Water quality

Guidelines

# EPA assessment of development applications in the Mount Lofty Ranges water supply catchment overlays

**Issued April 2023**

*EPA 1143/23: This guideline describes the EPA's assessment of referred development applications in the Mount Lofty Ranges water supply catchments and measures that can be taken to prevent or minimise the impacts of stormwater and wastewater on water quality.*

## Introduction

The Environment Protection Authority (EPA) is a referral body for development application (DA) assessment under the *Planning, Development and Infrastructure Act 2016*.

The EPA is referred certain DAs that are proposed within the Planning and Design Code's Mount Lofty Ranges Water Supply Catchment (Areas 1 and 2) Overlays (the Overlays). The purpose of the EPA assessment is to determine if the proposal would have a neutral or beneficial effect (NorBe) on the quality of water draining from the development site.

This guideline describes how the EPA will assess these DA referrals, with consideration given to:

- wastewater and stormwater management actions that would meet the requirement for a NorBe on water quality
- modelling tools that can be used to demonstrate that the development would have a NorBe on water quality.

### The overlays

Land within the Overlays is a water protection area proclaimed under the *Environment Protection Act 1993* (EP Act). This land contains a system of reservoirs and diversion weirs that provide public water supply, including drinking water, to Greater Adelaide.

Overlay Area 1 incorporates those catchment areas that discharge directly into primary reservoirs or diversion weirs from where water is taken into a water treatment plant. Polluted waters in Overlay Area 1 drain from a site via surface and underground waters into downstream reservoirs and diversion weirs and pass into the distribution system without significant detention and natural treatment.

Overlay Area 2 incorporates those parts of the public water supply catchments that drain into secondary reservoirs. Within secondary reservoirs the water is detained, and natural attenuation and de-sedimentation can occur, prior to its release into downstream primary reservoirs or diversion weirs.

The Overlays contain desired outcomes, performance outcomes and, for some of those performance outcomes, deemed-to-satisfy criteria/designated performance features. The intent of the policies is to ensure that new development has a NorBe on water quality draining from the development site.

### Neutral or beneficial effect on water quality

Development in the catchment areas covered by the Overlays has the potential to generate pollutants such as pathogens, nutrients, sediments, pesticides and chemicals that can be discharged into surface and underground waters and detrimentally affect water quality.

The planning policies in the Overlays are designed to ensure that new development has a NorBe on water quality flowing from the development site.

A development is considered to have a NorBe[1] on the quality of water draining from the site if:

1 there is no identifiable potential impact on water quality, or

2 any potential water quality impact is contained on the site and prevented from reaching any surface or underground waters that drain from the site, or

3 any potential water quality impact is transferred from the site to a licensed facility for treatment and disposal to standards approved by the EPA under the EP Act.

## EPA assessment of referred DAs

### Referral of development to the EPA

The Overlays identify classes of development and activities for which a referral to the EPA is required.

The purpose of the referral is for the EPA to provide expert technical assessment and direction to the relevant authority on whether a proposed development would have a NorBe on the quality of water draining from the site. When undertaking an assessment, the EPA is required to have regard to the objects of the EP Act, the general environmental duty and the *Environment Protection (Water Quality) Policy 2015*. The EPA does not undertake its assessment against the policies of the Overlays although it can reference such policies in support of the EPA's directed response to a DA.

Of the classes of development identified in the Overlays, this guideline addresses only the following:

> Any of the following classes of development that are not connected (or not proposed to be connected) to a community wastewater management system or sewerage infrastructure[2]:
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> a function centre with more than 75 seats for customer dining purposes
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> b restaurant with more than 40 seats for customer dining purposes
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> c restaurant with more than 30 seats for customer dining purposes in association with a cellar door

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1 The concept of how a neutral or beneficial effect on water quality is met has been adapted with permission from the *Neutral or beneficial effect on water quality assessment guideline* (WaterNSW 2022).

