LIVERPOOL PLAINS SHIRE COUNCIL

POLICY REGISTER **Policy No. 2.16**

POLICY TITLE: **BACKFLOW AND CROSS CONNECTION PREVENTION**

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History of Policy Review

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1	27th February 2008	11513	New Policy
2	28th August 2013	508	Plumbing Code of Australia and Australian Standard Changes

OBJECTIVES

COUNCIL, being the Water Authority:

- **Recognises** that its potable water supply is exposed to the possibility of contamination by a number of hazards.
- **Accepts** that it has a Duty of Care
    - To separate and protect the potable water supply from real or potential hazards.
    - To protect public health.
    - To manage cross connection and minimise the possibility of backflow.
    - To contain any real or potential hazard to within the boundaries of the consumer's property.
    - To ensure the integrity and safety of Council's water supplies.
    - To ensure that non-potable water from each and any end user does not infiltrate the Council water supply.
- **Directs** that procedures be put in place that
    - Identify existing and potential hazards.
    - Provide a register of Backflow Prevention Devices.
    - Provides for appropriately rated testable devices.
    - Make any landowner install containment, zone or individual devices.
    - Recoup costs that it incurs in the process of ensuring properties are compliant with the relevant codes and practices.
    - Provide for the installation and use of rainwater tanks.
    - Provide a timetable for compliance.
    - Provide for consultation and education of the community and service providers.

Accordingly,
Water service connections are required to have Backflow Prevention Devices installed in accordance with AS 3500.

All plumbing and drainage work shall comply with the provisions of the relevant legislation, standards and codes referred to herein, and the Backflow and Cross Connection Prevention Best Practice Guidelines.

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1. WHAT IS BACKFLOW PREVENTION?

Backflow Prevention is a combination of controls, through legislation and regulation, education, and physical installation of devices, to minimise or prevent water flow in a direction contrary to the normal or intended direction and/or to minimise or prevent the unintended flow of water from a potentially polluted source into a potable water supply.

Backflow can occur from a property to the water supply system in instances where there is a pressure differential between the water main and the property. This usually occurs if there is a break in the water main creating a pressure differential from the property to the main. For typical household meters, backflow is prevented through a non-return valve incorporated in the meter.

The need for backflow protection is determined by first identifying the individual hazards within premises using defined hazard criteria. In working upstream from each hazard the water is regarded as non-potable until a backflow prevention device is provided, suitable to the degree of hazard.

In assessing a potential backflow condition consideration must be given to the complexity of piping, the probability of piping change and negligent or increased use of equipment resulting in a backflow condition.

Backflow prevention devices shall be provided in accordance with the hazard rating referred to herein, the suitability of the device and for:

- **Containment Backflow Protection.** Protection provided in the property water service connection to the property border.

- **Zone Backflow Protection.** Protection provided at the connection to specified sections of a plumbing system within a building or facility; and

- **Individual Backflow Protection**. Protection provided at the water connection to a fixture or appliance.

2. WHAT ARE TYPICAL HAZARDS IN A POTABLE WATER SUPPLY? (HAZARD IDENTIFICATION)

Contamination can be effected through either:

- **Back siphonage -** where the pressure in the reticulation system becomes less than atmospheric, this causes water from connected properties to flow backwards into the town's supply.

- **Backpressure -** when the consumers' water pressure is greater than the pressure in the town's water supply.

- **Cross connection** - a direct or indirect physical connection of potable water supply to a line that is non-potable.

Hazards that Council's system may be affected by could include:

- Watermain break.
- Town water supply connected to a non-potable source.
- Standpipes.
- Internal repairs to a property.
- Industrial and commercial premises.
- Farms connected to the reticulated supply;
    - On-site water supplies.
    - Mixing of weed spray chemicals, often done by dropping a hose into a mobile tank.

- Normal domestic usage, including:
    - Hoses left submerged in a swimming pool.
    - Below ground irrigation systems.
    - Hand held shower roses.
    - Hazards identified from AS 3500.1.2 Annex D.

