WAIMAKARIRI DISTRICT COUNCIL

HYGIENE CODE OF PRACTICE FOR WORK ON PUBLIC WATER SUPPLIES

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1	Colin Roxburgh	Original version for adoption by Council	July 2020
2	Colin Roxburgh	Minor amendments to include reference to use of water for dust suppression purposes.	Oct 2020

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1 Introduction

The Waimakariri District Council monitors the water quality throughout its fourteen public water supplies on a daily basis to ensure a safe supply is maintained.

On a number of schemes a minimum residual chlorine level of 0.2mg/L is maintained in order to protect the supplies from bacteria that may enter downstream of the treatment plant. In particular, the schemes where this is added are rural-restricted or semi-restricted schemes where water enters private tanks before being consumed. These private tanks introduce an additional risk of contamination after the point of supply, and thus the extra level of protection is required in these cases. In total there are 14 schemes, 8 which are chlorinated and 6 which are unchlorinated.

The schemes where a chlorine residual is maintained are as follows:

- Mandeville-Fernside
- Oxford Rural No.1
- Oxford Rural No.2
- Poyntzs Road
- Garrymere
- Ohoka
- West Eyreton – Summerhill
- Pegasus (not rural-restricted however chlorine was previously used as part of manganese removal process, and is being left in place until further certainty is gained on future requirements under new regulator).

Aside from Pegasus (as noted above), all of the predominantly on-demand schemes do not have residual chlorine. These schemes supply Drinking-water Standards New Zealand complaint water from their plants. This is achieved either through the secure groundwater classification system, or by applying UV disinfection to the water before it is distributed. These schemes are:

- Rangiora
- Kaiapoi
- Woodend
- Waikuku Beach
- Cust
- Oxford Urban

In the case of the unchlorinated schemes, emergency chlorine systems are available such that they can be chlorinated at short notice, in response to an event. The potential triggers for such actions are detailed in individual scheme Water Safety Plans.

In both the cases of the chlorinated and unchlorinated schemes, it is imperative that the quality of the water delivered from the treatment plants is not compromised as the water is transported through the reticulation system to residents' properties. In order to achieve this, it is required that works carried out on the water supply network follow industry good practices as outlined in this Code of Practice in order to preserve water quality and safeguard the water system against contamination, both chemical and microbiological.

2 Objectives

Water supply authorities are required by law to ensure that the water supply system is free from conditions that may be hazardous to public health. The Health (Drinking water) Amendment Act 2007 requires drinking water suppliers to take all practicable steps to ensure they provide an adequate supply of drinking water that complies with the DWSNZ.

The objectives of this Code of Practice are to:

a) Prevent contamination of the water supply system by defining the minimum requirements for the disinfection of new watermains.
b) Prevent contamination of the water supply system by defining the minimum requirements for the disinfection of existing watermains and fittings following planned or reactive maintenance.
c) Prevent contamination of the water supply system by defining required best practices for workers and materials that come in contact with water.
d) Comply with regulatory requirements under:

- Health (Drinking Water) Amendment Act 2007
- Drinking Water Standards for New Zealand 2005 (Revised 2018)
- Health and Safety at Work Act 2015
- Resource Management Act 1991

e) Set out practices that follow good practice through the Guidelines for Drinking Water Quality Management for New Zealand 2005 (2016 edition).
f) Assist with demonstrating gaining an approved Water Safety Plan for each scheme.

2.1 Areas of Application

- Installation of new mains and connections
- Reticulation repairs/maintenance
- Valve and hydrants inspections/repairs
- Extracting water from hydrants
- Flushing of reticulation systems
- Reticulation inspections involving cutting of live mains
- Service connections and meters
- Temporary supplies
- Repair work or modification work on pipeline or connected facilities
- Water pump stations
- Reservoirs
- Transmission pipeline specific requirements
- Treated Water tanks at water treatment facilities
- Wells and surface pumps

2.2 Deviation from standard procedures

Where there are deviations from the procedure, for example during emergency works, these works shall be fully documented with supporting information showing the alternative disinfection procedures utilised and the reasons for deviations from the standard procedures. Any changes from the standard procedure needs to be approved by the appropriate 3 Waters Representative (see Appendix D for definitions).

2.3 Roles and Responsibilities

Contractor Responsibility

All water supply contractors must adhere to the Disinfection Code of Practice for all work on the Waimakariri District Council water supply networks.

Contractors, Engineers overseeing works, and 3 Waters Representatives shall audit the disinfection practises to ensure the Code is being followed. Records must be kept of audit results.

Contractors shall ensure that their water reticulation workers are medically fit for work on a daily basis. Refer to section 3.2 Water Reticulation Workers – Hygiene and Health.

Any problems or deviations from the outlined procedures, or any confirmed or suspected contamination of the water supply network, must be reported this as per Section 2.2 at the earliest opportunity.

3 Waters Unit Responsibility

The 3 Waters Unit will then respond to the event in accordance with the relevant Water Safety Plan.

In response to any issues, the responsibilities of the 3 Waters Representative (or any delegated staff member) are to:

- Be satisfied that disinfection and safety of the system is being undertaken in compliance with written procedures;
- Identify any special conditions or restrictions applicable to the management procedure being followed;
- Maintain a record of key steps taken in their relevant area of authorisation.

2.4 Reporting of Gastrointestinal Illness

Water supply workers shall report any gastrointestinal illness (e.g. vomiting, diarrhoea) or having had a gastric or viral illness within two weeks leading up to work on treated water facilities to their employer. The worker shall be required to not undertake any work in direct contact with the live water network for a minimum of 48 hours from the time that their last symptom of the illness is experienced.

In the event of a specific outbreak of a particular disease, they shall also follow any advice from the Ministry of Health or Canterbury District Health Board that may supersede the above minimum requirements.

Refer to section 3.2 Water Reticulation Workers – Hygiene and Health.

Medical clearance shall be provided upon request. In particular, this shall be required for any staff member diagnosed with a serious illness including typhoid, shigella, cholera or hepatitis A.

Any stand downs, or serious illnesses shall be reported through the following channels, depending on the nature of the works:

New subdivisions:	Reporting to the assigned Subdivisions Engineer, who shall notify a 3 Waters Representative.
Capital works:	Reporting to the Engineer's Representative, who shall notify a 3 Waters Representative.
Maintenance works:	Reporting to the Waimakariri District Council's 3 Waters Representative.

2.5 Notification

Any incident in which it is believed that the safety of the supply may have been compromised, or any testing indicating a transgression, will be reported to the Council staff member responsible for the works, who shall report this to a 3 Waters Representative. Proven transgressions will be notified to the Drinking Water Assessor by a 3 Waters Representative.

If E. coli contamination is detected the Waimakariri District Council will follow internal procedures defined in the relevant Water Safety Plan.

2.6 Assessment of Level of Risk

Disinfection is key to preventing contamination of the water supply during maintenance but isn't a substitute for incorrect procedures and poor practices.

The level of risk shall be assessed for all work carried out on the water supply system. In work on the live system, the contractor shall assess the risk of contamination on a case-by-case basis using the procedure in section 8.1 and then follow the corresponding recommended procedures.

The procedure for work and requirement for bacteriological testing depends upon the level of risk of contamination to the water supply system.

3 Water reticulation workers

3.1 Qualifications

Work on the water reticulation system shall be undertaken by a Water Supply Installer who is dedicated to the job on site overseeing the work who meets one of the requirements below:

- Is certified as a Christchurch City Council (CCC) Authorised Water Supply Installer, OR;

- Holds one of the following qualifications, as a minimum;

    - National Certificate in Water Reticulation (Planned and Reactive Maintenance Technician) (Level 3), OR;
    - New Zealand Certificate in Utilities Maintenance (Strand Water) (Level 4), OR;
    - Have committed to ongoing training towards the New Zealand Certificate in Utilities Maintenance (Strand Water) (Level 4), OR;
    - New Zealand Certificate in Infrastructure Works (Pipeline Construction and Maintenance) (Level 4) (strand Drinking-Water), OR;
    - New Zealand Certificate in Pipe Installations (Level 4) (trenched).

The qualified Water Supply Installer shall be present on site to oversee the pipe installations, connections and sterilisation process. This requirement shall apply to:

- Tendered capital works on the reticulation system;
- Subdivision works;
- Reticulation maintenance works.

For other works that are not specifically reticulation works (i.e. reservoir repairs, pump replacement or well works) where the above qualifications may not be relevant, staff do not require the above authorisation. For these works, the contractor shall submit and adhere to a site specific safety plan (SSSP) detailing disinfection practices that are approved by a suitably qualified and experienced Waimakariri District Council staff member prior to undertaking the works.

It is also noted that the above outlines generic minimum requirements. The Waimakariri District Council may impose any other requirements over and above these minimum requirements for individual construction contracts or subdivision consents, if deemed necessary.

Any exceptions to the above minimum requirements are required to be approved in writing by a 3 Waters Representative.

3.2 Hygiene and Health

Water supply workers are to partake in normal good personal hygiene procedures (washing hands after going to the toilet). Water supply workers with running/septic skin infections or wounds shall not work on the water supply network unless the infection or wound is effectively dressed and in a location unlikely to be immersed.

The Waimakariri District Council may at any time require water supply workers to produce a medical clearance against being carriers of potentially waterborne diseases including *Shigella, Salmonella, Campylobacter, Hepatitis A, Giardia* and *Cryptosporidium, COVID-19*.

External contractors who have recently worked on stormwater or wastewater sites (reticulation or treatment) shall not work on any water supply works until new or disinfected PPE is provided for the worker(s), and they have adequately washed themselves.

For the Waimakariri District Council's Water Unit, their standard procure shall be followed for these works (refer Appendix A).

4 Disinfection of tools, material and other equipment

Information provided in this section is generic minimum requirements for any contractor working on Council's water reticulation network. Additional detail on practices followed by the Council's Water Unit is provided in specific standard operating procedures appended to this document.

4.1 Vehicles

A high standard of cleanliness shall be maintained in the interiors of all vehicles used for water reticulation works. Vehicles must be equipped with sanitary wipes or antibacterial liquid for hand sanitation when working on site.

The exterior of vehicles shall be maintained in a clean state. How this cleanliness is achieved shall be managed by individual contractors using their own processes. These processes may include separate vehicles for water and wastewater activities, separate processes for inspections versus maintenance works, and processes for cleaning vehicles, including what would trigger cleaning to be undertaken, and what the cleaning method shall be employed. Contractors shall provide this methodology to Council upon request.

4.2 Stores

A high standard of cleanliness shall be maintained in the interior of all stores.

Water supply and wastewater equipment shall be stored separately. All materials shall be stored and handled to minimise contact with foreign materials. Fittings shall be boxed, capped or sealed with plastic wrapping. All pipes shall be capped.

4.3 Tools and Equipment

Separate tools and equipment must be used for water reticulation and wastewater or stormwater reticulation works. In cases where this is not possible, they are to be thoroughly cleaned and disinfected before use. This shall include disinfection either using a minimum 1% chlorine spray, or by submerging the tool into a 1% chlorine solution, if being used on water supply activity after sewage work.

Larger items of plant and equipment that may have become contaminated (i.e. excavators) shall be steam cleaned before use on potable water works. Disinfected tools must not be placed directly on the ground prior to use.

4.4 Materials

All materials used in the construction or maintenance of the main and fittings that come into contact with the drinking-water must be:

1. provided sealed by the manufacturer and covered until immediately before use,

Or

2. thoroughly disinfected and sprayed or rinsed in a minimum 1% chlorine solution (10,000 mg/l) prior to use. Disinfected items must be protected from potential contamination sources after sterilisation and prior to installation.

A bactericidal lubricant complying with AS/NZS4020 shall be used on all rings and gaskets coming into contact with the reticulated water.

4.5 Disinfection and Neutralising Chemicals

A minimum 1% solution for disinfection of tools, equipment, fittings and materials shall be used. A newly prepared solution shall be made available at least 6-weekly and the old solution disposed of after dechlorination.

Chemical neutralising of chlorine solution (dechlorination) should only be carried out using the chemicals listed in Appendix C.

4.6 Use of Fire Hydrants

Contractors connecting to fire hydrants can present a risk of contaminating the water supply network if there is a loss of pressure causing a backflow event while they are connected. The way this is managed is outlined below:

4.6.1 Dedicated Tanker Filling Points

Any filling of tankers shall be done at one of Council's dedicated tanker filling points, where a reduced pressure zone (RPZ) backflow prevention device is permanently installed upstream of the hydrant. Contractors must obtain a permit to use one of these filling points. At these filling points, the standpipes do not need to have a backflow preventer, although they should be generally kept clean. Information on these filling points can be found here:

https://www.waimakariri.govt.nz/services/water-services/tanker-filling-points

4.6.2 Use of Hydrants that are not Dedicated Tanker Filling Points

Only the Waimakariri District Council, Fire and Emergency New Zealand (FENZ), or a contractor with specific written approval under exceptional circumstances, shall use a hydrant that is not at one of the dedicated tanker filling points.

Water Unit Processes

As the Water Unit are the Council's dedicated operation and maintenance contractor, there are requirements for them to use hydrants that are different to other contractors. The Water Unit may be undertaking flushing of a scheme, either in reaction to a water quality event, or as part of programmed works. In general, routine flushing does not require upstands with backflow preventers provided the following requirements are able to be met:

- All upstands clean, and meet requirements for other tools and equipment used on water supply (as per Section 4.3)
- No hose connected to upstand, such that water is flowing freely to open air environment (therefore no risk of backflow), OR;
- If layflat hosing is used to control discharge;
    - Layflat hosing meets requirements for tools and equipment in terms of cleanliness, as per Section 4.3.
    - The layflat hose must be laid above ground, and not submerged in water at all.
    - The hydrant must be manned at all times by an experienced operator, ready to close the hydrant if there is any loss of pressure event.

In any other scenario, an upstand with a backflow preventer shall be used.

External Contractors

The form to gain approval to use a fire hydrant that is not at one of the dedicated filling points can be found here:

https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/10566/QS-U590-Permit-to-Use-Fire-Hydrant-Template-Is2-Updated-April-2019-Form-Fillable.PDF

A type of scenario where a contractor connecting to a hydrant that is not at a dedicated filling point would be an approved Chlorination Contractor connecting as part of the pressure testing and chlorination of a new water main, as described in Section 4.8 and 5.1.

4.7 Water Tankers for Emergency Supply of Potable Water

Any tanker used to provide emergency water supply for the Waimakariri District Council must be a tanker water carrier that only carries Class 1(a) water as defined by the Ministry of Health: Class 1(a) is water taken from a reticulated supply that complies with the DWSNZ and is listed in the Register of Community Drinking water Supplies and Suppliers in New Zealand.

4.8 Water Tankers for Super-chlorination

Chlorination of new mains shall be completed by either personnel specified on the Christchurch City Council (CCC) Approved Chlorination Contractor webpage (https://ccc.govt.nz/consents-and-licences/construction-requirements/approved-contractors/chlorination-contractors), or by the Waimakariri District Council's Water Unit.

These contractors shall either:

- Use a tanker to carry the water to the site that is clean, and is dedicated for the purpose of commissioning new water mains (i.e. it must not be a tanker that is used for any other activities such as wastewater or stormwater systems). In this event, the tanker shall be filled at one of Council's dedicated tanker filling points, as per Section 4.6.
- Fill pipes with water for super chlorination from a hydrant on the live system by:
    - Obtaining a permit to use a fire hydrant as per Section 4.6, and;
    - Installing a temporary connection to the network as per Section 5.1.

For further information on the requirements for the chlorination of new mains as part of their commissioning, refer to Section 6.2.

5 Work Practises

Good practices shall be applied at all times in main laying, maintenance and repair procedures.

In the event of a confirmed or suspected contamination of the water supply system the immediate area shall be isolated and escalated to a 3 Waters Representative.

All connecting valves used to isolate the reticulated water from a main being disinfected shall be tagged and recorded by the site supervisor responsible for the disinfection and signed off at re-commissioning.

5.1 Backflow Prevention Devices for Temporary Connections

Temporary connections may be required in some specific circumstances. An example would be to fill a pipe as part of super chlorination or pressure testing.

Prior to installing the temporary connection, the contractor shall apply to connect to a fire hydrant as per Section 4.6.2.

All temporary connections of reticulated water to mains shall incorporate a testable double check backflow prevention device, or an RPZ device. This includes water being used for hydrostatic pressure testing, flushing and disinfection. See Figure 5.1 below for a recommended temporary set up.

