600 penalty units.

3) A notice under this section must specify the following matters to the extent that they are within the knowledge of the person required to give the notice:

   (a) the location of the land

   (b) the activities that have contaminated the land

   (c) the nature of the contamination

   (d) the nature of the risk

   (e) any other matter prescribed by the regulations.

4) Information provided by a person for the purpose of complying with this section is not admissible as evidence in any proceedings against that person for an offence under the environment protection legislation. However, the fact that a person notifies the EPA in accordance with this section does not prevent the EPA declaring the land to be an investigation area or remediation site or from making an investigation or remediation order in respect of that or any other person.

APPENDIX B
Guideline Values for Contaminants in Environmental Media

Guideline values that should be used to assess the risk of harm to human health and the environment presented by land contamination can be obtained from the following publications.

Soils

Guideline values, referred to as Soil Investigation Levels, are published in *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme*, (NSW EPA 1998). These values should be used in conjunction with the Decision Process for Site Auditor Assessment of Urban Redevelopment Sites and accompanying policy, which are contained in these guidelines.

Surface waters

Guideline values are published in the *Australian Water Quality Guidelines for Fresh and Marine Water* (ANZECC 1992). (These guidelines are currently being revised. The revised guidelines, once finalised, are expected to replace the 1992 version.) These should be used in conjunction with the Decision Process for Site Auditor Assessment of Urban Redevelopment Sites in *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (NSW EPA 1998).

Note that in assessing water on sites an exception is defined in section 5 (3)(a) of the *Contaminated Land Management Act 1997*: '*However, land is not, for the purposes of this Act, contaminated land merely because in any surface water standing or running on the land a substance is present in such a concentration*'.

Groundwater

Until more specific guidelines for groundwater are developed, *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC 1992) apply. If groundwater is or may be used as a potable source, then the *Australian Drinking Water Guidelines* (ARMCANZ/NHMRC 1996) apply.

Sediments

There are at present no sediment guidelines available in Australia. Guideline values are to be included in the revised *Australian Water Quality Guidelines for Fresh and Marine Waters*(ANZECC 1992).

The revised guidelines, when available, should be used in conjunction with the Decision Process for Site Auditor Assessment of Urban Redevelopment Sites in the *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (NSW EPA 1998).

Until the revised guidelines are finalised, policy advice on a case-by-case basis may be obtained from the EPA.

Biota

In the case of human food consumption, food standards apply (that is, Maximum Residue Levels for agricultural chemicals in food and Maximum Permissible Concentrations for some other substances).

Air and dust

For advice on air and dust criteria, discuss the matter with a suitably qualified environmental consultant.

APPENDIX C
Worked Examples of Assessing Sites for Significant Risk of Harm

The following are hypothetical examples of sites that may or may not be considered to be presenting a significant risk of harm.

Example 1

Five drums of a mixture of semi-volatile chemicals are spilled onto the soil at an industrial site. The site is situated within a large heavy industrial area and the soil type is of a heavy clay nature. The terrain of the site is flat. The nearest residential houses are 100 m away and the nearest creek/water course is 120 m away. The groundwater at the site is found to be 20 m below surface. The site is fenced with security and has strict rules on occupational and safety hygiene.

Soil samples collected demonstrate chemicals X, Y and Z are above relevant threshold levels in soil to a depth of 0.3 m; no further contamination is found below this depth. Groundwater is found to be unaffected by the chemicals of concern. The off-site migration of contamination through stormwater is unlikely because the site is flat and there are measures in place to stop contaminated stormwater run-off from the site.

EPA assessment

The EPA would not consider this site to be presenting a significant risk of harm.

Although the concentrations of all chemicals are slightly above relevant threshold levels, there is no evidence of, or potential for, off-site migration of contamination. There are no routes of exposure to public health or to other aspects of the environment. The site is still suitable for its current use.

Example 2

The EPA receives a complaint from a farmer's son who has only recently inherited the management of the farm from his father. He is aware from the s. 149 certificate under the Environmental Planning and Assessment Act that the site has been used for cattle tick dipping.

