

## Fact Sheet

# Managing health risks associated with interactive water features

Interactive water features (IWFs), commonly referred to as water play features, spray parks, or splash pads, now feature in many parks, gardens, and playgrounds across South Australia.

If improperly designed and/or maintained, IWFs can present a risk to health through injury or illness. Nationally and internationally, IWFs have been associated with cases and outbreaks of disease caused by microorganisms including *Cryptosporidium*, *Legionella*, *Giardia*, and *Salmonella*.

A breach of the *South Australian Public Health Act 2011* (the Act) may be determined by the relevant local public health authority (usually the local council). Operating an IWF outside of generally accepted water quality parameters and in the absence of appropriate supervision and maintenance may constitute a breach of the general duty, or give rise to a material risk, or serious risk to public health as outlined in sections 56, 57 and 58 of the Act. Additionally, skin, eye and mucous membrane irritation may be caused by incorrect dosing of chemicals used to manage water quality.



The following guidance is provided to ensure that IWFs are designed, managed, and maintained so that they can be safely enjoyed. This information generally applies to recirculating systems. For single pass systems see the section on non-recirculating systems on the last page of this factsheet.

IWFs connected to public swimming pools must be managed in accordance with the South Australian Public Health (General) Regulations 2013.

## Site selection and system design considerations

### Site selection and impacts from surrounding land uses in multi-use spaces



IWFs are often located within public open spaces such as parks. It is important to consider how other activities in the area may impact water quality and functioning of the IWF. For example, sand pits, garden beds, and trees in the area can increase the likelihood of physical contaminants (such as sand, dirt, and leaf litter) entering the IWF system. This can impact the effectiveness of the IWF filtration and disinfection systems resulting in poor quality water.

The provision of showers, toilets and baby change facilities can enable good hygiene practices amongst users of IWFs. Encouraging IWF users utilise toilet and shower facilities can reduce the amount of physical and microbiological contamination entering the system.

Where IWFs are in areas where animals are often present (e.g., near dog parks), the provision of bag dispensers can enable safe collection and appropriate disposal of droppings which can

be a source of water contamination. Provision of dedicated dog water bowls (if appropriate) may also discourage pet owners from allowing dogs to drink from IWFs.

### System design, plans and manuals

Once installed, modification to IWF systems is costly, difficult, and not always possible. It is important to consult with an appropriate professional (such as a hydraulic engineer) and an environmental health officer at the local public health authority (usually the council) at the planning and design stage.

System components of recirculating systems should be appropriately sized and arranged to achieve adequate water circulation, turnover, filtration, and disinfection.

Consider maintenance requirements and access needs. For example, consider the location of filters and the ability to undertake required maintenance easily and effectively.

Materials and system components should be fit for purpose (slip resistant, anti-entrapment) and capable of withstanding ongoing exposure to disinfectants, including periodic shock dosing of disinfectants.

Splash pads should be graded to prevent water pooling and should ensure all water returns to the plant for filtration and treatment.

Full system design plans (as installed) and operating manuals should be maintained for review by an authorised officer as required.



### Plumbing installations

Contact the relevant authority (i.e., the [Office of the Technical Regulator](#) and/or the local council) to ensure compliance with all relevant legislation. All plumbing installations must be carried out by appropriately licensed persons and work must be approved by the regulatory authority.

## Operation and Maintenance of Recirculating Systems

### Source water

The quality of source water will have a direct impact upon the functioning and effectiveness of filtration and disinfection equipment.

Understanding the chemical and microbiological qualities of source water is important to ensure an appropriate system design, management and monitoring regime.

Filtration and disinfection equipment should be able to respond to normal variations in source water quality.

Water supplied by a network utility operator (e.g., SA Water) is likely to be more consistent in quality than water from other sources.

The use of non-drinking water will likely present public health risks that are not encountered in drinking water supplies. Therefore, drinking water should be used wherever possible.

### Water storage, circulation, and filtration

Water should be stored and circulated in a way that ensures adequate water turnover and distribution of disinfectant throughout all parts of the system.

Water tanks should provide ready access for cleaning and inspection and be capable of complete draining.

The size and number of tanks may vary dependant on the volume of water and the design of the IWF (including the number of offtakes and water flow rates). The IWF may incorporate one tank or multiple tanks, provided the overall water storage capacity is adequate to ensure the required free residual of disinfectant is maintained in the feature water.

Water temperature is an important factor that should be considered when sizing water storage tanks. Heating of small volumes of water may occur rapidly as it is exposed to external

surfaces during operation of the IWF. Higher water temperature will impact on water disinfectant residuals.

Due to the relatively small volumes of water and high pollutant load associated with IWFs, water turnover rates of 30 minutes are desirable and should not exceed one hour.

To demonstrate that an IWF has an adequate flow rate, a flow gauge should be fitted to the system.

IWFs should be fitted with coarse and fine filtration systems, as appropriate, to remove a wide range of particulate matter (soils, leaves etc.) and microorganisms.

The filtration system should be always operational while an IWF is open for use.

