

Backflow Prevention Policy

Adopted December 2021

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1 Introduction and context

1.1 Background

The Waitaki District Council (Council) is committed to providing safe, high quality drinking water to residents, visitors, businesses, and industries within the Waitaki district. This is set out in our Policy on Drinking Water Quality, adopted in December 2020.

Backflow, which is the unplanned reversal of flow of water or other substances into the drinking water supply system, is a significant risk to Council's water supply consumers. Backflow can happen either by back-siphonage or back-pressure from within the supplied premises.

Historically, Council has only been able to enforce protection of the supply from backflow, through the Building Act 2004 in its capacity as a Building Control Authority. The Building Act focuses solely on protecting people within a property by requiring the installation of backflow prevention devices at potential contamination sources (zone protection) - for example, at a hazardous appliance such as a bedpan washer. Source protection can only be required of a property owner when they activate a building consent and the risk is identified as part of that process.

The inclusion of Section 69ZZZ in the Health Drinking Water Amendment Act 2007 (the Act), gave water suppliers the power to install backflow prevention devices at property boundaries (or up to the point of supply for restricted connections) to protect the public water supply from risk. The Act also included provision for Council to recover the costs for installing boundary protection from property owners. This change in legislation enabled the development of concise backflow prevention policies and programmes.

If enacted in its current form, the Government's new Water Services Bill 2021 (Section 27) and the associated Draft Drinking Water Supply and Operational Compliance Rules, will further strengthen the requirements for Council to ensure that its supplies are protected from backflow and may provide scope for Council's Water Services team to require backflow prevention devices to be installed within a premise (source/zone protection):

27 Duty to protect against risk of backflow

(1) If a drinking water supply includes reticulation, the drinking water supplier must ensure that the supply arrangements protect against the risk of backflow.

(2) If there is a risk of backflow in a reticulated drinking water supply, the drinking water supplier may:

(a) install a backflow prevention device and require the owner of the premises to reimburse the supplier for the cost of installation, maintenance, and ongoing testing of the device; or

(b) require the owner of the premises to install, maintain, and test a backflow prevention device that incorporates a verifiable monitoring system that complies with an acceptable solution or verification method under section 49.

(3) A person who installs a backflow protection device must take all reasonable steps to ensure it operates in a way that does not compromise the operation of any automatic fire sprinkler system connected to the drinking water supply.

This Backflow Prevention Policy will be reviewed and amended accordingly once the bill is enacted into law.

1.2 Purpose

The purpose of this policy is to outline how Council will protect the health of its water supply consumers through installing boundary (or point of supply) backflow prevention in accordance with legislative requirements.

This policy supports Council's following strategic and operational documents:

- Policy on Drinking Water Quality
- Water Supply Activity Management Plan
- Water Safety Plans

1.3 Scope

This policy primarily addresses Council's approach to the installation, ownership and maintenance of backflow prevention devices at the boundary between public and private property for on-demand connections, or within the boundary up to the point of supply for restricted connections, in order to meet the requirements of the Health (Drinking Water) Amendment Act 2007.

It is intended to guide and support the Water Services team in implementing a comprehensive backflow prevention programme to actively manage backflow risk and protect consumers, and includes:

- General roles and responsibilities;
- Responsibilities for installation of appropriate backflow prevention devices at the point of supply and property boundary, and ongoing maintenance and testing;
- Council's approach to achieving boundary protection on all high, medium, and low risk properties and for general risk reduction of backflow on all other properties; and
- Responsibilities for paying the costs associated with backflow prevention.

Although this policy addresses source protection for clarity in terms of roles and responsibilities, it is not intended to address all the requirements for source protection under the Building Act 2004, which is administered through Council's Building Control Authority.

As noted under 1.1 Background, Council's Water Services team may be able to require source protection under the Water Services Bill 2021 once enacted.

1.4 Legislative, best practice and planning context

The following acts, guidelines and documents are relevant to backflow prevention and regulate and guide Council's responsibilities and powers and activities:

- The Health Act 1956
- Health (Drinking Water) Amendment Act 2007
- Local Government Act 2002
- The Building Act 2004
- New Zealand Building Code 1992
- Compliance Document for NZ Building Code 2004 Clause G12/AS1 (November 2018)
- Building (Specified Systems, Change in Use, Earthquake Prone Buildings) Regulations 2005
- Health and Safety at Work Act 2015
- Drinking-Water Standards for New Zealand 2005 (revised 2018)
- Boundary Backflow Prevention for Drinking Water Supplies (Code of Practice)
- Ministry of Health Water Safety Plan Guide (Distribution System) Backflow Prevention January 2014
- AS/NZS 2845.1:2010 Water supply - Backflow prevention devices - Materials, design and performance requirements
- AS/NZS 3500.1:2018 Plumbing and drainage – Water Services
- AS/NZS 3500.5:2012 Plumbing and Drainage Part 5: Housing Installations
- NZ Industry Standard - Field testing of backflow prevention devices/verification of air gaps
- NZS 4541: 2013 Automatic Fire Sprinkler Systems
- AS/NZS 4404 Land Development and Subdivision Infrastructure
- Waitaki District Council Policy on Drinking-Water Quality 2020
- Waitaki District Council Water Safety Plans

Provisions within these documents relating to backflow prevention are included in **APPENDIX A**.

1.5 Definitions

Backflow

Backflow is the unplanned reversal of flow of water (or water and contaminants) into a potable water supply. It can occur when a property's water pressure is higher than the network pressure, or when the water pressure changes in the network. Pressure differences between the network and a property can occur when:

- high water use downstream reduces water pressure upstream - e.g. firefighting
- a water main breaks or is shut off
- a customer uses water at a higher pressure than the pressure supplied
- the water outlet at the property is higher than the water main.

