GUIDELINES FOR
PLUMBING OF RAINWATER TANKS

REVISED MARCH 2008

QA SUMMARY – Changes to Guidelines

Version Number and Date		Reference or Site Item	Change	Details
1	10/3/08	Figure 8	Changes to Site Containment Note	Added Medium hazard specific details
2	10/03/08	Page 13	Change to note on Medium Hazard	Medium hazard RWT's ≥ 20mm services testable DCV or vented dual check valve with atmospheric port.

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1 Introduction

These guidelines set out the minimum Hunter Water plumbing requirements for rainwater tanks connected to **industrial, commercial and residential** properties that are also connected to the Hunter Water operated drinking water supply network. These guidelines are limited to properties with rainwater tanks used to store rainwater collected solely from roof runoff. It does not cover other statutory requirements such as Local Government (council) requirements.

Hunter Water supports the use of rainwater as a substitute for mains water for appropriate applications. The reduction in mains water use is environmentally beneficial and can deliver cost savings to water consumers. Environmental benefits include reduced load on the major water supply catchments as well as reduced run-off into urban stormwater systems.

Appropriately plumbed rainwater tanks can effectively supply rainwater to individual properties without putting the central water supply system at risk. These guidelines set out the plumbing requirements stipulated by Hunter Water Corporation to ensure that rainwater tanks are plumbed safely and effectively. This also ensures that the rainwater service cannot accidentally backflow into the drinking water main or be inappropriately cross-connected to the drinking water supply within the property. This eliminates the risk of contaminating the drinking water supply network. These requirements apply to all installations irrespective of whether or not the cost of the rainwater tank is being subsidised through a rebate scheme or similar. These guidelines are written in accordance with the Hunter Water Corporation Regulation, NSW State Code of Practice Plumbing and Drainage and Australian Standard AS 3500 National Plumbing and Drainage Code.

2 Hunter Water Corporation Rainwater Tank Plumbing Requirements

2.1 Limitations of this Document

This document contains a summary of the key Hunter Water Corporation plumbing requirements. For full details, readers are referred to the NSW Code of Practice Plumbing and Drainage 3rd Edition 2006. The NSW Code of Practice references AS/NZS 3500.1:2003 (Plumbing and drainage - Water services) also provides additional clauses specific to NSW state requirements as well as Sydney Water Corporation and Hunter Water Corporation requirements.

2.2 Location of Rainwater Tanks

Rainwater tanks shall not be positioned over or adjacent (within 1m) to a Hunter Water sewer main (including manholes, branch lines and shafts) or water main without written consent from Hunter Water Corporation. The onus of checking the location of Hunter Water assets and of making any required 'Build Over' application lies with the property owner. Rainwater tanks shall not be built within a Hunter Water Easement without written consent from the organisation.

It is noted that the Hunter Water Act 1991 authorises Hunter Water to demand the removal of **any interfering structure**, which includes rainwater tanks, from over or near its assets at the structure owner's expense, and to claim compensation for any damage caused by that structure. It is also noted that the State Environment Planning Policy (SEPP) No. 4 for Exempt Development does not include a rainwater tank built over or adjacent to a water main or a sewer main, unless it is installed in accordance with any requirements of the public authority that has responsibility for the main. If a rainwater tank is constructed over or adjacent to a water main or a sewer main without Hunter Water consent, then it would be deemed to be an unauthorised development as it would not have complied with the requirements of the SEPP.

2.3 Registration of Rainwater Tanks

All rainwater tanks installed after 1 July 2005 on properties that are also served by Hunter Water's mains water supply network must be registered with Hunter Water Corporation. The registration process for rainwater tank installations on new properties will be included with the existing mandatory water and sewer application/permit process. For existing properties, registration will require a rainwater tank installation permit to be issued prior to commencing installation.

2.4 Hunter Water Inspection of Rainwater Tanks

All rainwater tank installations will require a mandatory inspection once the installation is complete in order to finalise the registration process. An IPART approved fee will apply for this inspection. This inspection is required to ensure that all plumbing requirements are met and the risk of contamination to Hunter Water's water supply system is minimised. Hunter Water Corporation may also undertake future random inspections of rainwater tanks that are installed on properties that are also served by Hunter Water's mains water supply network. This would be to ensure the installations have not changed in a way that increases the hazard rating. Such random inspections would be at no cost to the owner.

2.5 Independently plumbed rainwater tank

An independently plumbed rainwater tank is a rainwater tank that is not cross connected with the mains water supply. An independently plumbed rainwater tank may still have a mains water top-up mechanism with an air gap **(Air gap must comply with requirements as nominated in AS3500.1:2003 Clause 4.6.3.2 a).** In its simplest form, an independently plumbed rainwater tank could be the sole source of water supply to an outdoor tap or the 'shed toilet'. Refer to **Figure 1** for a typical plumbing layout of a rainwater tank that is independently plumbed.