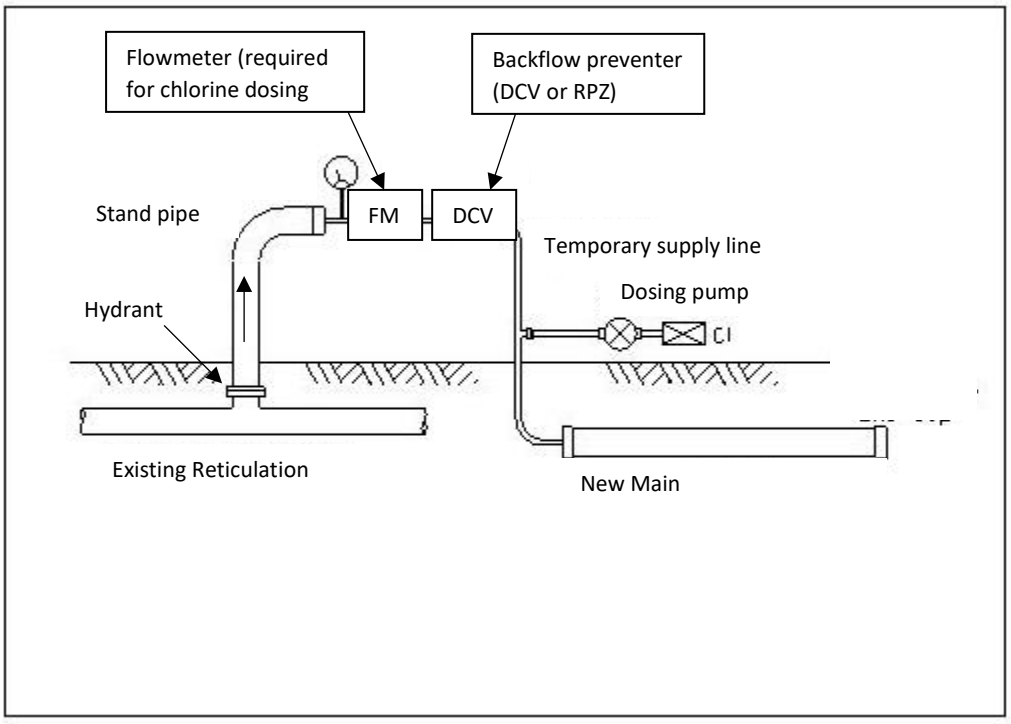


Figure 5.1: Suggested temporary flushing /dosing connection

For permanently installed backflow prevention devices refer to the Waimakariri District Council's Backflow Prevention Policy.

5.2 Air Scouring

Air scouring is not routinely undertaken on Waimakariri District Council supplies, and would only be undertaken by direct request from a 3 Waters Representative.

If undertaken, a specific control plan shall be adopted. Consideration shall be given to the potential requirements below in the creation of the control plan.

During a programme of air scouring the contractor shall ensure:

a) A trial shutdown is completed and shutdown notifications distributed to ensure scouring operations do not adversely affect public health.

b) All valves to be operated must be confirmed as functioning to close fully, so that they contain scour wastes.

c) All service connections, where possible, are isolated before air scouring.

d) All fittings and equipment must be disinfected with minimum 1% chlorine solution prior to use.

e) The compressor pressure shall be set at 200KPa less than the mains pressure to eliminate any risk of backflow.

f) All mains must be purged of scour waters following the air scouring to ensure mains are returned to service in a hygienic state.

h) Scouring should be followed by checks that the normal chlorine residual has been achieved again for normally chlorinated schemes, or bacteriological testing shall be completed for non-chlorinated schemes at the nearest available sampling location.

6 New watermains disinfection procedure

Connecting a new network watermain to the existing reticulation is not permitted until all requirements in the following sections have been successfully completed. The following overview gives two potential methods that could be employed. Approval shall be requested from the relevant Council Engineer (Engineer's Representative or Subdivisions Engineer) for the process to be used.

Method 1 – Using Temporary Connection

This method involves using a temporary connection (as per Figure 5.1) as outlined below. This is the preferred method:

1. Construct the pipe;
2. Undertaken pressure test (temporary connection as per 5.1 can be used to fill pipe);
3. Flush the pipe (use temporary connection as per 5.1 to achieve flushing velocity);
4. Chlorinate (use set-up as per 5.1 to dose chlorine);
5. Dispose of chlorinated water (can use mains pressure as per 5.1 to push out chlorinated water);
6. Connect to reticulated water (remove temporary connection, and construct permanent connection). Refer 6.3 for connection process.
7. Final flush using mains pressure after final connection.

Method 2 – No Temporary Connection

This method involves bringing in water for the pressure testing and chlorination. It is noted that with this method, the main cannot be flushed adequately until the mains are connected to generate sufficient flushing velocity. It therefore requires skilled and experienced operators to do this without risking water flowing in the wrong direction as part of the flushing exercise.

1. Construct the pipe;
2. Chlorinate (fill pipe using water brought in by tanker);
3. Undertaken pressure test

4. Flush out chlorinated water and dispose of (need to bring in more water to pump through to push out chlorinated water).
5. Connect to reticulated water (i.e. construct permanent connection). Refer 6.3 for connection process;
6. Flush using mains pressure after final connection, ensuring only connected from one location, and all water is flowing away from connection point.

6.1 Flushing

The main shall be thoroughly flushed in sections through hydrants, producing sufficient flow velocity to remove all foreign matter. The volume of water used must be equivalent to at least three times the volume of the pipe being flushed. This initial flushing shall be undertaken with water either brought in by tanker and pumped into the main, or through a connection as per Section 5.1.

Council may also require that the main (≥50mm internal diameter) shall be CCTV inspected and the CCTV report verified as completely free of debris and any pipe shavings before starting chlorination.

Flushing guidelines are provided in Appendix B.

If adequate flushing velocities are not able to be achieved prior to connecting to the live reticulation, then the connection may be able to be made at the discretion of the Waimakariri District Council, following preliminary flush. In these circumstances where the desired velocity cannot be achieved, the following steps shall be followed as a minimum:

- Potential CCTV survey, at the discretion of the Council. If undertaken, CCTV equipment used shall be dedicated for use in potable water supplies, and shall be stored / cleaned to maintain hygiene. Specific approval shall be obtained to undertake a CCTV survey prior to it commencing.
- The main shall have been adequately chlorinated, the chlorinated water disposed of, and replaced with potable water.
- Visual inspection of water being disposed for any signs of discolouration.
- Connection done under direct supervision of Council staff to ensure that reticulation water flows in one direction into the new pipework to achieve flushing velocities in a controlled manner, without any water from the new pipework being given a pathway to flow back into the live reticulation (i.e. water flow in controlled via a single isolation valve rather than multiple valves).

6.2 Chlorination

Following pressure testing of the pipework and prior to commissioning of any works with which potable water will come in contact, the system must be chlorinated. Chlorination shall be completed by either:

- The Waimakariri District Council Water Unit, for mains they have installed.
- A Christchurch City Council (CCC) Approved Chlorination Contractor to chlorinate the pipework. Refer to https://ccc.govt.nz/consents-and-licences/construction-requirements/approved-contractors/chlorination-contractors

The Chlorination Contractor will be required to arrange the provision, installation and removal of all temporary fittings necessary to allow for the introduction of the sterilising solution to, and its removal from, the system. The Chlorination Contractor is to ensure that a minimum of 24 hours' notice is given for sterilisation. The authorised installer is to flush the system to be sterilised to remove all debris and air (refer 6.1).

Note that the system must not be drained after flushing unless all high points are 'vented' to allow for complete removal of air.

The Chlorination Contractor will sterilise using a solution of water and chlorine. The system will be filled with water containing a free available chlorine (FAC) concentration of 25 g/m3 ± 5 g/m^3. It will be allowed to stand

for a minimum of 24 hours for all new systems. At the end of the disinfection period, the FAC concentration must be at least 10 g/m^3. If the FAC is less than 10 g/m^3 at the completion of the period, the disinfection process must be repeated until a satisfactory result is obtained.

6.2.1 Method of Introducing the Sterilising Solution:

The sterilising solution will be injected into the system using a portable chlorinator system, or using a tanker with a pre-mixed solution as outlined below. Under no circumstances will the use of hypochlorite powder or chlorine tablets dumped into the pipe and hydrant tees be an acceptable practice. The sterilising solution should be fed by gravity or pumped into one end of a stem if possible and the 'flushing' water in the system displaced out of the other end of the system to be disinfected until tests carried out show that the water being displaced contains the full FAC concentration.

6.2.2 Sterilising Process:

i. Fill the main with chlorinated water at the target concentration using one of the following two methods:
   a. If the solution is pre-mixed in a tank or tanker, the correct dose shall be achieved, and once confirmed, pumping of the water into the main shall commence. In this instance, the tanker shall have been filled with potable water from one of Council's designated tanker filling points prior to mixing with chlorine. OR;
   b. If the chlorine is to be dosed into the new main, this shall be done at the appropriate rate using a proportional dose system to achieve the target rate, based on a combination of the chlorine concentration and the flow rate being injected.

ii. Allow the chlorinated water to flow for at least the calculated travel time through the new mains before carrying out the initial total residual chlorination test.

iii. If the initial test complies, close off the main and leave the chlorinated water for 24hrs. If it fails, it will require re-chlorination.

iv. After 24hrs, carry out the free residual chlorine test. If it passes, continue. If it fails, repeat from step i.

v. Flush the main and dispose of the sterilising solution as detailed in the "Disposal of sterilising solution" clause (6.2.3 below). A flushing period exceeding the travel time by 15mins should be sufficient. Test for chlorine after disposing of the chlorinated water to ensure that the chlorine is at a level equivalent to or less than the normal level for that scheme.

For schemes where the water supply the pipe will be connected to is not normally chlorinated, and where the length of new pipe is > 100m:

vi. Take a sample for bacteriological testing. This shall be obtained from either a hydrant, flush point, or water toby box that is part of the new installation. If it fails, re-sterilise the watermain from step i.

vii. Commission the reticulation on achieving a complying bacteriological test.

6.2.3 Disposal of Sterilising Solution

After the satisfactory completion of the sterilising process, flush the main well before the services are connected. Flushing shall achieve a concentration of less than the normal chlorine levels for that supply (the Council can advise what this is for each supply). Dispose of the chlorine solution by either:

- Flushing into the sanitary sewer system (with approval from the Wastewater Asset Manager). This would require backflow prevention to be in place to prevent backflow of wastewater into the water main.
- Removing off-site; or
- Discharging to ground or to the storm water system in a manner approved by the Council. To do this, the solution must be de-chlorinated to below 1 mg/L (refer to Appendix C).

6.3 New Main Connection

The connection of a new main to existing reticulation may be treated as a medium risk (refer to Section 8.1 for risk classification) situation provided construction procedures are followed ensuring no contamination of either the new or existing main by foreign material or groundwater.

If the newly chlorinated main has not been connected to the existing reticulation within 15 working days of chlorination, the main shall be retested for E. coli as per the initial testing. If any of the new samples fail the E. coli test the disinfection procedure must be repeated.

The following process shall be followed in order to connect a new main (i.e following capital works project or new subdivision completion):

1. Complete application to connect form, submit to relevant Engineer (Subdivisions Engineer for subdivision work, Engineer's representative for Council capital works), and receive approval (https://www.waimakariri.govt.nz/__data/assets/pdf_file/0021/7554/QS-U550-AC-Application-for-Subdivision-to-connect-into-Council-Water-Main-effective-July-2019.pdf). This process will ensure that the following has happened:
    a) Residents have been informed of the planned shutdown.
    b) The main has been adequately chlorinated and flushed.
    c) The Water Unit are booked in to perform the shut down and stand-over.
2. Ensure Water Unit are on site to perform stand-over (as per connection application form).
3. Excavate trench and dig sump under the section of the existing pipe to be removed to allow for the connection. Ground shall be excavated to 200mm – 400mm below the bottom of the pipe, with the sump area sufficiently lower than this to allow pumping out of any water.
4. Shutdown and drain the connecting watermain in accordance with good practice. Ensure pumping is in place to pump this water from the trench while keeping the water level well below the pipe level.
5. If water is required to be added for dust suppression (i.e. AC pipe cutting where manual cutting methods are not possible), this shall be from a potable water source.
6. Thoroughly clean and disinfect existing connecting pipework/fittings. Use 1% chlorine spray.
7. Any new fittings to be installed shall be kept clear of the surrounding trench material and when unwrapped placed on a clean surface (e.g. impervious plastic sheet) until installed.
8. Spray all surfaces of fittings, and wipe the interior of open ends of the new and existing watermains with a minimum 1% chlorine solution (Refer to Section 4.5).
9. After completion of the work, the watermain must be flushed out through hydrants downstream of the new connection. The volume of water used must be equivalent to at least three pipe volumes.

7 Temporary Watermains Disinfection Procedures

When a project requires the use of a temporary watermain, all temporary fittings shall be disinfected as per Section 4 prior to connecting to the existing system.

7.1 Flushing

The temporary watermain shall be flushed with a volume of water equivalent to three pipe volumes of the temporary supply and flushed through all practical outlets to remove any foreign materials that may have entered during storage / installation. Refer to Appendix B for flushing volumes.

7.2 Chlorination

The temporary watermain and fittings shall be disinfected with a chlorine dose of 100 mg/l for a minimum period of 30 minutes. After the 30 minute contact time the water within the temporary watermain shall be re-tested and the residual FAC must not have dropped by more than 20mg/l. Field tests are acceptable as confirmation of the dosage.

The test results must be forwarded to relevant Council Engineer (Engineer's Representative or Subdivisions Engineer, whichever applicable).

Disposal of the super-chlorinated water shall be in accordance with the guidelines given under Section 6.2.3.

7.3 Post Chlorination Flushing

The watermain shall be thoroughly flushed in sections from an alternative potable water source with sufficient velocity of water to remove all foreign matter. The volume of water used must be equivalent to at least three pipe volumes. The final flushing water shall be tested for residual chlorine levels and must be equivalent to or less than the normal chlorine levels for that supply.

The test results must be forwarded to Engineer's Representative or Subdivisions Engineer (whichever applicable).

8 Disinfection Procedures for Emergency and Planned Repairs

It is noted that the Council's Water Unit is responsible for the maintenance of the Council's public water supplies. For any repairs to the reticulation system, the Water Unit will act as the head contractor for the repair. Generally, works will be completely solely by the Water Unit, however additional external resources may be called in as required.

Task specific Water Unit processes (or sub-processes) for typical repair types are appended to this document. These are documented using the Promapp process mapping software, which includes the following in Appendix A:

- Repair or Replace Toby Valves or Toby Box
- Replace Restrictor Housing
- Repair a Sluice Valve
- Complete Shutdown of Water Supply
- Install a New Fire Hydrant
- Complete Pipeline Repairs
- Complete Installation of a New Water Connection

8.1 Risk of Contamination

The level of controls and checks required depends on the level of risk of contamination to the network. The risk level is defined below:

Low Risk: The pressure in the main is maintained at all times while carrying out the work. The following controls shall be in place for Low Risk repairs:

- Thoroughly clean area to be worked on prior to start.
- Spray external surfaces with minimum 1% chlorine solution.
- Complete repair and return to service.

Medium Risk: The de-pressurising of the main has occurred in a controlled manner, with an adequate sump constructed (approximately 400mm beneath base of pipe), and controlled discharge of any water from the trench. Under medium risk scenarios, the repair process can be completed as per the relevant standard process for the contractor completing the works. The standard process shall include the following as a minimum:

- Excavate while controlling positive pressure (controlling positive pressure may include reducing the amount of water flowing out of the leak, while still maintaining some pressure).

- Reduce water level in trench to below pipe by constructing appropriate sump and pumping
- Clean outside of pipe with minimum 1% chlorine solution.
- Completely isolate the pipe, and drain water to empty pipe. Ensure pumping sufficient to keep up with water as it is drained.
- Visually inspect flushed water for contaminants and/or discolouration. If water coming out of pipe is discoloured, treat as High Risk.
- Cut into the pipe ready to make the repair.
- If water is required to be added for dust suppression (i.e. AC pipe cutting where manual cutting methods are not possible), this shall be from a potable water source.
- Thoroughly clean and disinfect interior and exterior of open ends of pipe to be connected into.
- Complete the repair.
- After completion of works, flush in a controlled manner through the repaired section and to waste before putting back into service.

