Self-Lay Policy

Appendix One – Commissioning and handover

February 2018
Version 1

Southern Water

Contents

1. Introduction and background

SW's commissioning and handover procedure is a quality control standard we use with our service delivery partners that install and renew mains and services under contract. This procedure is designed to confirm that the work has been completed satisfactorily, and supported by the appropriate documentation.

So, like our service delivery partners under contract to deliver Section 41 mains and Section 45 services works, we expect Self-Lay Providers (SLPs) to comply with the requirements and obligations set out in this Appendix. Compliance with the Self-Lay Policy will ensure that we're able to process commissioning and vesting seamlessly.

2. Works Inspection audits

We aim to undertake inspection audits in conjunction with the SLP and the developer. Our representatives may include the network engineer, assistant project manager for new works, or the Operations District Inspector.

Apart from any routine, programmed or un-programmed site visits to inspect the work during construction, the following joint programmed inspections are required to ensure that the work being delivered is compliant.

1. Pre-connection inspection

The purpose of this **Joint Inspection audit of Work: Pre-connection**, is to identify any part of the work that isn't compliant with the required specification and standards before the SLP submits an 'Application for connection at Point of Connection' (form SLF-H1) which could affect the connection and prevent its programming and/or work required to make a connection. For instance:

- Work that is identified as defective and not compliant with required standards shall be corrected by the SLP before requesting a connection to be made (form SLF-H1 – Part One) unless otherwise recorded as having no impact on the commissioning and handover of the main (i.e. defective work on covers and frames, chambers, marker posts).
- All defective work shall be recorded on our Work Inspection form and corrected without delay.
- If the defective work affects the structural integrity of the new mains/or may affect the water quality (and the main was previously pressure tested and sampled), it shall be re-tested and sampled, and the results provided to us for our approval to commence connection.
- If defective work doesn't prevent the connection and can be corrected afterwards then this is also recorded and shall be corrected after connection by the SLP - within 20 days of the connection date, unless otherwise agreed or instructed by Southern Water. This work is recorded as a Defect, as the date of connection will be recorded as the start date of the Defects Liability Period.
- This inspection audit shall confirm that all work has been carried out in compliance with the Self-Lay Policy (and in particular that all mains fittings, chambers, and meter chambers are both accessible and operable to a satisfactory standard), such that the new main is compliant with the required standard and specification and able to be vested.

2. Post vesting inspection

a) The purpose of the post vesting inspection audit is to revisit work that was identified as defective at the pre-connection inspection (that didn't require correction pre-connection) and to manage correction of these faults. . This Inspection audit also checks the final completed, commissioned main and installed apparatus so that the Net Asset Payment due can be made, relevant to the work to be vested; in line with our Self-Lay Policy.

   At this time we will also record the status of the main relative to identified defects at the commencement of the Defects Liability Period.

b) Identified defects need to be completed within 20 days of commissioning of the main, (unless we instruct that they need to be completed earlier for operational reasons) and set to the final permanent surface. If the final permanent surface isn't finished, such that covers, frames and marker posts cannot be set to a final permanent surface, then on-going inspection audits will be necessary. The SLP shall notify SW of the eventual completion date to a final surface finish so that a final inspection audit can be carried out and any outstanding asset payment can be released.

c) If the development site is still being constructed (even if mains and services may have been vested, and the SLP left the site) SW will continue routine inspections of the adopted assets to identify any damage to these assets; and to notify the developer .SW will rectify any damage identified and invoice the developer (who will be expected to approve this by signing our 'Third party cost recovery form 453').

d) Until the end date of the Defects Liability Period, SW will continue routine site inspections and record any further Defects. If any can be attributed to an installation by the SLP SW will notify the SLP for the SLP to rectify. Any identified defect that is a result of a third party or developer action shall be recorded as damage and SW will rectify and recover costs from the developer and/or other third party is damage caused by them..

e) SW will typically inspect the following:

   - All chambers, covers and frames shall be aligned correctly to access the asset and always be clear of debris.
   - All external and internal meter boxes shall be accessible and operable.
   - Any chambers sited within service strips shall have covers installed within a concrete surround, free of any planting which would obstruct or conceal the chamber.
   - All chambers shall comply with the Specification (see also our Design Guide for SLPs) for the permanent surface they'll be located in.
   - All marker posts and plates shall be installed so to be easily visible, and they shall accurately describe the fitting and details they refer to.

3. Handover and work completion information

a) As specified in our 'request for a connection' form (SLF-H1) we a 'Commissioning and handover pack', relative to the phase/section of main(s) to be commissioned and then vested. This pack is to be issued to SW to confirm that the self-lay mains have passed all tests and sampling criteria in accordance with our Self-Lay Policy shall include, as a minimum, the following;

   :

1. As-laid drawing at scale * 1:500 showing the mains, fittings, and meters installed (and locations/types), together with specific drawings of mains connections and thrust blocks.
   Note: SW's "sign-off" of a main as suitable for connection and commissioning does not require the services and meter locations to be shown on the As-laid drawing at this stage (as they will not have been installed). * The SLP shall update the drawing with these details when all services are installed and relative to the provision of details for SW to vest the services (*unless we have agreed an alternative).
2. Pressure test Certificate(s) for the newly laid mains.
3. Swabbing and flushing information/confirmation and required details.
4. Disinfection results for the newly laid mains.
5. Confirmation of sample results as "passed" following disinfection of the newly laid mains.
6. Record of all butt fusion (and any specifically approved electro fusion) joint reports – if polyethylene.
7. Fire hydrant Adoption Certificate from the relevant fire authority (when design is by SLP as otherwise by SW).

b) Governance relating to pre-connection approval from SW

1. The governance (handover pack) is the information listed in SLF-H1 Part 1. All of this required information is to be issued digitally (i.e. including certificates, drawings, forms, sample test results and other supporting documentation) by email to SW with a subject title in the format: 'SLP name, Site address and Agreement number'.