2 The classes of development for functions centres, restaurants and cellar doors vary in respect of their seating capacity. This is due to the amount of wastewater that would likely be produced for each class. Referral for these classes of development is based on the production of approximately 1,500 litres/day of wastewater. Note that the seating capacities are not equivalent persons as defined in the *On-site wastewater systems code* (2013). The volumes of wastewater are based on the daily flow rates as presented in 'Appendix E Hydraulic and $BOD_5$ Loadings' of the On-site wastewater systems code. For example, a restaurant seating 40 people would produce approximately 1,600L/day based on a daily flow rate of 20 L/person/day, and doubled as two dining sessions would be held each day.

d dwelling where a habitable dwelling or tourist accommodation already exists on the same allotment (including where a valid planning authorisation exists to erect a dwelling or tourist accommodation on the same allotment)

e tourist accommodation where a habitable dwelling or tourist accommodation already exists on the same allotment (including where a valid planning authorisation exists to erect a habitable dwelling or tourist accommodation on the same allotment)

f workers' accommodation where a habitable dwelling or tourist accommodation already exists on the same allotment (including where a valid planning authorisation exists to erect a habitable dwelling or tourist accommodation on the same allotment).

The EPA should be contacted for information about the EPA's requirements for referrals for other classes of development identified in the Overlays.

## Assessment of wastewater and stormwater for referred DAs

Management of wastewater and stormwater to ensure that pollutants do not drain or discharge from the site is the most effective way of minimising the impacts of development on water quality.

The following information identifies wastewater and stormwater management actions that could be implemented to ensure that proposed development would have a NorBe on the quality of water flowing from the site.

This section also contains information on a wastewater calculation tool and stormwater modelling tools. Modelling tools are an effective and consistent way of determining if a proposed development would have a NorBe on water quality. Such tools enable the potential impact of stormwater management measures to be independently, objectively, and consistently assessed using data and sound scientific principles.

In accordance with the *Planning, Development and Infrastructure Act 2016*, the EPA may seek additional documents or information that may be reasonably required to assess a referred DA. This could include information on how wastewater and stormwater would be managed, and the use of modelling tools to demonstrate a NorBe on the quality of water draining from the site.

### Wastewater management

Human wastewater contains pathogens and nutrients and there is a risk that wastewater from an on-site wastewater system could be discharged from the site and have a detrimental effect on water quality[3].

On-site wastewater systems are particularly susceptible to off-site discharge, potentially polluting surface or underground waters.

#### *Removal of wastewater off site*

It is preferable that wastewater be disposed of to SA Water sewerage infrastructure or a council-operated community wastewater management system (CWMS) that has capacity to manage it.

Connecting the development to sewerage infrastructure or a CWMS will transfer any potential water quality impact off site to an licensed facility for treatment and disposal to standards approved by the EPA. This will ensure that wastewater can be managed to have a NorBe on water quality draining from the site.

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3 *Pharmaceutical products and other human-sourced chemicals in creeks* (EPA 2019). Testing of water quality in surface waters within the area of the Overlays showed the presence of pharmaceutical products and human-sourced chemicals. These findings could only have derived from human wastewater indicating that it was discharged from an on-site wastewater system, either through surface water runoff or underground water (which may flow into surface waters). .

In accordance with the Overlays, development that is connected, or is proposed to be connected, to sewerage infrastructure or a CWMS, will not be referred to the EPA for assessment.

***On-site wastewater management***

On-site wastewater systems are designed primarily to manage pathogens that are contained within wastewater. Their ability to reduce nutrients is limited[4] and there is a risk that wastewater containing nutrients may enter surface or underground waters[5]. Increased levels of nutrients in waters, particularly nitrogen, have the potential to cause algal blooms in watercourses and reservoirs. This may necessitate interventions by water supply operators, including copper sulphate dosing of reservoirs and application of complex and expensive water treatment processes.

The land application component of an on-site wastewater system allows effluent to be applied to land, either via subsurface soakage for a septic tank system or via surface irrigation to vegetation for an aerated wastewater treatment system. The chemical form in which nitrogen is present in wastewater means that its concentration may not be readily reduced when applied to soils only[6]. Nitrogen in the wastewater could pass through the soil and enter underground water or discharge from the site through surface runoff. Nitrogen is more effectively reduced when it is irrigated to soils in which actively growing vegetation can use it, and when that vegetation can be harvested and removed from the site, thereby removing the nitrogen with it.

The EPA will focus on management of nutrients, in particular nitrogen, when assessing whether a development incorporating an on-site wastewater system would have a NorBe on water quality.

The following matters should be addressed in any DA involving the use of an on-site wastewater system that is referred to the EPA:

1 An on-site wastewater system must, at a minimum, be compliant with the *On-site wastewater systems code*.

  Compliance with the *On-site wastewater systems code* is a requirement under the *Public Health Act 2011*, but in respect of nutrient management it is a starting point.

  Depending on the type of on-site wastewater management system being proposed, the EPA may seek additional actions to ensure that nutrients within the wastewater are managed to prevent or minimise their off-site drainage or discharge into surface or underground waters.