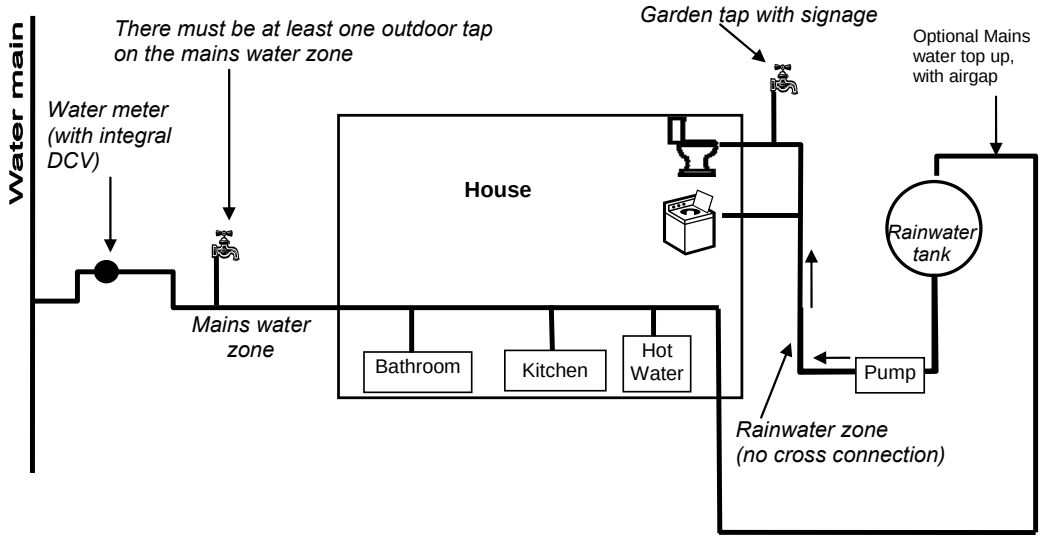


Figure 1: Independently plumbed rainwater tank with supply to select appliances. (Recommended by HWC & Dept of Health).

Having an independently plumbed rainwater tank rather than installing a cross connection to Hunter Water mains supply decrease the risk on contamination to Hunter Water and its customers. Independently plumbed rainwater tanks have a number of advantages including:

- No backflow prevention devices, apart from a water meter with integral backflow prevention that will be provided by Hunter Water Corporation, are required to protect the mains water supply system as there is no cross connection.
- System will cost less to install and operate.
- It is clear to the user if the rainwater system develops a fault as there is no automatic mains water bypass system.

An independent rainwater supply system does not necessarily preclude mains water backup to appliances. For example appropriately labelled dual independent water supplies can be plumbed to toilet cisterns and washing machines as shown in **Figure 2.**

Similarly separate rainwater and mains water supply hose taps can be located adjacent to each other in the garden. The user can then select mains supply or rainwater supply at each appliance by choosing which cistern tap is open or by choosing which tap the washing machine or garden hose is connected to. Hunter Water Corporation does not differentiate between above and below ground independently plumbed rainwater tanks.

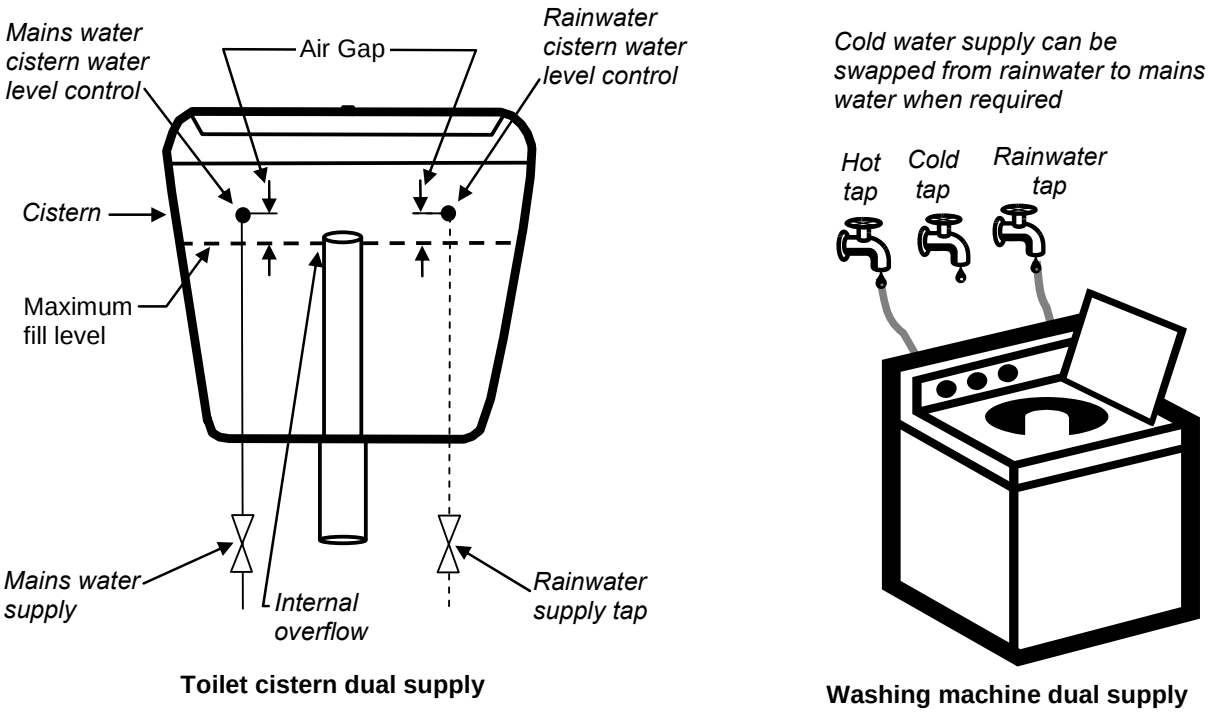


Figure 2: Options for dual supply to toilet cistern and washing machine using an independently plumbed rainwater tank.