Contaminants can be back-siphoned or injected by back-pressure into a potable water supply; or a combination of both, where cross connections exist.

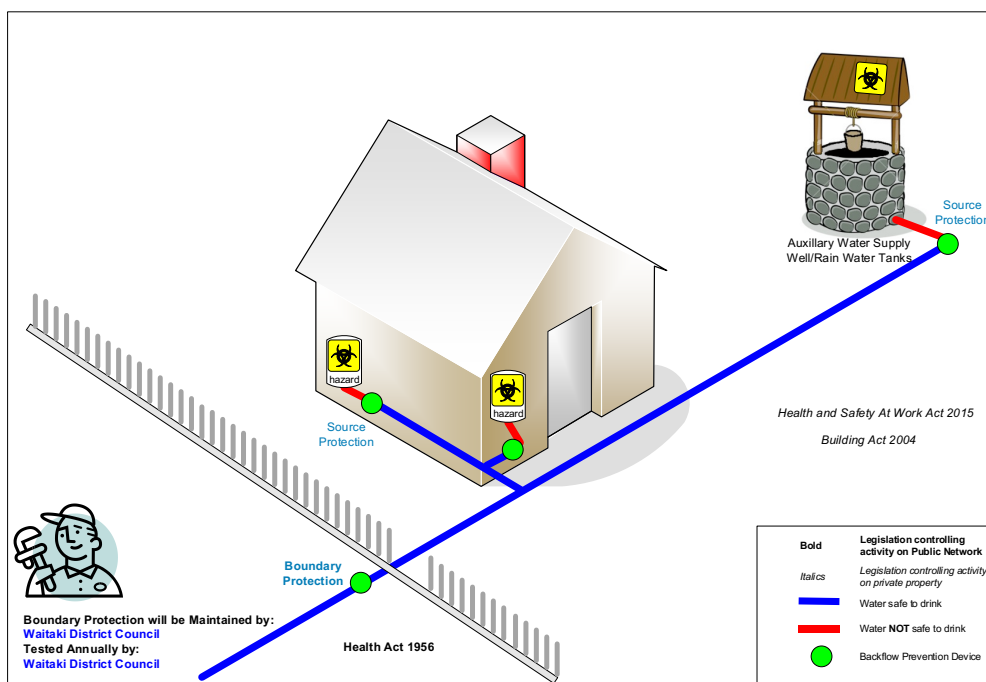
Any activity undertaken that makes a connection with the plumbing on a property poses a risk. At home, this risk could be from filling a bucket, watering can, swimming pool or spa by submerging the hose, leaving a garden hose running in a compost bin, submerging spray heads from showers or sinks, or using chemical cleaning products designed to connect to a hose.

Chemical or microbiological substances from commercial activities can also endanger public health if they get into the water system. Examples of commercial operations that can create a risk include medical and dental facilities, mortuaries, hairdressers, car washing facilities, and manufacturing.

There are many examples of backflow incidents around the world where substances including chemicals, cleaning solvents, wine, milk, dirty irrigation water and soapy water have flowed back into a public water network and caused sickness or death.

Source (individual and zone) protection is currently enforced under the Building Act by Council's Building Control Authority. Boundary protection (or point of supply protection on restricted supplies), is enforced by Council's Water Services team under the Health Act. This relationship for legislative backflow protection at source and boundary is indicated on the diagram below.

Figure 1-1: Backflow Prevention Overview



Term	Definition
Air gap separation	A physical separation between the free-flowing discharge end of a potable water supply pipeline, and the highest overflow level of the receiving vessel, used to prevent backflow
Auxiliary Supply	Secondary supply from an underground aquifer, water/break tanks, dams, purifying plant etc.
Backflow	The undesirable reversal of flow of water or other substances (or mixtures, etc.) into a potable water supply
Backflow prevention device	A device installed to prevent backflow of water or other substances (or mixtures, etc.) into a potable water supply
Backflow prevention device register	A register, held in Council's Asset Management Information System, of existing and future backflow prevention devices installed within, and at the boundaries of, private properties within the Waitaki District
Existing backflow device	Backflow prevention devices installed as boundary protection prior to the adoption of this policy. These devices may be inside or outside the property boundary
Boundary protection	Backflow prevention provided at the property boundary to protect a potable water supply from potential contamination. The purpose of an installation at this location is to achieve 'containment protection' as per AS/NZS 3500.5 and NZ Water CoP
Cross connection	An actual or potential connection between a potable water supply and an auxiliary supply or pipework which may be considered non-potable
Domestic	All users of potable water supply described in G12/AS1 for sanitation, human consumption, food preparation, utensil washing, oral hygiene
DWSNZ	The Drinking-Water Standards for New Zealand 2005 (revised 2018), which detail how to assess the quality and safety of drinking-water
Fire Line	Any water supply service pipe dedicated to supplying water for firefighting within a property
G12/AS1	Approved document for NZ Building Code Water Supplies, Clause G12, Second edition. Also referred to as "Building Code Acceptable Solution G12/AS1 Water supplies"
Hazard	Any condition, device or practice which, in connection with the potable water supply system, has the potential to: <i>High Hazard</i> – cause death <i>Medium Hazard</i> – injure or endanger health <i>Low Hazard</i> – would constitute a nuisance, by colour, odour or taste, but not injure or endanger health
On-demand connections	Water supply connections where the method of supply delivers the consumer a volume of water directly from the point of supply
Point of Supply	The point on the water pipe leading from the water main to the premises, which marks the boundary of responsibility between the consumer and the Council, irrespective of property boundaries (Waitaki Water Supply Bylaw 2014)
Restricted connections	Water supply connections where the method of supply delivers a specific allocation of water to the consumer through a flow control device (restrictor) over a 24-hour period. Storage is provided by the consumer to cater for the consumer's demand fluctuations. Volume and delivery are subject to the specified level of service
Suitably trained and qualified person	A person specifically trained and qualified to install and/or test backflow prevention devices, assess potential hazards and provide written documentation to support this