   This email shall be sent to the relevant SW Network Engineer and Assistant Project Manager (new works) as listed under:

   Kent
   colin.carter@southernwater.co.uk Network Engineer
   stephen.goodwin@southernwater.co.uk Assistant Project Manager (New Works)

   Sussex
   paul.surita@southernwater.co.uk Network Engineer
   glenn.smither@southernwater.co.uk Assistant Project Manager (New Works)

   Hampshire and Isle of Wight
   calin.fendrihan@southernwater.co.uk Network Engineer
   dean.abbott@southernwater.co.uk Assistant Project Manager (New Works)

2. Our Network Engineer will confirm if the SLP needs to provide an **additional data form** particular to a specific development.
3. The **commissioning advice form** (Appendix One, form 1) shall be completed by the SLP.
4. Based on information from the SLP, SW will complete a **WMD490 form** to notify our assets department of the mains designations and lengths referenced in the handover pack.
5. After SW receives the handover pack we will complete and attach a **Mapping Update Request** to track the update of mapping information into our systems related to new mains and fittings installations – this will be attached to the handover pack.

6. **As-laid drawings** – see our **Self-Lay Policy paragraph 17 (3),** on page 30/31 of the SWSLP.

7. **Marker posts and plates –** shall be those specified in the Schedule of Permissible Materials - currently white plastic posts, with a plate attached, numbered, indicating the location of a mains fitting e.g. valve, hydrant, or washout.

   While these could be installed concurrently with the work they are at risk of being damaged or removed so may be added after mains commissioning in agreement with us.

   The SLP is responsible for all installed assets including marker posts and plates during the Defects Liability Period (unless damaged by the developer or third-party on a development site) and for programming their installation or repair.

   Final installations will be checked during the post vesting inspection/thereafter to ensure that marker post plates clearly indicate the location and details of all new SW assets and are set to final surface level.

8. **Flushing** - See our **Self-Lay Policy paragraph 7.5 on page 19/20 of the SWSLP** (and below).

   As a general rule it's unnecessary to consider cleansing velocities, except the need to discharge a volume (twice the pipe's volume will ensure complete turnover) from a washout at the end of the main.

   We have a responsibility to ensure that our customers aren't affected by discoloured water. This can be caused by flushing out mains, so when discharging it's important to keep velocities in the pipe under control to avoid discolouration upstream.

   We advise limiting flow velocity to no greater than 0.2 m/sec with the need to turn over mains water at least once per week.

   Example guideline for SLPs/designers

Pipe size (mm)	Internal diameter (mm for PE)	Imperial equivalent	Area m2 and volume in m3 per meter	Volume in litres per meter (rounded off)
63	50	2 inches	0.00196	2
90	80	3 inches	0.00502	5
125	110	4 inches	0.00950	9.5
180	158	6 inches	0.01960	19.6
225	198	8 inches	0.03079	31
250	220	8 to 9 inches	0.03801	38
315	278	11 inches	0.06069	61
355	312	12 inches	0.07645	76.5

9. **Water regulation consent** – A notification form for service connections to our Water Regulation team is required so they can grant consent. Guidance and an online version of this form are available at southernwater.co.uk/notification-form-guidance-notes

   The SLP when completing this form and issuing to SW must ensure that they clearly reference in the form the SW new connections reference and that the consent is required for a self-lay connection.

10. **Mains swabbing** – when designing a main, ensure consideration for swabbing – as well as facilities for inserting and extracting the swab(s), the provision and disposal of the large flows of water required. Also consider discharging the flushing, and heavily chlorinated water, safely, without causing pollution.

    The main advantages of swabbing include:

    - Can be used on most mains diameters (up to approximately 1000mm).
    - Relatively long pipe line lengths can be cleaned at one time.
    - It is generally more effective at removing loose deposits than flushing.

    Disadvantages include:

    - There is a requirement for special insertion points on larger diameter mains.
    - Swabs may break up in a main and cause a blockage.

    All but the largest of mains which can be cleaned by man entry, shall be cleaned by swabbing.

11. **Mains samples** – **See also paragraph 12.2 under**. All sampling and data relating is to be undertaken by an approved UKAS accredited analytical laboratory who will confirm and provide all results and required reports relative to:

    - incoming main sample(s)
    - new mains sample(s) - result(s) for each length of new main to be commissioned and connected to existing water supply distribution network.

    All taking of samples shall be carried out by accredited persons employed by the UKAS Laboratory. Sample point location(s) where samples were taken must be detailed and cross-referenced with the results and provided to SW prior to SW accepting a request for a connection to its existing water supply distribution network.

    SW contracts out its laboratory services and the current provider is ALS Environmental Ltd which has a laboratory at SW's area office at Sparrowgrove, Otterbourne, nr Winchester, SO21 2SW. The SLP may elect to use ALS and SW for testing and sampling subject to suitable arrangements and charges for taking samples, sample testing, and testing parameters and reporting requirements being agreed between the parties. The SLP is to confirm at the pre-start meeting prior to commencement of any self-lay works proposed sampling arrangements and laboratories they intend to use.

