Water Quality Compliance Specification

MRWA Specification No. 04-02-2.2

Construction and Connection of New Drinking Water & Non Drinking Water Mains

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Document History

The following information indicates the changes made to this document.

Issue	Revision	Date Approved	Change	Reason for Change
1.0	A	2004	1st edition of the water quality compliance specification	
2.0	A	May 2012	Amended to include water quality compliance for non drinking water	Inclusion of non drinking water parameter limits
2.0	B	July 2012	Amended to include updated water parameter limits Appendix 1-Table 2	Updates to the drinking water microbiological parameter limits
2.0	C	October 2012	Amended to include updated water parameter limits Appendix 1-Table 2	Additional Updates to the drinking water microbiological parameter limits
2.1	D	November 2016	Expanded on chlorination explanation. Alteration to sample results notification table. Changed existing sample location to customer front tap – no hydrant samples. Addition of Appendix 4	To clarify that samples are to be collected after chlorination / neutralisation. To clarify Coliform and HPC results interpretation. Samples are not to be collected from a hydrant on an existing main due to samples being submitted that are not representative of water in the main. Example of appropriate location and number of samples to be taken.
2.2	E	March 2025	Addition of chlorine solution requirements, neutralising agents. Amended to include connection and charging of main. Expanded on Sampling explanation. Amended to include expiry of test	Updates made due to feedback from teams who use the specification, to improve clarity and understanding.

			results. Alteration to include updated Microbiological Parameter limits Appendix 1 – Table 3. Updated Sample Locations diagram (Appendix 4). Updated coliforms and HPC units to include CFU/ml. Updated references to Safe Drinking Water Regulations 2025.	

Contents

1 Purpose

All new water supply mains including drinking and non drinking water (i.e.: recycled water) mains need to demonstrate compliance with the Water Agency's water quality compliance standards

This specification has been established to define the joint Melbourne Retail Water Agency (MRWA – representing Greater Western Water, South East Water and Yarra Valley Water) water quality compliance requirements.

1.1 Drinking Water

Many new water mains are constructed each year to service new development or replacement/renewal of existing assets. The water quality from new mains must comply with Water Agency Licence requirements before the water is suitable for human consumption, i.e. it shall be safe to drink, clear and free from objectionable taste and odour.

The Australian Drinking Water Guidelines, the Victorian Safe Drinking Water Act 2003 and Regulations 2025 all focus on the Water Agency maintaining risk management plans for the water supply system from the catchment to the customer's tap. The updated Safe Drinking Water Regulations came into operation on 6th of July 2025. Water agencies are required to implement improvements in management of the quality of the water supplied, this will require with their service partners in this regard.

This specification is part of the Water Agency's risk management plan and follows the framework for managing drinking water in the Australian Drinking Water Guidelines, consistent with Hazard Analysis and Critical Control Point (HACCP) principles. The HACCP approach eliminates or reduces the water quality risks to an acceptable level. The process also requires verification that the water quality is compliant with the Water Agency requirements before a new main is accepted into service and the drinking water is made available for consumption.

1.2 Non Drinking Water

The Water Agencies all maintain Hazard Analysis and Critical Control Point (HACCP) for non drinking water schemes and this specification forms part of the risk management plan reducing the risk of hazards/contamination and verifying that the non drinking water quality is compliant with the Water Agency requirements before a new main is accepted into service and the non drinking water main is made available for use.

2 Scope

New water mains (including drinking and non drinking water) shall be constructed to minimize the risk of contamination of the water. The water from new mains must be tested for compliance with water quality parameters as defined in Appendix 1, before the main can be accepted for service.

The provisions of this specification apply to both drinking and non drinking water mains. Water mains greater than or equal to (>=) 225mm diameter must be

disinfected prior to sampling and testing.

The water from all disinfected mains must be neutralised before discharge to the environment.

