**Guideline: Assessing Public Health Risks under the *Public Health Act 2005***

**Table of Contents**

1.0 **INTRODUCTION** .................................................................................................................................................. 2

1.1 **PURPOSE** ....................................................................................................................................................... 2

1.2 **CONTEXT** ........................................................................................................................................................... 2

2.0 **HEALTH RISK ASSESSMENT AND PUBLIC HEALTH RISK** ........................................................................... 2

2.1 **STEPS TO ASSESSING PUBLIC HEALTH RISK** ............................................................................................ 4

2.1.1 **Identifying the issues** ................................................................................................................................... 4

2.1.2 **Hazard assessment** ....................................................................................................................................... 4

2.1.3 **Exposure assessment** ................................................................................................................................... 4

2.1.4 **Risk characterisation** ................................................................................................................................... 6

2.2 **RISK MANAGEMENT AND RISK COMMUNICATION** ....................................................................................... 6

ATTACHMENT – **CASE EXAMPLES AND APPROACHES FOR COLLECTING AND DOCUMENTING INFORMATION** .................................................................................................................. 8

**EXAMPLE A. MICRO-ORGANISM CONTAMINATION OF RAINWATER TANK** ................................................................. 9

**EXAMPLE B. MOSQUITO BREEDING IN A WATER RESERVOIR** ....................................................................................... 10

**EXAMPLE C. TERMITICIDE CONTAMINATION OF DRINKING WATER** ............................................................................. 11
1.0 Introduction

1.1 Purpose

The purpose of this guideline is to provide:

- background information on health risk assessment and how it can generally be applied to environmental health issues
- guidance on how to determine if a ‘public health risk’ exists under the provisions of the Public Health Act 2005 (the Act)
- example approaches to collecting and documenting information to support public health risk assessment.

The guideline should be read in conjunction with the Act.

1.2 Context

The Act introduces the term ‘public health risk’\(^1\) to cover particular types of hazardous agents. These agents include breeding grounds for mosquitos, vermin harbourage, water and waste.

Section 11 of the Act provides the meaning of ‘public health risk’. Authorised persons under the Act must be able to determine that a public health risk exists or is likely to exist before taking enforcement action (eg. serving a public health order). To be able to determine that a public health risk exists, an authorised person must be able to prove the elements of section 11. This guideline can assist in proving some of these elements (eg. ”is, or is likely to be, hazardous to human health”, ”contributes to, or is likely to contribute to, disease in humans”, ”the transmission of an infectious condition to humans”).

\(\text{It is important to remember that when determining whether a public health risk exists that risk is more than just presence of a hazardous agent.}\) In order for a hazardous agent to be a public health risk, people need to be exposed to a level of the agent that is known to be responsible for an adverse health effect. For example, the presence of dog faeces in a person’s backyard is not a public health risk on its own. However, dog faeces are known to contain pathogenic microorganisms and attract flies. Flies are known to be carriers of pathogenic microorganisms. If it can be proven that flies are landing on the faeces and that humans in the vicinity are likely to be exposed to the faecal matter carried by the flies, then this could be determined to be a public health risk.

2.0 Health Risk Assessment and Public Health Risk

The use of health risk assessment as a tool to respond to and manage environmental health issues has become increasingly important as it is recognised that situations cannot be judged simply as either ‘safe’ or ‘unsafe’.

The application of health risk assessment in assessing public health risks is not a new concept for officers in local government. Under the previous Health Act 1937, officers assessed environmental hazards to determine whether a “nuisance” existed. Often this assessment was intuitive or based on previous experience.

---

\(^1\) ‘Public health risk’ replaces ‘nuisance’ as used in the previous Health Act 1937. This change is to align with contemporary environmental health management and practice terminology.
Under the Act, the same intuitive or experience-based approach to assessing public health risks remains valid. Notwithstanding this, a more structured approach to assessing risks provides greater surety that risks are assessed in a systematic, consistent and transparent manner across different hazards and by officers across the state.

The enHealth Council (2002) has developed guidelines on environmental health risk assessment and provide a framework (Figure 1) for the assessment of public health risks. The guidelines define health risk assessment as: ‘The process of estimating the impact of a chemical, biological, physical or social agent on a specified human population system under a specific set of conditions and for a certain timeframe’ (enHealth Council, 2002).

