

# South East Water

## SEW-PC-2103 Water Main Repair Procedure for Various Mains Service Stream

### 1. Intent

This procedure outlines the processes involved in repairing various types of water pipes (excluding mild steel mains) including recycled water mains.

### 2. Scope

The scope of this procedure applies to the South East Water contract of Service Stream's Services business (Service Stream). This applies to all employees and subcontractors performing water maintenance activities.

### 3. Responsibilities

#### 3.1. Contract Manager

- Ensure that all appropriate actions are taken to implement this procedure.
- Ensure that training and facilities are available to enable training to be carried out at the required level and frequency.
- Provide a visible commitment to the Service delivery by undertaking regular on-site visits and participating in checking on-site conditions.
- Ensure that all tools, equipment, Safety gear, PPE, Materials, procedures and Supervision as required are available to safely and successfully execute the works.

#### 3.2. Supervisor/Operations Manager

- Arrange appropriate training for employees under their control.
- Ensure the Procedure and SWMS are updated when new hazards are identified or there is a change in the process.
- Ensure Sub-contractors have access to and are following the Procedures, SWMS's, Checklists and other associated documentation to comply with Service Stream / South East Water's requirements.
- Ensure as required, permits, notifications and planning has been established for the works, this includes the use of Dial Before You Dig and utility responses. As far as reasonably as practicable, all Dial Before You Dig instructions must be followed and adhered too
- Ensure all appropriate Hazard controls are implemented by a competent person, including for works that may occur within private properties.
- Ensure daily Microsoft Teams' meetings with all staff required for large resource intensive worksites. Discussion should cover site safety, site control, use of plant & direction from South East Water.

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### 3.3. Water Maintenance Worker

- Ensure all required permits, Pre-Start Checklist, and associated documents are completed correctly and signed onto by all personnel who are or have been on site.
- Ensure all of the required safety equipment/ PPE for the task is used.
- Report any defective equipment.
- Notify the Responsible Supervisor/ Shutdown Manager immediately of all issues, incidences or on site operational concerns raised in relation to the site or works being done.
- Raise any observations for improvement to equipment or procedures used to do the task.
- Present themselves for training when required
- Ensure a system of communication to call for assistance is established.
- Maintain any safety requirements being implemented.
- Participate in daily Microsoft Teams Meetings on large scale works with Supervisor and or Operations Manager to discuss upcoming events for that day. This will include site safety, site control, what plant will be onsite as well as third party contractors. This will also cover any instructions given by South East Water from an incident manager and who will be the site contact for all communication.

## 4. Procedure

### 4.1. Safety

- Wear protective clothing, glasses and gloves while installing the clamp.
- Follow safety precautions as outlined in Work Activity procedures.
- Ensure the tailgate of the truck is open or unlocked prior to positioning the truck to backfill the trench.
- Ensure the correct layout for Work Site Protection on Roadways.
- Ensure the correct layout for Work Site Public Protection.
- Prior to using any powered equipment, the Safe Working procedures of the powered equipment must be referred to and adhered to.
- Identify third party services prior to excavating

### 4.2. Complex and Large Scale Main Repairs

Where a job has been identified as being resource intensive, highly complex or very large scale, a daily meeting is required to be carried out each morning via Microsoft Teams. This will involve the Service Stream staff and direct contractors onsite and applicable South East Water staff.

During the course of this daily meeting, key discussion points should cover the use of plant onsite and the site control that will be required for effective management of the site. Safety shall be

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discussed in regard to excavation control, required PPE being onsite and in good condition. At this point all staff will have the opportunity to raise concerns from the works being carried out.

Through the course of the daily meeting a site contact shall be designated so as to coordinate with staff not onsite which will include Service Stream management as well as South East Water staff. If the event has been designated an Incident, then the chosen employee shall be responsible for liaising with the incident manager from South East Water in regard to all queries and directions.

### 4.3. Repair Procedure

Note: Field crew or manager is to inform all affected customers when arranging shutdown. Interruption to supply is to be carried out in accordance **SEW-PC-2101 Operating Valve, Shutting Down, Recharging Main.**

Crew must go to depot to get recycled water fittings to complete the repair on the recycled main or service.