3. RELEVANT LEGISLATION, STANDARDS AND CODES

The following provides council's authority and reference in relation to backflow prevention:

- **NSW *Local Government Act 1993*** Section 124 Order 5 (h) states that Local Government can take action as is necessary to bring into compliance with relevant standards or requirements set or made by this act relating to a water service connection or water meter.
- **NSW *Local Government Amendment (Miscellaneous) Act 2002*** provides Council's right of access to private property.
- **Local Government (General) Regulation 2005**
- **Public Health Act 2010**
- **NSW Plumbing and Drainage Act 2011**
- **Water Management Act 2000**
- **Australian Standard AS 3500:2003 (as amended) Plumbing and Drainage**
- **Australian Standard AS 2845.1 Water Supply Backflow Prevention Devices; Part 1: Materials, Design & Performance**
- **Australian Standard AS 5200 Technical Specification for Plumbing & Drainage Products – Proceedures for Certification of Plumbing & Drainage Products**
- **Australian Drinking Water Guidelines 2011**
- **NationalConstruction Code Series, 2012: Volume 3, Plumbing Code of Australia (PCA)**

4. HAZARD RATINGS (INCLUDING EXAMPLES)

AS 3500.1.2 cl.4.3 identifies three cross connection hazard ratings. This Australian Standard also lists examples of hazard ratings for various applications for individual (Table E1), zone (Table E2) and containment protection (Table E3).

- **High hazard** is any condition, device or practice, which in connection with the potable water supply system, has the potential to cause death. Examples of high hazards, paraphrased from descriptions in AS3500, include:

    - Containment
        - Premises with an alternate water supply.
        - Hospitals and Veterinary Clinics.
        - Sewerage treatment plants.
        - Vehicle washing facilities.
        - Abattoirs.
        - Various laboratories.
        - Various processing plants.

    - Zone
        - Sanitary dump points.
        - Food storage tanks with clean-in-place systems.
        - Various rooms in hospitals, laboratories and nursing homes.
        - Various industry and commercial treatment facilities.
        - Injected irrigation systems, drinking nipples and troughs.

    - Individual
        - Water treatment plants with auxiliary-non-potable water supplies.
        - Water treatment systems using acid/alkali regeneration ion-exchange resins.
        - Cooling towers permanently attached to water supply systems.
        - Bidet and bidette.
        - Chemical sprays and injectors and the like in agriculture, horticulture, commerce and industry, whether fixed facilities or mobile/portable tanks.
        - Food preparation or storage using clean-in-place systems.
        - Hospitals that process chemical, microbiological or photographic substances.

Priority is to be placed on identified high hazards.

- **Medium hazard** is any condition, device or practice, which in connection with the potable water supply system has the potential to endanger health. Examples of medium hazards include:

    - Containment
        - Caravan parks and marinas
        - Public swimming pools
        - Premises with grey water re-use systems

- Zone
  - Fire hose reels and various other fire services.
  - Secondary school laboratories.
  - Any irrigation system in other than domestic buildings with piping less than 150 mm above ground level, no injection.

- Individual
  - Water treatment plant chlorinators.
  - Low toxicity chemical dispensers in Industry and Commerce.

- **Low hazard** is any condition, device or practice which in connection with the potable water supply system would constitute a nuisance but not endanger health or cause injury. Examples of low hazards include:

  - Containment
    - Premises with rain water tanks.

  - Zone
    - Water filtration equipment.
    - Any irrigation system in domestic buildings with piping less than 150 mm above ground, no injection.

  - Individual
    - In-line water softeners and filters.
    - Various hose attachment outlet configurations.
    - Various fixtures including sinks, baths, bidets, bidettes, basins, showers, troughs.
    - Drink dispensers and other food preparation and storage tanks.

Cross connection between mains water supply and premises with a rainwater tank is considered as a low hazard requiring a non-testable backflow prevention device.