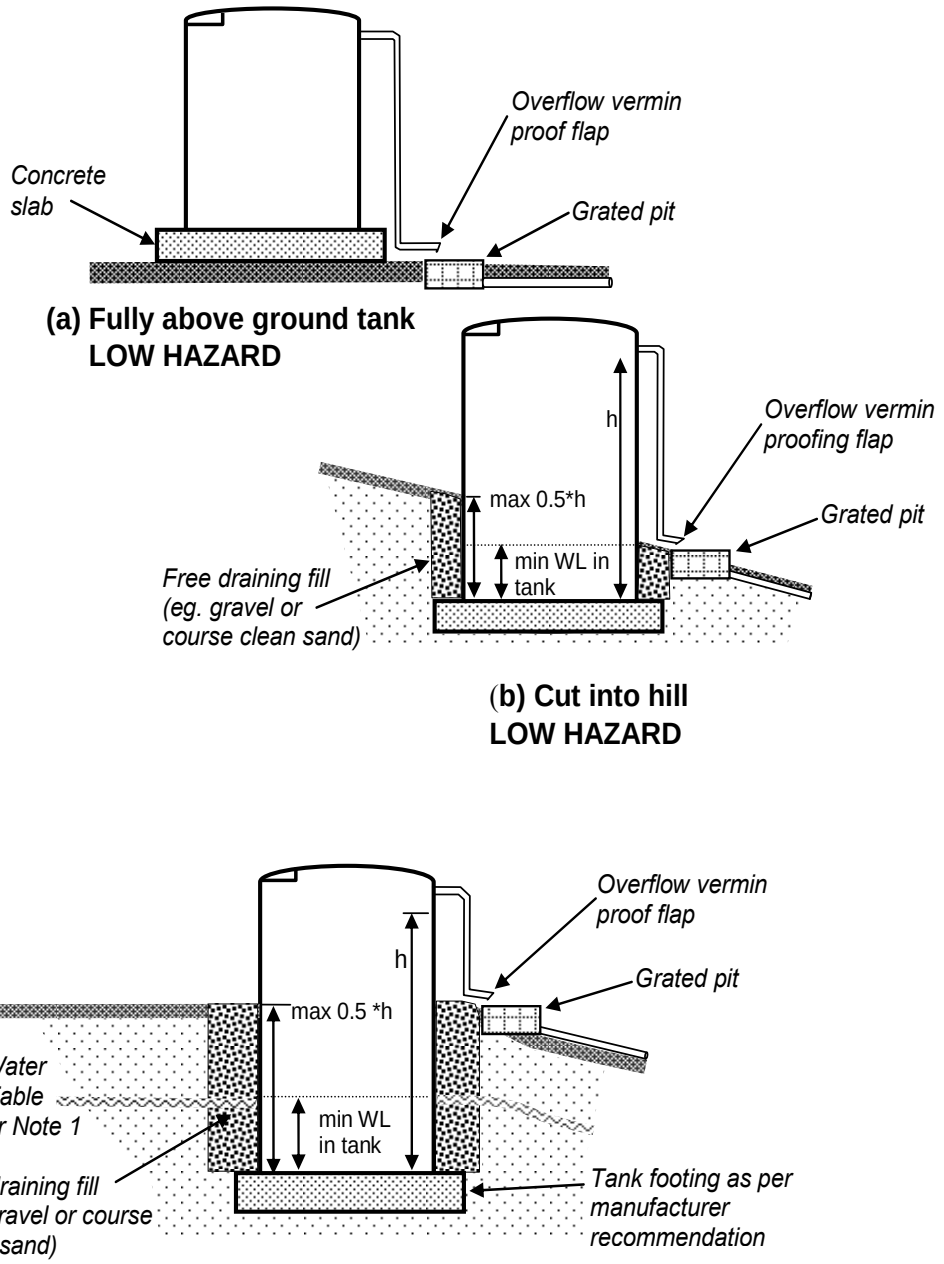
Note: All rainwater pipe lines shall be suitably signed and colour coded.

Hunter Water's requirements for a mains water top-up valve are:

- There must be a visible air gap in the top-up mechanism. There must be no circumstances under which water stored in the tank could compromise the air gap.
- The maximum mains water flow rate into the rainwater tank must not exceed 20L/min.

Above ground rainwater tank

Hunter Water will generally assess an above ground rainwater tank as being a 'low hazard' installation. Refer to **Figure 3** for the type of installations that Hunter Water would consider to be 'above ground'.



(c) Part buried tank

Notes 1. Site must not be subject to waterlogging above the minimum water level (WL) stored in the tank. The onus of proof will lie with the developer in establishing agreed maximum ground water levels. If in doubt it will be assumed maximum G/W levels can reach the ground surface at times.

Figure 3: Examples of rainwater tanks that would be defined as 'Above Ground'.

Note: All rainwater tanks shall be vermin proofed on the inlet and overflow connections.

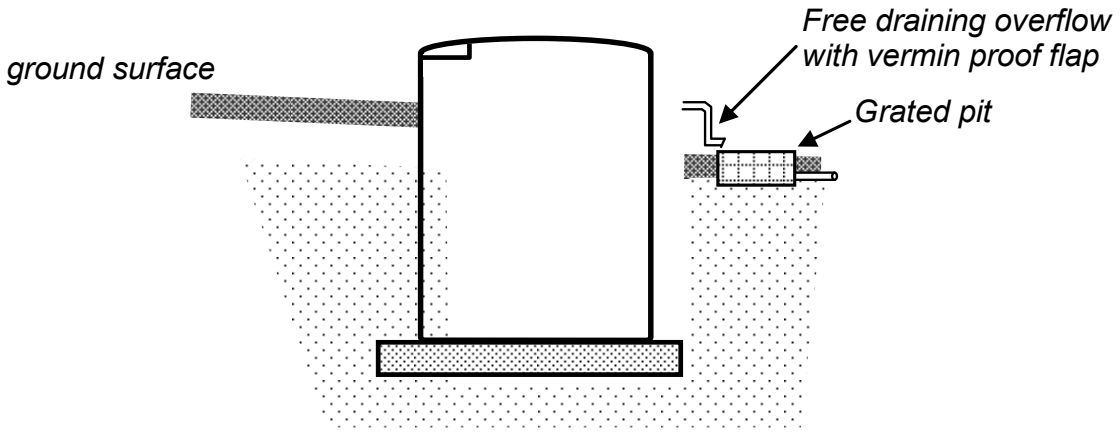
Below ground rainwater tank

Depending on the installation configuration, Hunter Water will assess a below ground rainwater tank as being either a 'medium hazard' or a 'high hazard' installation. Tanks assessed as being 'high hazard' shall not be cross connected with the mains water supply.