3 Quality Criteria

Preventing contamination from entering a main is an important step when constructing a new water main. The requirements for prevention of contamination and for mains cleaning are provided in Clause 5.

The physical, chemical and microbiological test results on samples collected are used to verify that the quality of the water to be supplied from the new water main is suitable for its intended use.

The Water Agency requirements for water quality test results are provided in Appendix 1.

The collection and testing of water samples shall be completed by an independent NATA accredited laboratory employing a drinking water analyst. All sample results shall be issued in accordance with NATA's accreditation requirements.

The locations for the sampling of water shall be identified on the design plans submitted to the Water Agency for approval.

An independent approved water mains disinfection contractor shall be used to disinfect >= 225 mm diameter mains to achieve a minimum chlorine contact time (CT) value (refer to details in Clause 6).

4 Basic Requirements

Preventing contaminated material from entering the water main during storage, construction and connection is required. This has the added benefit of reducing the amount of water required for swabbing/flushing and the amount of disinfectant required.

Remove any contaminating materials by swabbing and flushing the water mains. Disinfect water mains > = 225 mm diameter, using an independent approved contractor, to achieve a minimum CT value (refer to Clause 6 below).

Neutralise the disinfectant before it is discharged to the environment.

Determine the physical, chemical and microbiological quality by having an independent NATA accredited laboratory sample and test the water from identified locations on the existing and new water main/s.

Provide water quality test results as evidence that the water quality complies with the requirements.

Carry out further mains cleaning works on the main/s to rectify non-compliant test results. Resample and test in accordance with Clause 9 until all test results comply.

5 Preventative Measures

Preventing contamination of the drinking water in all parts of the water supply system from catchment to customers tap is the focus of the risk management plans/HACCP plans maintained by the Water Agency. It is essential that the requirements of this Clause be followed to reduce the risks of contamination. Preventing contamination at this early stage of an asset's life is relatively easy and low cost because it is the last time the asset is readily accessible.

5.1 Keeping Pipe Clean and Dry

5.1.1 Storage

Pipes, fittings and equipment delivered for construction shall be stored and handled so as to minimise entrance of foreign materials. Delay in placement of delivered pipes invites contamination. The more closely the rate of delivery is related to the rate of pipelaying, the less likelihood of contamination.

Equal care must be taken to protect fittings and equipment from contamination during transportation and handling.

5.1.2 Temporary Capping

Once a pipe has been installed and is in the trench, the contractor must use exclusion caps, plugs or blank flanges of approved design to seal all open ends of pipes and fittings if the pipe will be left unattended.

5.1.3 Jointing, Packing and Sealing Materials

No contaminated material or any material capable of supporting growth of microorganisms shall be used within the pipe. Materials or gaskets shall be handled in a manner, which avoids contamination. The jointing lubricant used shall be approved for use in potable water and delivered to the site in closed containers which are to be kept in clean conditions at all times.

5.2 Approved Products

Only products that comply with AS/NZS 4020 for use in contact with potable water and approved by the Water Agencies shall be used in the construction of the water mains.

The Contractor, or their nominated chlorination contractor, will ensure that each batch of chlorine solution meets the requirement as outlined in Table 1: Chlorine Specification for sodium hypochlorite solution. The acceptable impurity levels for sodium hypochlorite typical strength of 12% and 6% are based on the requirements specified in the ADWG Table 8.4. (a method is provided in ADWG Box 8.3 to determine impurities at other concentrations of Chlorine.)

Table 1.1: Chlorine Specification for sodium hypochlorite **12%**

Description	Specification
Available Chlorine	10 – 14 % w/w
Insoluble Matter	less than 0.5 % w/w
Cadmium	less than 5.0 mg/kg
Mercury	less than 2.5 mg/kg
Nickel	less than 50mg/kg

Table 1.2: Chlorine Specification for sodium hypochlorite **6%**

Description	Specification
Available Chlorine	4 – 6 % w/w
Insoluble Matter	less than 0.25 % w/w
Cadmium	less than 2.5mg/kg
Mercury	less than 1.25mg/kg
Nickel	less than 25mg/kg

5.3 Cleaning Methods

All new mains > = 100 mm diameter, shall be swabbed to remove any deleterious material.