12. **Pressure testing** - pressure testing of pressure pipes and fittings for use by public water suppliers must be carried out as set out in the **Water Industry 'Information and Guidance note' (IGN 4-01-03 October 2015: issue 2)**, **available to view online at water.org.uk/publications/wis-ign/general,** with reference to the following guidance

notes: ‘Pressure Testing and Disinfection (supplemental) of PE Water Pipelines, Services and Installations’. Pressure data, analysis report/pass certificate and pressurisation/decay graphs are to be provided within the handover commissioning pack.

All results must be provided in both graphical (test output graph) and tabular formats.

Pressure Testing and Disinfection (supplemental) of PE Water Pipelines, Services and Installations

While testing needs to be carried out in accordance with IGN 4-01-03, reference should also be made to Civil Engineering Specification for the Water Industry (CESWI) (with Additional Clauses), and both Southern Water’s Technical Specifications Manual, and Water Manual - Distribution (WM-D) – relevant extracts from the WM-D can be found at the end of this document in Appendix B.

a) Pressure Testing is a permit-required activity within SW’s Safe Control of Operations (“SCO”) process.
b) Notification of at least three clear working days shall be given before the intention to test a section of pipeline.
c) SW’s representative shall be given the opportunity by SLPs to witness all pressure testing.
d) Testing against closed valves shall not be permitted.
e) The Standard Test Pressure (STP) for polyethylene pipes must be the lowest of:
   - 1.5 times the Rated Pressure (PN)
   - Rated Pressure (PN) plus 5 bar
f) The PN rating of the lowest rated component in the system shall be used.
g) The value of STP should apply at the lowest elevation of the pipeline and shall therefore include the initial maximum static head applied.
h) The test pressure at the highest elevation shall be at least the maximum operating pressure. If this is not possible due to the elevations involved then the line is to be split prior to testing.
i) Service pipe connections using tapping tees may be bolted /welded to the main but the tapping hole shall not be made prior to any successful pressure test being conducted.
j) Disinfection shall only take place after a Pressure Test has been passed as complete.
k) On-site testing operations will be clearly identified using appropriate warning notice boards.

12.1 Polyethylene (PE) pipe testing
Subject to prior acceptance and written approval by Southern Water, four types of test are acceptable:

1. **Pressure Decay (Type 2) test**
   Undertake this test for all works other than those deemed by us as visual or mains renewal. This test is defined in the Water Industry Information & Guidance Note (IGN 4-01-03) ‘Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers’.

2. **Mains Renewal test (10 minute test)**
   When rehabilitating mains, work is often conducted under severe time constraints to minimise disruption to customers' supplies – in these circumstances, use the Mains Renewal test (10 minute test). It's only suitable for short test lengths with a small number of joints. The maximum permissible length is 200m, comprised of two jointed 100m coils. Any longer should use the Pressure Decay (Type 2) test. The Mains Renewal test procedure is defined in Water Industry Information & Guidance Note (IGN 4-01-03) 'Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers'.

3. **Visual test**
   When a new pipeline is being connected to an existing pipeline, the new pipeline needs to be tested up to the point of connection using either the Pressure Decay (Type 2) test or Mains Renewal test. After testing, the connection shall be made up and left exposed for us to visually inspect. We'll accept the pipeline if no leakage is detected under normal operating pressure after 24 hours.

4. **Service test**
   All new service connections must undergo a Service test. The procedure is defined in Water Industry Information & Guidance Note (IGN 4-01-03) 'Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers'.

- The system test pressure (STP) shall be 18 bar.
- The service should not have been tapped prior to this test being conducted.

  See also the Southern Water guidance 'Procedure for the Testing of New Service Connections to Mains' (WM-D 328) at the end of this document.

12.2 Disinfection and hygiene procedures

Disinfection should be undertaken in accordance with processes set out in our Water Manual – Distribution (see WM-D 323 and 326 at the end of this document).

Where we've agreed off-site pre-disinfection of coils then the following procedures shall be applied:

a) Disinfection and hygiene procedures for the use of capped (factory sealed) coiled pipework.
   - Factory sealed coiled pipe shall be installed within six months of the disinfection/sterilisation date. If more than six months has passed, the pipe shall be re-chlorinated according to the procedures for New Water Mains or Pre-disinfection of coiled pipework.
   - Factory sealed coiled pipework shall be charged with mains water then left to stand for 24 hours prior to sampling. Then representative water samples will be taken from the coiled pipe.
   - Once we're satisfied that satisfactory sample results have been obtained, pipework ends need to be marked with the sample tag number and use by date, which shall be seven days after the date of the satisfactory analysis. Pipes not installed by that date, need to be re-disinfected and the procedure started again.
   - Where a factory sealed coiled pipe has been cut or there's any doubt about the disinfection status of the pipe (or it's suspected that contamination has occurred),

then the coil shall be re-chlorinated according to the procedures for New Water Mains or Pre-disinfection of coiled pipework.

- New pipes shall not be connected to existing in-service mains and brought into service (commissioned) until the necessary water sample passes have been obtained and confirmed in writing.
- The pipe ends shall remain securely sealed to prevent contamination until the pipe is ready to be installed.
- On installation a swab soaked in 1000 mg/l free chlorine solution shall be passed through the coil and flushed to ensure a complete change of water. The main may then be commissioned.
- A check sample shall be taken from the main once commissioned. If a permanent ferrule is located within 10m of the downstream end of the pipe this may be used to obtain a sample.
- The check sample shall be taken on the same day as the main is commissioned.
- The contractor must take all necessary measures to minimise the risk of contamination of the new main (which has had a satisfactory bacteriological test) and during connection to the existing main.
- Bacteriological sample results and actions shall be recorded against the coil's unique tag number.

