

## 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) have grown in popularity in recent years and 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 such as *Cryptosporidium*, *Legionella*, *Giardia*, and *Salmonella*.

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 *South Australian Public Health Act 2011*. 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 appropriately designed, managed and maintained so that they can be safely enjoyed. This information generally applies to recirculating systems. For single pass systems see 'Non-recirculating systems'.

## 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 space may impact water quality and functioning of the IWF. Sand pits, garden beds and trees can increase the volume of physical contaminants (such as sand, dirt and leaf litter) entering the system which can impact the effectiveness of filtration and disinfection systems.
- > General site sanitation and provision of public infrastructure (such as toilet and shower facilities) can reduce physical and microbiological contamination of the system.
- > The provision of showers, toilets and baby change facilities can encourage good hygiene practices amongst users of IWFs.
- > Where IWFs are located in areas where animals are often present (e.g. near dog parks), the provision of bag dispensers can promote the 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 the IWFs.
- > IWFs connected to public swimming pools must be managed in accordance with the *South Australian Public Health (General) Regulations 2013*.

### System design, plans and manuals

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

## Fact Sheet

- > 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.
- > The splash pad 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.
- > Once installed, modification to systems is costly, difficult and not always possible so it is advisable to consult with an appropriate professional (such as a hydraulic engineer) at the planning and design stage.

### Plumbing Installations

- > All plumbing installations must be carried out by appropriately licensed persons and where required the work must be booked in for auditing with the regulatory authority i.e. the Office of the Technical Regulator or Local Government. Where an IWF is connected from a Network Utilities Drinking Water Supply a hydraulic design must be submitted to the Office of the Technical Regulator for assessment. [otr.hds@sa.gov.au](mailto:otr.hds@sa.gov.au)
- > [https://www.sa.gov.au/\\_data/assets/pdf\\_file/0018/7335/OTR-P-Hydraulic-design-submission-form-170616-editable.pdf](https://www.sa.gov.au/_data/assets/pdf_file/0018/7335/OTR-P-Hydraulic-design-submission-form-170616-editable.pdf)
- > IWFs are recognised as end of line equipment requiring a backflow prevention device to protect the drinking water system. All plumbing pipework and equipment supplying water to IWFs must be WaterMarked.
- > A warning or prohibition sign compliant with AS/NZS 3500.1 Clause 9.7.2 shall be installed at every outlet of an IWF.

### Backflow prevention

- > The installation of a high hazard Reduced Pressure Zone Backflow Prevention Device (RPZD) is required to be installed on the dedicated water supply branch to the IWF to protect the on-site plumbing drinking water system from contamination. The hazard rating of the required device may be reduced depending on the risk associated with the IWF. An appropriately qualified person who conducts the risk assessment to determine if the hazard rating can be reduced is required to lodge the results of the risk assessment with the OTR prior to the installation of the device. No branches shall connect to the pipework between the testable backflow prevention device and the IWF.
- > These devices must be commissioned by an appropriately licensed plumber and a copy of the commission, inspection and maintenance report and Certificate of Compliance must be forwarded to the owner/occupier of the facility and to the Office of the Technical Regulator within 7 days of completing the installation.
- > All testable devices are required to be retested annually with the test results forwarded to the owner and the Office of the Technical Regulator within 7 days of completing the retest.
- > Tanks supplying water to IWF's shall only be installed above ground and shall comply with AS/NZS 3500.1 Section 8.

## 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 in ensuring appropriate system design, management and monitoring.

## Fact Sheet

- > 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.
- > In any event, the use of non-drinking water will likely present a number of 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 range of particulate matter (soils, leaves etc.) as well as micro-organisms.
- > The filtration system should be operational at all times while the IWF is open for use.
- > The maintenance requirements and access needs should also be considered as the filters for IWFs tend to be located in a confined space underground, making access to perform maintenance difficult.

### Disinfection

- > Chlorine is commonly used as a disinfectant in aquatic venues as it is able to oxidise most 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 in an IWF 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.

# Fact Sheet

## UV disinfection

- > Full flow UV disinfection is recommended as it will assist in controlling combined chlorine, therefore reducing the odour associated with combined chlorine, as well as improving the water quality, particularly through the inactivation of cryptosporidium oocysts.
- > UV disinfection is usually used as an adjunct rather than a replacement for chlorine or other residual-based disinfectants. Residual-based disinfectants provide a disinfection barrier at the point of water contamination.
- > 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; however 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.
- > The UV disinfection system should be operational at all times while the IWF is open for use.
- > In order to control combined chlorine levels effectively, the UV system should remain operational at all times whilst combined chlorine levels remain in excess of approximately 1mg/l.
- > If free residual is unable to be maintained in the feature water, a thorough review of the water treatment process will be required. It would be advantageous to consider water flow to ensure the water is not short-circuiting through the treatment process.

## 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.
- > In any event, the pH of the water should be maintained through automatic equipment that continuously analyses and controls the pH level 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.

# Fact Sheet

## Water pooling

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

## Physical monitoring

- > A physical inspection of the 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.
- > Regular routine water testing is important to ensure the accuracy and reliability of remote monitoring. In any case, a manual water test should occur at least once each day the IWF is to be used by the public. The manual water test should include 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 physical inspection, and water quality monitoring should be maintained and made available for inspection.

## Supervision

- > Due to the nature of IWFs, operation is common in the absence of continued supervision. It is therefore imperative that water quality is monitored remotely and a visual inspection is carried out routinely, preferably daily, to monitor cleanliness and physical condition.

## 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 temperature probe – this will enable real time remote monitoring of free chlorine levels, pH and water temperature.
  - The probes should be configured to allow for the automatic shutoff of the IWF when free chlorine, pH and the water temperature is out of specification.
  - Consideration should be made for the provision of staff able to respond to and take appropriate remedial action to resolve water quality issues preventing the IWF from operating.
- > 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 a conspicuous location(s) which includes the following information and directions;
  - contact details for reporting issues/faults with the IWF
  - advice to not consume the water
  - advice to not use the IWF for people who have diarrhoea, or have had it in the last two weeks
  - to ensure babies and toddlers are wearing tight fitting swim nappies
  - the location of the nearest public amenities
  - animals are prohibited from accessing the IWF

## Hours of operation

- > If the IWF is intended to be operated outside of standard business hours, consideration should be given to afterhours staffing for regular physical inspection.

# Fact Sheet

## Seasonal operation

- > If an IWF is used seasonally, it is important the IWF is able to be drained fully when the IWF is not in use, or be 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

- > It is likely that a combination of employees and contractors will need to work collaboratively to operate and maintain the IWF throughout the extended operating hours.
- > The owner or operator of an IWF should take reasonable care to ensure the person(s) responsible for the care, control and management of an IWF has appropriate skills, knowledge and experience.
- > Procedures should be in place to guide the response to a range of incidents including faecal release, or physical and chemical contamination.

## Non-recirculating systems

- > Single pass water play systems are commonplace in many public parks and education centres.
- > The risks associated with single pass water systems are easily 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, with regard to the manufacturer's instructions.

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## For more information

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