2 General roles and responsibilities

2.1 Waitaki District Council (Council)

- a) **Council's Water Services team** will take all practicable measures to protect Council's water supplies from the risk of backflow contamination through:
- i. Educating the public about the hazards associated with backflow;
 - ii. Developing and implementing a Backflow Risk Management Plan;
 - iii. Ensuring appropriate backflow prevention devices are installed at the boundary or point of supply at high, medium and low risk properties where required under this policy;
 - iv. Maintaining a backflow prevention device register and ensuring annual testing of all boundary devices is undertaken and recorded;
 - v. Ensuring all relevant records pertaining to boundary or point of supply backflow prevention devices and testing are available for inspection by the Medical Officer of Health at all times;
 - vi. Ensuring all staff and contractors who work on the water supply understand and comply with the requirements of this policy.
 - vii. Leading reviews of Council's Backflow Prevention Policy, as required, but no less than every five years.
- b) **Council's Building Consent Authority** will take all practicable measures to protect Council's water supplies from the risk of backflow contamination through:
- i. Ensuring properties have adequate backflow prevention devices at the source (source protection) in accordance with Building Code G12;
 - ii. Ensuring consents for installation of backflow prevention devices at the source meet Compliance Schedule requirements.
 - iii. Advising property owners to apply for a Compliance Schedule for any existing backflow prevention device at the source, where none exists;
 - iv. Ensuring all applications for water supply connections (service applications) associated with building consents are assessed by the Water Services team for potential backflow protection at the boundary;
- c) **Council's Operations and Maintenance Contractor** will take all practicable measures to protect Council's water supplies from the risk of backflow contamination through:
- i. Completing new connections to the public water supply and installation of boundary backflow prevention devices in accordance with Council's standards and specifications, and manufacturers' recommendations, using suitably trained and qualified personnel;
 - ii. Undertaking annual testing on boundary backflow devices and maintaining certified backflow test equipment using suitably trained and qualified personnel;
 - iii. Providing records to Council's Water Services team, as required.

2.2 Property Owners

- a) All Property Owners with connections to Council water supplies must take all necessary steps to prevent contamination of the Council water supply, in accordance with this policy, and as required and enforceable under Section 9.11 of Council's Water Supply Bylaw 2014.
- b) If a property is tenanted, the Property Owner/s is legally responsible for ensuring the protection of the Council water supply, regardless of existing tenancy agreements. The Property Owner/s and tenants shall not interfere with any backflow prevention device fitted at their property.

3 Installation of backflow prevention devices

3.1 Backflow prevention devices for new water supply connections

- a) All properties with new on-demand connections to Council's water supplies are required to have backflow prevention installed at the boundary, outside the property, in accordance with the requirements of the Health Act and level of risk, as assessed by Council and outlined under Section 4 of this policy.
- b) All properties with new restricted connections to Council's water supplies are required to have backflow prevention installed either at the boundary, outside the property, or at any other location within the property boundary up to the point of supply, in accordance with the requirements of the Health Act and level of risk assessed by Council and outlined under Section 4 of this policy.
- c) The supply and installation of backflow prevention devices will form part of the Service Application process. The Property Owner/s will be responsible for paying the costs associated with the supply and installation of backflow prevention devices at the boundary or up to the point of supply.
- d) Boundary backflow prevention devices for new on-demand or restricted connections at or within the property boundary, will be installed by Council's operations and maintenance contractor in accordance with Council's standards, specifications and device manufacturer recommendations.
- e) Where a new connection is required by cutting into the existing public water mains, Council's operations and maintenance contractor will perform the connection to the Council water supply and installation of the appropriate backflow prevention device onto this connection in accordance with Council's standards, specifications and device manufacturer recommendations.
- f) For on-demand connections, such as retail shops located up to the boundary, where on-site conditions and available space do not allow for an acceptable and appropriate location outside the property boundary, the backflow prevention device may be located inside and as close to the boundary as possible, and details will be recorded in Council's backflow prevention device register. The location of a new boundary backflow prevention device does not alter the point of supply as defined by the Council's Water Supply Bylaw 2014.
- g) All boundary backflow prevention devices installed with new supply connections will become Council assets following installation and be recorded on Council's backflow prevention device register.
- h) As the asset owner, Council will be responsible for ongoing costs associated with annual testing, maintenance, and depreciation of the device.

