Groundwater prohibition areas

Updated November 2023

EPA 1128/23: This information sheet describes the health-based criteria and other considerations applied when determining the need for, and extent of, a groundwater prohibition area (GPA). The Environment Protection Authority may establish a GPA, when necessary, 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.

Introduction

In South Australia, groundwater is widely regarded as an important supplementary resource to mains and rain water. In recent times variable seasonal weather conditions, including dry hot summers, have placed an increased demand on groundwater used for domestic and irrigation purposes. Groundwater contamination arising from localised sources or from broader scale activities can impact the suitability of the groundwater resource for use and have a detrimental effect on groundwater dependent ecosystems[1]. Contaminated groundwater could result in adverse human health impacts through a range of exposure pathways including direct contact, drinking, or ingesting groundwater through recreational activities such as swimming in pools filled with groundwater or through eating produce that has been irrigated with contaminated groundwater.

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[2] and international organisations such as the World Health Organization[3], US EPA and other relevant bodies[4] to guide regulators and water users on acceptable levels of physical, chemical and biological constituents in water to assist in its monitoring and management for human health and safety. Exceedances of these guidelines in groundwater may indicate the existence of site contamination, making groundwater unsuitable for use.

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[5]. This is provided the EPA is satisfied that site contamination affects or threatens groundwater, and action is necessary to prevent actual or potential harm to human health or safety. When the EPA determines that action is necessary, it will establish a groundwater prohibition area (GPA). The establishment of a GPA is an institutional or regulatory control intended to prevent human exposure to groundwater contamination. This is not the same as remediation of the groundwater contamination, which is not always feasible.

Abstraction of groundwater within areas of known or suspected site contamination may increase the risk of human exposure to chemical substances. Groundwater contamination often occurs in areas where historical manufacturing or

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1 Ecological habitats established in groundwater-fed surface water expressions

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

3 WHO 2017, *Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda*, Geneva: World Health Organization 2022.

4 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 guideline criteria exists for the contaminant of concern being considered.

5 Site contamination is defined in section 5B of the *Environment Protection Act 1993*

industrial activities have occurred, and chemical disposal practices have resulted in groundwater becoming contaminated. Contamination within the groundwater can travel with the flow of the water away from source areas into areas where it may be abstracted and used for domestic purposes. The extent of contamination and how it moves are key considerations in the EPA's determinations about whether action is necessary.

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 a human receptor.

How does the EPA become aware of site contamination of groundwater

Detailed site investigations and other environmental assessments are carried out for a variety of reasons. In many cases these assessments include measuring concentrations of chemicals in groundwater and comparing these levels against health-based guidelines to determine whether site contamination exists. It is mandatory to notify the EPA under section 83A of the EP Act when an owner or occupier of a site **or** a site contamination auditor (auditor) **or** a site contamination consultant (consultant) becomes aware of the existence of site contamination at the site, or in the vicinity of the site, that affects or threatens water occurring naturally under the ground then.

In the first instance, liability for site contamination is assigned to the original polluter who is responsible for assessment and remediation of site contamination on- and off-site, regardless of when it was caused[6]. As site contamination is generally historical in nature and in some cases the original polluter no longer exists, the liability for on-site assessment and remediation may be passed onto the current site owner in certain circumstances. The EPA takes a risk-based approach to the regulation of site contamination[7]. Where site contamination has moved off site and the original polluter no longer exists, the EPA has an established framework to prioritise and assess the nature and extent of the contamination until the public health risks are understood and appropriately managed[8].

In addition to receiving section 83A notifications and site contamination assessment reports, an auditor may recommend a GPA in a site contamination audit, when the auditor considers a risk to human health and safety from groundwater contamination exists.[9].

The EPA relies on the information provided in notifications[10] and reports prepared by consultants and auditors to identify and understand areas where site contamination exists. Such information often provides the foundation for the EPA to consider the need to establish a GPA.

When is a GPA needed

The protection of human health and safety is the primary objective when considering establishing a GPA and the EPA aims to apply a precautionary approach to ensure that site contamination does not impact on human health or safety.

Actual or potential harm to human health and safety is determined through risk-based investigations and the identification of source–pathway–receptor linkages (Figure 1). The development of a broad conceptual site model 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 identifying pathways through which these contaminants can come into contact with human receptors.

6 Sections 103C and 103D of the *Environment Protection Act 1993*

7 Site contamination regulatory framework (EPA 2022)

8 *Orphaned site contamination management framework* (EPA 2022)

9 *Guidelines for the site contamination audit system* (EPA 2019)