Determining whether a public health risk exists may require different levels of professional skills and knowledge. In some situations, an authorised person will be able to assess and determine a public health risk exists based on their personal skills and knowledge and quick, relatively simple investigation. In other situations, advice/evidence may need to be sought from an appropriately qualified and skilled expert (eg. a toxicologist, a medical professional) and more detailed risk assessment and investigation required.

---

**Figure 1**  
**Health Risk Assessment Flow Chart**  (Adapted from - enHealth Council, 2004)
2.1 Steps to assessing Public Health Risk

The following sub-sections provide a brief description of each step of health risk assessment. The enHealth Council guideline (2002) on environmental health risk assessment provides more detail on each step.

2.1.1 Identifying the issues

This step involves developing a clear understanding of the issues the risk assessment will need to address. This process will assist in determining the scope and specific objectives of the risk assessment.

In identifying the issues it will be necessary to consider:

- how the problem was initially identified;
- what types of hazardous agents are causing the identified problem;
- how quickly and for what duration the problem might be experienced (e.g. short, medium or long term); and
- how does the public/complainant perceive the problem.

2.1.2 Hazard assessment


- Hazard identification

Hazard identification involves determining:

- what types of (adverse) health effects might be caused by the hazardous agent/s; and
- how quickly the adverse health effects might be experienced and their duration.

- Dose-response assessment

Dose-response assessment would normally be undertaken for complex assessments. If a health-based exposure standard or guideline is available for a hazardous agent, further assessment of the level of exposure required to produce an adverse response will not be necessary.


2.1.3 Exposure assessment

Exposure assessment involves determining the magnitude, frequency, duration, route and extent of exposure to one or more hazardous agents for the general population, for different subgroups of the population, or for individuals.

During the exposure assessment process, the following may need to be considered:

- are samples/measurements required
- what will be sampled/measured
- where will the samples/measurements be taken
- how will the samples/measurements be taken
- how will the samples/measurements be interpreted and communicated
are photographs required
what other information is required.

The enHealth guidelines (2002) provide a useful description of how to assess exposure. Generally, exposure assessment will require consideration of:

- Exposure pathways and routes:
  - The potential and most significant exposure pathways (eg. water, air, food, soil, injury (eg. bites));
  - Exposure routes (eg. ingestion, inhalation, absorption/puncture skin).

- Magnitude:

  When evaluating the level of exposure, it is important to consider the frequency and extent of exposure as well as the population (including any specific sub-populations) exposed to the hazardous agent/s. The estimate of the magnitude of exposure may be qualitative (ie. Insignificant, intermediate or significant).

  An estimate of the magnitude or level of exposure, for example may consider:
  - The estimated number of pests or potential number of pests,
  - The estimated or actual amount of hazardous agent taken in by the exposed individuals through various pathways (eg. ingestion of water/food/soil, inhalation of air) under a range of scenarios, including worst case.

- Frequency and duration:
  - How frequently the exposure has occurred or is likely to occur if not mitigated (eg. intermittent or continuously);
  - How long each exposure event has occurred or is likely to occur if not mitigated (eg. intermittent or continuously); and
  - If there is potential for cumulative exposure (eg. through exposure to multiple sources of the hazardous agent).

- Extent:
  - The geographical extent of exposure (ie. how wide spread is the hazardous agent and how many people could be affected including any sensitive sub-populations); and
  - The behaviour, occurrence, distribution and fate of the hazardous agent in the environment (eg. transport/mobility in soil or water, uptake by plants, persistence in the environment, potential to bioaccumulate in the food chain). This is mainly relevant for chemicals (eg. dioxins, pesticides) and is particularly useful information for determining appropriate risk management strategies.

- Population exposed:
  - The exposed population, particularly sensitive sub-populations:
    ▪ General sensitivity common to most hazardous agents (eg. children, pregnant women, elderly, immuno-compromised)
    ▪ Specific sensitivity to the hazardous agents by predisposed individuals (eg. air pollution and asthma);
  - Whether the hazardous agent could affect sensitive sub-populations at key locations (eg. schools, nursing homes, hospitals, child care centres).
2.1.4 Risk characterisation

Risk characterisation involves synthesising information from the previous steps of the risk assessment to describe the potential for adverse health effects to occur and to evaluate any uncertainty in the results and assessment process. Risk characterisation should enable a decision to be made on whether a public health risk exists or not.