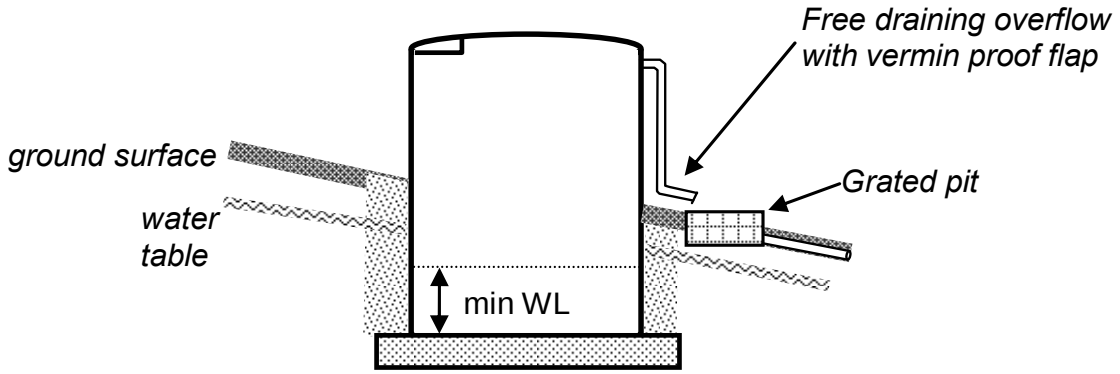
In order for a below ground tank to be assessed as 'medium hazard', it shall meet **all** of the following requirements:

- The tank inlet shall be sufficiently proud of the ground surface to prevent inflow of ground surface runoff (ie the inlet shall be high enough to keep out local area flooding during storms), and
- the tank overflow shall be free flowing and the outlet shall not be subject to inundation by ground surface runoff (ie the overflow set-up shall prevent local area flooding from entering the tank via the overflow), and
- the tank overflow shall be fitted with vermin proofing (ie animals such as frogs and rats shall be kept out of the tank), and

Refer to **Figure 4** for examples of below ground tanks that would typically be deemed 'medium hazard', and **Figure 5** for examples that would typically be deemed 'high hazard'.



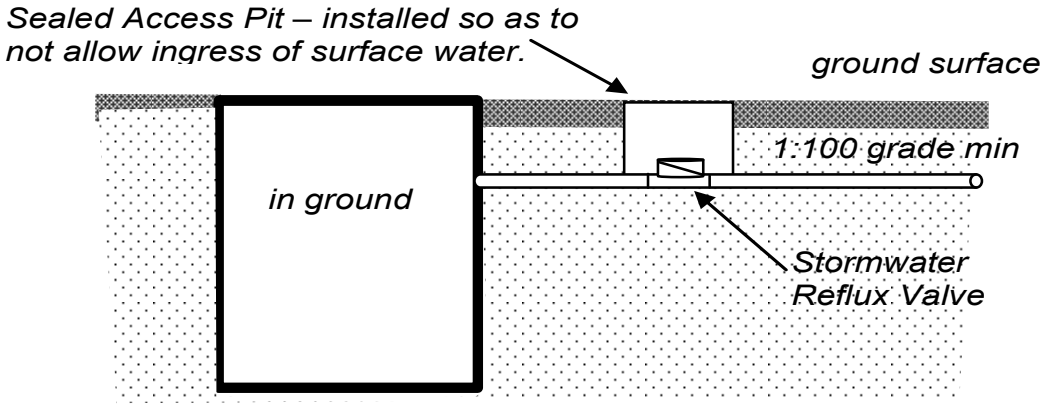
(a) Buried tank with no obstruction to overflow
MEDIUM HAZARD



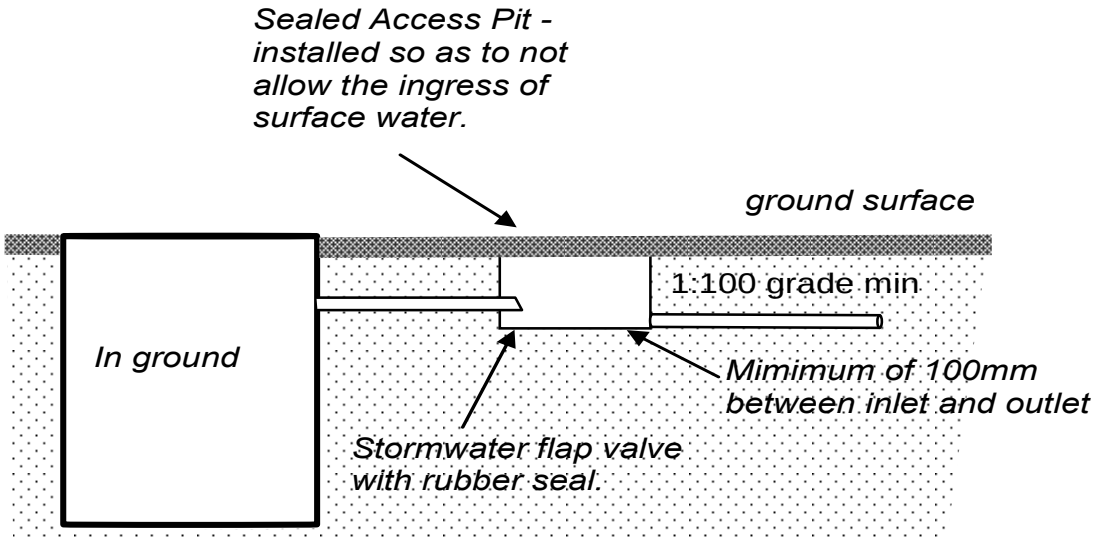
(b) Part buried tank on site subject to water logging above minimum water level stored in tank.
MEDIUM HAZARD

Figure 4: Examples of rainwater tanks that would be defined as below ground with medium hazard rating.

Note: All rainwater tanks shall be vermin proofed on the inlet and overflow connections.