He has found a report in his father's old records that soil samples collected from the dip demonstrated elevated levels of arsenic and DDT: arsenic 1,600 mg/kg to 7,220 mg/kg and DDT 1,525 mg/kg to 3,100 mg/kg.

The same records show that groundwater is at 5 metres depth.

The site continues to be used as a cattle tick dip site and is secured with a person-proof fence. The site is well grassed and the terrain is flat. There are no waterways nearby.

EPA assessment

The EPA would not consider the site to present a significant risk of harm. Although the site has elevated levels of contamination, there is:

- no evidence of harm to the environment or people
- no public access to the contaminated area
- no evidence of off-site migration and no potential for off-site migration
- no risk of pollution of waterways.

Example 3

Soils at an operating service station are found to be contaminated with petroleum products. The site is located 100 metres from a tidal creek. The soil in the vicinity of the site is sandy.

Leaking underground tanks were removed and replaced two years ago. Groundwater on-site is between 0.5 m and 1.5 m below the surface and is found to be contaminated with petroleum product.

Groundwater samples are collected from on-site and off-site locations. On-site wells show total petroleum hydrocarbons (TPH) concentrations ranging from 7,000 to 20,000 µg/L, and benzene, toluene, ethyl-benzene and xylene (BTEX) ranging from not-detected to 25,000 µg/L. Off-site wells have TPH ranging from not detected to 10,000 µg/L and BTEX from not detected to 8,000 µg/L. Water samples from the creek show concentrations of TPH and BTEX.

EPA assessment

The EPA would consider this site to present a significant risk of harm for the following reasons:

Toxicity – human effects

Benzene has been classified by Internal Agency for Research on Cancer (IARC) as a Group 1 carcinogen (i.e. a known human carcinogen). IARC has classified both toluene and xylene as Group 3 (i.e. substances that cannot be classified due to lack of data). Ethyl-benzene has not been classified.

Toxicity – environmental effects

Benzene: LC 50 values (i.e. the concentration which is lethal to 50% of the test population) for benzene for freshwater fish species range upwards from 5,300 µg/L (ANZECC 1992).

Ethyl-benzene: Acute toxicity in freshwater occurs at concentrations of 14,000 µg/L and acute toxicity in seawater occurs at concentrations as low as 430 µg/L (ANZECC 1992).

Toluene: Acute toxicity in freshwater occurs at concentrations of 54,600 µg/L; acute toxicity to fish in seawater occurs at 4,300 µg/L (ANZECC 1992).

Persistence

BTEX and TPHs are generally not regarded as persistent in the open environment. However, benzene is relatively persistent in groundwater.

Bioaccumulative

Ethyl-benzene has an octanol water-partitioning coefficient of 3.15; m-xylene and p-xylene have octanol water-partitioning coefficients of 3.20 and 3.15 respectively. Therefore these compounds are regarded as having the potential to bioaccumulate.

The physico-chemical properties of benzene, toluene and o-xylene do not indicate a potential to bioaccumulate.

Off-site migration of contamination

There is evidence of off-site migration of contamination through groundwater, which has the potential to continue unchecked given the sandy nature of the soil.

Suitability for current or approved use

The off-site migration of contamination has affected the groundwater and the creek, which are considered to be sensitive environments.

Example 4

An industrial site, currently used for welding, steel fabrication and vehicle smash repair, is situated within a large industrial area. The site was previously used as a tannery for a substantial period in the past, which has caused major site contamination.

The northern side of the site is adjacent to a river. On the riverbank, soil is found to contain elevated levels of arsenic (As) ranging from 2,000 mg/kg to 11,500 mg/kg and chromium (Cr) III ranging from 12,000 to 185,000 mg/kg. Groundwater samples collected along the riverbank also indicate elevated levels of chromium III. The sampling of the creek, however, does not indicate any elevated levels of arsenic or chromium.

EPA assessment

The EPA would consider this site to present a significant risk of harm for the following reasons:

Toxicity – human effects

Arsenic is classified in Group 1 under the IARC classification (i.e. it is a known human carcinogen).

Chromium III is classified as Group 3 under the IARC classification (i.e. substances which cannot be classified due to lack of data).