Risk characterisation describes the risks to individuals and populations in terms of the nature, extent and severity of potential adverse health effects resulting from exposure (or potential exposure) to the hazardous agent. It should include a summary of the key issues and conclusions of each of the other steps of the assessment, as well as describing the nature and likelihood of adverse health effects. The summary should include a description of the overall strengths and limitations (including uncertainties) of the assessment and conclusions.

Standards/guidelines/references can be used to assist in determining whether a public health risk exists or not. For example, the Australian Drinking Water Guidelines provides guideline concentrations for particular contaminants in drinking water. Where there are standards to compare the exposure levels against, these should be used to characterise the risk. Where there are no standards, it is appropriate to use the information gathered in the issue identification, hazard assessment and exposure assessment steps to determine the likelihood of exposure and the consequences.

In some situations, it may be difficult to determine that a public health risk exists when exposure exceeds a standard or guideline by a very small amount. It may be appropriate to undertake a more detailed assessment or expert advice will be required to determine the extent that a public health risk might exist.

Where there are no standards or guideline values it may be necessary to derive an “acceptable” guideline value. In these cases it may be appropriate to seek assistance from qualified professionals (eg. toxicologists). Reference can also be made to the enHealth Council guidelines (2002) for guidance.

Caution is required when interpreting standards and guidelines. Varying assumptions are used to derive standards and guidelines. These can relate to: exposure pathway (eg. inhalation, ingestion, absorption), amount of material consumed, duration of exposure and specific characteristics of sensitive populations (eg. children). An understanding of these assumptions is important when comparing exposure with standards, particularly when an estimated exposure is close to or above a standard or guideline. Further, standards and guidelines may often account for uncertainty by using uncertainty factors. These factors account for adequacy of the study, interspecies extrapolation, inter-individual variability in humans, adequacy of the overall data base, nature and extent of toxicity and scientific uncertainty.

2.2 Risk Management and Risk Communication

If a health risk assessment is carried out on a particular issue and it’s found that a public health risk exists, the next step is to determine what action must be taken to manage it. For an authorised person, this means determining what the person responsible for the public health risk must do to remove or reduce the public health risk or to prevent the risk from recurring. It also means determining what enforcement action should occur. Further information on enforcement options is available in the ‘Public Health Act 2005 – Public Health Risks – Enforcement Guideline’.

The action taken to manage a public health risk should be appropriate to the circumstances and have regard to the nature and seriousness of the risk to public health. Further information on
Choosing an appropriate level of response is available in the ‘Public Health Act 2005 – Public Health Risks – Enforcement Guideline’.

Risk communication is essential throughout the process of health risk assessment and, most importantly, after results of the assessment have been obtained. Risk communication involves clearly explaining in a manner understandable to the audience (e.g. the public, industry, Council) what the likely health risks are from exposure to the hazardous agent they are concerned about.

Further guidance on risk management and communication is available in the enHealth Council guidelines (2002).
ATTACHMENT – CASE EXAMPLES AND APPROACHES FOR COLLECTING AND DOCUMENTING INFORMATION

Example A: Micro-organism contamination of rainwater tank
Example B: Mosquito breeding in a water reservoir
Example C: Termiticide contamination of drinking water

NOTE: The following examples illustrate the health risk assessment process.

They are not to be relied upon as evidence for any real assessment or investigation. Officers must gather their own data, information and evidence and conduct their own assessment and investigation.

Other examples of health risk assessments are available in the enHealth document “Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards”.
Example A. Micro-organism contamination of rainwater tank

<table>
<thead>
<tr>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifying the issues</strong></td>
</tr>
<tr>
<td>- Possible presence of pathogenic micro-organisms (e.g. Salmonella) in water tank.</td>
</tr>
<tr>
<td>- The water tank is the primary source of drinking water for residents in the household.</td>
</tr>
<tr>
<td>- All residents are adults with no existing health problems.</td>
</tr>
<tr>
<td>- Owner found a dead frog in the tank and residents have reported stomach cramps and diarrhoea.</td>
</tr>
<tr>
<td>- Already experiencing the problem and expected to be a short-term problem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazard assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>From testing of the water, Salmonella was identified.</td>
</tr>
</tbody>
</table>

**Identifying the hazard associated with Salmonella**

- Gastroenteritis, stomach cramps, diarrhoea.
- Symptoms appear 6-12 hours after exposure and may last for several days.