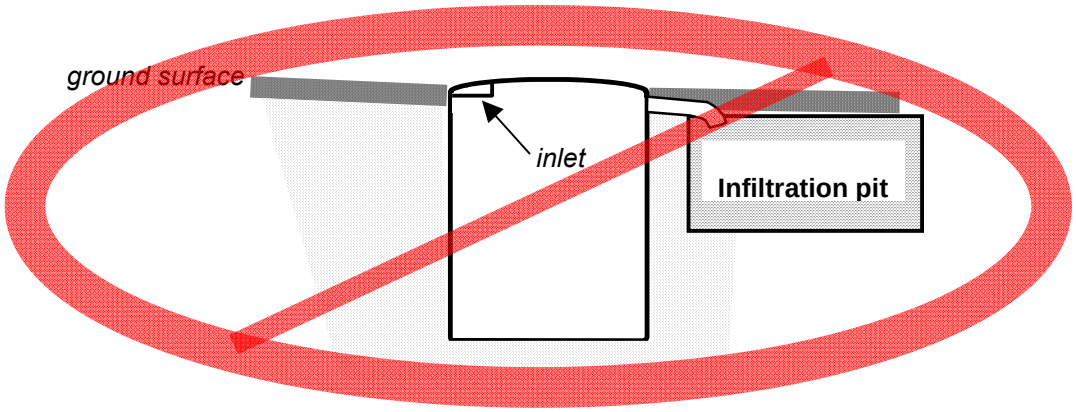
(c) Buried tank
MEDIUM HAZARD



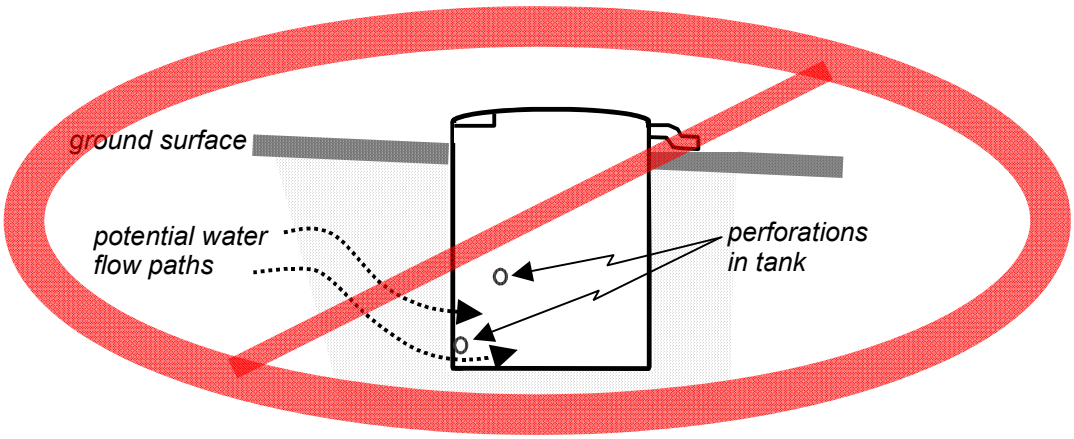
(d) Buried tank.
MEDIUM HAZARD

Figure 4: Examples of rainwater tanks that would be defined as below ground with medium hazard rating.

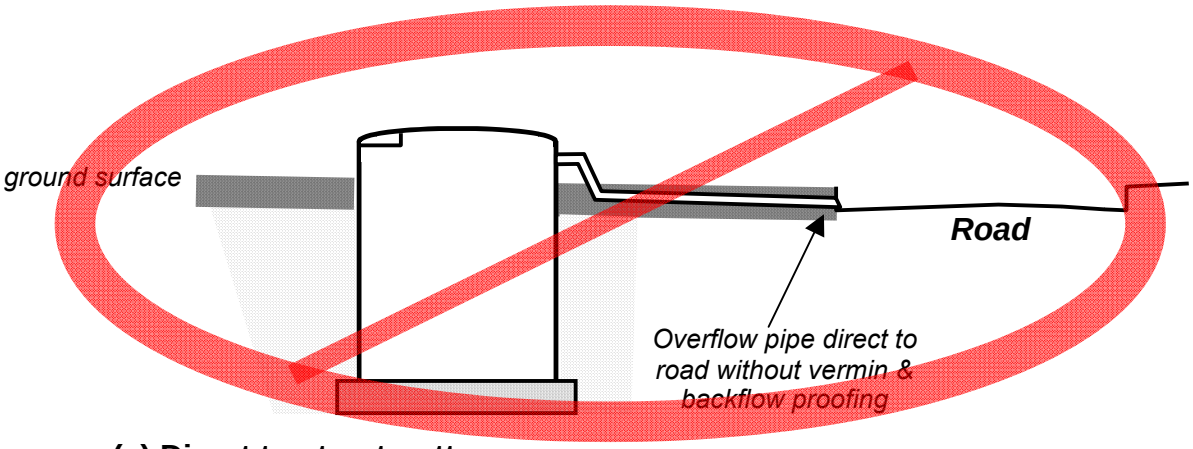
Note: All rainwater tanks shall be vermin proofed on the inlet and overflow connections.



(a) Buried tank with risk of stormwater contamination (inlet or outlet at or below ground surface)
HIGH HAZARD



(b) Leaking buried tanks
HIGH HAZARD



(c) Direct to street gutter
HIGH HAZARD

Figure 5: Examples of rainwater tanks that would be defined as below ground with 'High hazard' rating. Rainwater tanks with 'High Hazard' rating **MUST NOT** be cross connected with mains water supply.

Exceptions to the general rules

Hunter Water reserves the right to increase the hazard rating of any rainwater tank installation above the ratings typical for the type of installation. Hunter Water may take this action if any of the following occur:

- The water stored in the tank becomes polluted by decaying plant or animal material, or
- the tank develops a leak at or below ground surface, or
- liquids other than mains water or rainwater are stored in the tank, or
- chemicals are added to the tank such that they pose a health risk, or
- roof, guttering or tank corrosion or weathering by-products pollute the water in the tank, or
- the roof and/or guttering system being used collect rainwater becomes polluted.