Swabbing shall be carried out in accordance with Clause 18 of the MRWA Edition WSA03-2011 – 3.1

All mains, including those that are swabbed and mains that are less than 100mm diameter (i.e. typically 40 mm, 50 mm, or 63 mm) shall be flushed at high flow (at least 10 litres per second) for a minimum of 5 minutes for every 100 metres of main or part thereof. A high flow is required to generate a water velocity that will re-suspend, carry and discharge small particulate material.

Mains greater or equal to 225 mm diameter shall be disinfected after swabbing. Refer to Clause 6 for details.

Large mains above 750 mm diameter shall be manually cleaned in stages by sweeping and hosing and sealing after completion of all internal works and prior to disinfection.

5.4 Tools and Equipment

Equipment and tools must be cleaned and disinfected before use as per clause **15.5.3 Disinfection of fittings and equipment** in WSAA-03 (2011).

Crews working on drinking water assets must not work on sewer related jobs to eliminate the risk of cross-contamination.

6 Disinfection and neutralisation of disinfectant

Disinfection and neutralisation of water mains is to be undertaken as instructed below, with the intention that after the completion of this process, the new main is then charged with potable water and then sampled. The sampling process described in section 7 is not to be undertaken on the chlorinated water, but on the water main after is has been filled from the existing main.

Disinfection of water mains is to be carried out by a suitably qualified specialist disinfection contractor, as determined by the accredited contractor. Water mains > = 225 mm diameter shall be disinfected using chlorine as the disinfectant in the form of sodium hypochlorite solution.

The disinfectant is to be added to the new water main via a suitable injection point just downstream (within 3 metres) of the new main connection to the existing main – a hydrant is a suitable injection point.

The discharge point for disinfection will be at the end of the new main(s) and will be from a hydrant or other suitable control valve fitted with a portable flow meter to measure discharge flow.

The disinfectant is injected into the main when there is a known water flow – via a discharge flow meter. This flow is adjusted to match the disinfectant dose.

The flow of disinfectant into the new main will be calculated to achieve a minimum continuous dose of > = 5 milligrams per litre (mg/L) of free chlorine.

The injection of the disinfectant should stop when the free chlorine residual (FCR) in the discharge water is > = 5 mg/L.

The disinfected new main shall be isolated from the existing supply for backflow prevention during the contact period by closing the control valve as appropriate.

The disinfectant shall stay in the new main for a minimum contact time of at least 1 hour to achieve a minimum CT value of 5 milligram hours per litre (i.e. 5 mg/L of chlorine for a 1 hour period, or 2.5 mg/L of chlorine for 2 hours).

The FCR shall then be measured at half hour intervals.

Note that the measured FCR in the discharge water will decrease with time. The contact time should therefore continue until the minimum CT value is achieved – refer to table 1 below.

At the end of the contact time the chlorinated water in the new main shall be neutralised (to <0.1mg/L free chlorine residual) before the water is discharged to the environment.

One method of neutralising the chlorine is to add neutralising agents such as Sodium Thiosulphate or Ascorbic acid (Vitamin C) to the water as it is being discharged from the main. Refer to Table 6 in WSAA guideline: *Dechlorination of Drinking water discharged to waterways: National Guidance for the Urban Water Industry (2019)* for common dichlorination chemicals.

If this method is used, FCR measurements shall be taken of the discharge water to confirm zero or at least < 0.1 mg/L free chlorine levels to verify neutralisation.

An alternative neutralising method is to capture the disinfected water and contain it on site to allow the chlorine to dissipate. A minimum of 2 days containment period is suggested before the water should be allowed into the environment but again only when the FCR is zero or at least < 0.1 mg/L.