Arrive on site, make safe, complete Pre-Start checklist and assess job.

Check Point: - It is important to record arrival time to ensure accurate reporting of compliance times. Ensure all affected customers have been notified of shutdown and any alternative water supply has been arranged, as required.

Isolate (Shut down) section of main in accordance with procedure SEW-PC-2101 Operating a Valve, shutting down and Recharging a Main if required.

Check Point: - It is important to record water off time, streets affected, hydrants open and location of alternative supplies via Control Room / update Montage

The clamps are made from high-grade stainless steel and are suitable for permanent use. Stainless steel clamps do not need protection from corrosion, but fittings and attachments not made from stainless steel must be wrapped.

#### One-piece repair clamps

The use of stainless-steel repair clamps is applicable to:

- circumferential cracks (broken back);
- localised perforations; and,
- localised damage.

**Note: Ensure that main has sufficient strength to withstand the clamp e.g. not badly corroded.**

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### 4.3.1. Preparation & Fitting Procedure

- Excavate the hole to a sufficient size to work safely and comfortably.
- Where possible, allow the watermain to remain under pressure. If the leak is on top of the watermain, use a clip made from the same size pipe in UPVC to make the water spray to the side while you complete preparation. An assessment should be made based on the known assets within the vicinity and whether a risk is presented that excavating under water poses too much of a risk and requires the water main to be shut prior to excavating.
- Excavate the hole to allow excess water to be pumped out to avoid dirty water from entering the main. A sump hole should be dug at the end of the excavation to allow the water to be pumped out of.
- Positive Pressure from the water main should be maintained to avoid the possibility of debris or bacteria entering the water main whilst repairing. Positive flow should be maintained from both directions until excavations are 100mm under the watermain, at that point the downstream valve and the upstream valve can be closed for repair. Refer to appendix A – Water main shutdown and recharging example
- Prepare the surface of the main to receive the clamp fitting NOTE: DO NOT SCRAPE ASBESTOS MAINS

**Caution: A.C. pipes must be kept wet when cleaning to avoid generation of dust particles.**

- Asbestos Mains clean the surface by washing down with water or wipe with a clean rag (Do not scrape).
- Select the appropriate stainless-steel repair clamp.
- Remove the protective sleeves from the bolts and loosen the nuts sufficiently to open the clamp.
- Apply approved lubrication to the rubber seal flap to allow overlapping rubber to slide, creating a good seal.
- Place the clamp around the pipe and centre it above the crack/perforation/damaged area.
- Tighten the nuts using an even tensioning technique.
- Allow a few minutes for the rubber to relax, re-tighten the nuts and replace the protective sleeves on the bolts.
- Verify that the repair holds and then reinstate the polyethylene wrapping, prior to backfilling.

**NOTE:** The clamp can be positioned and joined adjacent to the repair if the main is under pressure.

### 4.3.2. Fault Finding (Repair Clamp)

**If the clamp is not sealing:**

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- Check for even gap between the plates on each side of the clamp.
- Check the main for fracturing and surface scrapes that extend past the clamp.
- Check the clamp rubber is flat and has overlapped correctly.

Check for protrusions or deformities on the main. Refer to flowchart

### 4.4. Solution

- Loosen all nuts and refit the clamp.
- Use an alternative repair method e.g. Cut and Replace Section

### 4.5. Pipe Replacement

#### 4.5.1. Welding Repair Process Mild Steel

Welding Mild Steel mains as a means of repair is applicable to:

- Refer to procedure SEW-PC-2104
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#### 4.5.2. Cast Iron/Cast Iron Cement Lined (CI/CICL)

Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.

#### 4.5.3. Water Services

Cut pipe using Quick Cut Saw with masonry cut-off wheel (and drawing wedges if required).

- Check the remaining pipe by striking with a cold chisel. If a dull sound emanates or the crack reappears then remove an additional section of pipe. Repeat procedure until the pipe 'rings' when struck with the chisel.
- Clear/clean ends of existing pipe of obstructions/burrs/ barmacles etc.
- Select the replacement pipe and Gibault's from **Table 1** and cut a piece slightly shorter than the length removed.
- Place a Gibault clip and rubber ring onto existing pipe ends. Place balance of Gibault assembly on to new pipe if made of ductile iron. If required use approved sling and truck mounted crane or backhoe to carry out lift. Level and align pipe such that gaps are approximately equal (insert blocking/timbers as required).
- Position the Gibault barrel centrally over the gap
- Tighten up Gibault bolts using an even tensioning technique all round.