10 Pursuant to section 83A of the *Environment Protection Act 1993*

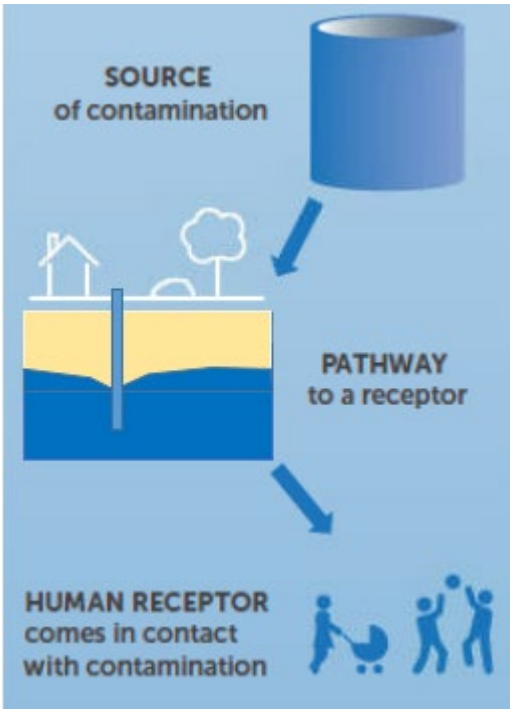

Figure 1 Source–pathway–receptor linkages

When groundwater is taken from a bore, its use 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, taking into account a range of factors including health-based criteria, and technical, legislative and social factors.

The need for a GPA is indicated where:

1 Site contamination that affects or threatens water exists and has spread.

2 Chemical substances of concern are identified above relevant Australian Drinking Water Guidelines[11].

3 There are known or likely users of groundwater in the vicinity of the groundwater contamination.

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

Health-based criteria recognised and supported by SA Health are considered. The criteria include:

1 Chemical substances of concern are identified in groundwater above relevant Australian Drinking Water Guidelines[12] and other relevant health-based drinking water guidelines; and

2 Chemical substances of concern are identified in groundwater at concentrations less than relevant Australian Drinking Water Guidelines but within 10% of the guideline.

[11] Where the contaminants identified in groundwater are not represented in the Australian Drinking Water Guideline, the use of other published specific health-based criteria may be appropriate

[12] 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 guideline criteria exist for the contaminant of concern being considered.

How is the extent of a GPA determined

The lateral and vertical extent of a GPA needs to account for the known area affected by groundwater contamination and uncertainty in understanding the sources and how contaminated groundwater moves.

Factors that are considered in determining the extent of a GPA include:

- the location and information relating to the known or likely source(s) of site contamination and how this contamination is being managed
- potential harm to groundwater posed by known (or suspected) soil contamination where no groundwater investigation has been undertaken
- the proximity of commercial/industrial precincts that could have sources of contamination related to historical activities
- variability of groundwater flow direction
- the proximity of registered bores or other groundwater users
- whether groundwater is used as the primary water supply
- whether existing registered bores are screened across more than one aquifer which provide a pathway to link contamination to deeper groundwater zones
- the potential for groundwater abstraction to draw contaminants towards the extraction point whether from existing registered bores or if new bores in the area were permitted
- the known lateral and vertical extent of the groundwater plume(s) including any areas of uncertainty such as the variability of the sub-surface profile
- the extent to which the groundwater plume(s) has migrated from the likely original source areas
- the stability of the groundwater plume(s)
- if not stable, the predicted future migration and long-term stability of the groundwater plume(s)
- whether a buffer zone is required to address the uncertainties and satisfy the precautionary principle.

The buffer zone is the area surrounding known groundwater contamination plumes which includes a potential conservative plume expansion area. A buffer zone may extend beyond the known and inferred groundwater contamination plume extent. This would occur where direct measurement has identified concentrations at 10% of the EPA recognised drinking water criteria at the leading edges of the groundwater plume, or where modelling has inferred further plume expansion.

Incorporating a buffer zone into a GPA also prevents further expansion of the known groundwater contamination through groundwater abstraction at a rate that would be higher than the natural groundwater flow.

Consideration is also given to excluding activities such as groundwater monitoring and/or remediation.

In making determinations on the need for and extent of a GPA, the EPA applies a precautionary risk-based approach when necessary[13].

Can a groundwater prohibition area change or be removed

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

[13] 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.

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

When information suggests that groundwater contamination appears to be more widespread than previously 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, the extent of a GPA may be reduced or possibly revoked.

How will the local community become aware of the EPA's proposal to establish a GPA

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

Prior to this the community may first have been made aware of contamination in their local area through engagement by an environmental consultant acting on behalf of another party and/or the EPA.

How will the local community know a GPA has been established

When the EPA establishes a GPA under section 103S of the EP Act, there is a requirement to place the details of the GPA in the Public Register[14].

It is important that all current and future owners of properties within a GPA are made aware of the prohibition or restriction. The EPA will flag the existence of a GPA on the Certificate of Title and write to all current landowners and tenants within the area to inform them of the pending establishment of a GPA.

Form 1 of the *Land and Business (Sales and Conveyancing) Regulations 2010* provides a series of questions that the EPA must respond to in relation to land and must be supplied to a purchaser prior to settlement of land pursuant to section 7 of the *Land and Business (Sales and Conveyancing) Act 1994*. One of the questions relates to the existence of a GPA.

Following the declaration of a GPA, notice will be given to potential purchasers of the land through the Form 1 statement. This provides an ongoing method to ensure potential and future owners are aware of a statutory prohibition and informs future purchasers that existing groundwater bores are no longer able to be used and no new bores can be installed at the property in the future.

Further information

Legislation

Online legislation is freely available.

General information

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Telephone: (08) 8204 2004
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[14] According to section 109 of the EP Act