Related documents

- Principles of Water Supply Hygiene & Technical Guidance Notes (available from Water UK online at water.org.uk/publications/reports/principles-water-supply-hygiene)
- Temporary Spade and By-Pass Arrangement for New Mains Connections (WM-D 424) – See Appendix Four to the Self-Lay Policy
- Temporary Hydrant and By-Pass Arrangement For New Mains Connections (WM-D 425) – See Appendix Four to the Self-Lay Policy

Bacteriological testing

This shall include the incoming main(s) sample, new main(s) sample result(s) for each length of new main and sample point location drawing(s) showing points at which samples were taken and cross referencing the sample sheets with the locations. The sampling and testing regime will comply with the requirements of our mains sampling procedures (detailed in WM-D326 at the end of this document).

Mains will not be sampled, connected, or commissioned, unless (within seven days of commissioning) there's a sufficient turnover of water within the new main (i.e. from connections/draw offs) to ensure water quality is maintained. See also the paragraph on 'mains flushing' above.

Appendix A – SW Water Manual – Distribution extracted documents: WM-D 323; WM-D 326; and WM-D - 328

CONTROLLED DOCUMENT **WM-D 323**

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SOUTHERN WATER
WATER MANUAL – DISTRIBUTION

OPERATIONAL PROCEDURES FOR THE PROTECTION OF WATER QUALITY DURING MAINS REPAIR & MAINTENANCE WORKS

1. Introduction

The purpose of these procedures is to set out the actions to be taken in order to safeguard public health by ensuring that the quality of water supplied to customers is maintained whilst mains repair and maintenance works are being carried out.

2. Contents

3. Scope

Repair, maintenance and installation works in respect of water mains and fittings, but excluding renovated mains and new mains except where making connections to existing mains.

4. Responsibility

- Water Quality Manager
- Water Quality Team
- Sampling Logistics Team Manager
- Water Managers and Water Team Managers
- Water Distribution Staff
- Project Managers /Contract Engineers*
- All persons authorised to carry out works covered by these procedures including contractors.

* *The Responsibilities of Project Managers/Contract Engineers shall be agreed with the relevant Distribution Team Manager in advance of the commencement of works on site.*

5. Disinfection Following Mains Repair & Maintenance Works – Overview
Note: See also WMD 423 – *Quick Reference Overview Card for Site Use*

REF	JOB / INCIDENT TYPE	SPRAY DISINFECT	FLUSH MAIN SECTION	CHLORINATE MAIN (50 mg/l, 30 mins)	SAMPLE	AWAIT SATISFACTORY SAMPLE RESULT	RETURN MAIN TO SERVICE
6.0	MAINTAIN PRESSURE / AVOID DRAINING MAIN (CLEAN JOB) e.g. Repair collar	✓	as necessary				✓
7.0	DEPRESSURISE / DRAIN DOWN (CUT, BROKEN OR DISMANTLED MAINS) – CLEAN JOB e.g. Mains Cut outs	✓	as necessary		✓		✓
8.0	MINOR SOILING AT MAINS OPENING	✓	✓		✓		✓
8.0 & 9.0	INGRESS FROM MAINS WATER IN TRENCH AFTER INITIAL MAINS ISOLATION. CUTTING (where necessary) & DRAIN DOWN OPERATIONS	✓	✓	✓	✓		✓
8.0 & 9.0	POSSIBLE HAZARDOUS CONTAMINATION e.g. Water from any drain or sewer	✓	✓	✓	✓	✓	✓

6. Works Carried Out Under Pressure

6.1 Definition

All works that may be safely carried out whilst maintaining a positive water pressure and avoiding draining the water main.

Typical examples may be:

- Fitting of repair clamps
- Replacement of hydrants where the existing tee piece/flanged upstand is reused
- Replacement of air valves, pressure reducing valves and district meters where controlling valves are provided at connection points

6.2 Method

1. Where the site is known or suspected to be contaminated prior to commencement of the works, the Distribution Inspector / Pipelayers shall inform the Distribution Team Manager who shall ensure that additional trench drainage, health & safety and customer protection measures are put in place as appropriate.

2. The Distribution Inspector shall, wherever practicable, avoid fully closing the main by partially restricting the appropriate controlling valve(s) in order to maintain a minimal positive water pressure at the site of the works.

3. The Pipelayers shall excavate to a sufficient depth below the invert of the main and install sufficient pumps etc. to ensure adequate protection against rising trench water ingress into the main and adequate working room for the installation/replacement of fittings.

4. Where despite precautions the existing main is known or suspected to have been contaminated also refer to 8.0 (below).

5. The Pipelayers shall ensure disinfection of the works as follows:

   a) All tools, new fittings and the existing mains and fittings in the vicinity of the works shall be kept clean and free from debris.

   b) "Chemtab" chlorine release tablets, as approved for use under Regulation 31 of the Water Supply (Water Quality) Regulations, 2000 shall be used.

   c) The disinfection solution shall be prepared by diluting 1 "Chemtab" tablet in a hand lever operated spray container containing 1 litre of drinking water, to give an available chlorine content of 1000mg/l.

   d) Safe working methods shall be employed at all times – see WMD 325.

e) The retention time for chlorine disinfection solutions shall be in accordance with the manufacturer's instructions and prepared solutions shall show a preparation and expiry date. Where doubt exists a fresh solution must be made up every day. Discarded solutions shall be diluted with a further 10 parts of water and shall be discharged in a manner that does not present a risk to the environment.

f) The "Chemtab" tablets and the associated spray bottles of disinfection solution shall be stored within the vehicle, in cool dry conditions, away from direct sunlight.

g) Immediately prior to the installation of fittings, the disinfection solution shall be applied by spraying in a steady stream rather than a mist, to ensure complete coverage of new/replacement fittings and, where practicable subject to any remaining positive water pressure, the existing main local to the works.