Subsequent inspections and reassessment of hazard rating

If, at any point in time, a cross connected rainwater tank is inspected and is assessed to be a high hazard, Hunter Water will require the rainwater tank to be immediately disconnected from the mains water supply by removal of a section of the linking pipework. The cross connection shall not be reinstated until the rainwater tank configuration and/or state of maintenance are improved to meet the requirements of a medium or low hazard installation.

2.6 Backflow Prevention Requirements

A backflow prevention device is defined in AS 3500 as a mechanical device which will prevent the reverse flow of water from a potentially polluted source into the drinking water supply system.

Required location of backflow prevention devices

For cross connected low and medium hazard rainwater tanks backflow prevention devices are required at two locations. The two locations for backflow prevention devices on low and medium hazard rainwater tanks are:

1. At the point of cross connection (zone protection)
2. At the property boundary - integral with or inline with the water meter (containment protection)

High hazard rainwater tanks shall not be cross connected.

Figures **6** and **7** show the required location of the zone protection device relative to the point of cross connection.
Figure **8** shows the required location of the containment protection device.

Note; for multiple occupancy developments (industrial, commercial and residential sites), zone and fixture containment will be required.

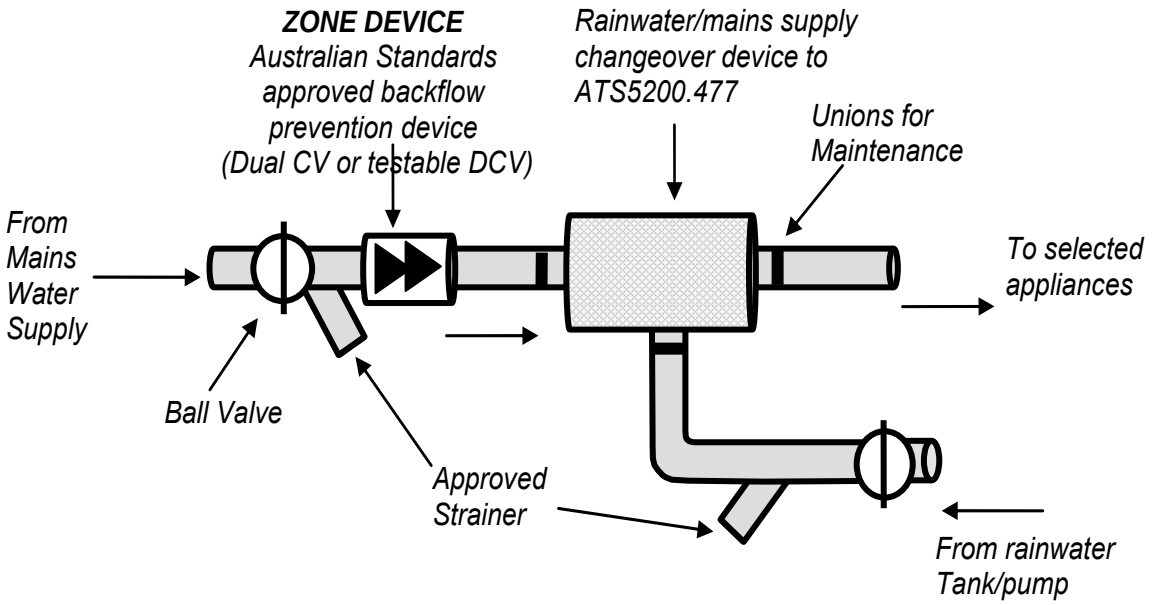


Figure 6: Automatically Controlled Cross Connection

Note: Backflow and changeover device must be installed with unions to facilitate removal for maintenance.

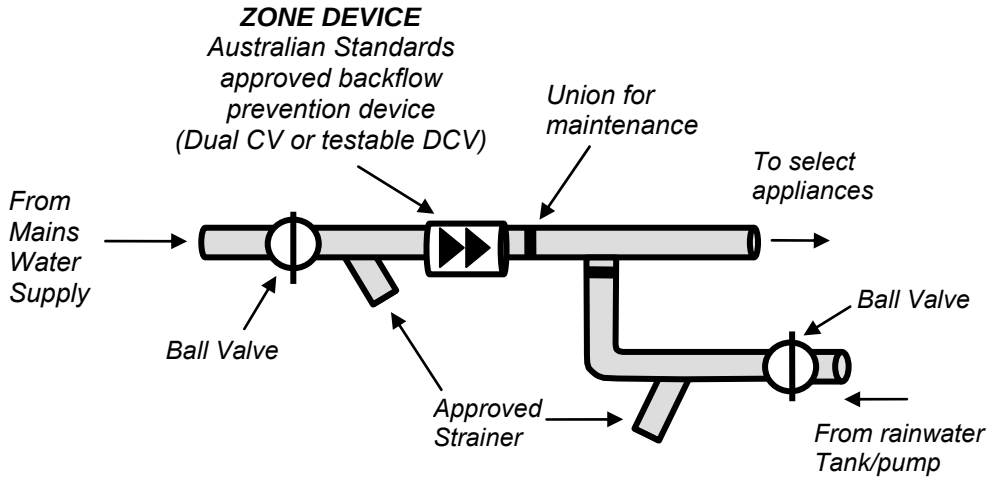


Figure 7: Manually Controlled Cross Connection

Note: Backflow device must be installed with unions to facilitate removal for maintenance.