3.2 Backflow prevention devices for existing water supply connections

- a) Council will inspect properties with existing water supply connections in accordance with Section 4 of this policy and its Backflow Risk Management Plan, to identify any backflow hazards and protection requirements.
- b) For existing on-demand connections, where the need for a boundary backflow prevention device is identified following a Council backflow hazard inspection, or through a Building Consent application process, an appropriate backflow prevention device will be installed by Council outside the property boundary in accordance with the requirements of the Health Act and level of risk, as assessed by Council and outlined under Section 4 of this policy.
- c) For existing restricted connections, where the need for a boundary backflow prevention device is identified following a Council backflow hazard inspection, or through a Building Consent application process, an appropriate backflow prevention device will be installed by Council either at the boundary, outside the property, or at any other location within the property boundary up to the point of supply, in accordance with the requirements of the Health Act and level of risk assessed by Council and outlined under Section 4 of this policy.
- d) Where a property has more than one water supply connection (that is, one connection per Certificate of Title), a backflow prevention device will either be installed for each connection, or the connections will be consolidated into one appropriate-sized connection with a backflow prevention device installed in accordance with the assessed hazard rating. The approach to be taken will be considered on a case-by-case basis and in consultation with the Property Owner.
- e) The Property Owner/s will be responsible for paying the costs associated with the supply and installation of a new backflow prevention device (or devices).
- f) Costs associated with the supply and installation of a backflow prevention device at a commercial or industrial property with an existing water supply connection/s will be loan-funded by Council.
- g) The Property Owner/s will repay the loan from Council, for the supply and installation of a backflow prevention device/s, through an annual targeted rate over a period of not more than five years, starting at a point in time determined through Council's Annual Plan process. Council may at any time elect to defer or nullify loan repayment obligations.
- h) Council may use its discretion in determining the loan funding terms and timing of repayments where there are substantially higher costs associated with the supply and installation of backflow prevention devices at higher risk commercial or industrial properties.
- i) Installation of backflow prevention devices at the boundary will be undertaken by Council's operations and maintenance contractor in accordance with Council's standards, specifications and device manufacturer recommendations.
- j) For on-demand connections, such as retail shops located close to the boundary, where on-site conditions and available space do not allow for an acceptable and appropriate location outside the property boundary, the backflow prevention device may be located inside and as close to the boundary as possible, and details will be recorded in Council's backflow prevention device register. The location of a new boundary backflow prevention device does not alter the point of supply as defined by the Council's Water Supply Bylaw 2014. All boundary backflow prevention devices on existing connections will become Council assets following installation and be recorded on Council's backflow prevention device register.
- k) As the asset owner, Council will be responsible for ongoing costs associated with annual testing, maintenance and depreciation of devices.

3.3 Relocation of existing boundary backflow prevention devices

- a) For on-demand supplies, where a boundary backflow prevention device has been installed within a property boundary prior to adoption of this policy, an assessment will be made on whether to relocate the backflow prevention device to an appropriate location outside the property boundary.
- b) Council will take responsibility for paying costs associated with relocation of existing boundary backflow prevention devices.
- c) Relocation and/or retrofitting of existing boundary backflow prevention devices will be performed by Council's operations and maintenance contractor in accordance with Council's standards and specifications.
- d) All existing boundary backflow prevention devices will become Council assets following relocation and will be included on Council's backflow prevention device register.
- e) As the asset owner, Council will be responsible for ongoing costs associated with annual testing, maintenance and depreciation of devices.

3.4 Protection of backflow prevention devices

- a) All backflow prevention devices at the boundary or point of supply, must be protected from vehicular traffic, frost and vandalism in accordance with Council's Water Supply Bylaw 2014.
- b) Above ground devices will be installed in a securely fenced or caged area with a concrete base and lockable access.
- c) Within the Central Business and Oamaru Historic areas, careful consideration will be given to the location and appropriate protective enclosures.
- d) Specific requirements for backflow prevention device protection will be assessed and determined by Council's Water Services team and outlined in the Backflow Risk Management Plan.

3.5 Source (point of risk) protection

- a) A Property Owner/s may separately be required by the Building Control Authority to install source protection (internal individual or zone devices) in accordance with the Building Act 2004.
- b) If a property is tenanted, the Property Owner/s is legally responsible for ensuring source protection of the potable water supply, where required, regardless of existing tenancy arrangements.
- c) Source protection devices are owned by the Property Owner/s and are typically located inside the property and close to the hazard which contains potential contaminants.
- d) The Property Owner/s must lodge a building consent for the installation, alteration, and removal of all source protection devices.
- e) Where source protection has been identified as a requirement, the Property Owner/s is responsible for lodging the building consent application, and ensuring the device or devices are installed within the specific timeframe given in writing by the Building Control Authority.

- f) The Property Owner/s is responsible for the costs associated with the installation, and ongoing maintenance and testing of source protection devices, in accordance with the Building Act 2004.
- g) The Property Owner/s is responsible for observing all legislative requirements regarding the correct use, or change of use, of all source protection devices located inside the property and connected to the potable water supply, and must maintain these devices in proper working order at all times.
- h) The Property Owner/s must notify Council of any change in property use or alterations to plumbing that may compromise the quality of the potable water supply or introduce additional hazards.
- i) The Property Owner/s must ensure any source protection device is not bypassed unless protected by another device of equivalent hazard rating.
- j) The Property Owner/s must ensure that any source protection device is accessible at all times and allow Council contractors access to devices as required.
- k) The Property Owner/s must ensure all source protection devices are tested annually by the anniversary date of the last test and return all test certificates to Council, while keeping copies of test certificates of at least two years previous.

4 Hazard identification and levels of protection

4.1 Identification of backflow hazards

- a) Council's Water Services team will implement a Backflow Risk Management Plan in accordance with legislative requirements, including scheduled property inspections to identify any backflow hazards and the appropriate level of backflow prevention required at the boundary.
- b) Council will assess all backflow hazards in accordance with the hazard ratings identified in the Water NZ Boundary Backflow Prevention for Drinking Water Supplies Code of Practice:
 - o **High hazard:** any condition, device or practice which, in connection with the Council water supply, has the potential to cause death (potential to be fatal).
 - o **Medium hazard:** any condition, device or practice which, in connection with the Council water supply, could endanger health (not fatal).
 - o **Low hazard:** any condition, device or practice which, in connection with the Council water supply, is a nuisance, but does not endanger health or cause injury.

Hazards and their classifications are included in **Appendix B** of this policy.

