

## 1.0 Purpose of Document

The purpose of this document is to set out the disinfection measures, practices and procedures required to protect the network **distribution** system against the risk of contamination.

## 2.0 Scope

All Affinity Water employees and contractors working on Maintenance and Repair, Mains Renewals, Trunk Mains and Developer Services contracts or any work on the network distribution system.

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## 4.0 Reference

Water Supply (Water Quality) Regulations 2016  
 DWI Regulation 31 Materials in Contact with Potable Water  
 OP026 Restricted Operations Procedure  
 NW010 Discharge to Water Courses  
 NW039 Repair of Broken Mains Procedure  
 NW053 Contaminated Land (Guidance for Network Staff)  
 NW080 Water Quality Sampling following Network Activities Procedure  
 SSO-156 On-site Chlorine Analysis Guidance Note  
 SSO-192 – Hygienic Storage of Pipes and Fittings  
 Mains Flushing Calculator  
 OP345 Access to the Network Procedure  
 AW0281 Method Statement Procedure  
 AW0282 Method Statement Guidance Note  
 Principles of Water Supply Hygiene and Technical Guidance Notes January 2017  
 HS512 Preparation Disposal and Safe Handling of Chlorine Solutions Procedure

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## 5.0 Introduction

Affinity Water has a **statutory** obligation to provide **high quality drinking** water at all times and must be aware of the need for continual care in protecting supplies from contamination. Precautions must therefore be taken to eliminate any risk of contamination.

There are several network activities requiring a disinfection process to ensure that the quality of the **water** supply is maintained from source to Customers taps.

This document covers all aspects of Network activities but excludes those carried out on Production assets due to the additional requirements for disinfection of these assets.

The Network Disinfection Table (Appendix 1) should be consulted prior to carrying out Network activities to confirm disinfection requirements. It is split into network activities and processes required for disinfection and other associated activities.

In addition, there are references to linked documents and appendices (work instructions) to cover individual processes.

All of the following operations are classified as restricted operations and must only be carried out by **competent** personnel with the appropriate training and authorisation.

## 6.0 Procedure

### Protection of Water Quality

#### General

Water Companies have a statutory duty to provide 'wholesome' water at all times, as defined in The Water Supply (Water Quality) Regulations 2016 under the Water Industry Act 1991. This section of the specification sets out the requirements necessary to maintain the high quality of drinking water.

**Whenever injection disinfection is undertaken there must be suitable measures in place to prevent backflow into the upstream distribution network and flow into areas downstream of the disinfection area. A single closed valve is NOT considered to be a suitable preventative measure to protect downstream customers. All customers must be adequately protected against highly chlorinated supply.**

#### Medical Clearance

All work on Affinity Water's water mains and pipes are designated as **Restricted Operations** and must only be carried out by personnel holding current National Water Hygiene Scheme certification. Refer to OP-026 Medical Screening for Restricted Operations Procedure.

#### Materials in Contact with Water

All materials used for construction of a pipeline and all associated apparatus which are likely to come into contact with treated potable water must be approved under DWI Regulation 31 for use in connection with the supply of water for drinking, washing, cooking and food production purposes. If there are any doubts, please contact Water Quality Services.

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### Storage and Installation of Materials

Materials should be transported, stored and installed in such a way that prevents the risk of contamination in accordance with SSO-192 – Hygienic Storage of Pipes and Fittings. It is therefore essential that they are stored in a manner that prevents ingress of soil, waters or contact with any other contaminants that may render them unfit for use. For example, pipe ends should be capped during storage, transportation and installation. Whenever work stops for an extended period e.g. overnight a secure end cap must be installed.

Pipes and fittings must be laid hygienically, and steps must be taken to prevent ingress of dirt, debris or polluted groundwater to the internal bore of the pipeline and jointing area during installation.

If any ingress does occur immediately escalate to your supervisor.

### Ground Contamination

If at any stage during network activities, it is apparent that the ground is contaminated or has been contaminated, installation work must stop immediately, and your Line Manager must be informed in accordance with NW053 Contaminated Land - Guidance Note.

### Swabbing, Disinfection and Mains Cleaning (Ice Pigging)

The process of swabbing and disinfection should be planned and agreed during the design process. It must be confirmed that enough water will be available and that the required flows and velocities will be achieved without causing any adverse effect on the existing distribution system. Any water used in swabbing, flushing, mains cleaning, pressure testing, disinfection and commissioning of any works on the network shall be potable water from the distribution network. This is not relevant for raw water mains.