High Risk: If as part of an emergency repair process, it is either confirmed or suspected that contamination of the water main is considered likely to have occurred, this shall be classified as a High Risk scenario. This may be either from a third party damage event where contaminated material is believed to have come into contact with the live network, or where depressurisation of the damaged pipe is not adequately controlled where it is suspected contaminants are likely to have entered the pipe. Under this scenario, the following steps shall be taken:

- Contact a 3 Waters Representative to advise of the event. A specific plan will be developed as to the steps to be taken prior to returning the pipe to service. The 3 Waters Representative is to refer to the relevant Water Safety Plan for guidance.
- The contractor undertaking the repair (Water Unit) shall take all steps to reduce the spread of the suspected contamination.
- Isolate the water main being worked on.
- Reduce water level in trench to below pipe by constructing appropriate sump and pumping
- Clean outside of pipe with minimum 1% chlorine solution.
- Cut into the pipe ready to make the repair.
- If water is required to be added for dust suppression (i.e. AC pipe cutting where manual cutting methods are not possible), this shall be from a potable water source.
- Visually inspect flushed water for signs of contaminants and/or discolouration.
- Thoroughly clean and disinfect interior and exterior of open ends of pipe to be connected into.
- Complete repair.
- Plan re-commissioning process, with guidance from a 3 Waters team member.
- If bacteriological contamination is suspected, bacteriological testing will be undertaken from the most appropriate sampling location as part of the repair and recommissioning process. The specific location will be determined on a case by case basis, depending on the repair location relative to existing sample points. A portable sampling point will likely be required (i.e. flammable sample tap that can be fitted to either a fire hydrant, or screwed onto a water toby box). This test shall consist the parameters outlined in Section 11.
- The steps taken by the maintenance contractor shall be recorded, and a review completed following the repair process.

8.2 Bacteriological Sampling Procedure

Where samples are required, the results shall be within the limits outlined in Section 11.

E. coli and total coliforms analysis must be completed by an IANZ registered laboratory. It is noted that the Council's Water Unit is responsible for E. coli sampling on the Council's public water supplies. The Water Unit procedures for taking bacteriological samples are appended (refer Appendix A)

9 Well and Surface Pump Maintenance

Any contractor who will be carrying out work on either wells, well pumps, or surface pumps, shall submit a methodology to the Council party engaging them to complete the works to demonstrate how they will manage the hygiene of the work.

9.1 Well Pump Replacement

Below are the minimum requirements for work on well pumps, which involves removing the well pump from the casing and either carrying out maintenance or replacement.

- Ensure staff working on site who will come into contact with the equipment manage their own personal hygiene as per Section 3.2
- Have 1% chlorine solution available on site, stored securely.
- Ensure all riser pipe removed is stored securely, with ends of pipe protected from both organic matter and potential for vermin to enter.
- Ensure all cables are stored securely, coiled up, and protected from any organic matter or potential contamination sources.
- All riser pipe, cables, pumps and any other equipment to be reinstalled into the well shall be treated with chlorine solution.
- Well flushed to waste and E. coli sample taken, and result confirmed as absent of E. coli prior to recommissioning. This criteria of waiting for the E. coli result before re-commissioning can only be waived with the approval of an designated member of the 3 Waters Team (refer Appendix D). Events that might allow this exception would be where the well that has been out of service is critical to maintaining supply, and the continued use of the backup supply (or the absence of any backup supply) in the interim is considered to present a higher level of risk than using the newly commissioned well without waiting for the E. coli result.

9.2 Surface Pump Replacement

Below are the minimum requirements for work on surface pumps, where parts of the pump are to be removed or in contact with the environment that will also be in contact with the drinking-water.

- Ensure staff working on site who will come into contact with the equipment manage their own personal hygiene as per Section 3.2
- Have 1% chlorine solution available on site, stored securely.
- Ensure all pipe / manifold removed is stored securely on site, with ends of pipe protected from any foreign material entering the pipe.
- All pipework / manifolds / gaskets, pumps and any other equipment to be reinstalled are treated thoroughly with chlorine solution.

10 Reservoir disinfection procedure

Reservoir disinfection is typically carried out by the Council's Water Unit. The Water Unit's Promapp process for reservoir cleaning is appended to this document (Complete Reservoir Cleaning and Recommissioning). In the event that a contractor other than the Water Unit is to undertake reservoir cleaning and disinfection, they shall follow the Water Unit's procedure, or an approved alternative.

Additional guidance for reservoir disinfection is provided in AWWA Standard ANSI/AWWA C652-02 for "Disinfection of Water-storage Facilities".

11 Laboratory test results

E. coli and total coliforms analysis must be completed by an IANZ registered laboratory. It is noted that the Council's Water Unit is responsible for E. coli sampling on the Council's public water supplies. The Water Unit procedures for taking bacteriological samples are appended (refer Appendix A)

The sample results shall be in accordance with Table 2 before the reservoir or pipeline will be considered satisfactory to put into service.

Table 1: Acceptable laboratory test results

Parameter	Acceptable Value
Residual chlorine (FAC)	Less than normal value for scheme (Council can advise for each scheme)
Turbidity (NTU)	Less than 1 NTU
pH	Within 0.2 of normal value for scheme (Council can advise for each scheme)
E. coli	<1 per 100 ml sample
Total coliforms	Target value 0 per 100mL sample. Values greater than this to be discussed with Council representative for guidance.
Odour	no adverse odour

Appendix A – Water Unit Key Processes

General Hygiene and Cleanliness:

A1 – Practice General Hygiene and Cleanliness While Carrying out Water Unit Work

A2 – Moving From Wastewater to Potable Water Plants

Key Reticulation Processes:

A3 - Repair or Replace Toby Valves or Toby Box

A4 - Repair a Sluice Valve

A5 - Complete Shutdown of Water Supply

A6 - Install a New Fire Hydrant

A7 - Complete Pipeline Repairs

A8 - Complete Installation of a New Water Connection

A9 – Complete Disinfection and Testing of a New Water Main

A10 - Replace Restrictor Housing

Reservoirs:

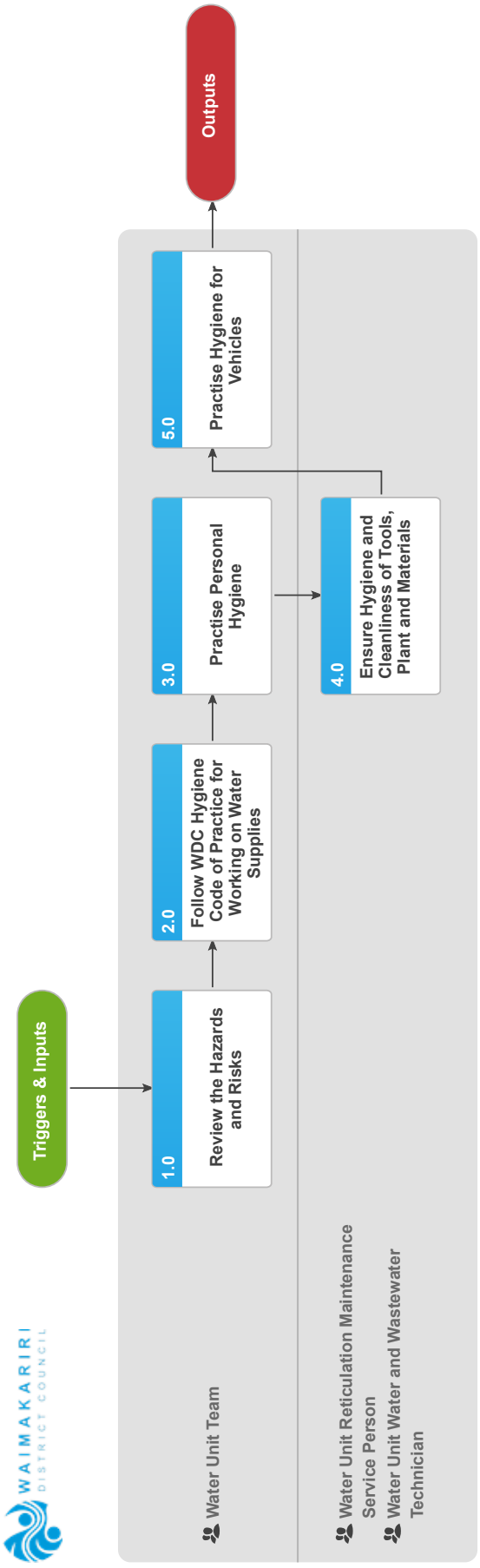
A11 - Complete Reservoir Cleaning and Recommissioning

Sampling and Laboratory:

A12 – QS-0910-AB Water Treatment Sampling Procedures

A13 – QS-0920-AC Idexx Colilert Test Method for Detection of Coliforms and E. coli in Water

Practise General Hygiene and Cleanliness While Carrying Out Water Unit Work v1.0



Practise General Hygiene and Cleanliness While Carrying Out Water Unit Work v1.0

Summary

Objective
To outline the hygiene practices that Water Unit personnel must follow when conducting any work on Public Water Supplies.

Background
To prevent contamination of the water supply and comply with regulatory requirements under:
• Health (Drinking Water) Amendment Act 2007
• Drinking Water Standards for New Zealand 2005 (Revised 2008)
• Health and Safety at Work Act 2015
• Resource Management Act 1991

Owner Richard Cookson

Expert Sarah Starkey

Procedure

1.0 Review the Hazards and Risks
Water Unit Team

a Hazard: Hazardous Substances (including fuels)
Risk: Poisoning, nausea/vomiting/headache, skin irritation/rashes, burns, disorders of lungs/internal organs, birth defects, cancer, death.
Control measure(s): Always follow the steps and requirements from the SOP for use and storage. PPE (see SDS for full list). Always follow the first aid response requirements from SDS. Do not use/store with any incompatible substances. Follow SOP for hazardous substances spills/incidents. Ensure training/competency prior to undertaking task

b Hazard: Biological waste products
Risk: Infectious diseases
Control measure(s): Avoid all contact with biological waste products. PPE (see SOP for full list – may include gloves, eye protection, face shields, full cover clothing etc.). Ensure all steps and requirements of SOP are followed. Ensure training/competency prior to undertaking task.

c Hazard: Water bodies
Risk: Drowning, hypothermia, infectious diseases
Control measure(s): Remain at least 2m back from the edge of any open water body. Use equipment to undertake sample collection tasks at a distance from edge. Complete JSA for any tasks that require entry into/on open water bodies. PPE (see SOP for full list – may include flotation device). Ensure all steps and requirements of SOP are followed. Create rescue plan for any entry into/on water bodies. Ensure training/competency prior to undertaking task.

2.0 Follow WDC Hygiene Code of Practice for Working on Water Supplies
Water Unit Team

a Read and understand the Code of Practice.

NOTE **Where do I find the Code of Practice?**
Please refer to the document Hygiene Code of Practice for Work on Water Supplies below.

3W Waimakariri District Council - Hygiene Code of Practice for Work on Water Supplies

3.0 Practise Personal Hygiene
Water Unit Team

a Wash hands thoroughly and use hand sanitiser before starting any task that involves working on the water supply, and after using the toilet.

b Cover any weeping or potentially infectious wounds.

c Inform your supervisor if you have been ill with vomiting or diarrhoea before conducting any water unit work.

NOTE **What if I have been sick, can I keep working if I feel better?**
You will be required to not be in contact with the water supply for 48 hours after the last episode of vomiting or diarrhoea.

d Follow correct procedures for travelling between Wastewater and Potable Water sites.

NOTE **What if I have had contact with wastewater?**
If if was just a splash, before going to a potable plant you must change to new overalls and wash and sanitise your hands. If the contamination level is significant, the expectation is that you decontaminate completely, including going to the office or home to shower, a complete change of clothes and clean of your vehicle.

NOTE **If I haven't had contact with any wastewater what is the minimum I need to do prior to going from a Wastewater site to a Potable Water site?**
Use personal hygiene practices, wash and sanitise hands.

4.0 Ensure Hygiene and Cleanliness of Tools, Plant and Materials
Water Unit Reticulation Maintenance Service Person, Water Unit Water and Wastewater Technician

a Ensure you maintain the cleanliness and functionality of tools, plant and materials between tasks by checking regularly and cleaning if necessary.

NOTE **When do I need to do this?**
Whenever tools come into contact with wastewater, and otherwise regularly to ensure cleanliness.

b Keep hand tools that are used to work on the water mains on a clean ground sheet throughout the repair e.g: spanners.

c Check tools after each task and remove any lumps of dirt.

d Lay tools out on plastic sheet and spray with Chlorine solution. Turn over and spray again. Leave tools for a minimum of ten minutes.Wipe excess liquid off tools and spray tools with CRC or other rust protector then dry tools before storing.

e Inspect all plant and/or machinery and water blast if necessary to ensure removal of all dirt.

f Spray cleaned area on plant and/or machinery with 1% Chlorine solution, leave for a minimum of ten minutes, wipe excess liquid off and spray with CRC or other rust protector and dry tools before putting away.

5.0 Practise Hygiene for Vehicles

Water Unit Team

a Use only the designated sewer vehicle for waste-water reticulation maintenance and repairs.

b Ensure your vehicle is kept clean and tidy at all times.

c Wipe steering wheel and gear change with disinfecting wipes or spray regularly and after any potential contamination.

d Water blast areas of heavy dirt from underside of vehicle when required.

e Spray any obvious areas of contact with sewage or animal manure.

NOTE **Can I drive my vehicle from a Wastewater Plant to a Potable Water Plant?**
Not if it can be avoided. If it can't be avoided there are protocols you must follow.
PROCESS Move From Wastewater to Potable Water Plants

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Move From Wastewater to Potable Water Plants	Note	Water Unit Team

PROCESS LINKS TO THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Water Pipeline Repairs	Process	Water Unit Reticulation Maintenance Service Person

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person, Water Unit Team, Water Unit Water and Wastewater Technician

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Sarah Starkey

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
Colin Roxburgh, Caroline Fahey

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Water Pipeline Repairs	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Move From Wastewater to Potable Water Plants	Richard Cookson	Sarah Starkey	Water Unit Technician Processes (DRAFTS)

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

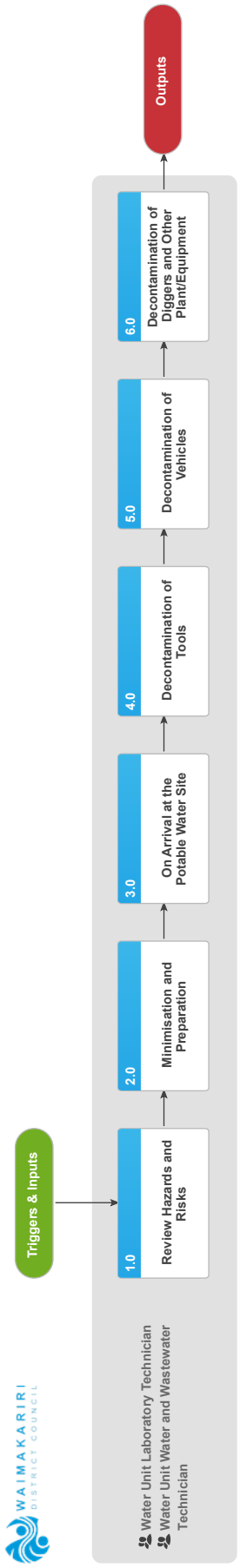
None Noted

Process Approval

Date	Approver	Type
22-06-2020 (GMT)	Richard Cookson	Process Owner
23-06-2020 (GMT)	Sherrianne Nation	Process Group Approver
23-06-2020 (GMT)	Sarah Starkey	Process Expert
23-06-2020 (GMT)	Sherrianne Nation	Promaster

Published on 23-06-2020 (GMT) by Sherrianne Nation

Move From Wastewater to Potable Water Plants [In Progress] v0.8



Move From Wastewater to Potable Water Plants [In Progress] v0.8

Summary

Objective
To minimise Health and Safety and Contamination Risks When Moving From Wastewater to Potable Water Plants

Owner Richard Cookson

Expert Sarah Starkey

Procedure

1.0 Review Hazards and Risks

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a Hazard: Hazardous Substances (including fuels)
Risk: Poisoning, nausea/vomiting/headache, skin irritation/rashes, burns, disorders of lungs/internal organs, birth defects, cancer, death.
Control measure(s): Always follow the steps and requirements from the SOP for use and storage. PPE (see SDS for full list). Always follow the first aid response requirements from SDS. Do not use/store with any incompatible substances. Follow SOP for hazardous substances spills/incidents. Ensure training/competency prior to undertaking task.

b Hazard: Biological waste products
Risk: Infectious diseases
Control measure(s): Avoid all contact with biological waste products. PPE (see SOP for full list – may include gloves, eye protection, face shields, full cover clothing etc.). Ensure all steps and requirements of SOP are followed. Ensure training/competency prior to undertaking task.

c Hazard: Water bodies
Risk: Drowning, hypothermia, infectious diseases
Control measure(s): Remain at least 2m back from the edge of any open water body. Use equipment to undertake sample collection tasks at a distance from edge. Complete JSA for any tasks that require entry into/on open water bodies. PPE (see SOP for full list – may include flotation device). Ensure all steps and requirements of SOP are followed. Create rescue plan for any entry into/on water bodies. Ensure training/competency prior to undertaking task.