Toxicity – environmental effects

As (total): phytotoxicity-based (i.e. toxicity to plant) investigation criterion for soil is 20 mg/kg (NSW EPA 1998).

As (III+): acute toxicity occurs in the freshwater environment from 812 µg/L (ANZECC 1992).

As (V+): acute toxicity occurs in the freshwater environment from 850 µg/L (ANZECC 1992).

Cr (III+): phytotoxicity-based investigation criterion for soil is 400 mg/kg (NSW EPA 1998).

Cr (III+): acute toxicity occurs in freshwater from 2,221 µg/L (ANZECC 1992).

Cr (III+): chronic toxicity occurs in freshwater from 70 µg/L (ANZECC 1992).

Persistence

Both arsenic and chromium are elements and are persistent in the environment.

Bioaccumulative

Arsenic is not considered to be bioaccumulative. Chromium can bioaccumulate in aquatic organisms by factors of between 10 and 1,000 (ANZECC 1992).

Off-site migration of contamination

There is evidence of chromium migration off-site through groundwater and there is potential for both arsenic and chromium to migrate off-site through soil erosion to the river.

Suitability of the site for its current or approved use

The site is not considered to be suitable for its current use. Elevated levels of arsenic between 2,000 and 11,500 mg/kg were detected. The Human Health Investigation Level for an industrial site is 500 mg/kg. Groundwater samples collected along the riverbank also indicated elevated levels of chromium III.

APPENDIX D
Site Contamination Notification Form (Contaminated Site Regulation 1998)

Contaminated Land Notification Form
Section 60 of the *Contaminated Land Management Act 1997*

This form should be completed by:

(a) a person who becomes aware that the person s activities in, on or under land have contaminated the land in such a way as to present a significant risk of harm, or

(b) an owner of land who becomes aware that the land has been contaminated (whether before or during the owner s ownership of the land) in such a way as to present a significant risk of harm.

NSW EPA
ENVIRONMENT PROTECTION AUTHORITY

1. Where to send completed forms	
Contaminated Sites Section NSW EPA PO Box A290 SYDNEY SOUTH NSW 1232	**IMPORTANT** TYPE OR PRINT
2. Reporter details	
Name:	Telephone Number (business hours): Fax Number (business hours):
Address:	I am: ❑ the owner of the site ❑ the person whose activities have contaminated the land
3. Site details	
Site or Establishment Name (if appropriate):	Street Address:
Lot and DP Number:	Local Government Area:
Owner(s):	Occupier(s):
4. Cause of Contamination	
Previous/present activities that caused or could have caused the significant risk of harm (where known):	
5. Contamination	
Contaminants of concern:	Source of information on contamination:

6. What aspects of the environment are affected?	7. Who/what is potentially at risk?
Tick all that apply: ❑ Air ❑ Groundwater ❑ Surface water ❑ Sediments ❑ Soil ❑ Stormwater ❑ Drinking water catchment ❑ Wetlands ❑ Other: (Please specify) _____	Tick all that apply: ❑ Residents ❑ Workers on commercial/ industrial sites ❑ School/kindergarten children ❑ Threatened species ❑ Aquatic life ❑ Plants ❑ Animals ❑ Other: (Please specify) _____

8. Are any other sites affected or at risk?

Tick appropriate box: ❑ No ❑ Yes

If "yes" is ticked, indicate which of the matters listed in items 6 and 7 apply to other sites:

_____

9. Additional pages attached

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

Number of pages attached: _____

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

I certify that:

(a) I have personally examined and am familiar with the information contained in this notification, and

(b) to the extent they are within my knowledge, the matters contained in this notification are true, accurate and complete.

Name:	Name:	CORPORATE SEAL AFFIXED IN ACCORDANCE WITH CONSTITUTION OF BODY CORPORATE
Position:	Position:	
Signature:	Signature:	
Date:	Date:	

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

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

Name:	Name:
Signature:	Signature:
Date:	Date:

If the notification is made by one or more individuals, the form must be signed by each individual concerned.

If the notification is made by a corporation, the form must be signed:

(a) by affixing the common seal of the corporation, or

(b) personally by a person authorised to do so by the corporation.

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