5. PREVENTION METHODS AND TYPES OF DEVICES, INCLUDING LANDOWNERS' RESPONSIBILITY

The landowner is responsible for

- Any downstream zone protection within their own property.
- Providing the appropriate testable backflow device to existing and new water service connections for medium and high applications.
- Registration of installed backflow devices with the LWU.
- Ensuring satisfactory operation of all registered backflow device(s).
- Annual testing and compliance of these backflow devices, including submission of test results to the LWU..
- Arranging annual testing of such devices by a person with appropriate backflow accreditation.
- Payment of fees associated with the management of backflow prevention.

Prevention methods and types of devices are detailed in AS 3500 include:

- Reduced Pressure Zone Device (RPZD)
  RPZDs may be used in *any High Hazard* situation.

- Registered Break Tank (RBT)
  RBTs may be used in a number of High Hazard situations.

- Registered Air Gap (RAG)
  RAGs may be used in a number of High Hazard situations.

- Double-check Valve (DCV)
  DCVs are identified for use in Medium Hazard fire services and certain heat exchangers.

- Vented Double-check Valve (VDCV)
  VDCVs are identified for use in Low Hazard dental and medical surgeries.

- Air Gap (AG)
  AGs are identified for use in Low Hazard fixtures and appliances and fire storage tanks.

6. CONTAINMENT PROTECTION

Containment protection is provided, in the water service connection, at the property boundary.

The purpose of containment using backflow prevention devices is to isolate one consumer's property from another and from the public water supply.

Containment devices are required in locations where there is a high risk of unprotected cross connections. The device is to be installed at the consumer's property boundary immediately downstream of the meter on water service connections where a meter is fitted.

The hazard rating shall be based on the requirements of AS 3500 Part 1 and the Council will determine the level of containment protection required for each property and water service connection.

The containment backflow device is to be located at the consumer's property boundary or immediately downstream of the Council's meter. In the case of more than one containment valve, where the water supply system is divided into zones, additional backflow prevention devices are to be installed at the direction of the Council.

On consumers' properties where any of the following activities or processes are carried out, Council may require the installation of containment devices:

- Agricultural, horticultural or similar undertakings with any form of secondary or dual water supply, chemical injection or bacterial contamination with or without any irrigation system.

- Property with an alternate or dual water supply or using any type of recycled water or effluent.

- Industrial or commercial property, hospital or laboratory using processes involving toxic chemicals, acids, alkalis, bacteria, micro biological substances, animal or human blood and blood products or recirculating process water.

- Commercial or public consumer's property that has a separate irrigation system such as cemeteries, golf courses, schools, parks, playgrounds, estates and major landscaped areas and, in particular, when also supplied by non-potable water supplies.

- Fire hydrant or fire sprinkler system directly or indirectly connected to the water authorities mains.

- On any other property or location in a property where containment is considered necessary by Council or required by the NSW Code of Practice Plumbing and Drainage.

7. ZONE PROTECTION

Zone protection aims to isolate any real or potential hazard within a section of the consumer's property or reticulation system containing different hazards from another section.

Potable water outlets may exist downstream of a containment device and do not remove the requirement for zone protection within the consumer's reticulated system.

No potable water outlets are permitted downstream of a zone protection device.

8. INSTALLATION REQUIREMENTS

8.1 New Water Service Connections, Applications, Plumbing Permits and Responsibilities

The Council shall:

- Ensure that any new installation on Council property complies with these guidelines
- Manage the procedure for new service connections, applications and plumbing permits to enable compliance by plumbers and landowners.