2.0 Minimisation and Preparation

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a Confirm that the transition must take place.

NOTE **Can either task be deferred or re-ordered (e.g. potable first or wastewater to the next day) so that the transition need not occur?**
It is preferable that this sequence of moving from wastewater to potable water plant does not occur if at possible.

NOTE **Can one of the tasks be allocated to the team associated with the plant so the transition need not occur?**
It is preferable that this sequence of moving from wastewater to potable water plant does not occur if at all possible.

b Use a vehicle dedicated to the type of plant being visited if at all possible.

c Check that the vehicle is equipped with necessary resources.

NOTE **What are the resources required?**
Disposable overalls, Chlorine spray 1% solution, disinfection wipes, water blaster, rubber gloves, hand sanitiser, gumboots, safety footwear.

d If the vehicle including trailers, equipment and tools have been used on wastewater and may be required to come within 20m from any exposed potable water it must be decontaminated according to procedures below prior to leaving the WWTP or at the Water Unit Depot.

e Ensure that the tools dedicated to the WWTP are not removed from the site.

f Clean hands thoroughly then apply hand sanitiser.

g Remove gumboots and put on safety boots or wash and spray existing footwear with chlorine solution.

3.0 On Arrival at the Potable Water Site

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a If the vehicle including trailers, equipment and tools have been used on wastewater it must be left at least 20m away from any exposed potable water unless decontaminated according to procedures below.

b If any work was carried out without wearing overalls at the WWTP then clean disposable overalls must be worn when dealing with potable water.

c Clean hands thoroughly then apply hand sanitiser.

d Wash and spray boots with chlorine solution.

e Carry out task.

4.0 Decontamination of Tools

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a Visually check tools and remove any lumps of dirt.

b Lay tools out on plastic sheet and spray with chlorine solution. Turn over and spray again.

c Leave for a minimum of 10 minutes, rinse.

d Wipe excess liquid off and spray tools with CRC or other rust protection.

5.0 Decontamination of Vehicles

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a Wipe steering wheel, gear change and inside and outside of door handles with disinfecting wipes.

b Water blast areas of heavy dirt from underside of vehicle.

c Spray obvious areas of contact with sewage or animal manure.

6.0 Decontamination of Diggers and Other Plant/Equipment

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

a Water blast bucket(s) and all areas likely to contact water and visually inspect to ensure removal of all dirt.

b Spray cleaned area with chlorine solution.

c Leave for a minimum of 10 minutes, rinse with H20.

d Wipe excess liquid off and spray with CRC or other rust protection.

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Laboratory Technician, Water Unit Water and Wastewater Technician

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Sarah Starkey

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
Colin Roxburgh, Caroline Fahey

STAKEHOLDERS FROM LINKED PROCESSES

None Noted

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

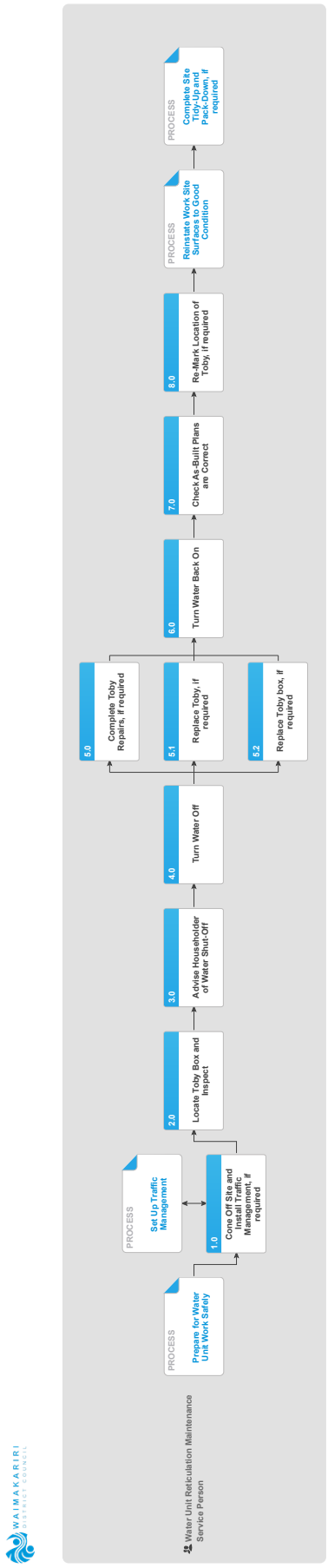
Systems

None Noted

Lean

None Noted

Repair or Replace Toby Valves or Replace Toby Box v4.0



Repair or Replace Toby Valves or Replace Toby Box v4.0

Summary

Objective
This process provides the guidelines for doing toby valve repairs or replacements of toby valve or toby box.

Background
@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Reticulation Maintenance Service Person

1.0 Cone Off Site and Install Traffic Management, if required
Water Unit Reticulation Maintenance Service Person

CONDITIONAL **Set Up Traffic Management**
Water Unit Reticulation Maintenance Service Person

2.0 Locate Toby Box and Inspect
Water Unit Reticulation Maintenance Service Person

a Bail water out of the toby box and begin to troubleshoot the problem.

NOTE **What are some likely problems?**
@todo: provide guidance re: some common or likely problems

3.0 Advise Householder of Water Shut-Off
Water Unit Reticulation Maintenance Service Person

a Advise householder that you need to turn water to complete repair.

4.0 Turn Water Off
Water Unit Reticulation Maintenance Service Person

a Turn water off.

b Open outside tap to check water is off.

5.0 Complete Toby Repairs, if required
Water Unit Reticulation Maintenance Service Person

5.1 Replace Toby, if required
Water Unit Reticulation Maintenance Service Person

a Dig back to service line. If toby is to be replaced and the service line is too close to the main then you may need to access and clamp service line OR turn off main.

b Replace toby.

5.2 Replace Toby box, if required
Water Unit Reticulation Maintenance Service Person

a Dig around the toby

b Slide base underneath toby

c Add new box (new boxes bigger than old boxes) NB: Any excess soil removed must to be taken back to the yard.

6.0 Turn Water Back On
Water Unit Reticulation Maintenance Service Person

a Ensure outside tap is turned on to flush water through (3-5 minutes).

b Turn water back on.

c After 3-5 minutes, close off outside tap.

7.0 Check As-Built Plans are Correct
Water Unit Reticulation Maintenance Service Person

a Use measuring wheel (measure from one boundary to another) NB: For rural connection GPS the location of the toby (accurate to 3 metres only).

8.0 Re-Mark Location of Toby, if required
Water Unit Reticulation Maintenance Service Person

a Re-mark location of toby on kerb with grinder, if required.

b Paint on kerb, if required.

PROCESS **Reinstate Work Site Surfaces to Good Condition**
Water Unit Reticulation Maintenance Service Person

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Reticulation Maintenance Service Person
Reinstate Work Site Surfaces to Good Condition	Process	Water Unit Reticulation Maintenance Service Person
Set Up Traffic Management	Conditional	Water Unit Reticulation Maintenance Service Person

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Reinstate Work Site Surfaces to Good Condition	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Set Up Traffic Management	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

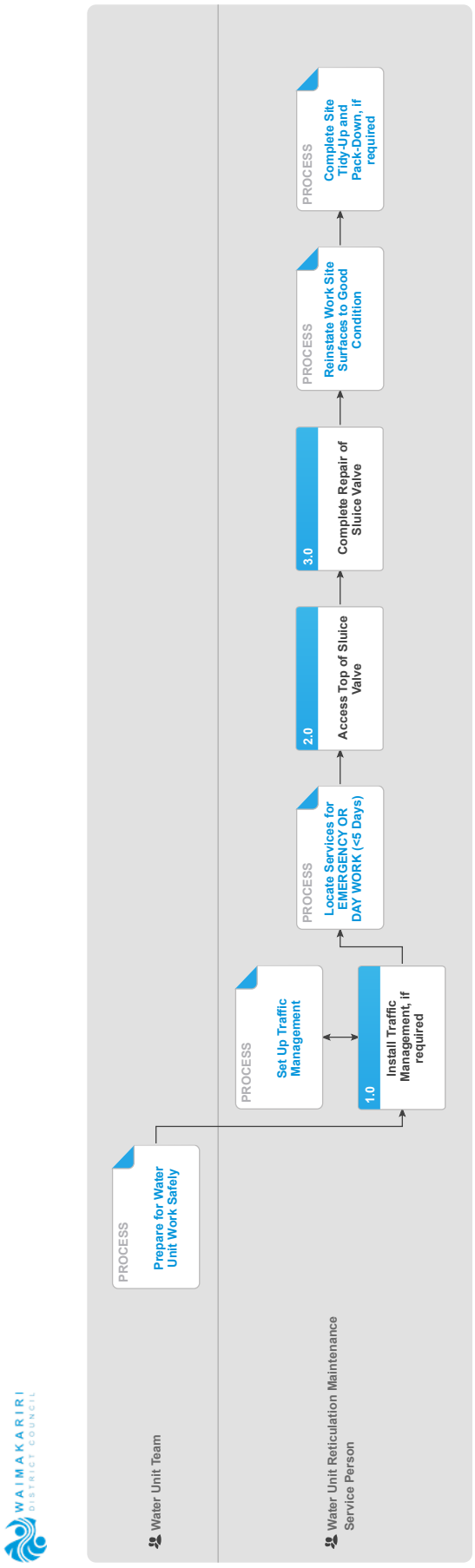
None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Phil Drozdowski	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Repair a Sluice Valve v4.0



Repair a Sluice Valve v4.0

Summary

Objective
This process provides the safe guidelines for conducting sluice valve repairs.

Background
@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Team

1.0 Install Traffic Management, if required
Water Unit Reticulation Maintenance Service Person

CONDITIONAL **Set Up Traffic Management**
Water Unit Reticulation Maintenance Service Person

PROCESS **Locate Services for EMERGENCY OR DAY WORK (<5 Days)**
Water Unit Reticulation Maintenance Service Person

2.0 Access Top of Sluice Valve
Water Unit Reticulation Maintenance Service Person

- **a** Clean out existing sleeve OR
- **b** Dig out valve box and remove pipe sleeve to get access to the top of the valve. NB: This may involve digging around the valve to gain access to work OR
- **c** Use hydrovac to clear out work area around valve, if required

NOTE **How is hydrovac operated safely?**
Refer to the process below.
PROCESS Operate a Hydrovac Excavator

NOTE **How many personnel are required to do this job?**
It is good to have two service persons on this job so that one can control the valve while the other is doing the repairs.

3.0 Complete Repair of Sluice Valve
Water Unit Reticulation Maintenance Service Person

- **a** Take the dolly off the valve.
- **b** Take the top piece off (unscrew or unbolt).
- **c** Remove old packing (rubber) using a long corkscrew.
- **d** Put new cone on.
- **e** Bolt the top plate back on (turn over). Ad washers to pack out if necessary, to bring up to level that allows tight fitting.
- **f** Put dolly back on.

PROCESS **Reinstate Work Site Surfaces to Good Condition**
Water Unit Reticulation Maintenance Service Person

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS
None Noted

INPUTS
None Noted

Outputs & Targets

OUTPUTS
None Noted

PERFORMANCE TARGETS
None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Locate Services for EMERGENCY OR DAY WORK (<5 Days)	Process	Water Unit Reticulation Maintenance Service Person
Operate a Hydrovac Excavator	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Team

Reinstate Work Site Surfaces to Good Condition	Process	Water Unit Reticulation Maintenance Service Person
Set Up Traffic Management	Conditional	Water Unit Reticulation Maintenance Service Person

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person, Water Unit Team

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Locate Services for EMERGENCY OR DAY WORK (<5 Days)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate a Hydrovac Excavator	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Reinstate Work Site Surfaces to Good Condition	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Set Up Traffic Management	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

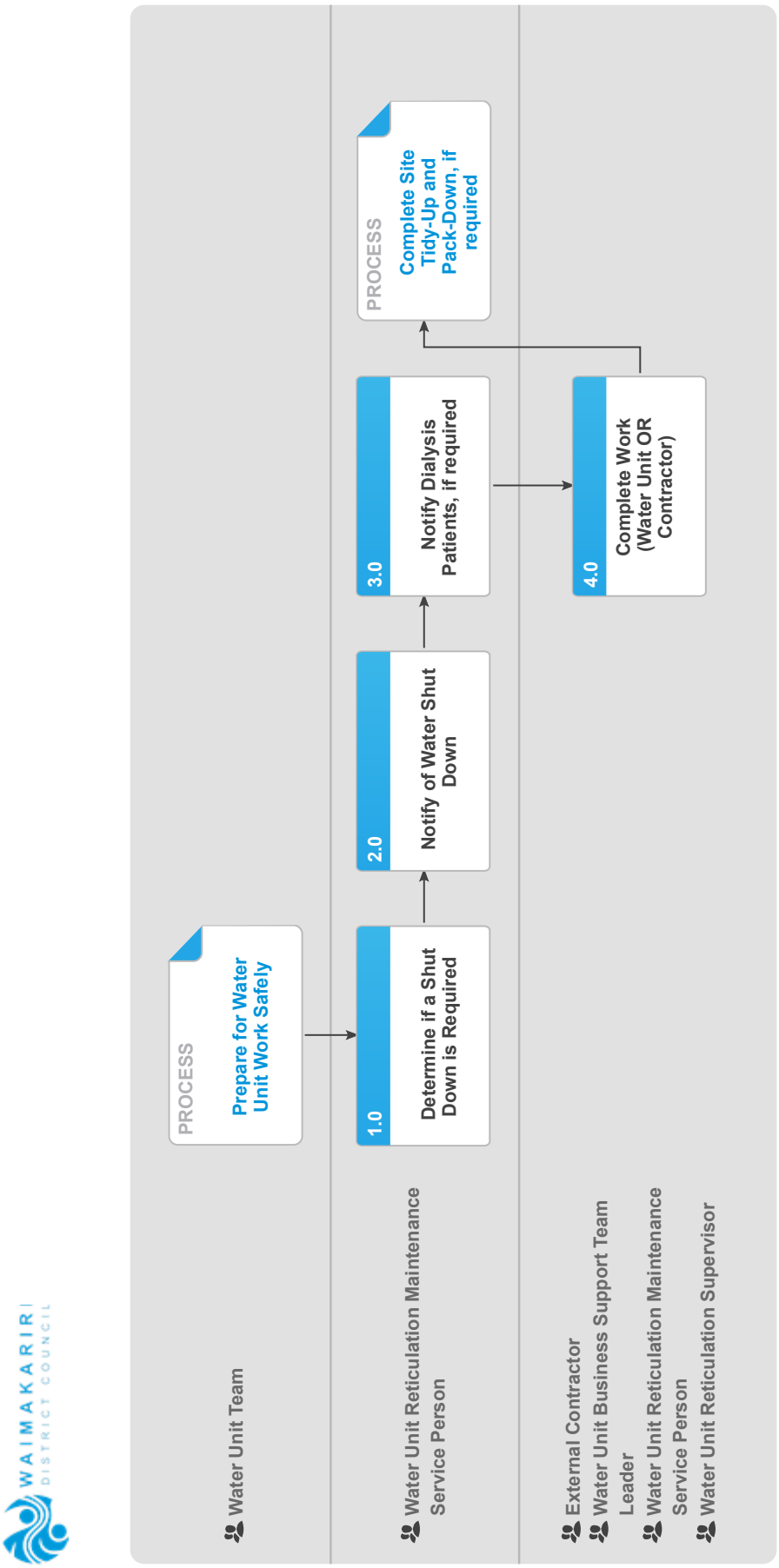
None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Phil Droz-dowski	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Complete Shut Down of Water Supply v4.0



Complete Shut Down of Water Supply v4.0

Summary

Objective
This process covers the safe guidelines for disconnecting supplies.

Background
@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Team

1.0 Determine if a Shut Down is Required
Water Unit Reticulation Maintenance Service Person

a @todo: define whether this is a supervisor responsibility or service person responsibility.

b Consider if an overlay is an option so some water is still available.

NOTE **What is an overlay?**
@todo: describe what is meant by an overlay and what would be involved.

c Consider if there is a "best time" window when the water shut down would be least disruptive.

d For programmed work (large scale/critical shut downs) schedule a Service Person to locate, excise and check all valves to make sure the valve key can access the valves

2.0 Notify of Water Shut Down
Water Unit Reticulation Maintenance Service Person

a Use the Notification processes to notify all householders/occupants of shut down.