When taking water from the existing distribution system consideration must be taken into account on the effects on the wider network and customers. Consideration should be given to pipe age, material and lining, especially bitumen lining.

For planned work where normal flushing cannot be carried out or where there are particular difficulties, then a method statement must be submitted (AW281 Method Statement Procedure, AW282 Method Statement Guidance Note) 1 week prior to the flushing being undertaken. In an emergency escalate to your line manager.

### Injected and Post Contact Chlorine Residuals

Repeat chlorination is required if a 10% drop between the injected chlorine residual and post contact residual is observed after the specified contact time.

### Connecting to Existing Network

All temporary connections and fire mains, which extract water from the distribution network, MUST be fitted with **appropriate back flow protection**.

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# Appendix 1

## Network Disinfection Table

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<b>Maintenance and Repair Work</b>	
<b>Activity</b>	<b>Disinfection Method</b>
Repaired Mains and Mains Work – live or partially throttled	<b>C + Refer to Appendix 2</b>
Repaired Mains and Mains Work – shut or throttled where risk is perceived	<b>C + Refer to Appendix 2</b>
District Meter maintenance, PRV's & PSV's etc. No bypass in place	<b>C + Refer to Appendix 2</b>
District Meter maintenance, PRV's & PSV's etc. Bypass in place >6" flush, sample await satisfactory sample results	<b>C + Refer to Appendix 2</b>
Cut main – possible foul water contamination	<b>Under Instruction from Water Quality Services</b>
Emergency Chlorination	<b>Under Instruction from Water Quality Services</b>
Booster – Low Level Disinfection	<b>Under Instruction from Water Quality Services</b>
Depressurisation of network	<b>Under Instruction from Water Quality Services</b>

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<b>Developer Services and Trunk Mains</b>	
<b>Activity</b>	<b>Disinfection Method</b>
New Mains	<b>A or B + Refer to Appendix 3</b>
New Trunk Mains	<b>A + Refer to Appendix 3</b>
New Mains Connection	<b>&lt;1m C + Refer to Appendix 3 &gt;1m A or B + Refer to Appendix 3</b>
Under Pressure Tees (UPT) including road crossings	<b>C + Refer to Appendix 3</b>
New Lay – e.g. replacement mains laid by open cut.	<b>A or B + Refer to Appendix 3</b>
Mains =>63mm DN	<b>A or B + Refer to Appendix 3</b>
>14 days from sample result to proposed connection	<b>A or B + Refer to Appendix 3</b>
<14 days flush main for 3 volumes. No Bact sample required.	
Fire Mains – Double Check Valve must be fitted between the fire main and the live distribution system. Only pipework between the live distribution system and the Double Check Valve must be disinfected and sampled.	<b>A or B</b>

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<b>Renewals and Rehabilitation Work</b>	
<b>Activity</b>	<b>Disinfection Method</b>
<u><b>On Line Techniques</b></u> Pipe Bursting/ Slip Lining or any other structural or close fit lining	<b>A or B + Refer to Appendix 4</b>
<u><b>Off Line Techniques</b></u> Directional Drilling/Open Cut	<b>A or B + Refer to Appendix 4</b>
Swabbing Cleaning Techniques	<b>A or B + Refer to Appendix 4</b>
Epoxy/Thermopipe	<b>A or B + Refer to Appendix 4</b>
Overland riders =>63mm DN	<b>A or B + Refer to Appendix 4</b>
>14 days from sample result to proposed connection	<b>A or B + Refer to Appendix 4</b>
<14 days flush main for 3 volumes. No Bact sample required.	

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Disinfection Method	Pre – Disinfection	Process	Chlorine conc.	Contact time	Post - Disinfection	Return to supply
<b>A</b>	<p>Main to be charged up with one volume of water to ensure the internal surfaces are wet prior to swabbing.</p> <p>Swab – swabs are to be inspected for soiling. If swabs are found to be soiled, then swabbing operations must continue until swabs are clean.</p> <p>All swabs are to be retained for inspection.</p> <p>Following swabbing flush the main =&gt;3 x volumes until the on-site turbidity &lt;1NTU.</p>	Injection disinfection	>20 mg/l <25 mg/l	<p>&gt;16 hours &lt;24 hours.</p> <p>Following the contact time check that the free chlorine residual is &gt;20 mg/l</p>	<p>Dechlorinate the main ensuring the total volume of chlorinated water has been discharged. Continue flushing until normal district chlorine residual is recorded consistently.</p> <p>On-site turbidity must be &lt;1NTU.</p> <p>On-site taste and odour must be checked, and satisfactory results must be achieved.</p> <p><b>Stand for a further &gt;16 &lt;24 hours before sampling in accordance with NW080.</b></p> <p>Repeat chlorination is required if a 10% drop between the injected chlorine residual and post contact residual is observed after the specified contact time.</p>	<p>Await sample result.</p> <p>Satisfactory results received.</p> <p>If a Precautionary Boil Water Notice is in place, then this must be lifted immediately upon receipt of the satisfactory result.</p> <p>Upon receipt of a satisfactory result the main must be connected to the existing network no later than 14 days from the original sample date.</p>