6. On recommissioning the main, the Distribution Inspector shall flush the main as necessary, by the controlled operation of appropriate valve(s) and washout hydrant(s) until the supply runs clear.

7. Works Where Mains Are Depressurised (Cut, Broken or Dismantled Mains)

7.1 Definition

1. All works carried out where depressurisation / full or partial draining of water mains occurs or is necessary - exposing the inside of the main to possible contamination.

2. Typical examples will be:

   - Mains repair cut outs or any other mains breaks that cannot be repaired whilst maintaining positive water pressure / avoiding draining the main.

   - Any maintenance or installation works that cannot be completed whilst maintaining positive water pressure / avoiding draining the main – for example the installation or replacement of flanged tees.

7.2 Method

1. Where the site is known or suspected to be contaminated prior to commencement of the works, the Distribution Inspector / Pipelayers shall inform the Distribution Team Manager who shall ensure that additional trench drainage, health and safety and customer protection measures are put in place, as appropriate.

2. The Distribution Inspector shall, wherever practicable, avoid fully closing the main prior to excavation by partially restricting the appropriate controlling valve(s) in order to maintain a minimal positive water pressure at the site of the works.

3. The Pipelayers shall excavate to a sufficient depth below the invert of the main and install sufficient pumps to ensure adequate protection against rising trench water ingress into the main and adequate working room for the installation/replacement of fittings. Particular care shall be taken once the open ends of the main have been exposed.

4. The Distribution Inspector shall then fully close down the controlling valve(s) as required in order for the works to progress.

5. Where despite precautions the existing main is known or suspected to have been contaminated also refer to 8.0 (below).

6. The Pipelayers shall ensure that tools, new fittings and the existing mains and fittings in the vicinity of the works are clean and free from debris.

7. The Pipelayers shall ensure disinfection of the works as described in 6.2.5 (page 3 above) and in addition shall, by similar methods, disinfect the exposed internal and external surfaces of the existing main and fittings.

8. On recommissioning the main, the Distribution Inspector shall flush and vent the main as necessary by controlled operation of the appropriate valve(s) and wash out hydrant(s) until the supply runs clear.

7.3 **Sampling**

1. On completion of the works, water sample(s) shall be obtained, from 1 property situated downstream, sited as near as practicable to the location of the works.

2. Interruptions to Supply Form WM-D 452 shall be used to notify Sampling Logistics of the need for a water sample and of suitable sampling locations. This form must be completed whenever a sample is required regardless of whether an interruption to supply has occurred.

3. Water samples shall be tested for total and faecal coliforms, one and three day colony counts, qualitative odour, free and total chlorine and appearance.

4. In the event of a sample failure Sample Logistics shall liaise with the appropriate Distribution Team Manager in order to arrange the necessary remedial actions and re-samples.

8. Dirty Water Ingress / Mains Contamination – Risk Assessment and Additional Actions

8.1 General

1. Every effort shall be made to exclude dirty water ingress / mains contamination during the course of works, as described in 6.0 and 7.0 (above).

2. Where, despite precautions, a quantity of dirty water / contamination enters the main the Pipelayers shall take immediate action to prevent further ingress and shall inform the Distribution Inspector.

3. The Distribution Inspector, in liaison with the Pipelayers, shall assess seriousness of the incident and the additional actions required in accordance with the guidelines detailed in 8.2, 8.3 and 8.4 below.

8.2 Minor Soiling At Mains Opening(s)

8.2.1 Definition

1. *Where there is only minor soiling at the mains opening and where there is no evidence of potentially hazardous contaminants within the trench and associated trench water from which the soiling has occurred (see 8.4 below for definition of hazardous contaminants).*

8.2.2 Additional Actions

1. The Distribution inspector shall ensure that the main is flushed thoroughly before returning to service.

2. In all instances water samples shall be obtained (see 7.3).

8.3 Ingress From Mains Water In Trench After Drain Down

8.3.1 Definition

1. Where mains water from within the trench rises to submerge and enter the mains opening(s) after completion of the initial mains isolation, cutting (where necessary) and drain down operations.

2. Where there is a presence of mud/silt in the main (other than normal mains deposits), indicating that a quantity of dirty water has entered the main.

3. Where there is no evidence of the presence of hazardous contaminants (see 8.4 below for a definition of hazardous contaminants).

8.3.2 Additional Actions

1. The Distribution Inspector shall flush the main thoroughly and shall inform their Supervisor / Team Manager and Customer Services.

2. The Distribution Team Manager shall ensure that the enhanced disinfection (chlorination) procedure detailed in 9.0 (below) is carried out prior to sampling and returning the main to service.

8.4 Hazardous Contamination Incidents

8.4.1 *Definition*

1. Where a potentially hazardous contaminant is identified or suspected within the trench or associated trench water from which the dirty water ingress/contamination has occurred.

2. Where a potentially hazardous contaminant is known or suspected to have been backsiphoned into the main from customer connections.

3. Some examples of hazardous contaminants are:

- Water from any drain or sewer
- Commercial waste or chemicals
- Fuel oils
- Farmyard slurry
- Ditch, river or pond water

8.4.2 *Additional Actions*

1. Actions shall follow as for 8.3 (above) and in addition the following shall apply:

2. The Distribution Inspector and Pipelayers shall ensure that the main and customer service connections are fully isolated as a matter of urgency.

3. The Distribution Team Leader shall also inform the Water Manager and Water Quality Manager in order that any appropriate additional sampling and notifications may be actioned.