The Plumber shall:

- Install the type and configuration of backflow prevention devices that are required on properties in accordance to the Plumbing Code of Australia, and AS3500 National Plumbing and Drainage Part 1.2: Water Supply Acceptable Solutions.
- Obtain a Plumbing & Drainage Certificate that must be issued prior to occupation. All plumbing and drainage work must comply with an approval granted by Council and the provisions of the Local Government (General) Regulation 2005. This covers Development Application conditions if warranted and includes ground sprinkler systems.
- Fit all new water connections with the appropriate backflow device at the time of installation.
- Fit testable backflow devices after the water meter outlet in required applications.
- Install low hazard rated backflow prevention devices on all new water service connections. If these water service connections meet high and medium hazard ratings the owners shall ensure the correct device is installed.
- Fit line strainers immediately upstream of any RPZD or DCV.
- Install resilient seated isolating valves to the device manufacturer's instructions.
- Install all devices in accordance with specific installation requirements and the manufacturer's instructions.
- Flush pipe work before devices are connected.
- Protect the device against damage.
- Install devices in parallel to permit shut down of the water service connection where continuous water supply is essential.
- Hold a backflow accreditation from an approved registered organisation when inspecting, commissioning, maintaining and testing testable backflow devices.
- Inform and educate consumers of the risks and hazards associated with backflow contamination, particularly consumers that require a higher degree of backflow prevention.

The Plumber shall *not:*

- Apply heat to any backflow prevention device during installation.
- Install unprotected bypasses around backflow prevention devices.

The Landowner shall:

- Arrange for all plumbing work to be undertaken by an appropriately qualified licensed plumber.

Reduced Pressure Zone Devices:

- Are to have free ventilation to the atmosphere for relief valve outlet at all times.
- Are to be located in an area that may be subject to ponding.
- Are to have the relief drain outlet located not less than 300mm above the surrounding surface.

- Are to be located so as not to be subject to freezing.

Double Check Valves:

- Shall be located so as not to be subject to freezing.

Pressure Vacuum Breakers:

- Shall be located not less than 300mm above the highest outlet.
- Shall be ventilated to the atmosphere at all times.
- Shall not be located in an area that may be subject to ponding.
- Shall not be located in an area that may be subject to freezing.

General Installation requirements:

- Council reserves the right to refuse water supply (under the Local Government Act 1993) to new and existing water service connections that do not comply with Council's Backflow and Cross Connection Prevention Guidelines. The consumer faces possible disconnection if upgrades are not undertaken as requested.
- Separate water control valves and provision for water metering are to be provided to each tenement or sole occupancy unit wherever practical.
- Once installed, the device(s) shall be maintained in accordance with the Plumbing Code of Australia, Australian Standard 3500.
- All new fixed irrigation and lawn-watering systems in domestic premises shall have zone protection in accordance with Australian Standard 3500 section 7.
- Direct interconnection of an alternative water supply (Eg. Bore, dam, rainwater tank), is not permitted. Alternative water supplies if used, shall be completely separate and the outlets shall be marked in accordance with Clause 4.2.5 of the Standard.
- Backflow prevention devices shall not be interfered with, covered up or bypassed.

8.2 Existing Domestic Water Service Connections

Residential properties and all domestic service replacements with a standard water service connection are required to have dual check valve backflow prevention.

Residential properties that have an underground sprinkler system are required to have an approved valve fitted to the supply of the underground sprinkler system only.

Council reserves the right to refuse water supply (under the Local Government Act 1993) to existing water service connections that do not comply with Council's Backflow and Cross Connection Prevention Guidelines. The consumer faces possible disconnection if upgrades are not undertaken as requested.

The Plumber shall:

- Install dual check water meters, where required by Council, as replacements in ongoing maintenance program in low hazard situations.

The Landowner shall:

- Arrange for an appropriately qualified plumber to carry out such protection work as directed by Council.

8.3 Existing Commercial/Industrial/Institutional Water Connection Services

Council shall:

- Assess all existing commercial properties in accordance with AS3500.
- Give priority for compliance to properties that have been identified as having high or medium hazard ratings.
- Initiate a retrofit program to Council facilities, where needed.
- Install Reduced Pressure Zone Devices (RPZs) on high hazard council owned facilities.
- Install medium hazard rated devices under medium hazard conditions (e.g. irrigation systems on sport/recreational facilities).

The Landowner shall:

- arrange for an appropriately qualified plumber to install RPZs on high hazard rural and/or industrial water service connections or if Council considers that a development is in a high-risk category.
- arrange for an appropriately qualified licensed plumber to carry out such other protection work as required by the standards and codes or as directed by Council.