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Disinfection Method	Pre – Disinfection	Process	Chlorine conc.	Contact time	Post - Disinfection	Return to supply
<b>B</b>	<p>Main to be charged up with one volume of water to ensure the internal surfaces are wet prior to swabbing.</p> <p>Swab – swabs are to be inspected for soiling. If swabs are found to be soiled then swabbing operations must continue until swabs are clean.</p> <p>All swabs are to be retained for inspection.</p> <p>Following swabbing flush the main =&gt;3 x volumes until the on-site turbidity &lt;1NTU.</p>	Injection disinfection	>50 mg/l <60 mg/l	30 mins	<p>Dechlorinate the main ensuring the total volume of chlorinated water has been discharged. Continue flushing until normal district chlorine residual is recorded consistently.</p> <p>On-site turbidity must be &lt;1NTU.</p> <p>On-site taste and odour must be checked, and satisfactory results must be achieved.</p> <p><b>Stand for a further 30 minutes before sampling in accordance with NW080.</b></p> <p>Repeat chlorination is required if a 10% drop between the injected chlorine residual and post contact residual is observed after the specified contact time.</p>	<p>Await sample result.</p> <p>Satisfactory results received.</p> <p>If a Precautionary Boil Water Notice is in place, then this must be lifted immediately upon receipt of the satisfactory result.</p> <p>Upon receipt of a satisfactory result the main must be connected to the existing network no later than 14 days from the original sample date.</p>

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Disinfection Method	Length of Branch Pipework	Process	Chlorine conc.	Contact time	Post - Disinfection	Return to supply
<b>C</b>	<=1m  <span style="background-color: yellow;">Road Crossings – Refer to Appendix 3</span>	Spray chlorinate with a lance	A minimum concentration of 1000 mg/l of free chlorine	5 mins	Flush with a minimum of 3 volumes until normal district chlorine residual recorded & turbidity on-site <1NTU.  On-site taste and odour must be checked, and satisfactory results must be achieved.	Upon completion of the work the main can be opened to the existing distribution network. Where possible the area of supply should be restricted until satisfactory sample results are received.

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## Appendix 2 Existing Mains (Maintenance & Repair and Connections)

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Instruction  
    General  
    Potential Contamination from Sewers  
    Further Disinfection and Monitoring Table

### Reference

Technical Guidance Note 3 Distribution System (Repairing Mains)  
NW039 Repair of Broken Mains Procedure  
NW080 Water Quality Sampling following Network Activities  
SSO-502 Protocol for Communication with Health and Local Authorities - Reference Document  
SSO-128 Notification of Events to the Drinking Water Inspectorate Procedure

### Introduction

The Network system can be vulnerable to contamination during abnormal operating conditions such as repairing a burst main. However, there are measures that can be taken to minimise the risk of Contamination.

Guidance is given in Technical Guidance Note 3 Distribution System (Repairing Mains) and the following instruction.

### Instruction

#### General

Burst mains and other types of repairs are more difficult to control than planned work, but every effort should be made to prevent contamination entering the main. This may be achieved by applying the following practices.

Some mains repairs require depressurisation and cutting, but in other cases the pressure is maintained whilst a repair is affected by a collar/clamp etc. The predominant risk occurs when the main has been depressurised and broken.

If a shutdown has taken place then the information **must be recorded on Maximo** and a water quality sample taken in accordance with Appendix 1 of this procedure.

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## Cut outs

The pressure should not be completely taken off the burst except in extreme circumstances until excavation has been carried out to a level of at least 300mm below the invert of the main.

The trench should be pumped dry and at this time a controlled amount of water should still be issuing from the fracture. Suitable pumping capacity **must** be available to ensure the water level in the trench is kept below the cut in the main and a suitable sump hole provided to take the pump suction prior to the pipe being cut out for repair. This sump hole should be maintained throughout the job to ensure water levels are minimised.