4. The main shall not be returned to service until clearance is obtained from the Area Water Quality Manager (or nominated representative) following confirmation of the necessary bacteriological sample passes:

- During normal working hours written confirmation shall be provided.

- Out of normal working hours verbal confirmation may be provided followed up by written confirmation during the next working day.

9. Enhanced Disinfection (Chlorination) Procedure

9.1 Purpose

Where enhanced disinfection is required in accordance with 8.3 or 8.4 (above).

9.2 Supervision

The works shall be supervised on site at all times by a trained person (or persons) holding a current City & Guilds Qualification in Mains Disinfection.

9.3 Method

9.3.1 *General:*

1. Enhanced disinfection shall be achieved by flushing and charging the main with water containing a free chlorine content of 50mg/l for a minimum contact time of 30 minutes.

2. Particular care shall be taken to ensure that all of the affected sections of main are adequately disinfected and that customers do not receive contaminated or heavily chlorinated water prior to or during the chlorination process.

9.3.2 *Procedure:*

1. The affected section(s) of main shall be kept fully isolated except where upstream pressure is required during the chlorination / flushing process.

2. Individual customer connections shall be fully isolated by closing company stopvalves and where necessary and practical, customer stopvalves.

3. Prior to chlorination customer information cards shall be delivered to every property and shall include a warning not to attempt to draw water until further notice (see WMD 423).

4. Alternative supplies shall be provided as appropriate.

5. Safe working practices shall be employed at all times.

6. Only Hypochlorite Solutions approved for use under Regulation 31 of the Water Supply (Water Quality) Regulations, 2000 shall be used.

7. Where necessary, chlorination points shall be installed at the upstream valve(s) to ensure complete disinfection.

8. Wherever practicable existing hydrants shall be used to create chlorination flushing flows but where suitable existing hydrants are not available additional flushing points shall be installed to ensure even distribution of the chlorinated water and complete flushing prior to returning the main to service.

9. Accurate control of the chlorine strength and even distribution of the chlorinated water shall be achieved by introducing hypochlorite solution into the main at a controlled dosing rate via purpose designed chlorination equipment and measured flushing flow(s).

10. Care shall be taken to ensure that the heavily chlorinated water cannot backflow or backsiphon into the feeder main.

11. In all cases the flushing flows / upstream pressure shall be monitored constantly during the chlorination process. Where a significant drop in flow / pressure is detected the upstream feeder main and chlorination equipment shall be immediately isolated to prevent the possibility of backflow / backsiphonage occuring. This is of particular importance where direct injection is used.

12. For fully automatic flow proportional dosing (e.g. hydrant to hydrant) a double check valve assembly shall be incorporated within the inlet pipework (e.g. standpipe) feeding the chlorination unit.

13. Where direct injection is carried out care shall be taken to ensure excessive quantities of undiluted hypochlorite cannot build up at the point of injection:

    - Only the appropriate small diameter direct inject lines shall be used.

    - Direct injection lines shall only be connected directly to the through-flow of mains being chlorinated and not via offset communication pipes or hydrant legs.

14. In order to confirm correct chlorine strength and coverage, flushing flow(s) shall be tested during the chlorination process using a suitable chlorine meter or comparitor until free chlorine residuals of 50mgl are achieved.

15. The main shall then be fully isolated and left to stand for a minimum contact period of 30 minutes.

16. For heavily contaminated mains an extended contact period of up to 2 hours may be required.

17. At the end of the contact period further chlorine residual tests shall be carried out. Where residuals have decreased to a level of 35 mg/l or less, the need for further disinfection shall be considered.

18. On completion of disinfection the main shall be flushed thoroughly and then tested until maximum free chlorine residuals of 0.4 mg/l, or an appropriate (lesser) local level are achieved at all outlets.

19. **De-chlorination shall be carried out wherever there is risk contaminating the environment, for example by way of drains sewers or watercourses.**

20. For further advice on the disposal of chlorinated water and Environment Agency notifications and consents refer to Southern Water Services "Operational Guidelines for Water Mains Discharges" (see WMD 324).

21. Water Samples shall be taken from every section of main affected by the contamination incident.

22. On restoring supplies, further customer information cards shall be delivered (see WMD 423).

10. Auditing of the Procedures

The Water Quality Team, in association with local Distribution Team Managers, shall audit the procedures to ensure compliance at a minimum frequency of once per annum.

11. Related Documents

• Operational procedures for the Protection of Water Quality during Mains Repairs & Maintenance Works – Quick Reference Overview Card for Site Use	WMD 422
• Operational Guidelines for Water Mains Discharges (SWS)	WMD 324
• Customer Notice Cards for Enhanced Disinfection (Chlorination)	WMD 423
• "Important additional information regarding the interruption to your water supply"	WMD 423
• "Restoration of your water supply"	WMD 423
• Safe Working Method – Disinfection of Water Mains During Mains Repair & Maintenance Works (SWS) – Use of Hand Lever Operated Sprays.	WMD 325
• Interruptions to Supply Form	WMD 452
• Disinfection and Hygiene Procedures for New Water Mains & Services	WMD 326
• Guidance on the Preparation of Chlorine Solutions for Mains Disinfection	WMD 327
• Safety Instruction Book (SWS).	
• Health & Safety Management Manual (SWS).	
• Health & Safety Information for Contractors (SWS).	

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SOUTHERN WATER

WATER MANUAL – DISTRIBUTION

DISINFECTION & HYGIENE PROCEDURES FOR NEW WATER MAINS AND SERVICES

1. INTRODUCTION

The installation of new water mains and services represents a potential opportunity for contamination to enter the distribution system. The following procedures detail the precautions to be taken during such work to minimise the risk of contamination occurring.

