

## Groundwater prohibition areas

Issued July 2022

*EPA 1128/22: This information sheet has been prepared to describe the health-based criteria and other considerations the EPA applies when determining the need to implement a groundwater prohibition area. A groundwater prohibition area may be required to prevent actual or potential harm to human health or safety from site contamination that affects or threatens groundwater under section 103S of the Environment Protection Act 1993 by defining the lateral and vertical extent where the use of groundwater is to be restricted or prohibited.*

### Introduction

The Environment Protection Authority (EPA) has the ability under section 103S of the *Environment Protection Act 1993* (EP Act) to restrict or prohibit the taking of water affected by site contamination<sup>1</sup> if it is satisfied that site contamination affects or threatens groundwater and that action is necessary to prevent actual or potential harm to human health or safety. When the EPA determines that preventative action is necessary, it will establish a groundwater prohibition area (GPA). This is an institutional or regulatory control to manage site contamination of groundwater. It is not a form of remediation.

Groundwater contamination often occurs in areas where historical manufacturing and/or industrial activities have taken place and chemical disposal practices have resulted in groundwater becoming contaminated. Contamination within the groundwater can travel with the flow of water away from industrial areas into residential areas where it may be abstracted and used for domestic purposes.

By establishing a GPA, the EPA is seeking to prevent human exposure to contaminants in groundwater by eliminating the exposure pathways between contaminated groundwater and humans.

### Determining the need for and extent of a groundwater prohibition area

Safe drinking water is essential for maintaining public health. Drinking water guidelines have been developed in Australia by the National Health and Medical Research Council<sup>2</sup> and international organisations such as the World Health Organization<sup>3</sup>, the US EPA and other relevant bodies<sup>4</sup> to guide regulators and water users on acceptable levels of

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<sup>1</sup> Site contamination is defined in section 5B of the EP Act

<sup>2</sup> National Health and Medical Research Council and National Resource Management Ministerial Council 2011, *Australian Drinking Water Guidelines 6* (Version 3.6 updated March 2021).

<sup>3</sup> WHO 2022, *Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda*. World Health Organization, Geneva, <https://www.who.int/publications/i/item/9789240045064>

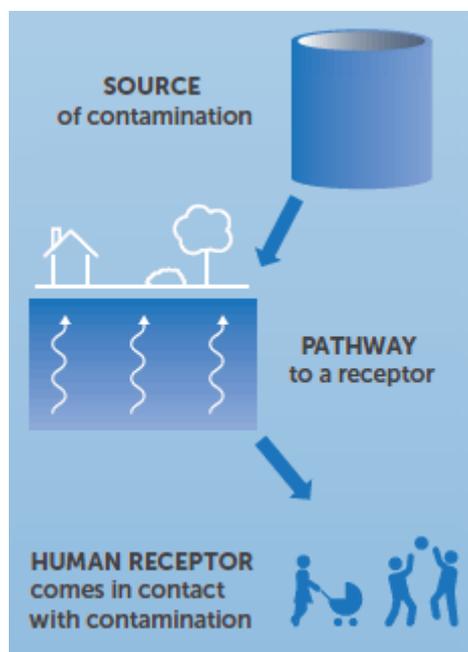
<sup>4</sup> Where reference to relevant Australian Drinking Water Guidelines is made throughout this document the use of other relevant health-based drinking water criteria is appropriate where no Australian Drinking Water Guideline criteria exists for the contaminant of concern being considered.

physical, chemical and biological constituents in water to assist in its monitoring and management for human health and safety.

Detailed site investigations and other environmental assessments carried out and reported by a site contamination consultant<sup>5</sup> (consultant) can include measuring concentrations of chemicals in groundwater and comparing these levels against health-based guidelines to determine whether contamination exists. A site contamination auditor<sup>6</sup> (auditor) will consider the presence of groundwater contamination in carrying out and completing a site contamination audit<sup>7</sup>. Where warranted, an auditor can include a recommendation in a site contamination audit report (audit report) that a GPA be established, in order to minimise risk to human health and safety from groundwater contamination<sup>8</sup>.

The EPA relies on the information provided in notifications<sup>9</sup> and reports produced by site contamination consultants<sup>10</sup>, and site contamination auditors to identify and understand where site contamination which affects or threatens groundwater exists and represents actual or potential harm to human health or safety when compared against health-based guidelines. Such information often provides the foundation for the EPA considering the need to establish a GPA.