Care must be taken not to pump silt directly into a ditch or drain, an action which could lead to a prosecution of the Company by the Environment Agency. See NW010 Discharge to watercourses.

After the affected length has been removed, the open ends of the existing pipeline must be thoroughly cleaned and sprayed with freshly made chlorine solution of a minimum concentration of 1000 mg/l.

Once an existing pipe has been cut and disinfected any open ends must be sealed with freshly disinfected plugs/cap ends or clean plastic bags until the replacement pipe is fitted into the existing pipe. **If the main is to be left in this condition for a period of time, then the open ends must be secured with a bolted end cap or similar mechanical fitting to prevent any ingress.**

If the replacement pipe is less than one meter in length, then it should be sprayed fully with freshly made chlorine solution of a minimum concentration of 1000 mg/l. If greater than 1m and less than or equal to 12m length then a swab soaked in a freshly made chlorine solution of a minimum of 1000mg/l should be pulled through and removed prior to installation by a trained and competent operative. A full COSHH and Health and Safety Risk Assessment must be carried out prior to the swabbing taking place. If the pipe is greater than 12m injection disinfection is required.

The ends of the pipes and all fittings should be cleaned and sprayed internally and externally prior to fitting **with freshly made minimum 1000ppm chlorine solution.**

**Flush and sample main in accordance with Appendix 1 of this Procedure and NW080 Water Quality Sampling Following Network Activities.**

## Clamps

The pressure should not be completely taken off the burst except in extreme circumstances until excavation has been carried out to a level of at least 300mm below the invert of the main.

**Care must be taken not to pump silt directly into a ditch or drain, an action which, could lead to a prosecution of the Company by the Environment Agency.**

Ideally clamp repairs should be carried out under full pressure with as little throttling as possible to ensure positive pressure is maintained, minimising water quality risk.

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All fittings should be sprayed internally and externally with a freshly made chlorine solution of 1000 mg/l. The external surface of the main should be cleaned and sprayed with a freshly made chlorine solution of a minimum concentration of 1000 mg/l prior to installing fittings.

**Flush and sample main in accordance with Appendix 1 of this Procedure and NW080 Water Quality Sampling Following Network Activities.**

### Potential Contamination

#### Third Party Damage

Dependant on the cause of the third party damage, emergency chlorination may be necessary. Each case must be considered on the circumstances surrounding the damage.

**If broken sewers are present in the vicinity of a burst, then special precautions will be necessary. The line manager and Operations Scientist MUST be informed for a risk assessment to be undertaken.**

Ensure that all materials (fittings) used in repairs are free from extraneous material. Heavily spray pipes, fittings and open ends with freshly made chlorine solution of a minimum concentration of 1000 mg/l.

The need for further disinfection and monitoring should be assessed on the basis of the risk of contamination having occurred. Precautionary boil water notices may be necessary.

Consider tapping the main for sampling purposes if suitable sampling arrangements are not available.

Once the job is complete ensure that prior to moving on to the next job, all personnel have new issue PPE, all equipment and tools used are cleaned and fully disinfected using freshly made 1000 mg/l chlorine solution. Vehicles and larger equipment should be pressure washed internally and externally at a suitable location e.g. NOT on a production site. This is to prevent cross contamination to another site.

**Where ingress of groundwater into the main has occurred, then special precautions will be necessary. The line manager and Operations Scientist MUST be informed if damage has occurred for a risk assessment to be undertaken.**

Precautionary boil water notices may be necessary prior to results of samples.

On commissioning the main leave the minimum number of valves open to restrict the distribution of water. Fully identify the properties affected and inform the Line Manager and Operations Scientist to confirm any additional actions.

**Flush and sample main in accordance with Appendix 1 of this Procedure and NW080 Water Quality Sampling Following Network Activities.**

Open all valves **only** after receiving clearance from Water Quality Services.

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## Appendix 3 New Mains and New Trunk Mains (Not connected to the Distribution Network)

### Reference

Technical Guidance Note 2 Distribution System (New Mains and Services)  
NW080 Water Quality Sampling following Network Activities

### Introduction

The main must be laid in a clean and hygienic condition. New pipework must be pressure tested swabbed, flushed, disinfected and satisfactory samples obtained before being brought into service.

During installation, the pipe ends must be capped using freshly disinfected plugs/cap ends or clean bags whenever work stops. The ends of the pipes and all fittings should be cleaned and sprayed internally and externally prior to fitting with freshly made minimum 1000ppm chlorine solution.

Guidance is given in Technical Guidance Note 2 Distribution System (New Mains and Services) and the following instruction.