Records shall be kept of:

a) the volume of water in the main to be disinfected,

b) the volume of disinfectant,

c) the FCR at end of dosing,

d) the FCR at half hour intervals until end of contact time,

e) the contact time,

f) the neutralisation method used,

g) three FCR readings during the sodium thiosulphate treatment,

h) the containment period and,

i) one FCR measure at the end of the on site containment method.

6.1 Safety

Chlorine disinfectants and chlorine neutralising agents are harmful substances – manufacturer's specification and Material Safety Data Sheets shall be followed when using, storing, handling, etc.

Table 1

Minimum contact time for the disinfectant based on the lowest measured free chlorine residual (FCR). The contact time is proportionally based on a minimum CT value of 5 mg hours/L.

Free Chlorine Residual (C) mg/l at time T	Minimum Contact Time (T) hours
5.0 or greater	1 hour
4.0	1.25 hours
3.0	1.7 hours
2.5	2 hours
2.0	2.5 hours
1.5	3.3 hours
1.0	5 hours

7 Connection and charging of main

When the final connection between the new water main/s and the existing network is made, extra care must be taken to prevent the risk of contamination of the connecting piece of main, including maintaining a clean workspace.

The designers should select the preferred charging location and indicate this on design plans submitted for approval. Contractors are to adhere to the charging locations stipulated in design plans, a dispensation request to Water Agency will be required if the approved charging location needs to be changed.

8 Sampling

Water samples shall be collected from the identified locations by an independent NATA accredited laboratory after final swabbing / flushing / hydrostatic pressure testing and disinfection and neutralisation and temporary connection to the existing main. The consultant (during design phase) shall record the exact location of each site sampled for appropriate referencing by the laboratory and for the Water Agency. At least one sample for each Sample Set (refer 7.1 and 7.2) shall be collected. Refer to the flowchart of the sampling/testing process shown in Appendix 3.

"Existing main" and "New main" samples must be collected at the same time.

8.1 Sample – Existing Main

One sample must be taken from the existing main used for charging purposes. The sampling location hierarchy must be followed as follows:

1. Water Authority sample tap within 50m of charging point.

2. Closest front garden tap of a property with non-plastic, flame-able fitting within 50m of charging point. Permission from the property owner must be obtained to collect sample from a front garden tap. Samples should not be taken from plastic tap fittings to avoid potential contaminants.

3. Hydrant using a disinfected standpipe, with a flame-able tap fitting.

The sampling procedure must include but not be limited to the following requirements:

- A hydrant use permit must be obtained from the water authority to obtain samples from hydrants.

- The fitting at the sample tap/front garden tap or hydrant access point must be appropriately disinfected with an approved disinfectant prior to sampling.

- The sample point should be flushed at a minimum flow of 0.5 litres per second for a minimum of 5 minutes.

- The flame-able tap fitting should be flamed as per the NATA accredited laboratory procedure.

- The sampler must follow all NATA accredited laboratory procedures to prevent cross contamination of samples.

The sample collected from the “existing main” is to be taken from the main that was used to charge the new main. If the new non drinking water main was filled/ charged from the drinking water main, then the “existing main” sample is to be taken from the drinking water main.

8.2 Sample – New Main

A minimum of one sample shall be taken from each new main at the downstream end point (refer Appendix 4 for typical example) and at all dead ends of new water mains.

If one or more of the samples fails to meet the specified water quality parameter limits, each selected sub main/dead end shall be retested to the required parameters set out in section 9.3 and 9.4.

If any services are available, they are the first preference for sampling. If it is not possible to take a sample from a service or tapping point on the new main, a fire hydrant on the new main can be used after it has been flushed at a minimum flow of 0.5 litres per second for a minimum of 5 minutes.