NOTE **How is a planned shut down notified?**
The Water Unit Supervisors/Project Coordinator will issue a formal shutdown notification (letter) to all householders/occupants. See the process below for more detail.

PROCESS Complete a Planned Water Shut Down Notification

NOTE **How is an unplanned shut down notified?**
See the process below which sets out the unplanned notification procedure.

PROCESS Complete an Unplanned Water Shut Down Notification

3.0 Notify Dialysis Patients, if required
Water Unit Reticulation Maintenance Service Person

NOTE **How do I know where dialysis patients are located and how do I notify them?**
Use the process linked below.

PROCESS Locate Registered Dialysis Patients (Locations from DHB)

4.0 Complete Work (Water Unit OR Contractor)
External Contractor, Water Unit Business Support Team Leader, Water Unit Reticulation Maintenance Service Person, Water Unit Reticulation Supervisor

a Ensure all required fittings are transported to the site before any shut downs

b @todo: is there a task required for 'place fittings'?

c Start shutting water down as per plan once fittings confirmed in place

d Open a fire hydrant (if possible) to check water is off and close

e Once work is complete, open the fire hydrant or other point to bleed air from the lines

f Go to each valve point and turn water back on

g Close fire hydrant once water all back on

h Check for any leaks

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS
None Noted

INPUTS
None Noted

Outputs & Targets

OUTPUTS
None Noted

PERFORMANCE TARGETS
None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete a Planned Water Shut Down Notification	Note	Water Unit Reticulation Maintenance Service Person
Complete an Unplanned	Note	Water Unit

Water Shut Down Notification		Reticulation Maintenance Service Person
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Locate Registered Dialysis Patients (Locations from DHB)	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Team

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

External Contractor, Water Unit Business Support Team Leader, Water Unit Reticulation Maintenance Service Person, Water Unit Reticulation Supervisor, Water Unit Team

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete a Planned Water Shut Down Notification	Richard Cookson	Sarah Starkey	Water Unit Administration Processes
Complete an Unplanned Water Shut Down Notification	Richard Cookson	Sarah Starkey	Water Unit Administration Processes
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Locate Registered Dialysis Patients (Locations from DHB)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

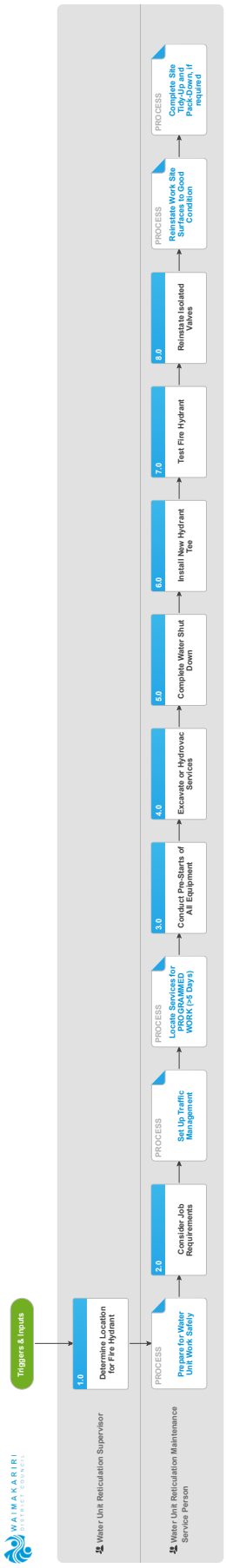
None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Phil Drozdowski	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Install a New Fire Hydrant v1.0



Install a New Fire Hydrant v1.0

Summary

Objective
This process covers the guidelines for fire hydrant installation.

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

1.0 Determine Location for Fire Hydrant
Water Unit Reticulation Supervisor

a Receive plan submitted from Asset Manager.

NOTE **What if the fire hydrant needs to be installed in the middle of a road?**
A subcontractor will be needed to set up traffic management. Programme this work using a preferred subcontractor.

b Check size and type of pipe that hydrant will be cut into on WAIMAP.

c If pipe is asbestos, ensure staff are provided correct PPE and have current asbestos training.

NOTE **What do I need to consider when working with asbestos?**
See the process linked below for further information.
PROCESS Identify, Assess and Manage Asbestos Risk

d Consider fittings required for the job e.g. riser, fire hydrant, a hydrant tee etc

e Make sure appropriate fittings are available. Order in, if not.

f As an excavator will be required for this work, staff will need to set up appropriate traffic management.

g Identify any services that may be in the ground at the proposed location. Use 'Dial Before U Dig' service, if appropriate.

NOTE **How do I use the 'Dial Before U Dig' service?**
Follow the process below.
PROCESS Use 'Before U Dig' Service

h Select appropriate staff members (2) to assign job to.

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Reticulation Maintenance Service Person

2.0 Consider Job Requirements
Water Unit Reticulation Maintenance Service Person

a Consider plant and equipment required for the job.

b Consider fittings required for the job e.g. riser, fire hydrant, a hydrant tee etc

c Consider who will be affected by the work e.g. Doctor, Dentist, Dialysis, Schools etc and talk to the businesses/ people who will be impacted by a water shut off.

d Complete a planned water shut down notification.

NOTE **How is a planned shutdown notified?**
Refer to the process attached below.
PROCESS Complete a Planned Water Shut Down Notification

PROCESS **Set Up Traffic Management**
Water Unit Reticulation Maintenance Service Person

PROCESS **Locate Services for PROGRAMMED WORK (>5 Days)**
Water Unit Reticulation Maintenance Service Person

3.0 Conduct Pre-Starts of All Equipment
Water Unit Reticulation Maintenance Service Person

NOTE **Where would I find pre-starts for all the equipment?**
Each piece of equipment has an SOP for operation e.g. Operate an Excavator etc. These SOPs will include a section for pre-start checks to be conducted.

4.0 Excavate or Hydrovac Services
Water Unit Reticulation Maintenance Service Person

a Complete excavation or use hydrovac.

NOTE **What is the excavation procedure?**
PROCESS Operate an Excavator

NOTE **How is the hydrovac operated?**
PROCESS Operate a Hydrovac Excavator

5.0 Complete Water Shut Down
Water Unit Reticulation Maintenance Service Person

a Contact Customer Services (0800 965 468) and let them know who will be affected and expected duration of shut down.

NOTE **Why is it important to let Customer Services know of the shut down?**
Businesses/affected people may not have read or received the planned shutdown letter.
If the valves in the immediate vicinity are not working, you will need to expand the work site which may impact businesses or residents that had not been contacted initially.

b Identify which valves need to be turned off.

c Shut down water and, where possible, leave valve lid upside down to identify that the valve is shut.

6.0 Install New Hydrant Tee
Water Unit Reticulation Maintenance Service Person

a Measure the hydrant tee.

b Cut the water main to suit tee.

NOTE **What kind of pipe could it be?**
The main could be AC, PVC or PE. PVC and PE may be cut with a saw but Asbestos Concrete (AC) must be cut following an asbestos handling procedure and specialised equipment.

PROCESS Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe

c Install the hydrant tee with appropriate fittings.

7.0 Test Fire Hydrant
Water Unit Reticulation Maintenance Service Person

a Open another hydrant on highest point of line.

b Turn water back on (air is bled out through the open hydrant).

c Check new hydrant for leaks.

NOTE **What if there are leaks?**
Complete shut down again.
Repair leaks.
Test again.

d Turn other hydrant off.

8.0 Reinstate Isolated Valves
Water Unit Reticulation Maintenance Service Person

a When you are satisfied there are no leaks, turn rest of valves on.

b Return lid to original position.

c Reinstate excavation works.

d Notify affected businesses/persons that water is back on.

PROCESS **Reinstate Work Site Surfaces to Good Condition**
Water Unit Reticulation Maintenance Service Person

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS
None Noted

INPUTS
None Noted

Outputs & Targets

OUTPUTS
None Noted

PERFORMANCE TARGETS
None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete a Planned Water Shut Down Notification	Note	Water Unit Reticulation Maintenance Service Person
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Identify, Assess and Manage Asbestos Risk	Note	Water Unit Reticulation Supervisor
Locate Services for PROGRAMMED WORK (>5 Days)	Process	Water Unit Reticulation Maintenance Service Person
Operate a Hydrovac Excavator	Note	Water Unit Reticulation Maintenance Service Person
Operate an Excavator	Note	Water Unit Reticulation Maintenance Service Person
Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Reticulation Maintenance Service Person
Reinstate Work Site Surfaces to Good Condition	Process	Water Unit Reticulation Maintenance Service Person
Set Up Traffic Management	Process	Water Unit Reticulation Maintenance Service Person
Use 'Before U Dig' Service	Note	Water Unit Reticulation Supervisor

PROCESS LINKS TO THIS PROCESS
None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person, Water Unit Reticulation Supervisor

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete a Planned Water Shut Down Notification	Richard Cookson	Sarah Starkey	Water Unit Administration Processes
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Identify, Assess and Manage Asbestos Risk	Charlotte Browne	Rob Hawthorne	Manage Asbestos
Locate Services for PROGRAMMED WORK (>5 Days)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate a Hydrovac Excavator	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate an Excavator	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Reinstate Work Site Surfaces to Good Condition	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Set Up Traffic Management	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Use 'Before U Dig' Service	Richard Cookson	Daniel Burt	Water Unit Management Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

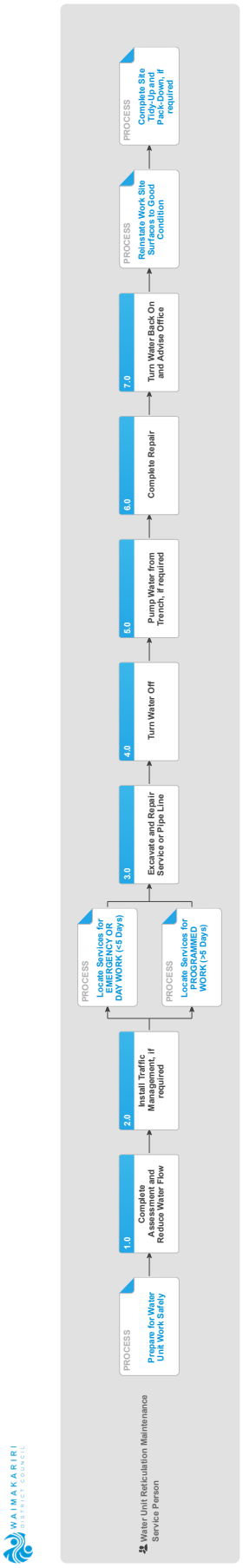
None Noted

Process Approval

Date	Approver	Type
21-07-2019 (GMT)	Caitlin Mills	Process Group Approver
30-07-2019 (GMT)	Phil Drozdowski	Process Expert
31-07-2019 (GMT)	Richard Cookson	Process Owner
01-08-2019 (GMT)	Charlotte Browne	Promaster

Published on 01-08-2019 (GMT) by Charlotte Browne

Complete Pipeline Repairs v5.0



Complete Pipeline Repairs v5.0

Summary

Objective
This process provides the safe guidelines for pipeline repairs.

Background
Traffic management is the most important hazard control. Underground services must be carefully excavated. Other risks include conflicts with public (following water disconnection).

@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Reticulation Maintenance Service Person

1.0 Complete Assessment and Reduce Water Flow
Water Unit Reticulation Maintenance Service Person

a Ensure pressure is maintained in pipes by closing most of the valves but leaving a small feed.

b Consider whether chip/pea metal may be required and ensure this is available on site to help improve drainage. This may involve calling another member of staff or contractor to deliver materials to site.

c Make site safe until traffic management arrives, if applicable.

d Identify the material of the pipe.

NOTE **How would I identify the material of the pipe?**
Check WAIMAP or if this information is not captured, expose pipe during excavation.

If pipe is identified as asbestos, ensure you follow the SOP for use of the asbestos saw, linked below.

NOTE **What if the pipe is asbestos?**
If pipe is identified as asbestos, ensure you follow the SOP for use of the asbestos saw, linked below.

PROCESS Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe

2.0 Install Traffic Management, if required
Water Unit Reticulation Maintenance Service Person

NOTE **When would external traffic management be required?**
If an excavator is being brought to site.

NOTE **How do I set up traffic management?**

PROCESS Set Up Traffic Management

PROCESS **Locate Services for EMERGENCY OR DAY WORK (<5 Days)**
Water Unit Reticulation Maintenance Service Person

PROCESS **Locate Services for PROGRAMMED WORK (>5 Days)**
Water Unit Reticulation Maintenance Service Person

3.0 Excavate and Repair Service or Pipe Line
Water Unit Reticulation Maintenance Service Person

NOTE **When would I excavate by hand?**
When repairing a 15mm - 32mm service line.

NOTE **When would I use an excavator?**
For any other repairs (50mm or greater pipe lines).

a Turn water off when required in order to see within trench, and notify Main Office immediately.

NOTE **How do I notify Main Office?**
Call Customer Services on 0800 965 468 to inform them of any disruption to water supply.

b Excavate the work area carefully to 100mm below pipe.

NOTE **How should excavation be carried out?**
Refer to the process below.

PROCESS Operate an Excavator

c Construct sump in trench to allow pumping. Ensure water level in trench is below the bottom apex of the pipe.

d Stop excavating at 1.4m and notify WorkSafe of Notifiable Work if the excavation is likely to be over 1.5m.

NOTE **How do I notify WorkSafe of Notifiable Work?**
The notification can be completed online by using the website form attached below.

WorkSafe Hazardous Work Notification Form
https://forms.worksafe.govt.nz/hazardous-work-notification

e Get or request trench box if excavation is going to be over 1.5m deep, or if the ground conditions require shoring.

NOTE **How do I install a trench box safely?**
Refer to the process below.

PROCESS Complete Installation of Trench Box (Shoring)

4.0 Turn Water Off
Water Unit Reticulation Maintenance Service Person

a Check WAIMAP to determine which valves to isolate to make repair, and so you can advise Main Office.

b Confirm there are no dialysis patients in the area that need to be notified.

NOTE **Where do dialysis patients live currently?**
Refer to the list on the Water Unit noticeboard or on your tablet.

@todo continuous improvement opportunity - add dialysis layer to WAIMAP

PROCESS Locate Registered Dialysis Patients (Locations from DHB)

c Notify Main Office that water is being turned off and advise them all areas that will be affected.

NOTE **How do I notify Main Office?**
Call Customer Services on 0800 965 468 to inform them of any disruption to water supply.

d Turn water off.

e Care must be taken if valves are located in the road. CAUTION: A spotter will be required if the valve is in the live lane.

f Use hydrant or flush point in isolated area to bleed water pressure, if available.

g If there is no hydrant or flush point available then a V should be cut in the bottom of the pipe to relieve the water pressure.

5.0 Pump Water from Trench, if required

Water Unit Reticulation Maintenance Service Person

NOTE **How do I pump water from a trench?**
Use an adequately sized mechanical pump to remove excess water in order to be able to see work area.
See the below process for full guidance.

PROCESS Operate a Pump (Trash/Volume)

6.0 Complete Repair

Water Unit Reticulation Maintenance Service Person

a Use 1% chlorine spray to disinfect all fittings and pipes throughout the repair.

b If the material of the pipe was not able to be identified during Activity 1.0, complete a visual assessment.

NOTE **What if the pipe is asbestos?**
Use chain cutter, if available. @todo create cutter SOP

If not, use the asbestos saw, following the process linked below.

PROCESS Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe

c Inspect interior of the pipe, and if debris is present, flush into trench.

d Complete repair.

NOTE **What if a new section of pipe is required?**
If a new section of pipe is required, then the new pipe should be inspected, cleaned, and disinfected by swabbing with a minimum 1% chlorine solution.

e Disinfect all interior surfaces by either spraying or swabbing with a 1% chlorine solution.

f Backfill and haunch over the pipe (leaving gibaults exposed) to add weight so that repair does not rupture.

7.0 Turn Water Back On and Advise Office

Water Unit Reticulation Maintenance Service Person

a Flush pipelines through hydrant or outside (house) taps for isolated zone.

b Consider flushing wider area after isolated zone has been flushed.

NOTE **When would a wider area need flushing?**
If you suspect debris or contaminants have entered pipe as part of repair process.

If you are unsure of impact of debris or contaminant, contact your supervisor for further guidance.

c Turn water on using a 50mm feed initially.

d Inspect the repaired pipe for leaks before backfilling and reinstating the site.