### Residual disinfection

Chlorine is commonly used as a disinfectant in IWFs as it can effectively kill pathogens and oxidise pollutants not removed by filtration. If another disinfectant is selected, it is important to understand and demonstrate its efficacy across the likely operational conditions. Refer to tables 3, 6 and 7 in the *Standard for the Operation of Swimming Pools and Spa Pools in South Australia* for advice on minimum water quality parameters based on disinfectant types and relevant operating conditions.

IWFs should be fitted with automatic equipment that continuously analyses and controls the level of disinfectant in the water.

Where chlorine is used to disinfect the water:

- > The minimum residual free chlorine should be 4mg/L. Combined chlorine should not exceed 1mg/L and total chlorine should not exceed 10mg/L.
- > Cyanuric acid may be used at a concentration of 30-50 mg/L in outdoor IWFs to UV stabilise the free chlorine.

### UV disinfection

UV disinfection supports the effectiveness of chlorine or other residual disinfectants. It is not a replacement for residual disinfection.

Full flow UV disinfection is recommended as it will assist in controlling combined chlorine, reducing associated odour and will improve the water quality and can inactivate *Cryptosporidium*. To control combined chlorine levels effectively, UV systems should be always in operation while an IWF is open for use.

The UV dose delivered to the water will be influenced by parameters such as the flow rate and the UV transmissivity (UVT) of the water. The end of lamp life (EOLL) dose rate will vary depending on the UV model selected. Preferential selection should be given to third-party validated equipment capable of delivering a minimum UV reduction equivalent dose (RED) of 22mJ/cm<sup>2</sup> (this being the RED required for 4 log inactivation of *Cryptosporidium*). The system should also display and/or transmit the calculated UV dose to ensure the minimum UV dose is being achieved.

It is also important to consider the likely quality of water post filtration to ensure the flow rate and UV transmissivity are suitable.

### pH

The pH of the water can affect performance and efficacy of disinfectants.

Where chlorine is used as a disinfectant, the pH of the water must be maintained between 7.2 and 7.6. If another disinfectant is selected, efficacy data should be provided to the relevant authority to support the intended pH operating parameters.

The pH of the water should be maintained through automatic equipment that continuously analyses and controls the pH of the water.

### Alkalinity

The alkalinity of the water should be maintained to prevent the fluctuation in pH and scaling of IWF surfaces.

Where chlorine is used as a disinfectant, the alkalinity of the water should be maintained between 60 and 200mg/L. If another disinfectant is selected, efficacy data should be provided to the relevant authority to support the intended alkalinity operating parameters.

### Spray height

The spray plume height and velocity will impact upon the exposure risks of IWFs.

An IWF with very high spray plumes will expose more people to the drift, including those who may not be directly using the facility.

An IWF with very low spray plumes may result in accidental or intentional consumption by young children.

### Water pooling

IWF pads should be designed in a way to avoid water stagnation or pooling. The water quality within stagnant or pooled water is likely to be significantly lower and may present a potential drowning risk.

### Monitoring

A physical inspection of an IWF should occur each day it is intended to be operated. This is important as IWFs are typically located in open air public spaces, which will be unavoidably accessed after hours.

Manual water tests should occur at least once each day the IWF is to be used by the public. The manual water test should include testing the amount of free chlorine, total chlorine, pH, alkalinity, cyanuric acid, and water temperature. More frequent manual water testing may be required as necessary for the operating conditions.

Records of the inspection, water quality monitoring, and remedial action taken should be maintained and made available for inspection.

### Remote monitoring

In addition to the automatic dosing equipment for disinfectant and pH control, operators of an IWF should consider installing a free chlorine probe, pH probe and water temperature probe to enable real time remote monitoring.

Probes should be configured to allow for the automatic shutoff of the IWF when free chlorine, pH or the water temperature is outside of accepted parameters.

Consideration should be made for the provision of staff to be able to effectively monitor and respond to water quality issues.

If remote monitoring is used, results should be reliable and accessible during operating hours and at the request of an authorised officer.

### Signage

Safety signage should be provided in conspicuous locations and include the following:

- > Contact details for reporting issues/faults with the IWF.
- > Advice to not consume the water in the IWF.
- > Advice to not use the IWF for people who have diarrhoea or have had it in the last two weeks.
- > A requirement for babies and toddlers to wear tight fitting swim nappies.
- > The location of the nearest public amenities.
- > Animals prohibited from accessing the IWF.

### Hours of operation

If an IWF is intended to be operated outside of standard business hours, consideration should be given to after-hours staffing for regular physical inspection and response.

## Seasonal operation

If an IWF is used seasonally, it is important the IWF can be drained fully when it is not in use or is placed on a seasonal filtration and dosing program to ensure the water quality is maintained when the IWF is not in use.

## Operator skills and knowledge

A combination of employees and contractors will need to work collaboratively to operate and maintain an IWF during operating hours.

The owner or operator of an IWF should take reasonable care to ensure the people responsible for the care, control, and management of an IWF have appropriate skills, knowledge, and experience.

Procedures should be in place to guide the response to a range of incidents including faecal release, equipment failure, and physical and chemical contamination.

## Non-recirculating systems

Single pass water play systems are commonplace in many public parks and education centres.

The public health risks associated with single pass water systems can be resolved by using potable water, ensuring the water is free draining and not able to pool and the system is cleaned as often as necessary and in accordance with the manufacturer's instructions.

## For more information

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