The procedures are based on the Water UK industry best practice document: Principles of Water Supply Hygiene and Technical Guidance Notes.

2. SCOPE

These procedures apply to the installation of water mains and services for the provision of water supplies suitable for domestic purposes.

For the purposes of these procedures a 'main' is defined as any pipe of 50mm internal diameter (typically 63mm outside diameter) or greater. Service pipes will not normally require disinfection unless the internal diameter exceeds 50mm and the length exceeds 15m, or there are doubts over the cleanliness of the pipework.

Where new linings are drawn into existing mains, these shall be treated generally as new mains.

3. RESPONSIBILITY

- Head of Water Quality SWS.
- Water Managers & Managers SWS.
- All persons involved in the works described within these procedures, including contractors.

4. GENERAL

No person shall be permitted to carry out these works until they have:

- Completed a Southern Water health questionnaire and had this approved by the relevant Southern Water Manager.
- Received appropriate training.

Only materials and substances that are approved under Regulations 25 and 26 of the Water Supply (Water Quality) Regulations 1989 (as amended) and appear in the current list published by the DWI shall be used.

Pipes and fittings shall be stored, transported, and installed in ways which minimise the risk of contamination occurring:

- Pipes and fittings shall be stored avoiding ground contact (i.e. on pallets and plastic sheeting).

- Pipes shall be capped during storage and, as far as practicable, during installation to avoid the ingress of ground/trench water and animals' etc. This is of particular importance during breaks in the installation process and where the site is left unattended.

- Appropriate trench drainage measures (pumps etc) shall be installed to avoid the ingress of trench/ground water into new or existing mains. Particular care must taken when carrying out connections to the in-service mains network (see section 8 below and refer to WMD 323).

5. TEMPORARY WATER SUPPLIES / FINAL CONNECTION

Only mains drinking water supplies shall be used for testing, flushing, swabbing and disinfection operations.

Pipe-work configurations between new and existing mains for the purposes of providing temporary water supplies for testing, flushing, swabbing, and disinfection operations and for subsequent final connections, shall be installed in ways that safeguard the existing in-service mains and services from potential contamination.

The actual method of connection will vary according to the nature of the works and specific approval for the method to be used must be sought from the relevant Southern Water Manager.

The following outline methods are approved for use:

(a) Spade & By-pass Arrangement

A "spade" (i.e. blanking plate) is installed at the point of connection (i.e. closed valve) between the new and in-service mains, and a temporary by-pass incorporating a double check valve assembly is installed around this point to provide the temporary water supply. The spade is left in place until after a satisfactory sample result has been obtained.

(b) Rider Pipe Arrangement

A temporary rider pipe incorporating a double check valve assembly is installed between the two mains, with the new and existing mains being otherwise left physically disconnected until after a satisfactory sample result has been obtained.

Notes:

1. Method a) above shall be used as far as practicable in order to avoid the need to fully drain down and open new or existing mains to carry out final connections (see section 8 below).

2. For both of the above methods the temporary supplies shall be isolated and disconnected when not in use. This is of particular importance where the site is left unattended and during the disinfection contact period.

3. For smaller diameter mains by-pass/rider main connections will be generally be connected via ferrules, and for larger mains via standpipes and hydrants.

4. See Related Documents - WM-D 424 and WM-D 425 detail typical by-pass arrangements.

6. PROVISION OF SAMPLING POINTS

Sufficient sampling points shall be provided at suitable points to enable representative water samples to be taken of the complete length of new mains installed.

The precise numbers and location of sampling points shall be agreed with the relevant Southern Water Manager or representative in accordance with the following guidelines:

(a) For relatively short sections of main the use of permanent or temporary end hydrants will generally be sufficient for this purpose.

(b) For longer sections of main interim sampling points shall be required at intervals of not greater than 500m.

7. NEW MAINS DISINFECTION

New mains shall be disinfected in accordance with this section.

Disinfection shall be carried out post swabbing, flushing and pressure testing operations.

The main shall be swabbed and flushed through its entire length until the supply runs consistently clear. Only new, clean swabs shall be used. Care shall be taken to ensure that the wash water does not re-enter the main after the swabs have come out. All swabs must be recovered and accounted for and the retrieval point must be immediately resealed.

Fittings and connection points should be inspected for cleanliness and sprayed with a 1000 mg/l free chlorine solution immediately prior to installation.

The new main shall be charged with water containing a 20mg/l free chlorine concentration for a minimum contact period of 16 hours in accordance with the following procedure:

(a) Accurate control of the chorine concentration and even distribution of the chlorinated water shall be achieved by introducing hypo-chlorite into the main at a controlled rate via suitable dosing equipment and measured flushing flows. The chlorine concentration shall be checked using a comparator at each downstream hydrant whilst the water is being discharged.

(b) De-chlorination shall be carried out wherever the discharge water presents a risk to the environment or as otherwise specified by the Southern Water Manager or Environment Agency.

(c) When the chlorinated water has been discharged for sufficient time to achieve a 20mg/l free chlorine concentration at all outlets, the main shall be shut down and left to stand for a minimum disinfection contact period of 16 hours.

(d) At the end of the disinfection contact period the residual chlorine concentrations shall be re-checked.

(e) Where free chlorine concentrations have dropped to below 15mg/l this indicates that contamination may be present within the main. In this event the cause shall be investigated and the main re-flushed, swabbed and chlorinated as appropriate.

(f) When satisfactory results have been obtained the main shall be flushed/de-chlorinated until normal background chlorine levels are achieved. The main shall then be left to stand for a further 24 hours prior to sampling.