NOTE **What if there are leaks?**
Complete repair work until no leaks present.

e Reinstate trench.

f Turn on all other closed valves.

g Advise the Council Main Office (0800 965 468) that the water is back on.

PROCESS **Reinstate Work Site Surfaces to Good Condition**
Water Unit Reticulation Maintenance Service Person

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Installation of Trench Box (Shoring)	Note	Water Unit Reticulation Maintenance Service Person

Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Locate Registered Dialysis Patients (Locations from DHB)	Note	Water Unit Reticulation Maintenance Service Person
Locate Services for EMERGENCY OR DAY WORK (<5 Days)	Process	Water Unit Reticulation Maintenance Service Person
Locate Services for PROGRAMMED WORK (>5 Days)	Process	Water Unit Reticulation Maintenance Service Person
Operate a Pump (Trash/Volume)	Note	Water Unit Reticulation Maintenance Service Person
Operate an Excavator	Note	Water Unit Reticulation Maintenance Service Person
Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Reticulation Maintenance Service Person
Reinstate Work Site Surfaces to Good Condition	Process	Water Unit Reticulation Maintenance Service Person
Set Up Traffic Management	Note	Water Unit Reticulation Maintenance Service Person

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
Water Asset Manager, Water Operations Team Leader

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Installation of Trench Box (Shoring)	Richard Cookson	Daniel Burt	Water Unit Reticulation Processes
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Locate Registered Dialysis Patients (Locations from DHB)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Locate Services for EMERGENCY OR DAY WORK (<5 Days)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Locate Services for PROGRAMMED WORK (>5 Days)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate a Pump (Trash/Volume)	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
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Operate the Asbestos Saw (Battery)/Handle and Dispose of Asbestos Cement Pipe	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Reinstate Work Site Surfaces to Good Condition	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Set Up Traffic Management	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

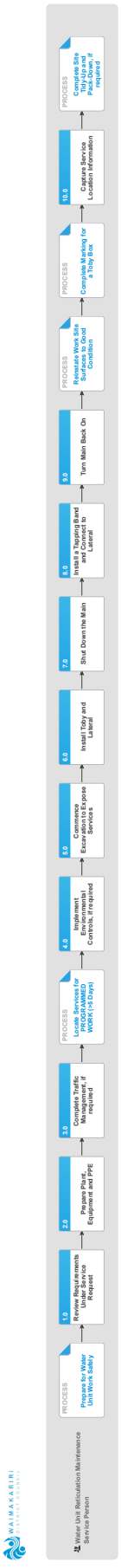
None Noted

Process Approval

Date	Approver	Type
08-12-2019 (GMT)	Caitlin Mills	Process Group Approver
10-12-2019 (GMT)	Richard Cookson	Process Owner
18-12-2019 (GMT)	Phil Drozdowski	Process Expert
18-12-2019 (GMT)	Charlotte Browne	Promaster

Published on 18-12-2019 (GMT) by Charlotte Browne

Complete Installation of a New Water Connection v5.0



Complete Installation of a New Water Connection v5.0

Summary

Objective
This process covers the correct method for installing a new water connection.

Background
@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Reticulation Maintenance Service Person

1.0 Review Requirements Under Service Request
Water Unit Reticulation Maintenance Service Person

a Make sure all installation paperwork has been provided with the service request.

NOTE **What sort of paperwork could I expect?**
Detail of new connection (size, location, type, backflow if needed, etc.).

b Check WAIMAP for work location

c Travel to site

NOTE **Do you need to communicate with occupants/property owners/people that may be affected by the installation?**
No, due to the fact that this is a new connection, occupants will not be affected.

2.0 Prepare Plant, Equipment and PPE
Water Unit Reticulation Maintenance Service Person

a Arrange for the use of an excavator, if required. This will include raising a PO if not using Water Unit plant.

NOTE **How do I raise a Purchase Order?**
Follow the process linked below.
PROCESS Raise a Purchase Order

b Arrange for a trailer or truck.

c Make sure you have all task appropriate equipment available. Contact the Reticulation Supervisor for guidance, if required.

d Ensure all required fittings/pipe are available. Notify the Stores Maintenance Person if stock levels are low.

e Ensure standard PPE is available.

3.0 Complete Traffic Management, if required
Water Unit Reticulation Maintenance Service Person

NOTE **How do I set up traffic management?**
Follow the process linked below.
PROCESS Set Up Traffic Management

PROCESS **Locate Services for PROGRAMMED WORK (>5 Days)**
Water Unit Reticulation Maintenance Service Person

4.0 Implement Environmental Controls, if required
Water Unit Reticulation Maintenance Service Person

NOTE **What is an environmental control?**
See attached process for further information.
PROCESS Apply Environmental Controls in Water Unit Work

5.0 Commence Excavation to Expose Services
Water Unit Reticulation Maintenance Service Person

NOTE **How do we excavate safely?**
Refer to process attached
PROCESS Operate an Excavator

a Excavation is usually required in rural locations.

b Commence hand excavation of service, if required.

c Continue excavation until water main located successfully.

6.0 Install Toby and Lateral
Water Unit Reticulation Maintenance Service Person

a Spray down fittings with 1% chlorine before installing.

b Install meter, base and box.

NOTE **Which connections require a water meter to be installed?**
All urban connections.

Restricted connections do not require a water meter.

NOTE **Which connections should have a base and box installed?**
ALL connections (urban and restricted).

7.0 Shut Down the Main
Water Unit Reticulation Maintenance Service Person

a Contact Customer Services (0800 965 468) and advise of water shut down.

b Identify which valves need to be turned off.

c Shut down water and, where possible, leave valve lid upside down to identify that the valve is shut.

8.0 Install a Tapping Band and Connect to Lateral
Water Unit Reticulation Maintenance Service Person

a Spray down fittings with 1% chlorine before installing.

b Determine size and type of main (asbestos (PVC) or PE or other).

c Identify the appropriate tapping band for the main.

d Install tapping band and drill through pipe.

e Connect to lateral.

9.0 Turn Main Back On

Water Unit Reticulation Maintenance Service Person

a Bleed air through fire hydrant where possible.

b Check fittings for leaks.

PROCESS

Reinstate Work Site Surfaces to Good Condition

Water Unit Reticulation Maintenance Service Person

PROCESS

Complete Marking for a Toby Box

Water Unit Reticulation Maintenance Service Person

10.0 Capture Service Location Information

Water Unit Reticulation Maintenance Service Person

a GPS the service location and record coordinates.

b Put an RU (restrictor unit) marker peg in place at the boundary straight in line with the connection point (rural properties only)

PROCESS

Complete Site Tidy-Up and Pack-Down, if required

Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Apply Environmental Controls in Water Unit Work	Note	Water Unit Reticulation Maintenance Service Person
Complete Marking for a Toby Box	Process	Water Unit Reticulation Maintenance Service Person
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Locate Services for PROGRAMMED WORK (>5 Days)	Process	Water Unit Reticulation Maintenance Service Person
Operate an Excavator	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Reticulation Maintenance Service Person
Raise a Purchase Order	Note	Water Unit Reticulation Maintenance Service Person
Reinstate Work Site Surfaces to Good Condition	Process	Water Unit Reticulation Maintenance Service Person
Set Up Traffic Management	Note	Water Unit Reticulation Maintenance Service Person

PROCESS LINKS TO THIS PROCESS

Process Name	Type of Link	Assigned Role
Process Water Application to Connect to Council Infrastructure	Process	Water Unit Team

RACI

RESPONSIBLE

Roles that perform process activities

Water Unit Reticulation Maintenance Service Person

Systems that perform process activities

None Noted

ACCOUNTABLE

For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED

Those whose opinions are sought

STAKEHOLDERS

None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process

			Group
Apply Environmental Controls in Water Unit Work	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Complete Marking for a Toby Box	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Locate Services for PROGRAMMED WORK (>5 Days)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Operate an Excavator	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Process Water Application to Connect to Council Infrastructure	Kalley Simpson	Libica Hurley	Manage Water Related Processes
Raise a Purchase Order	Paul Christensen	Michael Garrod	Finance Processes for ALL STAFF
Reinstate Work Site Surfaces to Good Condition	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Set Up Traffic Management	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

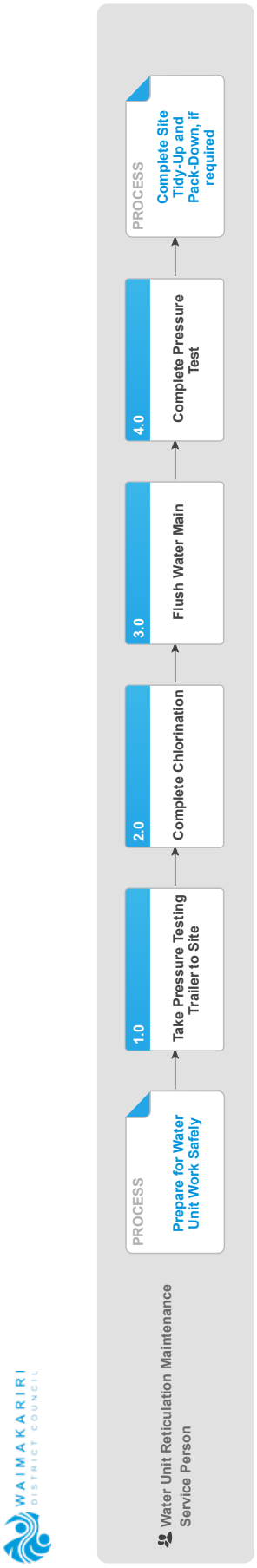
None Noted

Process Approval

Date	Approver	Type
11-09-2019 (GMT)	Caitlin Mills	Process Group Approver
12-09-2019 (GMT)	Phil Droz-dowski	Process Expert
13-09-2019 (GMT)	Richard Cookson	Process Owner
13-09-2019 (GMT)	Caitlin Mills	Promaster

Published on 13-09-2019 (GMT) by Caitlin Mills

Complete Disinfection and Testing of New Water Main v4.0



Complete Disinfection and Testing of New Water Main v4.0

Summary

Objective
This process covers the guidelines for completing disinfection and testing of new water mains.

@todo: what is the trigger/request process for this type of work?

Background
@todo: complete hazard/risk assessment below:
HAZARDS:
Hazardous Substance (Chlorine)

RISKS ASSOCIATED WITH THOSE HAZARDS:
Burns, inhalation, eye damage, skin damage

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls: substance must be handled as per the Safety Data Sheet (which is attached to the Pressure Test Trailer)
PPE: As per Safety Data Sheet
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS

Prepare for Water Unit Work Safely
Water Unit Reticulation Maintenance Service Person

1.0 Take Pressure Testing Trailer to Site
Water Unit Reticulation Maintenance Service Person

a Complete a pre-start check on the pressure tester and trailer.

NOTE **How do I complete a pre-start check on the pressure tester and trailer?**
@TODO pressure tester and trailer pre-start check process to be developed

2.0 Complete Chlorination
Water Unit Reticulation Maintenance Service Person

a Establish inlet end (lower point) and bleeding point (higher end).

b Connect to your pressure tester trailer.

c Add suction hose to 20L chlorine solution container (pump set to correct dosage).

d Turn on pressure tester water pump and then chlorine pump.

e Go to inlet point in line, make sure chlorine is going through by testing with chlorine strips. @todo: instructions on how to test with chlorine strips.

f Wait for water to reach bleeding point, test again for chlorine using chlorine testing strips.

g When correct shut all pumps down and leave 0 pressure for 24 hours to disinfect.

NOTE **What PPE is required?**
Refer to the Chlorine SDS and ensure PPE is worn as stated.

3.0 Flush Water Main
Water Unit Reticulation Maintenance Service Person

a Flush the water main until 0 residual of chlorine is present. CAUTION: The main must be able to be flushed to the sewer main OR the sucker truck will be required to remove the chlorinated water. ENVIRONMENTAL DAMAGE will occur if chlorinated water goes to storm-water.

b Have hose attached to bleeding point to take chlorinated water to the sewer line/sucker truck.

c Pump clean water in through the inlet and flush until chlorine is tested at 0ppm.

4.0 Complete Pressure Test
Water Unit Reticulation Maintenance Service Person

a Ensure main is full of water.

b Connect pressure tester to the inlet point.

c Pump up the water main to required kpa. NB: Time and pressure etc. will be defined for you in the job specifications.

d @todo: instructions for recording readings.

e @todo: instructions for what happens if the pressure test fails.

PROCESS

Complete Site Tidy-Up and Pack-Down, if required
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Site Tidy-	Process	Water Unit

Up and Pack-Down, if required		Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Reticulation Maintenance Service Person

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

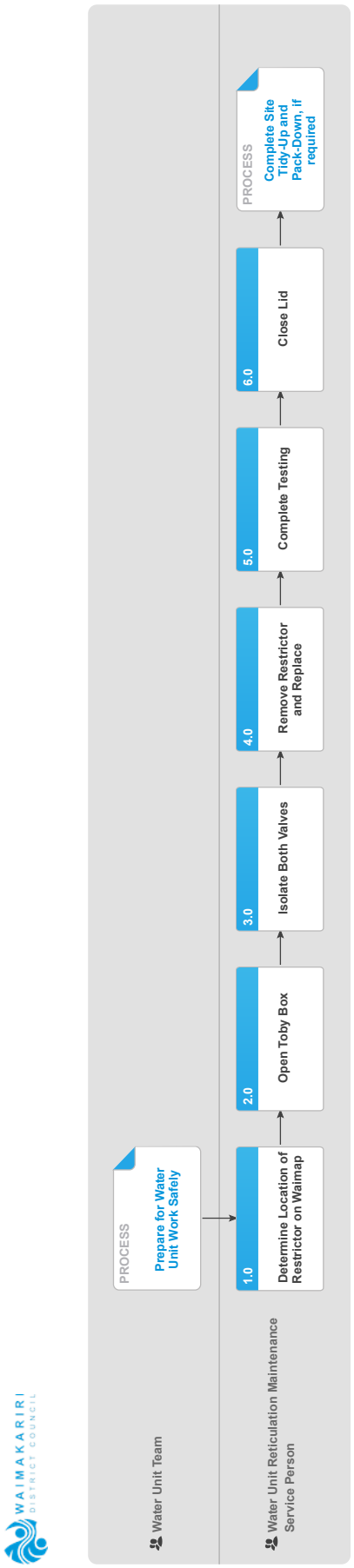
None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Phil Drozdowski	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Replace Restrictor Housing v4.0



Replace Restrictor Housing v4.0

Summary

Objective
This provides the guidelines for completing restrictor housing replacement.

Background
@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Phil Drozdowski

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Team

1.0 Determine Location of Restrictor on Waimap
Water Unit Reticulation Maintenance Service Person

a Locate restrictor location by checking WAIMAP.

NOTE **What further checks do I need to do if the restrictor is on private property?**
Check the Health and Safety Alerts System on Waimap for person/property/dog alerts. See the attached process below.

PROCESS Manage and Use Health & Safety Alerts System

2.0 Open Toby Box
Water Unit Reticulation Maintenance Service Person

3.0 Isolate Both Valves
Water Unit Reticulation Maintenance Service Person

a Turn off upstream valve.

b Turn off the downstream valve.

c Open the test point to check valves are off and relieve any pressure.

4.0 Remove Restrictor and Replace
Water Unit Reticulation Maintenance Service Person

a Use tools to remove restrictor and replace - or change restrictor unit size. @todo: specific tools required.

b Check the strainer for any debris and clean out if required.

c Put back together.

5.0 Complete Testing
Water Unit Reticulation Maintenance Service Person

a Turn water back on at upstream valve.

b Test gear on test valve point (KPA and flow checks).

c Test to ensure working correctly and up to correct volume of water.

d Open downstream valve.

e Close test point.

f Take test gear off.

6.0 Close Lid
Water Unit Reticulation Maintenance Service Person

a Complete a final check to make sure both valves on restrictor are open (before leaving).