The Consultant shall indicate the Water sample point locations on the design drawings and provide appropriate location reference for use by the laboratory and the Water Agency personnel. As part of the design verification process, the Water Agency may provide advice on the required Water sampling locations prior to the sample collections being carried out. Where there are multiple existing mains the Consultant should select the preferred charging location and the Contractor should adhere to the design charging location stipulated in design plans.

9 Tests

The water samples shall be tested by an independent NATA accredited laboratory for the physical, chemical and microbiological parameters specified in Appendix 1 using NATA accredited methodology and drinking water analysts.

Refer to the flowchart of the sampling/testing process shown in Appendix 3.

9.1 Expiry of Test Results

Water quality tests are to be obtained as close as practically possible to the connection to the existing main. If the connection is delayed for more than 45 calendar days, water quality tests must be repeated before connecting to the existing main.

10 Test Results

The MRWA water quality testing parameters for Drinking Water (Table 3) and Non-drinking Water mains (Table 4) are defined within Appendix 1.

The consultant shall notify the Water Agency of all results as detailed in Clause 10.

An interpretive summary must be provided along with the water quality results to compare with parameters in this specification. This summary must outline whether results comply with this specification, or not.

The Water Agency shall be notified by the consultant and the laboratory if any sample contains *E. coli* immediately after the result is available.

10.1 Non-compliant results for the Existing main

For test results outside the limits specified below in Table 2, the Water Agency will carry out rectification works on the existing main to ensure that the water quality complies with the limits (including re-testing) before the new main is accepted into service.

Table 2 Existing Main Limits

Parameter	Units	Existing Main Water Agency Limits	ADWG Recommended Limits
PHYSICAL PARAMETERS			
pH	Units	> 6.5 and < 9.2	> 6.5 and < 9.2
Apparent Colour	HU	<= 20	~25
Turbidity	NTU	<= 3	5
EC	uS/cm	< 200	~1250
CHEMICAL PARAMETERS			
Free chlorine residual	mg/L	< 1.5	5
Total chlorine residual	mg/L	< 1.5 e.g. 0.4	5
MICROBIOLOGICAL PARAMETERS			
E. coli	orgs/100 mL, or, MPN/100mL	< 1	< 1
Total coliforms	orgs/100 mL, or, CFU/mL	≤ 200	< 200 #
Heterotrophic Plate count	orgs/mL, or, CFU/mL	≤ 1000	< 1000 #

= these limits are advisory as there is no specific recommended limits in ADWG

10.2 Non-compliant results for the New main

For test results outside the limits specified in Appendix 1, the consultant will carry out rectification works on the new main to ensure that the water quality complies with the limits before the new main is accepted into service. These works will depend on the results as follows:

10.3 For microbiological quality:

- The main/s shall be flushed, or swabbed and flushed, (as per Clause 5 above), and if required, disinfected, until the follow up samples for both the new and existing main comply with *all parameters* at each sub main sample point.

- If a sample from the new main meets the requirements (<2xExisting Main) for Total Coliforms and (<5xExisting Main) for Heterotrophic Plate Count, however the result is higher than the ADWG value in Section 9.1 above, then the sample passes the specification requirements, however the laboratory is to notify the water authority so they can take rectification works (i.e. existing main Total Coliforms 150 orgs/100mL, new main 240 orgs/100mL – the new main quality has not failed as it is <2 x 100 orgs/100mL, however is higher than the ADWG limits due to the elevated levels in the existing main, so the water authority shall take appropriate rectification works).

10.4 For chemical and physical quality:

- Arrange for follow up samples for both the new and existing main/s and test for the parameter/s that failed at each sub main.

- If the follow up sample/s comply with the limits then no further works are required.

- If the follow up sample/s fail again then the new main/s shall be flushed, swabbed and flushed (as per Clause 5 above) until further follow up sample/s for both the new and existing mains comply with *all parameters*.