- c) Each hazard rating has a minimum requirement for the type of backflow prevention device to be used.
- d) Property Owners and/or occupiers will be notified at least 7 days in advance of a backflow hazard inspection.
- e) Where an inspection identifies that a boundary backflow protection device is required, the owner will be notified within 28 days of the inspection.

- f) The required device must be installed in accordance with the requirements of this policy and within the period specified by Council.

4.2 Levels of protection required for hazard situations

The following types of protection are required for specific hazard situations:

Hazard situation	Required backflow protection
On-demand residential connections	Manifold with dual check valve (non-testable)
Restricted residential connection	Manifold with dual check valve (non-testable)
Low hazard (all connections)	25mm (20mm ID) connection - manifold with dual check valve (non-testable)
	>25mm connection – dual check valve (non-testable)
Medium hazard property	Double check valve (testable)
High hazard property	Reduced Pressure Zone (RPZ) device

4.3 Exemptions

- a) In some circumstances, a backflow prevention device that differs from requirements within this policy may be approved, as appropriate, to manage the level of assessed risk to the Council water supply.
- b) Exemptions may include:
- accepting a private device as providing adequate boundary protection although it is not located outside the boundary, but very close to the boundary (proxy device)
 - possibly allowing a lower standard of backflow prevention device due to the level of protection provided by private devices and internal plumbing layout
- c) An exemption to any requirement under this policy may be granted in writing only at the discretion of the Water Services Manager.

5 Testing

5.1 Requirements for backflow prevention device testing

- a) Council will test all testable boundary backflow prevention devices operating within its network in accordance with Health Act requirements and Council's Backflow Risk Management Plan. Testing will be carried out at the following times:
- Immediately after installation and before use;
 - Annually;
 - On completion of any maintenance work on the backflow prevention device; and
 - After a backflow incident or suspected backflow incident.
- b) A copy of the test certificate must be kept with the equipment and be available for inspection by Council at any time.

5.2 Requirements for boundary backflow prevention device testers

- a) All personnel undertaking tests on Council-owned backflow prevention devices at the boundary must be suitably trained and qualified in accordance with industry standards.
- b) Special consideration will be given when testing backflow prevention devices installed on fire lines.
- c) In accordance with Appendix 6 of *Boundary Backflow Prevention for Drinking Water Supplies 2013*, the requirements for only a registered IQP to test backflow prevention devices at the source, as per the Building Act, remain.

6 Changes to property use and hazard levels

- a) Where commercial and industrial properties undergo a change in use, Council will require that any backflow prevention device or devices already installed remain in place to avoid future re-installation costs should a hazardous situation occur.
- b) The following approach will be taken where there is a change in use for a property impacting on the hazard level:

Current hazard level	New hazard level	Council approach
High hazard	Medium hazard	<ul style="list-style-type: none"> • Backflow device will remain installed • Annual inspections and maintenance will continue to be undertaken
High or medium hazard	Low or no hazard	<ul style="list-style-type: none"> • Backflow device will remain installed • Hazard change status will be noted on the property file for future reference by Council's Building Control Authority • Three-yearly inspections will be undertaken to ensure there has been no subsequent change in the risk the property presents

Current hazard level	New hazard level	Council approach
Low or no hazard	High or medium hazard	<ul style="list-style-type: none"> • If there is no existing backflow prevention device, a new device will be installed appropriate for the assessed hazard at the Property Owner/s cost • If an existing backflow prevention device is in place and is appropriate to the new hazard level, annual testing of the device will resume • If an existing backflow device is in place but is inadequate for an increased hazard level, the device will be upgraded at the Property Owner's cost, and annual testing of the device will resume

APPENDIX A: Legislative, best practice and planning context

Legal obligations

The Health Act 1956

The Health Act 1956 requires that adequate water supplies are provided to communities including any building built, sold or let must have an adequate and convenient supply of wholesome water.

69G Interpretation wholesome, in relation to drinking water, means—

(a) being potable; and

(b) not containing or exhibiting any determinand in an amount that exceeds the value stated in the guideline values for aesthetic determinands in the drinking-water standards as being the maximum extent to which drinking water may contain or exhibit the determinand without being likely to have an adverse aesthetic effect on the drinking water

Section 23 of the Act also provides for the network supplier “to make bylaws under and for the purposes of this Act or any other Act authorising the making of bylaws for the protection of public health.”

The Health Act 1956 now contains significant new provisions relating to backflow that were introduced via the Health (Drinking Water) Amendment Act 2007 that relate to the protection of drinking water including the installation of backflow prevention devices.

The Health (Drinking Water) Amendment Act 2007

The Health (Drinking Water) Amendment Act 2007 revoked the previous Water Supplies Protection Regulations 1961, which were established under the Health Act 1956, and which previously contained the main legislative provisions relating to backflow prevention.

Following is Section 69ZZZ which specifically addresses backflow prevention.

69ZZZ Protecting water supplies from risk of back-flow

1 This section applies if a networked supplier considers that there is a need to protect the networked system from risks of pollution caused by water and other substances on properties connected to the networked system.

2 A networked supplier may,—

(a) if the supplier considers it desirable or necessary,—

(i) install a back-flow prevention system in the network on the side of the point of supply for which the supplier is responsible for maintaining; or

(ii) allow the owner of property to which water is supplied to install a back-flow prevention system that incorporates a verifiable monitoring system (being a monitoring system approved by both the supplier and a drinking-water assessor):

(b) require the owner of the property in respect of which the back-flow prevention system operates or the person who is required (whether under the Local Government Act 2002 or any contract) to pay for drinking water supplied to that property,—

(i) if paragraph (a)(i) applies, to reimburse the supplier for the cost of that system (including the cost of installation, testing, and on-going maintenance); and Backflow Prevention Management Plan & Policy

(ii) if paragraph (a)(i) or (ii) applies, to repair or modify any back-flow prevention system that, in the opinion of the supplier, is not functioning adequately. A person who installs a back-flow protection device must take all reasonable steps to ensure it can operate in a way that does not compromise the operation of any automatic sprinkler system connected to the water supply.