8. SAMPLING & FINAL CONNECTION/ COMMISIONING

New mains shall not be connected to existing in-service mains and brought into service (commissioned) until the necessary water sample passes have been obtained and confirmed in writing.

Following cleaning and disinfection, Southern Water (or Southern Water approved sampling contractor) shall take representative water samples from the new main.

As a minimum each water sample shall be analysed for residual chlorine, coliforms and turbidity and checked for qualitative odour and appearance using the acceptance criteria detailed below:

Determinand	**Acceptance Criteria**
Total Chlorine	0.1-0.4 mg/l
Free Chlorine	0.1-0.4 mg/l
Total Coliforms	0/100 ml
Faecal Coliforms	0/100 ml
Turbidity	<1 FTU
Qualitative Odour	Nature = 1 Intensity = 0
Appearance	Presence = 0 Absence = 1

Where the final connection involves depressurisation and draining down of the existing in-service main and opening/exposing the main to possible contamination an additional downstream check sample shall be obtained in accordance with section 7 of WMD 323 (see Related Documents).

Where dirty water/contamination enters the new or existing mains whilst carrying out the final connection, the Dirty Water Ingress / Mains Contamination Risk Assessment and Additional Actions detailed in section 8 of WMD 323 shall be followed.

Mains shall not be sampled, connected and commissioned unless (within 7 days of commissioning) there will be sufficient turnover of water within the new main (i.e. from connections/draw offs) to ensure water quality is maintained.

Mains shall be connected and commissioned as soon as possible following confirmation of the relevant sample passes.

At the time of commissioning, mains shall be flushed to ensure a complete change of water.

If not connected and commissioned within 7 days of the relevant sample pass(es) having been confirmed, mains shall be flushed within this period to ensure a complete change of water. Further flushing shall be carried out within every subsequent 7-day period prior to commissioning, and at the time of commissioning.

Where mains are left standing/un-flushed for a period of more than 7 days following the relevant sample pass(es) having been confirmed, they shall, in addition be re-sampled prior to commissioning. The need for further disinfection shall also be considered.

9. SERVICE PIPES

All new services shall be inspected for cleanliness, and flushed with mains drinking water immediately prior to being used for supply.

If there is any doubt over the cleanliness of the pipe-work this shall be either replaced or disinfected and sampled generally as for new mains.

Service pipes shall not be connected to mains until the mains have been sampled and commissioned in accordance with section 8 above.

10. RELATED DOCUMENTS

Principles of Water Supply Hygiene & Technical Guidance Notes (Water UK).

Operational Guidelines for the Protection of Water Quality During Mains Repair & Maintenance Works (Southern Water ref. WM-D 323).

Disinfection during Main Repair & Maintenance Works – Use of Hand Lever Operated Sprays (SWS ref. WM-D 325).

Operational Guidelines for Water Mains Discharges (SWS ref. WM-D 324).

Guidance On The Use of Sodium Hypochlorite For The Preparation Of Chlorine Solutions Used For The Disinfection Of Water Mains (SWS ref. WM-D TBA).

Hygiene Code of Practice (SWS)

Safety Instruction Book (SWS)

Health & Safety Management Manual (SWS)

Temporary Spade and By-Pass Arrangement for New Mains Connections (SWS ref WM-D 424)

Temporary Hydrant and By-Pass Arrangement For New Mains Connections (SWS ref WM-D 425)

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SOUTHERN WATER
WATER MANUAL – DISTRIBUTION

PROCEDURE FOR THE TESTING OF NEW SERVICE CONNECTIONS TO MAINS

PURPOSE

To ensure all service connections to existing mains are made to operational mains only.

SCOPE

All new connections carried out to water mains excluding connections to mains on current new development sites and mains renewals and diversions.

RESPONSIBILITY

Mains and Services gangs. Distribution Inspectors

PURPOSE

Complete accuracy of all mains records cannot be guaranteed and there is a risk that a main other than an operational water main may be tapped when providing a new service to an existing main. This procedure is to carry out a simple test for the presence of chlorine to confirm that the main being tapped is of operational status and that the water to be supplied is wholesome.

METHOD

1. **Single connection to existing main, either service or new site main connection.**

   Locate main using normal methods and carry out tapping.

   Before connecting new service pipe to new ferrule or connecting to the new valved branch draw a small quantity of water off into a clean clear 70ml sample pot.

   Pour in the contents of one sachet of DPD No4 powder and agitate to mix.

   The sample should go dark pink almost immediately and certainly within one minute.

   Mark on the works ticket *CL2 test carried out – passed*

   If the sample fails to change colour after 2 or 3 minutes, then contact the Distribution Inspector for advice and request that he attend site. **Do not connect the service until it has been proved beyond all doubt that the main is a live potable water main.** This may be by further detailed sampling or positive shut down or some other method.

Distribution Inspector to inform Section Leader of failed test and actions to be taken. Section Leader to monitor and agree when the service can be connected to the main once a positive chlorine sample has been obtained from the tapping or the correct main has been located and re-tapped and tested. Section Leader to make sure notes are kept with the job ticket of actions taken and results.

2. **Multiple connections to the same main in the same tapping hole**

   If the tappings are in the same hole and are from the same main only the first tapping needs to be tested for the presence of chlorine as per the above procedure. If the tappings are in separate holes or are from separate mains, each tapping must be treated as per 1 above.

RECORDS

- Works ticket to be endorsed and records of actions as appropriate
- GIS records to be updated

TRAINING

There is no formal training requirement for this procedure.

Informal training is to be provided on issue and amendment of this procedure.

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