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**Verify that the repair holds and then wrap the Gibault's if ductile iron material prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or
- shut down the main, release the clips, check the pipe surface and rubber rings,
- then reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's).

### 4.5.4. Ductile Iron Cement Lined (DACL)

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- Refer to procedure - Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using:
  - Quick Cut Saw with masonry cut-off wheel, or
  - Hand held wheel cutter ('Reed' or 'Rigid' cutter).
- Check the remaining pipe by striking with a cold chisel. If a dull sound emanates or the crack reappears then remove an additional section of pipe. Repeat procedure until the pipe 'rings' when struck with the chisel. Note that DAEL and CIEL pipes do not respond in the same way, a different sound will emanate from each type of pipe.
- Clear/clean ends of existing pipe of obstructions/burrs/bamacles etc.
- Select the replacement pipe and Gibault's from Table 2. and cut a piece slightly shorter than the length removed. Place a Gibault clip and rubber ring onto existing pipe ends
- Place balance of Gibault assembly and polyethylene sleeving for Gibault's (and ductile pipe) on to new pipe
- If required use approved sling and truck mounted crane or backhoe to carry out lift.
- Level and align pipe such that gaps are approximately equal (insert blocking /timbers as required).
- Position the Gibault barrel centrally over the gap.
- Tighten up Gibault bolts using an even tensioning technique all round.

**Verify that the repair holds and then wrap the Gibault's (and reinstate the polyethylene wrapping of the Ductile Iron pipe) prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or

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- shut down the main, release the clips, check the pipe surface and reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's).

### 4.5.5. Asbestos Cement (AC)

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.

**Caution:** Wear the working with Asbestos PPE and keep pipe wet when cleaning /cutting AC pipe (refer to procedure - Asbestos - Safe Work Practices).

- If there are metallic services off the section of main being replaced use a Volt Detector to guard against possible electrocution, (refer to procedures - Electrical Hazards, Safe Work Practices: Water Services).

Cut pipe using hand saw or disposable blade on a cleanable handle

- Clear/clean the existing pipe ends of obstructions/burrs using a wet disposable rag.
- Select the replacement pipe and Gibault's from Table 3 and cut a piece slightly shorter than the length removed.
- Place a Gibault clip and rubber ring onto existing pipe ends.
- Place balance of Gibault assembly and polyethylene sleeving for Gibault's (and ductile pipe) on to new pipe
- If required use approved sling and Excavator or backhoe with a certified lifting point to carry out the lift.
- Level and align pipe such that gaps are approximately equal (insert blocking/timbers as required).
- Position the Gibault barrel centrally over the gap.
- Tighten up Gibault bolts using an even tensioning technique all round.

**Verify that the repair is not leaking prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or
- shut down the main, release the clips, check the pipe surface and rubber ring, then reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's).

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### 4.5.6. Galvanised Wrought Iron (GWI or Gal)

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- Refer to procedure - Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using:
  - hacksaw, or
  - Quick Cut saw with masonry cut off wheel.
- Clear/clean ends of existing pipe of obstructions/burrs/ bamacles etc.
- Select the replacement pipe and Gibault's from the table below and cut a piece slightly shorter than the length removed. (Table 4)
- Place a Gibault clip or other approved jointing assembly and rubber ring onto existing pipe ends.
- Place balance of Gibault assembly and polyethylene sleeving for Gibault's (and ductile pipe) on to new pipe
- If required use approved sling and truck mounted crane or backhoe to carry out lift. Level and align pipe such that gaps are approximately equal (insert blocking/timbers as required).
- Position the Gibault barrel centrally over the gap-Roll the rubber rings into place and assemble the Gibault's. Tighten up Gibault bolts using an even tensioning technique all round.

**Verify that the repair holds and then wrap the Gibault's (if made of Ductile Iron) in polyethylene sleeving prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or
- shut down the main, release the clips, check the pipe surface and rubber ring, then reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's).