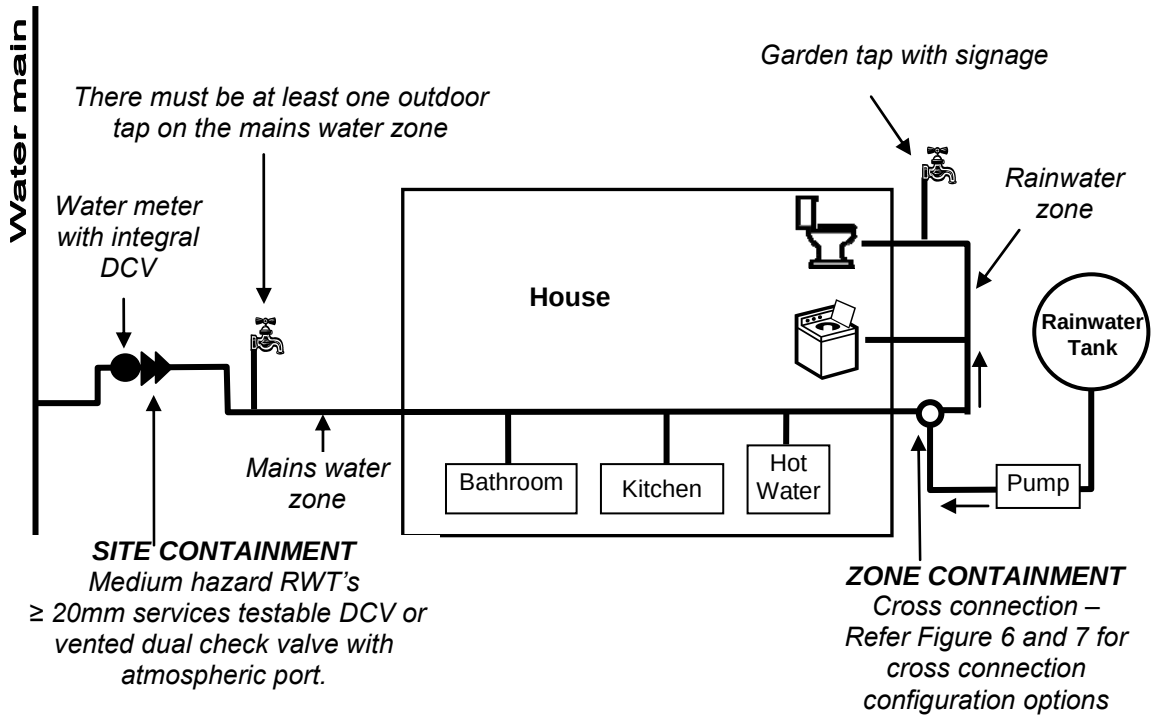


Figure 8: Cross connection configuration for rainwater supply to select appliances - toilet, washing machine & outdoor tap.

NSW Department of Health state: "the use of rainwater tanks for drinking purposes is not recommended where a reticulated potable water supply is available".

Required type of backflow prevention devices

The type of backflow protection required at each location is dependent on the hazard rating associated with the rainwater tank installation. The following table shows the required type of backflow prevention devices.

Hazard rating of rainwater tank	**Required type of Australian Standards Approved backflow prevention device**	
	Zone protection device	**Boundary/Site protection device**
Low hazard	Dual check valve (DCV)[1]	Water meter with integral Dual Check Valve (20mm only). Independent Dual Check Valve shall be fitted at the outlet of the water meter for 25mm and greater.
Medium hazard	Dual check valve (DCV)[1]	Medium hazard RWT's ≥ 20mm services testable DCV or vented dual check valve with atmospheric port. Note: Vented dual check shall only be installed horizontal.

High hazard	Cross connection with drinking water supply not permitted

Note 1: Hunter Water will accept either an Australian Standard's approved Dual Check Valve or Australian Standard's approved testable DCV for the zone protection.
Note 2: All backflow prevention devices shall be fitted with in-line strainers to protect integrity of the device.

Registration, inspection and replacement of backflow prevention devices

For medium hazard installations, installation (when directed by HWC) of a testable DCV at the boundary is mandatory (see Note 3), and it will be entered into the Hunter Water register of testable devices. Owners will be required to provide **annual certification** of the device to Hunter Water at the **owner's expense**.

If a customer chooses to install a testable DCV at a location where it is not mandatory (eg for zone protection), Hunter Water will not enter the device onto its register. Testing of the device would be at the owner's discretion.

The boundary water meter with integral Dual Check Valve used for low hazard installations does not require annual testing. Hunter Water may, however, require more frequent replacement of the water meter than for houses without rainwater tanks.

Plumbing Requirements for Cross Connections to HWC mains water supply

Please note that the requirements of this clause do not apply to an independently plumbed rainwater tank. Refer Clause 3.3 for the definition of 'independently plumbed'.

Fittings

All components used to construct a rainwater harvest bypass system must meet the relevant plumbing standards i.e. water mark or Australia Standards Approval.

Layout

The bypass (cross connection) is deemed to be the point in the customers pipework that marks the divide between pipework that can be supplied by the rainwater tank and pipework that is supplied solely by mains water.

If a cross connection is to be installed, Hunter Water recommends that the cross connection be at a three way junction in the pipework between mains water supply, rainwater tank supply and the delivery pipe to the appliances being supplied with rainwater.

Note: All rainwater pipe lines shall be suitably signed and colour coded.

Figure **8** shows typical plumbing to and from a three way cross connection. This type of cross connection is recommended because it offers the greatest operational flexibility to the home owner.