11 Notification

The Water Agency shall be notified by the consultant if any sample contains *E. coli* immediately after the result is available. The laboratory will also directly notify the Water Agency immediately.

Any non-compliant results for the other parameters shall be reported to the Water Agency within 24 hours of being available.

A copy of the test results with sample site references shall be provided by the consultant to the Water Agency with the construction verification form and ideally within 48 hours of results becoming available.

A copy of any non-compliant results will also be automatically sent to the Water Agency directly by the laboratory.

A copy of the records for disinfection and neutralisation (refer to Clause 6) shall be provided by the consultant to the Water Agency with the construction verification form.

12 Competency and Training

Safe Drinking Water Regulations 2025 specifies that employees and contractors of a water agency should be appropriately skilled and trained in water supply systems in order to take responsibility for the monitoring and management of hazards and risks to the quality of water. Consultant may be requested by individual water agencies to undertake specific training to fulfil the regulatory requirements.

13 References

- Water Act 1989
- Water Agency Licence for Provision of Water and Sewerage Services
- Safe Drinking Water Act 2003
- Safe Drinking Water Regulations 2025
- Australian Drinking Water Guidelines 2011 (NHMRC)
- AS/NZS 4020 – Testing of products for use on contact with drinking water

Appendix 1

Drinking Water Quality Parameter Limits

Table 3

This table refers to either the drinking water or non drinking water new mains where the new main has been charged by the *existing* drinking water main.

Parameter	Units	New Main Sample Water Agency Limits
PHYSICAL PARAMETERS		
pH	Units	"Existing Main result" ± 0.5
Apparent Colour	HU	≤ ("Existing Main result") + 5
Turbidity	NTU	≤ ("Existing Main result") + 0.5
EC	uS/cm	< ("Existing Main result") + 50
CHEMICAL PARAMETERS		
Free chlorine residual	mg/L	"Existing Main result" ± 0.2
Total chlorine residual	mg/L	"Existing Main result" ± 0.2
MICROBIOLOGICAL PARAMETERS		
E. coli	orgs/100 mL or, MPN/100mL	< 1
Total coliforms	orgs/100 mL, or, CFU/mL	< (2 x "Existing Main result")* and less than 200 orgs/mL
Heterotrophic Plate Count	orgs/mL, or, CFU/mL	< (5 x "Existing Main result")* and less than 1000 orgs/mL

* The selection of < 2 x "Existing Main result" for Total Coliforms and < 5 x "Existing Main result" for Heterotrophic Plate Count, has been recommended based on natural sample variation and to allow for an error margin.

Non Drinking Water Quality Parameter Limits

Table 4

This table refers to Non drinking water mains where the new non drinking water main has been charged by an existing non drinking water main.

Parameter	Units	Sample Set B New Main Water Agency Limits
PHYSICAL PARAMETERS		
pH	Units	"Existing Main result" ± 0.5
Apparent Colour	HU	< ("Existing Main result" + 5)
Turbidity	NTU	< ("Existing Main result" + 0.5)
EC	uS/cm	< ("Existing Main result" + 50)
CHEMICAL PARAMETERS		
Free chlorine residual	mg/L	"Existing Main result" ± 0.2
Total chlorine residual	mg/L	"Existing Main result" ± 0.2
MICROBIOLOGICAL PARAMETERS		
E. coli	orgs/100 mL	< 1

Notes:

HU = Hazen Units

NTU = Nephelometric Turbidity Units

µS/cm = (microsiemens per centimetre)