**Dose-response assessment**

- No Salmonella should be detected in any water samples (ADWG).

**Exposure assessment**

- Tank provides only source of water for domestic use.
- Salmonella detected in drinking water samples from taps and tank.
- Tank provides water to only one house.
- No sensitive groups currently live in the household.

<table>
<thead>
<tr>
<th>Risk characterisation</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health risk</td>
<td>Reasonable belief that a public health risk exists due to the presence of Salmonella in the primary drinking water source and residents have reported symptoms of gastrointestinal illness.</td>
</tr>
</tbody>
</table>
Example B. Mosquito breeding in a water reservoir

Please note: this particularly scenario could constitute an offence under the proposed amendments to the Public Health Regulation. Depending on the enforcement measure required, the public health risk provisions may be used instead of the Public Health Regulation.

<table>
<thead>
<tr>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifying the issues</strong></td>
</tr>
<tr>
<td>- There are existing cases of Dengue fever in the area.</td>
</tr>
<tr>
<td>- Mosquitoes breeding in water reservoirs near to residential areas may carry Dengue viruses.</td>
</tr>
<tr>
<td>- Part of a campaign to reduce Dengue fever cases in the area following an outbreak of Dengue fever.</td>
</tr>
<tr>
<td>- Considerable community concern.</td>
</tr>
</tbody>
</table>

**Hazard assessment**

**Identifying the hazard**

- Dengue fever – more commonly seen in older children and adults.
- Dengue haemorrhagic fever – most commonly seen in children under fifteen years of age, but can also occur in adults.
- Health effects usually occur suddenly.

**Dose-response assessment**

- One mosquito can infect a person.

**Exposure assessment**

- Known cases of Dengue fever in area and numerous suitable water reservoirs for breeding mosquitoes are located in people’s backyards throughout the community – photographs have been taken of water reservoirs.
- The mosquito that carries the virus is known to be in the area – identified from collected mosquitoes.
- Mosquitos normally only travel about 1 km from their breeding sites.
- People living within 1 km of cases of Dengue fever are at risk.
- Young children live within the mosquito affected area.

**Risk characterisation**

<table>
<thead>
<tr>
<th>Public health risk</th>
<th>Yes</th>
<th>✓</th>
<th>No</th>
</tr>
</thead>
</table>

**Justification**

Reasonable belief that a public health risk exists due to the significant presence of suitable water reservoirs for mosquito breeding and reported cases of Dengue fever in the area.
Example C. Termiticide contamination of drinking water

<table>
<thead>
<tr>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifying the issues</strong></td>
</tr>
<tr>
<td>- Organo-phosphate pesticide (chlorpyrifos) used to kill termites has possibly leached into a household’s drinking water. Children live in the household.</td>
</tr>
<tr>
<td>- Residents have detected a taint in the drinking water and reported experiencing nausea and headaches.</td>
</tr>
<tr>
<td>- Considerable concern and anxiety among people in household.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazard assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifying the hazard</strong></td>
</tr>
<tr>
<td>- Chlorpyrifos, like other organophosphate compounds, inhibits cholinesterase enzymes that play a key role in the normal functioning of the nervous system.</td>
</tr>
<tr>
<td>- Health effects generally occur within 4 hours of exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dose-response assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Guideline values for chlorpyrifos - ADWG health value of 0.01 mg/L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exposure assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Reticulated water supply is only source of water for domestic use.</td>
</tr>
<tr>
<td>- Chlorpyrifos concentration in the water samples was 0.1mg/L (approx 10 times the ADWG).</td>
</tr>
<tr>
<td>- Contamination localised to single residence.</td>
</tr>
<tr>
<td>- Adults and children living in the residence.</td>
</tr>
<tr>
<td>- Children are a sensitive sub-group.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk characterisation</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health risk</td>
<td>Yes √ No</td>
</tr>
</tbody>
</table>
References