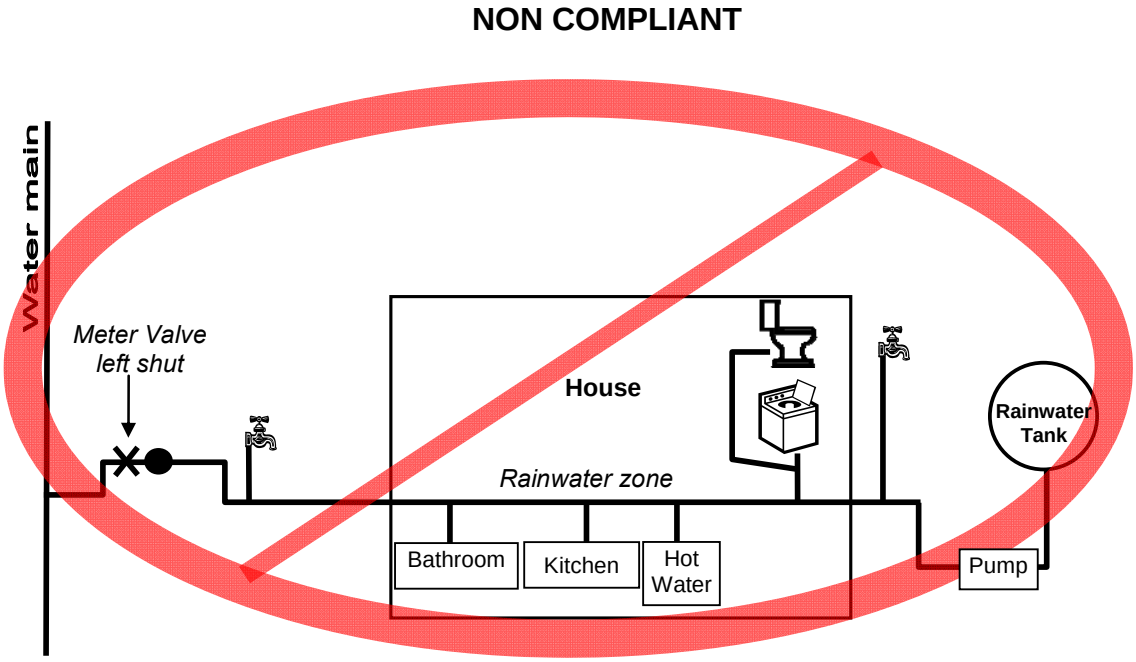


Figure 9: Unacceptable rainwater configuration. Shutting the meter valve to separate mains water supply from rainwater supply is not permitted. There must be at least one outdoor tap supplied solely by mains water and the meter valve must be left open.

Under no circumstances shall a closed water meter stop tap be used as the break point between mains water supply and rainwater supply. An example of unacceptable use of the meter tap as the point of cross connection is shown in **Figure 9.**

For all installations, Hunter Water requires that there must be at least one outdoor hose tap supplied solely by mains water (ie in between the water meter and the point of cross connection), preferably located near the water meter frame. This hose tap has multiple functions. It provides a mains pressure water supply for fire-fighting purposes independent of household electrical supply and also allows Hunter Water staff to test the function of the water meter.

2.7 Recommended End Uses for Rainwater

Hunter Water does not regulate the end uses for rainwater. Based on NSW Department of Health recommendations, Hunter Water recommends that rainwater collected from a clean roof via a well maintained guttering system and stored in a well maintained rainwater tank should be of suitable quality to flush toilets, water the garden, and wash clothes.

Hunter Water notes that the water quality of rainwater is largely controlled by the property owner and can be highly variable depending on the level of maintenance of the roof, gutters and tank, the extent of overhanging vegetation and atmospheric pollution levels. Rainwater will have different corrosive properties than mains water. Rainwater is not fluoridated nor chlorinated.

While Hunter Water does not recommend plumbing all end uses in a dwelling to rainwater, Hunter Water's plumbing guidelines do not prevent customer's from choosing to take up this option.

3 Definitions

3.1 Above ground rainwater tank

An above ground rainwater tank is a tank collecting roof water only that meets all of the following criteria:

- at least half the tank is above ground (may be fully above ground), and
- view of and access to the inlet pipe, air gap and overflow pipe are unobstructed, and
- any fill or soil placed against the tank is free draining (eg coarse river sand), and
- the site is not prone to waterlogging above the minimum level that water can be stored in the rainwater tank (ie pump cut-out level or mains water top-up target level).

3.2 Below ground rainwater tank

A below ground rainwater tank is a tank collecting roof water only for which one or more of the following criteria are true:

- more than half of the tank is underneath the ground, or
- the view of and access to any one of the inlet pipe, air gap and overflow pipe is obscured by the ground or something similar (eg rockery or garden bed), or
- any fill or soil placed against the tank is not free draining (eg clay fill), or
- the site is prone to waterlogging above the minimum water level in the rainwater tank.

There should be no possibility that surface runoff (eg on a sloping site) will drain into the rainwater tank:

- no open stormwater pits,
- backflow from street gutters,
- stormwater retention pits shall not be connected to any rainwater tank cross connected to HWC potable supply.

3.3 Independently plumbed rainwater tank

An independently plumbed rainwater tank is a rainwater tank that is not cross connected with the mains water supply. An independently plumbed rainwater tank may still have a mains water top-up mechanism with an air gap. In its simplest form, an independently plumbed rainwater tank could be the sole source of water supply to an outdoor tap or the 'shed toilet'.

Hunter Water does not require any special backflow prevention devices to be installed for independently plumbed rainwater tanks except the replacement of existing non backflow water meters with integrated dual check valve water meters.

3.4 Rainwater tank with cross connection

A rainwater tank with cross connection is a rainwater tank with a supply pipe that is cross connected with the mains water supply. The purpose of the cross connection is invariably to allow either automatic or manual mains water backup supply to appliances connected to the rainwater tank. The backup could be used during a power failure, low water level in the tank or if there is some sort of failure in the rainwater system (eg pump failure).

Refer ATS 5200.477 – 2006 Technical Specification for plumbing and drainage products.
Part 477: Rainwater/mains supply change over device.

3.5 Hazard rating

The hazard rating refers to the level of health risk associated with a particular rainwater tank installation. The level of backflow protection required by Hunter Water Corporation for cross connected rainwater tanks is based on the hazard rating. The three applicable hazard ratings are: high, medium and low.

3.6 Site Containment

A backflow prevention device installed at the water meter(s) on the property boundary, to prevent backflow from within the property.

3.7 Zone Containment

A backflow prevention device installed at the connection to specified sections of a plumbing system within a building or facility.

3.8 Individual Containment

A backflow prevention device installed at the water connection to a fixture or appliance.

4 Additional Documents for Reference

- AS 3500-2003: Plumbing and Drainage.
- ATS 5200.477 Rainwater/mains supply changeover devices.
- NSW State Code of Practice: Plumbing and Drainage 2006.
- Sydney Water Guidelines – Rainwater Tanks 2003.
- BASIX.
- Building Code of Australia.
- NSW Department of Health Guidelines – Rainwater Tanks