A networked supplier—

(a) must test each back-flow protection device operating in its network at least once a year; and

(b) must advise the territorial authority in its area of the results; and

(c) may require the occupier of the property in respect of which the device operates to pay the reasonable costs involved in conducting the test.

Local Government Act 2002

The LGA2002 is a wide-ranging piece of legislation that sets out the purpose and obligations of local authorities. Although not specifically covered by the LGA2002, there are several areas of the Act that have relevance to the prevention of potential contamination by backflow.

These include:

- Part 7 details specific obligations of local authorities.
 - Although not specifically covering backflow potential contamination, section 130 covers obligations to maintain water services.
 - In addition, section 126 covers general obligations relating to the supply of water at a scheme level.

The Building Act 2004

This requires that buildings are safe and sanitary, and that occupants are safeguarded from possible illness.

The Act requires, under sections 100 and 101, an annually renewable Building Warrant of Fitness (for non-residential buildings) to ensure the specified systems stated in the compliance schedule are operating correctly. The compliance schedule includes any backflow preventers installed at the source of potential contamination.

The Building Act calls upon the Building Code in the Building Regulations 1992, specifically, Schedule 1, G12 Water Supplies regarding backflow prevention. This is the minimum acceptable standard to comply.

It should be noted that existing buildings, and their specified systems, are not required to be upgraded to comply with the Building Code unless an alteration or change of use takes place (refer sections 112A, 115 and 116A of the Building Act 2004). This effectively means that where a building, and its associated water systems, were built and approved under legislation prior to the introduction of the Building Code, Council may not be able to use the Building Act to enforce the installation of a backflow preventer within a building. However, with the passing of the Health (Drinking Water) Amendment Act 2007, Council now has the ability to enforce the installation, and ongoing testing and maintenance, of backflow prevention devices on the reticulation side of a property boundary (boundary protection).

New Zealand Building Code 1992

The New Zealand Building Code was established as the First Schedule to the Building Regulations 1992. It should be noted that at the time of publication, the Building Code was being reviewed to align it with the Building Act 2004. All new building work must comply with the Building Code. It is a performance-based code, which means it states how a building and its components must perform as opposed to describing how the building must be designed and constructed. The relevant clause in the NZ Building Code for Water Supplies is G12.

The first objective of G12, as stated in G12 1.1, is to “*safeguard people from illness caused by contaminated water*”. Clause G12 3.2 further specifies that a building’s potable water supply systems shall be protected from potential contamination and shall be installed in a manner which avoids the likelihood of potential contamination within the building’s system, and water main.

A building owner is therefore required by law to ‘avoid the likelihood of potential contamination within the system and the water main’. To help building owners ensure that their building’s potable water system complies with this legal requirement, the then Department of Building and Housing (Ministry of Business, Innovation and Employment) prepared a Compliance Document in accordance with section 22 of the Building Act 2004. Compliance Documents are non-mandatory guidance documents, but do provide a recognised method with the specified performance criteria of the NZ Building Code.

Compliance Document for NZ Building Code 2004

Clause G12/AS1 (November 2018) The Compliance Document for G12/AS1 Water Supplies (November 2018) provides guidance on the following aspects:

- Section 3.1 of the Compliance Document for Clause G12/AS1 prohibits water that has been drawn from the water main from being returned to the public system via backflow or cross connection.
- Section 3.2 prohibits cross connections between mains potable water supplies and private potable water supplies, as well as between potable water supplies and any facilities or pipes containing non-potable substances.
- Section 3.3 sets out hazard ratings for various types of facilities or appliances.
- Section 3.4 specifies the conditions under which backflow protection shall be provided i.e. wherever it is possible for water or contaminants to backflow into the potable water supply, as applicable the appropriate hazard rating in table 2 of the document.

Building (Specified Systems, Change in use, and Earthquake Prone Buildings) Regulations 2005

Schedule 1, Specified Systems (7), states ‘Automatic back-flow preventers connected to a potable water supply’. This legislation simply re-affirms that where installed, a ‘specified system’ is subject to a compliance schedule and a Building Warrant of Fitness.

Health and Safety at Work Act 2015

A guiding principle of the Health and Safety at Work Act (HSWA) is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable. The HSWA shifts the focus from monitoring and recording health and safety incidents to proactively identifying and managing risks so everyone is safe and healthy.

The HSWA requires identifying the risks associated with hazards and associated mitigation to reduce those risks.

Waitaki Water Supply Bylaw 2014

The Waitaki Water Supply Bylaw came into force on 10 December 2014. Under Section 10 – Breaches and Infringement Offences it clearly identifies (g) *Failure to prevent backflow on or from a premise as a breach of conditions of supply.*

Section 9.11 Backflow Prevention Consumer responsibility:

The consumer shall (under the Health Act 1956 and its amendments, and the Building Act 2004) take all necessary steps on the consumer's side of the point of supply to prevent water which has been drawn from the water supply system from returning to the water supply system. These steps include: (a) Backflow prevention either by providing an adequate air gap, or by the use of an appropriate backflow prevention device; (b) The prohibition of any cross-connection between the Council water supply system and: i. Any other water supply (potable or non-potable) ii. Any other water source iii. Any storage tank iv. Any other pipe, fixture or equipment containing chemicals, liquids, gases, or other substances. NOTE – Fire protection systems that include appropriate backflow prevention measures would generally not require additional backflow prevention, except in cases where the system is supplied by a non-potable source or a storage tank or fire pump that operates at a pressure in excess of the water supply system's normal minimum operating pressure.