Actual or potential harm to human health and safety is determined through investigation and the identification of source–pathway–receptor linkages. The development of a broad conceptual picture of the site based on available information is used by the EPA to identify whether the presence of contaminants of concern presents a risk to human health. This includes finding out if there are pathways through which these contaminants can come into contact with human receptors.



**Figure 1 Source–pathway–receptor linkages**

When groundwater is taken from bores, the use of that groundwater creates a potential pathway for human exposure to contaminants in the groundwater.

Where source–pathway–receptor linkages are identified, the need for action to prevent actual or potential harm to human health or safety is determined by the EPA taking into account a range of factors, primarily health-based criteria but also

<sup>5</sup> A site contamination consultant is a person suitably qualified in the assessment and remediation of site contamination.

<sup>6</sup> A site contamination auditor is an experienced site contamination professional accredited by the EPA under Part 10A of the EP Act to independently examine and review the work undertaken by a consultant and provide written opinions and determinations in the form of a site contamination audit report.

<sup>7</sup> [Overview of the site contamination audit system](#) (EPA 2015)

<sup>8</sup> [Guidelines for the site contamination audit system](#) (EPA 2019)

<sup>9</sup> Pursuant to section 83A of the EP Act

<sup>10</sup> A site contamination consultant is a person suitably qualified in the assessment and remediation of site contamination.

technical, legislative and social issues. Once the need for a GPA is determined, the available information will then be used by the EPA to determine the horizontal and vertical extent of the GPA.

In making GPA determinations, the EPA applies a precautionary approach to the assessment of risk of site contamination<sup>11</sup>.

## Health-based criteria applied in GPA determinations

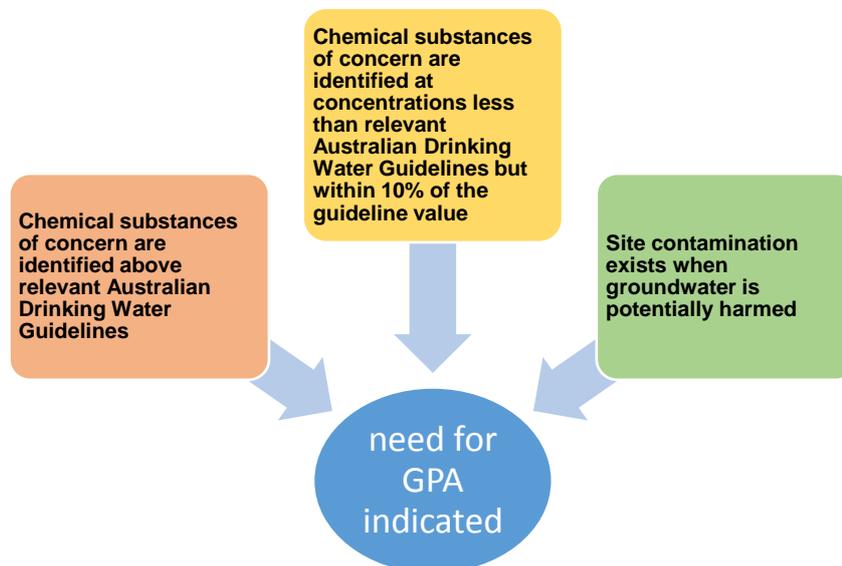
SA Health recommends that it is reasonable to lower the direct community exposure to groundwater contaminants in affected suburbs, and more generally where groundwater exceeds relevant health-based guidelines, through various means including, where appropriate, a prohibition on groundwater abstraction.

The EPA applies health-based criteria when determining the need for a GPA to be established and defining the extent of the proposed GPA. The use of such health-based criteria is recognised and supported by SA Health.

The need for a GPA is indicated where site contamination that affects or threatens water exists when:

- 1 Chemical substances of concern are identified above relevant Australian Drinking Water Guidelines<sup>12</sup>.
- 2 Chemical substances of concern are identified at concentrations less than relevant Australian Drinking Water Guidelines but within 10% of the guideline (for example, based on human health considerations, the concentration of arsenic in drinking water should not exceed 10 µg/L, the criteria used to determine a buffer zone will be 1 µg/L).
- 3 Site contamination exists when groundwater is potentially harmed (ie if chemical substances present in soil have not been removed and the groundwater has likely been contaminated as a result). Where the EPA considers groundwater is potentially harmed, the source site and an off-site area around that source site will be included in the GPA.