### Instruction

1. Ensure that all pipes and fittings are **CLEAN AND FREE FROM DIRT AND DEBRIS** before placing in position.
2. Lay the main and carry out pressure testing.
3. Following completion of satisfactory pressure testing, the main should be swabbed and flushed until on-site turbidity <1NTU using potable water.
4. Using either injection disinfection technique **A** or **B** for new mains and **A** for trunk mains (See Network Disinfection Table)
5. Sample as in accordance with NW080 Water Quality Sampling following Network Activities.
6. In the case of trunk mains over 500m in length samples representative of each 500m section must be taken. For new mains a sample should be taken on each leg.
7. Sample results - after receipt of clearance commission the main at the earliest opportunity. Further clearance will be required if the main is not commissioned within 14 days from sample date. Final connection should not be made until a satisfactory water sample is obtained.

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## Under Pressure/Cut In Tees

If the connection for a new site is made using an under-pressure tee, the branch requires a sample to be taken from it. If a tee is cut into the main and the parent main is depressurised, samples must be taken from both the new branch pipework and the parent main. Sampling, as per NW080 Water Quality Sampling following Network Activities, comprises on site turbidity, free and total chlorines, taste and odour and laboratory analysis of bacteriological and physical parameters.

## Road Crossings

For road crossings which are subject to traffic management restrictions, then either factory sealed pipe should be utilised or install a pre-chlorinated pipe, which has previously received a satisfactory water quality sample result. After installation of either pipe, a water quality sample must be collected in accordance with NW080.

For road crossings which are **NOT** subject to traffic management restrictions, then install either factory sealed pipe or pre-chlorinated pipe as above, on install a pipe with back to back hydrants and use either disinfection method A or B.

## Mains Connections

Mains connections are made to piece through two sections of pipe, which have been previously sampled, using a new piece of pipe. The length of the connection should where possible be no greater than 1m. When a new piece of pipe is installed to make the connection, samples must be taken which are representative of the new pipework and any sections of main which are depressurised during the connection work. Sampling, as per NW080 Water Quality Sampling following Network Activities, comprises on site turbidity, free and total chlorines, taste and odour and laboratory analysis of bacteriological and physical parameters.

## Ad hoc connections

Connections <63mm only require an on-site odour check unless a risk assessment identifies the need for further check which may include on-site turbidity, free and total chlorines, taste and odour and laboratory analysis of bacteriological and physical parameters.

Ad hoc connections =>63mm should be subject to disinfection as per Appendix 1.

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## Appendix 4 Renewals and Rehabilitation

### PROCEDURE FOR MAINS RENEWALS OR MAINS REHABILITATION

#### Reference

AW0281 Method Statement Procedure  
 AW0282 Method Statement Guidance Note  
 OP345 Access to the Network Procedure  
 Appendix 1 Network Disinfection Table  
 NW080 Water Quality Sampling following Network Activities  
 WATER UK WIS 4-02-01 Operational Requirements: In situ Resin Lining of Water Mains  
 WATER UK IGN 4-02-02 Code of Practice: In situ Lining of Water Mains  
 Technical Guidance Note 4 Distribution System (Renovated Mains)

Before the use of any mains renovation technique, the Contractor **must** provide Affinity Water with a detailed method statement in the Company format (AW0281 Method Statement Procedure & AW0282 Method Statement Guidance Note) and OP345 Access to the Network Procedure.

The method statement must include disinfection and sampling procedures in accordance with Appendix 1 Network Disinfection Table and NW080 Water Quality Sampling following Network Activities and must be approved by Community Operations and the Operations Scientist (Network).

Epoxy Lining and High Build – Must only be carried out with approved materials, used in accordance with manufacturer’s instructions and by approved contractors, in accordance with specified conditions of approval e.g. WATER UK WIS 4-02-01 Operational Requirements: In situ Resin Lining of Water Mains, WATER UK IGN 4-02-02 Code of Practice: In situ Lining of Water Mains.

#### In Line Techniques

##### Factory Sealed Clean Polyethylene Pipes

Where clean factory capped coils are used, the coils must be stock rotated to ensure they are used within the 6 months ‘use by’ date. The coils must be stored to ensure the outer seal is not damaged and must not be stored directly on the ground. If the seal is damaged the inner seal must be checked and if intact the outer seal can be repaired. If both seals are damaged, then the coil can no longer be classed as clean and must be subjected to in-situ disinfection following installation.