8.4 Setting Timelines for Compliance

From the date of publication of this document, Council shall determine a time line for compliance of existing installations to be implemented, to include:

- Assess and address hazards.
- Comply with the requirements on Council property.
- Develop a cross connection control programme and plumbing compliance programme.
- Require backflow prevention device registration as a DA consent requirement.
- Require existing backflow prevention device registration.
- Replace non-testable devices in conjunction with meter replacements.
- Implement a program to fit all domestic services with dual check valves.
- Review of compliance requirements.

9. INSPECTION AND REGISTRATION OF TESTABLE DEVICES

9.1 Application and Registration

Council requires:

- That hydraulic calculations/designs be carried out by hydraulic consultants or other suitably qualified persons.
- Hydraulic calculations/designs for other than domestic installations with 25 mm or less water services connections.
- Details of testable devices to be fitted.

9.2 Register Database kept by Council

Council shall maintain a database of all testable devices including air gaps.

9.3 Frequency of Inspection and Testing

Council shall require testing of all testable devices on installation and annually with results forwarded to the Council.

9.4 Authorised Testing Personnel

Council staff or any licensed plumber may assess the hazard level and make the installation but only Council staff or a licensed plumber holding the appropriate accreditation with backflow prevention shall commission, test, and/or maintain the device.

9.5 Enforcement

Council shall ensure compliance by exercising any or all of the following options:

- Issue an order under the Local Government Act and regulations.
- Deny supply.
- Disconnection.
- Impose a fee or charge as detailed herein.
- Carry out the work at the consumer's cost.

9.6 Education and Training

- Council shall provide relevant training to staff to:
    - Identify potential hazards regarding backflow contamination.
    - Advise and educate consumers of the risks and hazards associated with backflow contamination.
    - Install, commission and maintain backflow prevention devices.

- Council shall facilitate education and information programmes in conjunction with accredited education providers.
- Council shall undertake public awareness activities to inform all consumers of the need for backflow and cross connection control and the responsibilities of the consumer.

10. FEES, CHARGES AND ADMINISTRATION

Fees are subject to review each year and are listed in Council's Operational Plan.

11. GLOSSARY OF TERMS

Terms are fully detailed in the Glossary of Terms in AS/NZ 3500.0.
Of particular relevance to these Guidelines are the following definitions:

Term	Abbreviation	Definition
Air Gap or Registered Air Gap	AG or RAG	The unobstructed vertical distance through the free atmosphere between the lowest opening of a water service connection pipe or fixed outlet supplying water to a fixture or receptacle and the highest possible water level of such fixture or device.
Accredited backflow prevention plumber		A licensed plumber who has completed an accredited backflow prevention course.
Backflow Prevention Containment Device		Any of the devices listed herein designed to prevent the reverse flow of water from a potentially polluted source into a drinking water supply system.
Break Tank or Registered Break Tank	BT or RBT	A storage cistern or tank incorporating an air gap, specifically designed for the purpose of backflow prevention.
Consumer		A person responsible for the use of the water. This may also be the customer or landowner.
Contaminant		Any solid, organisms, liquid or gas entering, or with the potential to enter and pollute, the potable water supply.
Double –check Valve	DCV	A device to prevent backflow caused by backpressure, and which has two independently operating force loaded non-return valves and incorporates specific test points for in-service testing.
Licensed Plumber		A plumber with a license issued by the NSW Office of Fair Trading.
Non-potable water		Water is deemed non-potable if there is a potential for contamination from an umprotected source and the water is, thereforenot fit for human consumption.
Potable Water		Water, which is suitable for human consumption.
Reduced Pressure Zone Device	RPZD	A device to prevent backflow caused by either back-siphonage or backpressure in a water reticulation system. This device incorporates two independently operating force loaded non-return valves that automatically drains to waste whenever the pressure in the system between the upstream and downstream non-return valves reduces to a pressure not less than 14 kPa below the pressure at the inlet to the upstream non-return valve.