The last two points (2 and 3) above are used to determine the 'buffer zone' of a GPA. Buffer zones are considered necessary where there is a risk of a groundwater plume expanding, due to unknown plume stability and abstraction drawing and further expanding the plume.



**Figure 2** The three health-based criteria recognised by SA Health and used to inform the EPA's determinations on the need for a GPA to be established where site contamination that affects or threatens water exists<sup>13</sup>

<sup>11</sup> Where there are threats or serious irreversible damage to human health and or the environment, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation or human exposure. Part 10 of the EP Act sets out the Objectives of the Act, including the precautionary approach.

<sup>12</sup> Where the contaminants identified in groundwater are not represented in the Australian Drinking Water Guidelines, the use of other published specific health-based criteria may be appropriate

<sup>13</sup> [Guidelines for the site contamination audit system](#) (EPA 2019)

## Other factors considered in the determination of a GPA

Following application of the health-based criteria, the EPA also takes a range of other considerations into account in determining the need for and extent of a GPA. Other factors which are generally taken into account include;

- known groundwater users, with consideration given to registered wells and their recorded or known construction and use
- where the source(s) of site contamination is not known
- where person(s) with liability for the site contamination are not known or do not exist
- groundwater plume delineation – to understand the delineation of groundwater plumes, a broad conceptual understanding of the area is developed through the information held by the EPA<sup>14</sup>
- where remediation approaches have not yet, or are unlikely to, address risk to human health associated with contaminated groundwater
- where groundwater is used as the primary water supply
- using treated groundwater for the purpose of food or beverage manufacturing or processing or other industrial purpose within a proposed GPA
- any requirement for groundwater monitoring or remediation, and
- groundwater dewatering requirements associated with construction and maintenance of buildings and infrastructure in the area.

## Buffer zone

The buffer zone is the area surrounding known groundwater contamination plumes which includes a potential plume expansion area. A buffer zone may extend beyond the known and inferred groundwater contamination plume extent where direct measurement has identified concentrations at 10% of the relevant drinking water criteria at the leading edges of the groundwater plume or modelling has inferred further plume expansion. Incorporating a buffer zone into a GPA also prevents further expansion of the known groundwater contamination through the taking of groundwater<sup>15</sup>.

## Variation or removal of a groundwater prohibition area

Contemporary information within or in the vicinity of an established GPA which is received by the EPA may trigger the review of the extent of an existing GPA. This information may include reports or notifications that document changes in the previously known groundwater conditions, such as:

- a site contamination audit report
- detailed site investigation reports
- groundwater monitoring reports
- notifications of site contamination that affects or threatens groundwater<sup>16</sup>.

The information received by the EPA will be used to identify if there are any changes to the known risks to human health and safety from site contamination identified in groundwater.

When a risk of exposure to contaminated groundwater appears to have expanded, for example through the installation of additional groundwater monitoring wells indicating that groundwater contamination is more widespread than previously

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<sup>14</sup> Groundwater contamination plumes may be delineated by direct measurement and/or analysis of a range of groundwater hydraulic parameters where determined, and include hydraulic gradient, hydraulic conductivity and aquifer sediment porosity estimations.

<sup>15</sup> The taking of groundwater in the buffer zone can create a change in water pressure and actively pull the contaminated water into that part of the buffer zone.

<sup>16</sup> Required under section 83A of the *Environment Protection Act 1993*

known, a GPA may be varied. When a risk of exposure to contaminated groundwater is no longer evident, for example due to remediation of the groundwater contamination, a GPA may be revoked fully or in part.

## Engagement

When the need for a GPA, or the variation or removal of an existing GPA is determined by the EPA, the EPA will engage closely with the local community. Detailed information will be provided to the local community throughout the process. Information on each individual GPA will also be publicly available on the EPA website.

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## Further information

### ***Legislation***

Legislation may be viewed on <https://www.legislation.sa.gov.au/>

### ***For general information please contact:***

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