mg/L = milligrams per litre

orgs/100 mL = organisms per 100 millilitres

orgs/mL = organisms per millilitre

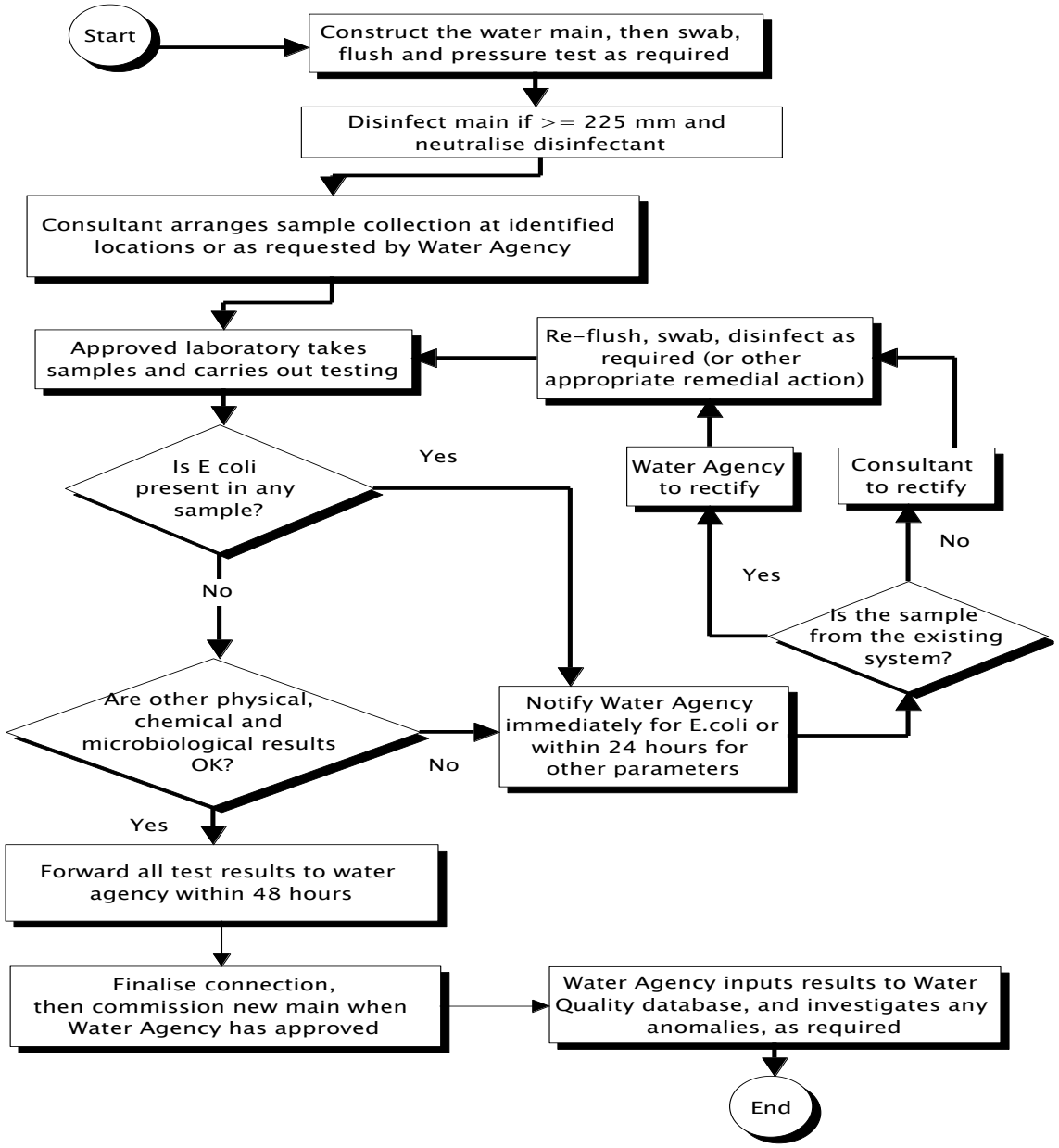
Appendix 2

Approved Laboratories and Analysis

An independent approved laboratory is one that has NATA accreditation for all parameters listed in Appendix 1 and employs drinking water analysts.

Appendix 3

Flowchart – Water Quality Compliance for New Mains



Appendix 4

Typical example for sample locations and numbers