- Factory sealed clean coils do not require in-situ swabbing and disinfection following installation if the if any of the following conditions are met:
  - i. If the coil has a factory fitted towing eye and it remains intact during the pipe burst or drilling. However, if the eye is dislodged then swabbing and disinfection must be undertaken.
  - ii. If the factory sealed pipe is laid in a trench and is sealed until the point of fittings being installed.

Where factory sealed coils are to be installed within an existing main, either close or loose fitting within the existing pipe or by insertion through pipe-bursting or created by directional drilling, then a factory fitted towing eye must be in place.

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Once installed the towing eye must be thoroughly examined to ensure it has remained intact. Photographic evidence must be produced and entered into the quality file.

### Pre Chlorinated Coils

a) Pre-disinfected with free chlorine levels of 20mg/L for 16 hours (or equivalent), flushed and then recharged with mains water for a further 16 hours before sampling at appropriate points and written approval obtained before being brought into service. A significant reduction in chlorine concentration using this method over the contact period may indicate a dirty or otherwise contaminated pipe; or

b) Disinfection for a minimum of 50mg/L of free available chlorine for 30 minutes followed by flushing and sampling prior to being returned to service. A significant reduction in chlorine concentration using this method over the contact period may indicate a dirty or otherwise contaminated pipe; or

c) Use of factory sealed and pre-disinfected pipes (supplied with a manufacturers expiry date) with the seal remaining intact until the pipe is ready to be installed; or

d) Treated as a new main installation and disinfected accordingly

The risk of contamination during the installation of pre-disinfected coiled pipe (e.g.: loss of sealed cap through “pulling” main) should be assessed. Where the pipe is suspected to have become contaminated during installation, further cleaning and disinfection methods should be considered.

Where a pre-chlorinated coiled pipe has had a pulling head inserted, or has been cut or there is any doubt about the disinfection status of the pipe, or it is suspected that contamination has occurred, i.e. during insertion, then the coil should be re-chlorinated.

Factory-sealed coiled pipe should be installed within 6 months of the disinfection/sterilisation date. Where the 6 month period has been exceeded, the pipe should be re-chlorinated.

On restoration of supplies to customers following renovation, a precautionary boil water notice **must** be issued until clearance is given by Water Quality Services.

### Pipe Bursting/Slip Lining or any other Structural or Close Fit Lining

1. Ensure that all pipes and fittings are **CLEAN AND FREE FROM DIRT AND DEBRIS** before placing in position.
2. Insert the new main.
3. Following completion of satisfactory pressure testing (if required), the main should be swabbed and flushed until on-site turbidity <1NTU using potable water.
4. Use either injection disinfection technique **A** or **B**.
5. Service connections must not be made to the main until all chlorination works have been completed and the chlorinator has given clearance for this work to proceed.

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6. Sample as in accordance with NW080 Water Quality Sampling following Network Activities.
7. Where customers are going to be supplied by the renewed main a Precautionary Boil Water Notice (PBWN) must be utilised.
8. Upon receiving satisfactory sample results the PBWN must be immediately lifted.
9. In the event of any sample failures, Water Quality will advise on what action is to be taken prior to repeat sampling and the PBWN must stay in place until satisfactory sample results are received.
10. Sample results - after receipt of clearance commission the main at the earliest opportunity. Further clearance will be required if the main is not commissioned within 14 days from sample date. Final connection should not be made until a satisfactory water sample is obtained.

### Off Line Techniques

#### Directional Drilling or Open Cut

1. Ensure that all pipes and fittings are **CLEAN AND FREE FROM DIRT AND DEBRIS** before placing in position.
2. Insert the new main.
3. Following completion of satisfactory pressure testing (if required), the main should be swabbed and flushed until on-site turbidity <1NTU using potable water.
11. Use either injection disinfection technique **A** or **B**.
12. Service connections must not be made to the main until all chlorination works have been completed and the chlorinator has given clearance for this work to proceed.
13. Sample as in accordance with NW080 Water Quality Sampling following Network Activities.
14. Where customers are going to be supplied by the renewed main a Precautionary Boil Water Notice (PBWN) must be utilised.
15. Upon receiving satisfactory sample results the PBWN must be immediately lifted.
16. In the event of any sample failures, Water Quality will advise on what action is to be taken prior to repeat sampling and the PBWN must stay in place until satisfactory sample results are received.
17. Sample results - after receipt of clearance commission the main at the earliest opportunity. Further clearance will be required if the main is not commissioned within 14 days from sample date. Final connection should not be made until a satisfactory water sample is obtained.

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