  Further information on these additional actions is contained below.

2 A land application system that applies effluent from an on-site wastewater system to land must manage nutrients to prevent or minimise their discharge into surface or underground waters.

  The site and soil assessment report prepared by a wastewater engineer in accordance with the *On-site wastewater systems code* should address the management of nutrients based on the information below.

  Where wastewater is to be applied to a vegetated surface irrigation area or a vegetated subsurface soakage area (only at a depth that is within the plant root zone), it must be ensured that the volume of wastewater and the nutrients in the wastewater would be taken up by the vegetation. This will prevent or minimise discharge of wastewater and nutrients to surface or underground waters. Typically, applying wastewater to a vegetated surface irrigation area or

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4 The ability of a septic tank system to remove nitrogen is limited. An aerated wastewater treatment system may remove between 30% and 90% of nitrogen prior to its irrigation to land.

5 Clause 16 of the *Environment Protection (Water Quality) Policy 2015* states that a person who owns or occupies premises at which an on-site wastewater treatment system is installed must ensure that waste (which includes wastewater) from that system is not discharged into surface waters or underground waters or onto land from which it is likely to enter those waters – unless the wastewater has been treated so that it does not exceed 5 mg/L total nitrogen (as nitrogen) and 0.5 mg/L total phosphorus (as phosphorus) at the point it enters the waters or is reasonably likely to enter them.

6 Approximately 10% of nitrogen in wastewater applied to soil will be removed through soil processes, meaning that about 90% of the nitrogen will pass through the soil and into underground water unless taken up by actively growing plants.

vegetated subsurface soakage area to remove nitrogen will require a larger area of land than would be required under the *On-site wastewater systems code*.

Irrigation of wastewater to vegetation to remove nitrogen works most effectively when the selected plants can take up large amounts of nitrogen and are actively harvested or pruned with cuttings removed from the site.

Nitrogen is taken up by plants and used to produce leafy growth. Removal of a plant's leafy growth will encourage new flourishes of growth resulting in further uptake of nitrogen. Pruning and removing leafy growth will increase the amount of nitrogen that is removed from the wastewater. For example, 75 kg/ha/yr of nitrogen will be taken up by unmanaged shrubs and trees. If managed through pruning or coppicing, with the cuttings removed from the site, up to 150 kg/ha/yr of nitrogen will be removed[8].

Different types of vegetation have different capacities to take up nitrogen from wastewater. Selecting a plant species capable of utilising large quantities of nitrogen would mean a smaller vegetated irrigation area or vegetated subsurface soakage area would be required to achieve a nutrient balance.

Section 8.4 of the *On-site wastewater systems code* contains information on surface irrigation systems including the need to consider soil types, slope of the land and types of irrigation systems. This information should be followed to ensure that irrigation of vegetation is occurring appropriately.

Actively maintaining the irrigation area is required to ensure that the greatest amount of nitrogen is taken up by the plants. This may necessitate pruning and removal of cuttings from the site, harvesting of fruit, replacing dead or dying plants, maintaining irrigation equipment, and monitoring the area to ensure that irrigated wastewater is not pooling or discharging from the site.

**Wastewater Irrigation Evaluation Tool**

The Wastewater Irrigation Evaluation Tool (WIET) has been developed to assist with determining the size of the vegetated surface irrigation or vegetated subsurface irrigation area. The WIET is a simple Microsoft Excel tool into which data relating to a proposed on-site wastewater management system can be entered.

The WIET only needs to be used for classes of development that generate human wastewater from a peak loading capacity of less than 40 Equivalent Persons (or less than 6,000 litres/day).

The WIET will assist with determining if the proposed size of the irrigation area and the type of planted vegetation would be sufficient to take up the quantity of nitrogen in the applied wastewater. The results of the WIET calculation will be either a NorBe Pass or a NorBe Fail. The results can be converted to a PDF and submitted with the DA.

The WIET is suitable to be used for a septic tank with a subsurface soakage area only if the soakage area is within the root zone of the vegetation that is being irrigated.

The WIET was developed to assist with determining whether nitrogen in irrigated wastewater would be taken up by actively growing vegetation and be prevented from entering waters, resulting in a NorBe on water quality. The WIET is indicative and precautionary in its application rather than being definitive and absolute. The tool also adopts the reasonable assumption that actively growing vegetation is managed to maintain ongoing and effective nitrogen uptake. The WIET is one part of the EPA's decision-making process when assessing a DA that is required to demonstrate that a NorBe on water quality would be achieved. Consideration is also given to stormwater management measures.