PROCESS **Complete Site Tidy-Up and Pack-Down, if required**
Water Unit Reticulation Maintenance Service Person

Triggers & Inputs

TRIGGERS
None Noted

INPUTS
None Noted

Outputs & Targets

OUTPUTS
None Noted

PERFORMANCE TARGETS
None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Site Tidy-Up and Pack-Down, if required	Process	Water Unit Reticulation Maintenance Service Person
Manage and Use Health & Safety Alerts System	Note	Water Unit Reticulation Maintenance Service Person
Prepare for Water Unit Work Safely	Process	Water Unit Team

PROCESS LINKS TO THIS PROCESS
None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Reticulation Maintenance Service Person, Water Unit Team

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Phil Drozdowski

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Site Tidy-Up and Pack-Down, if required	Richard Cookson	Phil Drozdowski	Water Unit Reticulation Processes
Manage and Use Health & Safety Alerts System	Charlotte Browne	Katrina Blake	Manage Workplace Violence
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

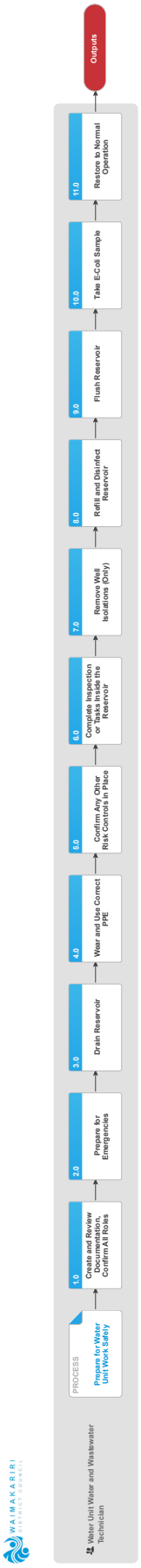
None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Phil Droz-dowski	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Complete Reservoir Cleaning and Recommissioning (Disinfection and Flushing) v4.0



Complete Reservoir Cleaning and Recommissioning (Disinfection and Flushing) v4.0

Summary

Objective
This process provides the safe entry and steps required for reservoir cleaning and recommissioning (disinfection and flushing).

Background
Potentially critical personal safety risks include Confined space entry and Work at height risks including drowning, electrical hazards, asphyxiation (gas/fumes).

There are also significant potable water risks related to contamination of the water supply which could affect an entire community and cause serous health effects.

@todo: complete hazard/risk assessment below:
HAZARDS:

RISKS ASSOCIATED WITH THOSE HAZARDS:

RISK CONTROL FRAMEWORK:
Elimination:
Substitution:
Isolation:
Engineering controls:
Administrative controls:
PPE:
Recovery Controls:

Owner Richard Cookson

Expert Darryn Williams

Procedure

PROCESS **Prepare for Water Unit Work Safely**
Water Unit Water and Wastewater Technician

1.0 Create and Review Documentation, Confirm All Roles
Water Unit Water and Wastewater Technician

NOTE **Does this process replace a Job Safety Analysis (JSA) that is specific to the site and task?**
NO! This process sets out the high level requirements that are generic to all reservoir entries for cleaning.

In no way does this process replace or supersede a JSA prepared for the specific job that is to be completed at a single site.

A JSA and Permits must always be completed before entering any confined space.

NOTE **How do we prepare for confined space entry work?**
See attached procedure.
PROCESS Prepare for Entry to a Confined Space (Water Unit Tasks)

a Ensure that a MINIMUM TEAM OF FOUR competent personnel are delegated to complete the activity.

b Review all paperwork and documentation with team in a team briefing attended by all four team members. Note: Documentation will include Confined Space Permit, Work at Height Permit and Job Safety Analysis (JSA).

c PERSON 1 & 2: Ensure that two persons fully trained in confined space entry and work at height (qualifications current i.e. less than 2 years old) are available to enter the emptied reservoir.

d PERSON 3: Ensure a safety observer is in place stationed outside the reservoir manhole. This person acts as the communication link between the confined space entrant and the outside. They take gas readings as per Confined Space procedure.

e PERSON 4: Ensure that the person operating the Hiab remains in position and in control of the Hiab lifting device at all times while personnel are in the confined space. The Hiab operator must be constant communication with the safety observer positioned outside the manhole at all times.

f Ensure all hazards identified in the JSA are controlled to an acceptable level of risk.

g Consider and record any new hazards and controls.

2.0 Prepare for Emergencies
Water Unit Water and Wastewater Technician

a Ensure there is a robust RESCUE PLAN in place and that all team members understand their role if an event occurs. Discuss the plan while on site and go through how you will complete a rescue.

b Test rescue system and harness prior to entering reservoir.

3.0 Drain Reservoir
Water Unit Water and Wastewater Technician

a Isolate the well pumps and valves.

NOTE **How do I complete isolations?**
See the attached process below for completing isolations.
PROCESS Complete Isolations (Lockout/ Tagout)

b Drain the reservoir through surface pressure pumps to reticulation.

c Turn off pressure pumps and isolate if possible
DANGER: Currently all pressure pumps cannot be isolated with personal danger padlock and require refitting (at older stations).

d Turn off all down stream valves for each pump within the pump station to prevent water from the network pressurising back to assist protection with pump non returns.
DANGER: Currently all valves cannot be isolated with personal danger padlock and require refitting (at older stations)

NOTE **What issues does the low level of protection in place currently introduce?**
Workers in confined spaces potentially put at risk through lack of protection from full isolation (padlocks).

e Open up drain pipe to release remaining water to stormwater network until completely empty.

f Leave drain valve open just in case. NB: Ensure there is a non-return is installed so no vermin or debris can enter the reservoir.

g Record all isolations in Head Works Log Book and notify the Asset Manager and other Technician staff that the reservoir has been emptied.

4.0 Wear and Use Correct PPE

Water Unit Water and Wastewater Technician

a Wear the correct PPE as defined in the JSA: new gum-boots, full cover disposable protective overalls, safety helmet with chinstrap, fall protection (personal harness), disposable gloves. NB: Any exposed gear e.g. boots, harnesses etc need to be sprayed with 1% chlorine to ensure they are sterile before entry to maintain a sterile environment.

b Each confined space entrant must wear a personal gas detector.

c The safety observer must take continuous gas readings while any persons are in the confined space.

d CAUTION - HEALTH RISK: Personal hygiene and cleanliness of equipment is critically important and could affect the health and safety of a community! All equipment should be new e.g. shovels, tools. Hands must be very clean and gloves worn. NO person should enter a reservoir if ill. No person should enter a reservoir after completing any 'dirty' or sewer work.

5.0 Confirm Any Other Risk Controls in Place

Water Unit Water and Wastewater Technician

a Confirm the rescue system to be in place (having already been tested).

b Set up blower and ensure fresh air is constantly blowing into the reservoir.

c Ensure personnel are tethered via fixed rated and certified anchor points if needing to be outside the yellow safety lines or less than 2 metres from the edge of reservoir or manhole (if unmarked).

d Ensure conditions are appropriate for completing the work (no rain/wind, adequate visibility etc).

e Maintain housekeeping levels to reduce slip/trip/fall risks.

f Complete any other requirements of the job-specific Job Safety Analysis (JSA).

6.0 Complete Inspection or Tasks Inside the Reservoir

Water Unit Water and Wastewater Technician

a Complete the tasks as per the work order/task e.g. engineer complete structural assessment, cleaning task e.g. removal of sand.

b Ensure all personnel are out of the confined space before recommissioning commences.

c Ensure all hatches, lids etc. are made secure e.g. padlocked and airtight.

d Ensure removal of all construction debris or other material e.g. sand/silt may require removal prior to flushing.

7.0 Remove Well Isolations (Only)

Water Unit Water and Wastewater Technician

a Remove well pumps and valve isolations.

8.0 Refill and Disinfect Reservoir

Water Unit Water and Wastewater Technician

a Calculate the volume of chlorine required to achieve 15-20ppm in the reservoir.

b Close the drain and continue running wells into reservoir to fill to maximum reservoir level.

c Add the chlorine from the chamber hatch as reservoir is filling. NB: ensure all PPE is in place as per the Safety Data Sheet (SDS).

d Once chlorine has been added and reservoir is full take 3-stage residual chlorine test (bottom, mid and top) to ensure the saturation level is between 15-20ppm. Sterilise the testing dipstick with 1% chlorine spray before using.

e Leave reservoir super-chlorinated for 24 hours.

f Repeat 3-stage testing to ensure that the chlorine remains greater than 10ppm.

NOTE **What needs to happen if above or below 10ppm?**
If less then 10ppm in 8f tests this indicates that there is possibly a contamination issue. If this is the case follow steps 8.g-i and repeat Section 8 from the beginning.

If greater then 10ppm in 9f tests then continue process.

g Turn off well and empty the reservoir once disinfection has been completed. There are two options when emptying super-chlorinated water:

OPTION 1: Calculate volume of sodium thiosulfate required to neutralise the chlorine to safe environmental discharge level (<2ppm)

OPTION 2: Discharge to sewer (if viable). Make sure the reservoir drain has a manhole chamber to pump super-chlorinated water to nearby sewer manhole.

NOTE **What risk management must be considered in the JSA for this activity?**
Both options have limitations based on site and time constraints. A full assessment is required when planning the work. The JSA should be based on best possible options for each specific scenario.

9.0 Flush Reservoir

Water Unit Water and Wastewater Technician

a Open drain and turn on wells to flush reservoir to remove residue.

b Take chlorine residual tests until 0ppm is achieved at drain manhole or outlet.

c Bleed pumps to remove residual super-chlorinated water.

10.0 Take E-Coli Sample

Water Unit Water and Wastewater Technician

a Close drain and refill reservoir with non-sterilised water.

b Fill to maximum level.

c Take a sample for e-coli testing ensuring all equipment is super-chlorinated before entering the reservoir.

d Wait 24 hours for e-coli results.

NOTE **What needs to happen if e-coli is present or absent?**

If e-coli is present then there is a contamination issue. If this is the case consider count to determine whether okay to drain to storm-water. If count is significant another method of disposal may be required.

If e-coli is absent the disinfection process is complete. Continue process from Section 11.

11.0 Restore to Normal Operation

Water Unit Water and Wastewater Technician

a Check pumps to make sure there is no residual super-chlorinated water or trapped air.

b Return pump station to network.

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Isolations (Lockout/Tagout)	Note	Water Unit Water and Wastewater Technician
Prepare for Entry to a Confined Space (Water Unit Tasks)	Note	Water Unit Water and Wastewater Technician
Prepare for Water Unit Work Safely	Process	Water Unit Water and Wastewater Technician

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Water Unit Water and Wastewater Technician

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Richard Cookson
Process Expert	Darryn Williams

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Isolations (Lockout/Tagout)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Prepare for Entry to a Confined Space (Water Unit Tasks)	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes
Prepare for Water Unit Work Safely	Richard Cookson	Sarah Starkey	Water Unit Safe Work Processes

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

None Noted

Lean

None Noted

Process Approval

Date	Approver	Type
Approval bypassed	Adam Cresswell	Process Group Approver
Approval bypassed	Darryn Williams	Process Expert
Approval bypassed	Richard Cookson (DELETED)	Process Owner
08-07-2019 (GMT)	Adam Cresswell	Promaster

Published on 08-07-2019 (GMT) by Adam Cresswell

Water Unit Laboratory

Water Treatment – Sampling Procedures

NOTE: Samples must be tested within 24 hours of collection. They must be collected under clean conditions from disinfected taps, and they must be adequately and accurately labelled. If they are not to be tested immediately, they must be kept cool.

1. Prepare Labelled Bottles

1.1 An "Idexx" 120ml sterile bottle with sodium thiosulfate, catalogue number WV120SBST-200 is used. (chlorinated or unchlorinated supplies)

1.2 Alternatively, sterilised bottles (see QS-O915-AA for details) may be used.

2. Recording

2.1 For Waimakariri District Council water supplies, each sample bottle should be clearly labelled at the source of sample with the following information:

- time and date of sampling
- exactly where the sample was taken
- chlorinated or unchlorinated
- a unique reference number, for each sample – this is recorded on each sample bottle by laboratory staff (see QS-O910-AA Laboratory Samples - Incoming Procedures)

2.2 For private supplies complete Sampling Data Sheet QS-O910-AD by recording all relevant data.

- Prepare labels, making sure the label always stays with the right bottle: sticky labels with ball-point pen do very well.
  : time and date of sampling
  : exactly where the sample was taken
  : type of water: filtered, unfiltered, untreated etc.
  : who collected the sample
  : a unique reference number, for each sample – this is recorded on each sample bottle by laboratory staff (see QS-O910-AA Laboratory Samples - Incoming Procedures)

- Add any other possibly useful information: unusual conditions encountered during sample collection, possible pollution sources and observed weather conditions.

3. Clearing Service Line

3.1 Open tap fully and let water run to waste for 2-3 minutes, or for a time sufficient to permit clearing of the service line.

Water Treatment – Sampling Procedures

4. Disinfect Water Taps

This can be done one of two ways:

4.1 ***1st choice:*** *Flame Taps* (unpainted metal taps ONLY)

- Let the tap run for 15 – 30 seconds.
- Turn the tap off and flame thoroughly until the spout water boils.
- Run tap until the water is cool.
- Take the sample.

Warning: hot water may spurt out of tap during flaming.

4.2 ***2nd choice:*** *Swab Taps with Sodium Hypochlorite Bleach Solution*
- plastic taps, mixer taps, painted or unpainted metal taps

(Most strong household bleaches are sodium hypochlorite based. The strength of the sodium hypochlorite should be marked on the bottle. Dilute the bleach to 1 percent sodium hypochlorite, using the calculated amount of water, and use the 1 percent solution for disinfection.)

- Let the tap run for one minute.
- Wash the outside of the tap and as much of the inside as possible with the 1 percent bleach solution, using a wash bottle.
- Leave to stand for two to three minutes, so that the tap will be disinfected.
- Run the water a minute to remove the bleach from the inside and the lip of the tap.
- Take the sample.

Warning: Sodium hypochlorite is highly corrosive. Handle it with care. If you get it on your skin, wash it off immediately. Wear appropriate personal protective equipment (PPE) i.e. chemical protective gloves, safety glasses or face shield.

4.3 ***3rd choice:*** *Swab Taps with methylated spirits (meths) or isopropyl alcohol*

- Let the tap run for one minute.
- Wash the outside of the tap and as much of the inside as possible with meths or alcohol.
- Leave to stand for two to three minutes, so that the tap will be disinfected.
- Run the water a minute to remove the alcohol from the inside and the lip of the tap.
- Take the sample.

4.4 Troublesome Taps

If a tap is leaking from the spindle or can not be cleaned satisfactorily, insert a short length of sterile hose inside the tap outlet. A short length of plastic tubing can be disinfected as described above for plastic taps, or by scalding. Insert the host, let water run 15-20 seconds to clear deposits, and then collect sample. If the hose is used again, it should be re-sterilised first.

Water Treatment – Sampling Procedures

5. Collecting and Handling Samples

- Turn on the tap, to gentle flow (don't change flow rate while bottle is filling, as deposits might be dislodged).
- Hold the bottle in one hand, and the cap in the other (hold the cap with open end down and avoid touching the top of the open bottle).
- Fill to the required mark. (If the bottle overflows, don't tip water out and start again, as this will remove the sodium thiosulfate. Use a new bottle, discarding failed sample bottle.)
- Replace the cap immediately.
- Put the bottle in chilly bin (at below 10^{o}C), for storage and transport to the testing site if the sample is not going to be tested right away.
- Make sure that any melted ice-water in the bin does not come in contact with the top of the sample containers.
- Samples need to be processed within twenty four (24) hours of collection time.

6. Samples Not Collected by Trained Water Unit Staff

6.1 Must be in an approved sample bottle

6.2 Must be chilled unless delivered to the laboratory within 1 hour.

6.3 Customer must be made aware that unless trained approved persons are used for sample collection, results cannot be guaranteed against outside contamination.

6.4 Samples will not be accepted for testing in non-approved bottles.

6.5 Samples that are heavily contaminated with silts etc. will not be accepted.

Water Unit Laboratory

Idexx Colilert Test Method For The Simultaneous Detection Of Total Coliforms And E.Coli In Water

1. Scope and Application

1.1 This method is intended for use in the simultaneous detection and confirmation of total coliforms and E. coli in water. Any positive sample for total coliforms is an indication of contamination. Any positive sample for both total coliforms and E. Coli is an acute violation (finished distribution water)

1.2 The minimum, non-zero number of bacterial counts detectable with this method is a function of the dilution scheme used when processing the sample.

1.3 The Colilert method can be applied to fresh waters, drinking waters, ground waters, reuse waters and waste waters. It can be used as a Presence/Absence test or quantification with the Quanti-Tray (20.1, 20.5) or with 5x20ml, 10x10ml or 15 tube serial dilution (MPN).

1.4 Since there can be wide range of coliform levels in surface waters and wastewaters, dilutions can be used with this method for detecting and enumerating the actual level.

2. Summary of Method

2.1 The method is based on Defined Substrate Technology. The product utilizes nutrient indicators that produce colour/fluorescence when metabolised by total coliforms and E. coli. When the reagent is added to the sample and incubated, it can detect these bacteria at 1 CFU/100mL at 24 and up to 28 hours with as many as 2 million heterotrophic bacteria/100mL present.