Unmanaged risk

Notwithstanding 9.11.1 the Council may fit a backflow prevention device on the Council side of the point of supply if it considers it is desirable or necessary to do so where the consumer cannot demonstrate that the risk of backflow is adequately managed. The Council may charge the consumer for the installation, maintenance, operation and ongoing testing and certification of this backflow prevention device as set out in the fees and charges section of the Council's Annual Plan.

Annual Testing

The Council may undertake annual backflow testing on point of supply backflow prevention devices. The owner of the premises at which the backflow prevention device is installed may be charged for such testing as set out in the fees and charges section of the Council's Annual Plan. The Council shall keep appropriate records of testing.

Standards and best practice guidelines

Drinking Water Standards for New Zealand 2005 (revised 2018)

Following is an excerpt from the Drinking Water Standards for New Zealand 2005 (revised 2018).

'The DWSNZ are applicable to networked drinking-water supplies, as defined in the Health Act 1956.

The DWSNZ do not set out how a water supply should be managed. The Health Act covers the high-level obligations of a water supplier, and the Local Government Act 2002 covers broader management obligations. Those obligations specific to risks are covered by a supplier's water safety plan.

The public health safety of drinking-water is best protected if multiple barriers to contamination are in place. These barriers include:

- *minimising the extent of contaminants in the source water that the treatment process must deal with*
- *removing undesirable soluble and particulate matter*

- *disinfecting to inactivate any pathogenic organisms that may be present*
- *protecting the treated water from subsequent contamination.'*

Boundary Backflow Prevention for Drinking Water Supplies Code of Practice

This publication is a recommendation, as determined by Water New Zealand (formerly NZWWA), of how local authorities should carry out 'good practice' in protecting their water supplies from potential contamination, in particular via backflow into mains water supplies.

The Backflow Prevention Code of Practice (CoP) deals only with Boundary Protection, with internal protection at the source of potential contamination, principally controlled by the Building Act 2004 and the Building Code 1992.

Following the guidelines put forward in the Code of Practice will provide water suppliers with a means of compliance with the Health Act and should result in a more consistent approach to backflow prevention throughout New Zealand.

Adoption of the code requires Water Suppliers to:

- Ensure that the actions of customers do not have the potential for an adverse effect on other customers through potential contamination of water supply mains
- Be proactive in determining what customers pose significant potential hazards to the integrity of the water supply • Have clear policies on backflow prevention
- Have a 'risk management programme' to identify potential hazards and ensure that appropriate backflow devices are installed at all properties/premises. The risk management programme should include a database of containment devices, and include a system for regular testing of devices
- Ensure that all personnel are appropriately trained

WDC has used this Code of Practice in the preparation of this document.

Ministry of Health Water Safety Plan Guide (Distribution System) Backflow Prevention January 2014

The Ministry of Health produces various guides to assist water suppliers in complying with existing Drinking Water Standards and legislation. The Ministry of Health Guide Water Safety Plans (Distribution System) - Backflow Prevention provides guidance on the types of potential hazards associated with backflow events, identifying possible causes and preventive measures.

WDC have prepared Water Safety Plans for the drinking water supply areas of:

- Oamaru
- Waihemo
- Kurow
- Omarama
- Otematata
- Duntroon
- Lake Ohau
- Lower Waitaki

The WDC Water Safety Plans take into account the Ministry of Health Guide to Water Safety Plans (Distribution System) - Backflow Prevention.

AS/NZS 2845.1:2010 Water supply - Backflow prevention devices - Materials, design and performance requirements

Section 1.1

“This Standard specifies requirements for the materials, design, performance and testing of mechanical backflow prevention devices that are used for the protection of water supplies”. 3.5 AS/NZS 3500.1:2018 Plumbing and drainage – Water Services 3.5.1 Section 1.1 “This Standard specifies the requirements for the design, installation and commissioning of cold water services from a point of connection to the points of discharge, and non-drinking water from a point of connection to the points of discharge. It applies to new installations as well as alterations, additions and repairs to existing installations.”

Section 4.1

“Section 4 specifies the requirements and methods for the prevention of contamination of the drinking water within the water service and the water main and provides for the selection and installation of backflow prevention devices.”

Please note that AS/NZS 3500.4:2003 has the following reference for backflow prevention under Section 3.2 Cross-Connection and Backflow Prevention: “Cross-connection controls and backflow prevention devices shall be installed in accordance with AS/NZS 3500.1.”

AS/NZS 3500.5:2012 Plumbing and Draining Part 5: Housing Installations

Section 1.1

“This Standard specifies requirements for the design and the installation of-

- (a) Cold water services;
- (b) Heated water services;
- (c) Rainwater systems
- (d) Water supply systems that are combined with home fire sprinkler systems;
- (e) Greywater systems
- (f) Sanitary plumbing and drainage systems; and (g) Stormwater drainage systems for a property containing up to 19 Class 1a buildings (single dwellings).

Section 1.4.3

“This Standard may be used as an alternative solution for compliance with the New Zealand Building Code clause G12, Water Supplies, clause G13, Foul Water and clause E1, Surface Water.”

Sections 2.16, 2.20 and 2.23

Section 2.16 deals with the Protection of Potable (Drinking) Water Supplies while Section 2.20 deals with Provision of Backflow Prevention Devices and Section 2.23 specifically addresses protection of hazards relating to the installations of Irrigation and Lawn Watering.