**Wastewater Irrigation Evaluation Tool**

[8] Water NSW *Neutral or beneficial effect on water quality assessment tool – Consultant and consultant administrators user guide* (2022).

3 A wastewater holding tank can be used to temporarily hold wastewater prior to its transfer off site to a licensed facility for treatment and disposal to standards approved by the EPA.

a The wastewater holding tank must be compliant with the *On-site wastewater systems code* (2013).

b A recirculating holding tank system that incorporates growing vegetation, using evaporation and transpiration to reduce wastewater volumes and take up nutrients, prior to its transfer to a licensed facility for treatment and disposal may demonstrate a NorBe on water quality.

c To ensure that any overflows from a holding tank do not discharge to surface waters, secondary protection in the form of a bund should be constructed around the holding tank. The bund should comply with the *Bunding and spill management guideline* (EPA 2016).

**Stormwater management**

Stormwater can wash pollutants, such as sediments, pesticides, pathogens and nutrients, into surface waters and increased volumes of stormwater from hard surfaces can cause erosion of land and watercourses.

The EPA will assess a referred DA to determine whether stormwater is proposed to be managed so that a NorBe on water quality would be achieved.

***Construction activities***

When undertaking construction activities, including clearance of land, the following actions should be considered to ensure a NorBe on water quality:

1 Avoid soil disturbance by timing and staging all activities to minimise the extent to which soil is exposed to rain and runoff.

2 Divert stormwater runoff around disturbed areas of the site. Water should be diverted around stockpiles and areas where soil has been disturbed, and flow velocities should be minimised.

3 Stabilise and cover (eg with vegetation, mulch, hydroseeding, etc) all disturbed areas as quickly as possible.

4 Install sediment capture devices such as swales, detention ponds and sediment traps.

Further information on stormwater management during construction activities can be found in:

1 EPA stormwater pollution prevention codes of practice for the *building and construction industry* (1999) and *local, state and federal government* (1998).

2 International Erosion Control Association Australasia *Field guides for construction site managers and builders* and design fact sheets

***Treating polluted stormwater***

Stormwater may become polluted by operational activities undertaken at the site so should be treated to remove pollutants prior to discharge from the site. Stormwater treatment options include:

1 Water sensitive design measures can be used to treat and reuse stormwater, including:

   a landscaping, rain gardens, bio-retention systems, green roofs and rainwater tanks

   b infiltration systems, pervious pavements and vegetated swales.

   Further information on water sensitive design measures can be found in Water Sensitive SA *Technical manual for water sensitive urban design in Greater Adelaide* (2010) and *InSite Water − stormwater management guidelines for small-scale development* (2020).

2 Other treatment systems such as an oil/water separator may be required for hard surfaces such as restaurant or function centre carparks at which stormwater could be contaminated with hydrocarbons.

***Stormwater modelling tools***

Stormwater management measures should ensure that the following criteria are met when compared to untreated stormwater runoff from the development site:

1 90% reduction in litter/gross pollutants

2 45% reduction in average annual total nitrogen

3 60% reduction in average annual total phosphorous

4 80% reduction in average annual total suspended solids.

Stormwater modelling tools, including the following, can be used to determine if the proposed stormwater management measures would meet those criteria:

1 The Water Sensitive SA Insite Water Tool provides a method to demonstrate whether small-scale development (<5,000 $m^2$) such as additions, single dwellings, townhouses and commercial, retail and light industrial developments would meet performance criteria for stormwater runoff quality, volumes and flow rates, and hence have a NorBe on water quality.

   The results of the InSite Water tool can be converted to a PDF and submitted with the application.

2 The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) can model treatment devices to identify the best way to capture and reuse stormwater runoff, remove contaminants, and reduce stormwater runoff volumes.

   MUSIC can be used for large-scale (>5,000 $m^2$) or very complex developments to determine if the proposed stormwater management actions would have a NorBe on water quality.

   MUSIC modelling should be undertaken in accordance with the Water Sensitive SA *South Australian MUSIC Guidelines* to identify input parameters and information that are specific for South Australia.

   MUSIC modelling should be accompanied by a MUSIC Auditor assessment that identifies any input parameters that do not comply with the SA MUSIC guidelines.

   The results of MUSIC can be converted to a PDF and submitted with the application.

## Disclaimer

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

## Further information

### Legislation

Online legislation is freely available.

### General information

Environment Protection Authority
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