2.2 Colilert is a Standard Methods for the Examination of Water and Wastewater, On-line and in the 20th, 21st, 22nd and 23rd edition, AWWA, APHA, WEF; section 9223B.

3. Definitions

3.1 In this method, coliform bacteria are those bacteria which produce a yellow colour and for E. Coli, also produce a fluorescent signal under a 6 watt, 365-366mm UV light after incubation at 35 +/- 0.5^{O}C at 24 and up to 28 hours with as many as 2 million heterotrophic//100Ml present.

4. Interferences

4.1 Some water samples containing humic material may have an innate colour and a control blank of the same water sample may be required for comparison to the inoculated sample.

4.2 Heterotrophic bacteria greater than 2,000,000/100m L could yield a positive coliform reaction for coliforms.

Idexx Colilert Test Method For The Simultaneous Detection Of Total Coliforms And E.Coli In Water

5. Safety

5.1 The analyst/technician must know and observe the normal safety procedures required in a microbiology laboratory preparing, using and disposing of samples, reagents and materials, and while operating sterilizing equipment.

5.2 Mouth pipetting is prohibited.

6. Equipment and Supplies

6.1 Pipettes, sterile, T.D. bacteriological or Mohr, glass or plastic of appropriate volume and sterile loops.

6.2 Sterile vessels, glass or plastic (free from fluorescence) with sodium thiosulphate. Any water containing an oxidizing agent such as chlorine must be neutralised with sodium thiosulphate.

6.2.1 Vessels containing sodium thiosulfate must neutralise up to 5 mg/L of chlorine for drinking water samples.

6.2.2 Vessels must be at least 120 ml or larger capacity to hold 100ml sample to allow for proper mixing of sample

6.3 51 Well Quanti-Tray or Quanti-Tray/2000 Trays

6.4 Quanti-Tray Sealer

6.5 Incubator maintained at 35 +/- 0.5 ^{o}c

6.6 6 Watt 365-366 mm UV light.

7. Reagents

7.1 Sterile, non-buffered, oxidant-free water for dilutions (17.1).

7.2 Presence/Absence, 51 Well Quanti-Tray or Quanti-Tray 2000 Comparator

7.3 Sodium thiosulfate reagent – Standard Methods for the Examination of Water and Wastewater, (20.3) or sterile vessels containing sodium thiosulfate to neutralize up to 15mg/L chlorine

7.4 Store colilert at 2-30^{o}C away from light. The expiration date is indicated on the package (12 months from the date of manufacture).

Idexx Colilert Test Method For The Simultaneous Detection Of Total Coliforms And E.Coli In Water

8. Sample Collection, Preservation and Storage

8.1 Sampling procedures described in detail in the USEPA microbiology methods manual, Section II, A (20.2) and in Standard Methods for the Examination of Water and Wastewater (20.3)

8.1.1 Storage Temperature and Handling Conditions: Ice or refrigerate bacteriological samples at a temperature less than 10^{o}C (2-10 ^{o}C) during transit to the laboratory. Use insulated containers to assure proper maintenance of storage temperature. Ensure that samples vessels are not totally immersed in water during transit. Do not allow samples to freeze. If frozen, sample cannot be thawed and a new sample is required.

8.1.2 Holding Time Limitations: Examine samples as soon as possible after collection. For drinking water samples do not exceed 24 hours hold time from collection to incubation. For non-potable water compliance, it is 8 hours from time of collection to incubation (20.4).

9. Quality Control

9.1 The laboratory accepts new batches of colilert based on the information on the manufacturer's Certificate of Analysis (CoA) Quality Control Certificate issued for each batch manufactured.

9.1.1 Bactieria tested:
Escherichia coli
Klebsiella variicola

9.1.2 Manufacturers Method: Ten samples per organism are incubated at 35 +/- 0.5^{o}C with reads at 24 hours for target organisms and 28 hours for non-target organisms. The inoculum level for target bacteria is approximately 20-50 cuf/100mL. Quantative testing is performed on all target organisms using IDEXX Quanty-Tray MPN compared to spread plate counts using tryptic soy agar with or without 5% sheep's blood. Productivity ratio is the average MPN/average plate count. The passing range is >0.5 to <1.4 (ie greate than or equal to 0.5 to less than or equal to 1.4).

9.2 Follow Section 12. P/A Procedure or Section 13. Quanti-Tray Enumeration Procedure and Section 14 Interpretation and Calculations.

9.3 Six monthly Sealer Check with food color or dye: (20.7; see Section V, 5.3.2.1.2)

9.3.1 Add 2-3 drops of food coloring dye or equivalent to 100 mL of water. Mix well.

9.3.2 Add to this the Quanti-Tray and seal the tray.

9.4.3 Observe the tray. There should be no dye observed outside the wells.

9.4.4 If dye is observed outside the well, retest and if it still occurs call IDEXX Water Technical Service (1-800-321-0207).

10. Calibration and Standardisation

10.1 Check thermometers atleast annually against NIST certified thermometer or one that meets the requirements of NIST Monograph SP 250-23 (21.3).

11. Corrective Action

11.1 If an unacceptable result is obtained, then the lab should review the test procedure to determine the cause of the failure to prevent this from reoccurring again by:

11.2 Defining the problem:

A. identify corrective action and steps required to correct the problem

B Implement correction action

C Document corrective action

11.3 Repeat testing to ensure that corrective action was successful

11.4 Examples are:

11.4.1 Procedure followed for preparing the control and/or diluent.

11.4.2 Incubation temperature within the required tolerance

11.4.3 Verified the thermometer for the incubator or water bath was calibrated against NIST thermometer and corrections made if required (20.3)

11.4.4 Sample incubation within the required time period.

11.4.5 Test kit is within the expiration date

11.4.6 Call and review problem encountered with IDEXX Water Technical Service at 1-800-321-0207

12. Presence-Absence (P/A) Procedure

12.1 Carefully separate one blister pack from the strip taking care not to accidentally open the adjacent pack.

12.2 Ensure the Colilert powder is in the bottom of the blister pack.

12.3 Hold the blister pack face down (paper side up) at the top and towards the bottom, and snap back at the score line forming a “v”, with the opening facing into the open vessel.

12.4 Allow the powder to fall into the water sample contained in the sterile, non-flourescent vessel.

12.5 Aseptically cap and seal the vessel

12.6 Mix well until powder is dissolved

12.7 Incubate for 24 and up to 28 hours at 35 +/- 0.5^{o} C

12.8 Read the results at 24 hours. In addition, laboratories may incubate samples for additional time (up to 28 hours total for their convenience). Compare each result against the comparator dispensed into an identical vessel.

12.9 If less yellow than the comparator, the test is negative. **Note**: However, if the results are ambiguous to the analyst based on the initial reading, incubate up to an additional four hours (but not to exceed 28 hours total) to allow the colour to intensify.

12.10 If the sample has a yellow colour equal to or greater than the comparator, the presence of total coliforms is confirmed. If colour is not uniform, mix by inversion, then recheck.

12.11 If yellow is observed, check vessel for fluorescence by placing a 6-watt, 365-366 mm UV light within five inches of the sample in a dark environment. Be sure the light is facing away from your eyes and towards the vessel. If the fluorescence is equal to or greater than the comparator, the presence of E. coli is confirmed.

12.12 Positives for both total coliforms and E. coli observed before 24 hours and negatives observed after 28 hours are also valid.

13. Quantification Procedure

13.1 For accuracy and counting range, use the IDEXX Quanti-Tray System with either the 51 well Quanti-Tray or the Quanti-Tray/2000 and follow the above Presence/Absence procedure. The multiple tube (MPN) can be used as: 5 tubes x 20 mL, 10 tubes x 10 mL, or 15 tube serial dilutions. Consult Standard Methods for the Examination of Water and Wastewater for the appropriate MPN Tables.

13.2 If a dilution is required, use sterile deionized or distilled water, not buffered water for making dilutions. Always add Colilert to the final 100 mL diluted sample only.

13.3 Follow the package insert for the Quanti-Tray (20.5) along with the package insert for Colilert (20.1) and/or refer to section 12.-12.6 above. Remove a sterile tray from the plastic bag (tear open the plastic bag at the bottom which has a black line around the bag) remove the number of trays required for testing. Close the bag using tape or a clip. Label the back of the tray with a felt tip marker to identify the sample. Open the tray following the directions

as outlined in the insert for Quanti-Tray (20.5). Pour the reagent mixture from the vessel into the tray avoiding contact with the foil tab. Seal the tray with the Quanti-Tray sealer.

13.4 Incubate at 35 +/- 0.5^{o} C for 24 and up to 28 hours. See package insert for instructions.

14. Interpretation and Calculations

14.1 Follow the same interpretation directions from Section 12.8-12.12 to count the number of positive wells. Refer to the Quanti-Tray MPN Table provided by IDEXX to determine the Most Probable Number (MPN) for total coliforms (yellow wells) and E. coli (yellow and fluorescent wells) in the sample. Correct the MPN value for any dilution made. The colour and fluorescence of the positive wells may vary. Use the appropriate Quanti-Tray MPN comparator following the instructions as indicated.

14.2 Positives for both total coliforms and E. coli observed before 24 hours and negatives observed at 28 hours are also valid.

15. Method Performance

15.1 Colilert was found to be as equally sensitive to LTB, BGLB and EC+MUG. E. Coli recovery was not statistically different compared to m-TEC 20.6)

16. Reporting Results

16.1 Report results as Presence or Absence for total coliforms and E. coli. For Quantification, report results as MPN/100 mL for total coliforms and E. coli.

17. Verification Procedure

17.1 No Applicable

18. Pollution Prevention

18.1 The solutions and reagents used in this method pose no threat to the environment when recycled and managed properly.

18.2 Solutions and reagents should be prepared in volumes consistent with laboratory use to minimise the volume of expired materials to be disposed.

19. Waste Management

19.1 It is the laboratory's responsibility to comply with all federal, state and local regulations governing waste management, particularly the biohazard and hazardous identification rules and land disposal regulations. Compliance with all sewage discharge permits and regulations is also required.

19.2 Samples, reference materials and equipment known or suspected to have viable bacteria attached or contained must be sterilized prior to disposal.

20. References

20.1 IDEXX Colilert Package Insert

20.2 Bordner, R., J.A. Winder and P.V. Scarpino (eds.) Microbiological Methods for Monitoring the Environment, Water and Wastes, EPA-600/8-78-017. Office of Research and Development, USEPA. (December 1978)

20.3 Baird RB, Eaton AD and Rice EW (eds.). 1998 Standard Methods for the Examination of Water and Wastewater, 23rdth Edition, American Public Health Association, Washington, DC

20.4 Federal Register/vol 77, #97/Friday, May 18th, 2012, page 29806-29807

20.5 IDEXX Quanti-Tray Package Insert

20.6 Federal Register/vol.66, no. 169/Thursday, August 20th, 2001, page 45818.

20.7 USEPA Manual for Certification of Laboratories Analyzing Drinking Water, Fifth Edition, Section V.

Appendix B – Flushing Guidelines

Flushing time guidelines in minutes for new works prior to disinfection

Table 2: Time in minutes to flush at 20 L/s per hydrant

Pipe Diameter	**Number of hydrants to achieve flushing velocity***	**Length of Pipe**			
(mm)	-	50m	100m	200m	500m
50	-	5 minutes	5 minutes	5 minutes	5 minutes
75	-	5 minutes	5 minutes	5 minutes	8 minutes
100	1	5 minutes	5 minutes	5 minutes	15 minutes
150	3	5 minutes	6 minutes	5 minutes	11 minutes
200	4	5 minutes	5 minutes	6 minutes	15 minutes
300	9	5 minutes	5 minutes	6 minutes	15 minutes
600	35	5 minutes	5 minutes	7 minutes	15 minutes
Pipe >600mm	Scour valve – per design	-	-	-	-

**assumes flow rate through 75mm hydrant of 20 L/s*

Note: flushing rates of 5 L/s and 10 L/s can be used effectively on 50 and 75mm lines respectively.

Appendix C – Chemical Neutralising

At the end of the contact time, the chlorine in the water in the new main must be neutralised before the water is discharged to the receiving environment (the street channel or stormwater system). There are three options that can be used to de-chlorinate the water:

1. Chemical Neutralisation dosing;
2. Chemical Neutralisation with dechlorination mats (where dosing at a discharge chamber is not feasible); or
3. Chlorine Dissipation.

1. CHEMICAL NEUTRALISATION

Chemical Neutralisation as a method to de-chlorinate water involves dosing to the water as it is being discharged from the main. The most effective and most commonly used chemical to achieve dechlorination is Sodium Thiosulphite though there are other alternatives:

Table 3: Chlorine Neutralisation Chemicals

Name	Chemical Formula	Solubility
Sodium thiosulphite pentahydrate	$Na_2S_2O_3.5H_20$	200g/l
Anhydrous Sodium sulphite	Na_2SO_3	26.9g in 100g of water at 20°C
Sodium Sulphite heptahydrate	$Na_2SO_3.7H_2O$	30g/100ml

Chemical SDS sheets must be available at all times.

Procedure:

a. To prepare 15% w/v solution of any of the above three chemicals, the following steps should be taken:

Step 1. Fill the solution tank approximately 2/3 full with water
Step 2. Add the required amount of the neutralising chemical into the tank as specified in Table 5.
Step 3. Mix the solution until the added chemical has dissolved
Step 4. Add the remainder of water and mix
Step 5. Stir periodically to avoid the solution stratifying

Table 4: Amounts of Chemicals Required for Chlorine Neutralisation

Solution Volume	Sodium Thiosulphite	Anhydrous Sodium Sulphite	Sodium Sulphite Heptahydrate
(L)	(kg)	(kg)	(kg)
100	15.2	15	30
200	30.3	30	60
300	45.5	45	90
400	61.0	60	120
500	76.0	75	150
600	91.3	90	180
700	106.2	105	210
800	121.2	120	240
900	136.0	135	270
1000	151.5	150	300

b. To add the neutralisation chemical to the super-chlorinated water, the following steps should be taken:

Step 1. Calculate the flow rate required to add the neutralising chemical (refer below formula).
Step 2. Use a calibrated dosing pump to achieve the calculated required flow rate by adjusting the speed or stroke setting of a calibration chart.
Step 3. Verify successful neutralisation by testing for FAC (Free available chlorine). Note that the FAC of the discharged water to the environment must be <0.02mg/l.

To Calculate Flow Rate:

The following formula shows the rate at which the prepared neutralising chemical needs to be added to the water as it is being discharged from the main:

Flow (L/hr) = FAC (g/m_3) x 3 x draining flow rate of chlorinated water (L/min) x 60min/hr
% Strength of the neutralising solution x 10,000

Example:
The FAC of the super-chlorinated water to be neutralised is 20mg/l (i.e. 20g/m3). The super-chlorinated water is being discharged from the main at a flow rate of 100 L/min. The required flow rate of the 15% neutralising chemical solution is:

Flow = 20 g/m_3 x 3 x 100 L/min x 60 min/hr
15% x 10,000
= 2.4 L/hr

2. CHLORINE NEUTRALISATION WITH DECHLOROMATS

Dechloromats must be placed such that the channelled water does not flow outside the span of the mat, but still cover the full width. The channelled flow must be long enough to ensure proper mixing with the Sodium Sulphide. Typical channelled flow height should not be more than 50mm. Sampling must be taken 10m downstream of the mat. When tablets reach half their original size it must be replaced or new tablets added.

3. CHLORINE DISSIPATION

This is an alternative method in dealing with the hyper chlorinated water which allows the chlorine to dissipate.
Capture the disinfected water on site prior to the discharge of the chlorinated water (e.g. in a tanker). It is suggested that the water is kept contained on site for a minimum of 2 days until the FAC is reduced to the acceptable level of the ultimate receiving environment.

Appendix D – Designated 3 Waters Representative

Where 3 Waters Team members are required for escalation or decision making, as set out in this document, one of the follow staff members can be contacted, in order of escalation (depending on who is available at the time):

Staff Member Position	Name	Contact Details
Water Engineer	Craig Freeman	craig.freeman@wmk.govt.nz
Water Operations Team Leader	Caroline Fahey	caroline.fahey@wmk.govt.nz 027 406 5138
Water Asset Manager	Colin Roxburgh	colin.roxburgh@wmk.govt.nz 021 481 873
3 Waters Manager	Kalley Simpson	kalley.simpson@wmk.govt.nz 021 223 3428
Manager Utilities and Roading	Gerard Cleary	gerard.cleary@wmk.govt.nz 021 480 839