NZ Industry Standard - Field Testing of backflow prevention devices and verification of air gaps

This document covers the testing of backflow prevention devices and verification of air gaps. The procedures in the document for testing backflow devices endeavours to help to ensure uniformity of practice and reliability of testing thus providing improved protection of public health from potential contamination of water supplies through cross connections and backflow.

NZS 4541: 2013 Automatic Fire Sprinkler Systems

This document provides rules for the design, installation and maintenance of sprinkler systems in order that such systems reliably protect against the loss of life and minimise property damage from fire.

AS/NZS 4404 Land Development and Subdivision Infrastructure

The Code for Subdivision and Development AS/NZS: 4404 is the principal document defining design requirements. New works within the urban areas are constructed in general accordance with NZS4404 Land Development and Subdivision Infrastructure which sets minimum standards for reticulation construction, including the provision of firefighting water.

Section 6.3.9.2 – Prevention of backflow

Drinking water supply systems shall be designed and equipped to prevent backflow. The location and operation of hydrants, air valves, and scours shall ensure no external water enters the system through negative pressure from normal operation.

Plans and policies

Waitaki District Council Policy on Drinking Water Quality

The policy states that: *“Waitaki District Council is committed to managing its water supplies to provide safe, high-quality drinking-water that consistently meets the expectations of the New Zealand Drinking-water Safety Plan Framework, the requirements of the Health (Drinking-Water) Amendment Act 2007 and Drinking-Water Standards for New Zealand, other relevant legislation, and consumers.”*

Specifically, Clause 4 of the policy states that we will *“take a proactive approach to addressing potential drinking-water (including source water) quality issues through regular review and analysis of available data, and implementation of preventative measures (including multiple-barrier protection, where required) and current industry best practice.”*

Waitaki District Council Water Safety Plans

Council through its Water Safety Plans has identified backflow prevention as a high priority means of reducing the risk of contamination into the water supply. The Water Services unit have imposed backflow prevention during the building consent process. As a result, some commercial and industrial properties presently have backflow devices installed. However, it is believed that there is further scope for a more proactive programme to be developed that would seek to actively identify properties presenting backflow risks. This Backflow Prevention Policy and support Backflow Prevention Hazard Identification and Management Plan seeks to formalise the backflow prevention approach.

APPENDIX B: Hazard ratings

The full list of hazards and their classifications included below comes from Clause G12/AS1 of the Building Code:

HIGH HAZARD	MEDIUM HAZARD	LOW HAZARD
<p>Any condition, device or practice which, in connection with the potable water supply system, has the potential to cause death. May include but not necessarily be limited to:</p> <ul style="list-style-type: none"> a) Autoclaves and sterilisers b) Systems containing chemicals such as anti-freeze, anti-corrosion, biocides, or fungicides c) Beauty salon and hairdresser's sinks d) Boiler, chiller and cooling tower make-up water e) Car and factory washing facilities f) Chemical dispensers g) Chemical injectors h) Chlorinators i) Dental equipment j) Direct heat exchangers k) Fire sprinkler systems and fire hydrant systems that use toxic or hazardous water l) Hose taps associated with High hazard situations like mixing of pesticides m) Irrigation systems with chemicals n) Laboratories n) Mortuaries o) Pest control equipment p) Photography and X-ray machines q) Piers and docks r) Sewage pumps and sump ejectors s) Sluice sinks and bed pan washers t) Livestock water supply with added chemicals u) Veterinary equipment <p>Note: The examples given are not an exhaustive list. Where there is doubt comparison must be made to the hazard definitions.</p>	<p>Any condition, device or practice which, in connection with the potable water supply system, has the potential to injure or endanger health. May include but not necessarily be limited to:</p> <ul style="list-style-type: none"> a) Appliances, vehicles or equipment b) Auxiliary water supplies such as pumped and non-pumped fire sprinkler secondary water c) Deionised water, reverse osmosis units and equipment cooling without chemicals d) Fire sprinkler systems and building hydrant systems e) Hose taps and fire hose reels associated with Medium hazard f) Irrigation systems with underground controllers g) Irrigation without chemicals h) Livestock water supply without added chemicals i) Untreated water storage tanks j) Water and steam cleaning k) Water for equipment cooling l) Drink dispensers with carbonators m) Swimming pools, spas and fountains <p>Note: The examples given are not an exhaustive list. Where there is doubt comparison must be made to the hazard definitions.</p>	<p>Any condition, device or practice which, in connection with the potable water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health. May include but not necessarily be limited to:</p> <ul style="list-style-type: none"> a) Drink dispensers (except carbonators). <p>Note: The example given is not an exhaustive list. Where there is doubt comparison must be made to the hazard definitions.</p>

Clause G12/AS1 of the Building Code outlines the acceptable solutions for various hazard levels, as below:

Type of backflow protection	CROSS CONNECTION HAZARD					
	HIGH		MEDIUM		LOW	
	back-pressure	back-siphonage	back-pressure	back-siphonage	back-pressure	back-siphonage
Air gap (see Note 1)	✓	✓	✓	✓	✓	✓
Reduced pressure zone device	✓	✓	✓	✓	✓	✓
Double check valve assembly (see Note 2)			✓	✓	✓	✓
Pressure type vacuum breaker (see Note 3)		✓		✓		✓
Atmospheric vacuum breaker (see Note 4)		✓		✓		✓
<p>Note:</p> <ol style="list-style-type: none"> 1. Air gaps must not be installed in a toxic environment. 2. Double check valves can be installed in a medium and low hazard toxic environment. 3. Pressure type vacuum breakers are designed to vent at 7 kPa or less. However, they require a significantly higher pressure to reseal and must be installed only in systems which provide pressures sufficient to ensure full closing of the valve. 4. Hose outlet vacuum breakers are a specific type of atmospheric vacuum breaker. 						