### 4.5.7. Unplasticised Polyvinyl Chloride (uPVC) - WHITE



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- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- If there are metallic services off the section of main being replaced use a Bridging Test, refer to procedure - Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using:
  - hand saw, or
  - Quick Cut Saw with masonry cut off wheel.
- Clear/clean ends of existing pipe of obstructions/burrs/barnacles etc.
- Select the replacement pipe and Gibault's from the table below and cut a piece slightly shorter than the length removed. **(Table 5)**
- Place a Gibault clip and rubber ring onto existing pipe ends. Place balance of Gibault assembly and polyethylene sleeving for Gibault's (and ductile pipe) on to new pipe.
- If required use approved sling and truck mounted crane or backhoe to carry out lift. Level and align pipe such that gaps are approximately equal (insert blocking/timbers as required).
- Position the Gibault barrel centrally over the gap-
- Tighten up Gibault bolts using an even tensioning technique all round.

**Verify that the repair holds and then wrap the Gibault's if made of ductile iron prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or
- shut down the main, release the clips, check the pipe surface and rubber ring, then reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's). **(Table 5)**

### 4.5.8. Unplasticised Polyvinyl Chloride (uPVC) - BLUE

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- If there are metallic services off the section of main being replaced use a Bridging Test. Refer to procedure Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using:
  - hand saw, or
  - Quick Cut Saw with masonry cut off wheel.
- Clear/clean ends of existing pipe of obstructions/burrs/barnacles etc.

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- Select the replacement pipe and Gibault's from the table below and cut a piece slightly shorter than the length removed. **(Table 6)**
- Place a Gibault clip and rubber ring onto existing pipe ends.
- Place balance of Gibault assembly and polyethylene sleeving for Gibault's (and ductile pipe) on to new pipe.
- If required use approved sling and truck mounted crane or backhoe to carry out lift.
- Level and align pipe such that gaps are approximately equal (insert blocking /timbers as required).
- Position the Gibault barrel centrally over the gap.
- Tighten up Gibault bolts using an even tensioning technique all round.

**Verify that the repair holds and then wrap the if made of ductile iron prior to backfilling.**

If the Gibault's leak:

- tighten the bolts, or
- shut down the main, release the clips, check the pipe surface and rubber ring, then reassemble.

If the pipe leaks beyond the replaced section locate the problem and proceed as before (Note: use a single length of pipe, not three Gibault's).

### 4.5.9. Copper (Cu)

**Caution:** Where replacing copper pipe with PE pipe, a larger size PE pipe is required to maintain adequate flow through the main.

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- Refer to procedure - Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using:
  - hacksaw, or
  - hand held wheel cutter (Tube Cutter).
- Clear/clean ends of existing pipe of obstructions/burrs/barnacles etc.
- Replace with same diameter annealed copper pipe using soldered joiners or compression fittings (Remember to allow sufficient length to accommodate the flare).
- If replacing Hard Drawn copper pipe, it will be necessary to anneal the ends using a blow torch if compression fittings are to be used.
- **Verify that the repair holds prior to backfilling.**
- If the compression fittings leak:

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- tighten the joint, or
- shut down the main, undo the joint, check the flare surface and rubber ring, then reassemble.
- If the soldered joint leaks:
  - shut down the main and re-solder the joint.
- If the pipe leaks beyond the replaced section locate the problem and proceed as before.

### 4.5.10. Polyethylene (PE)

- Clean surface of main to determine extent of defective/damaged pipe and location of proposed cut.
- If there are metallic services off the section of main being replaced use a Bridging Test. Refer to procedure - Electrical Hazards, Safe Work Practices: Water Services.
- Cut pipe using a hand saw.
- Clear/clean ends of existing pipe of obstructions/burrs/barnacles etc. Replace with size for size PE pipe using Propriety fittings.
- Verify that the repair holds prior to backfilling.
- Replace fitting using new insertion rubbers, bolts, washers and nuts or with Gibault joints.
- If the compression fittings leak:
  - tighten the joint, or
  - shut down the main, undo the joint, check the surfaces and reassemble.
- If the pipe leaks beyond the replaced section locate the problem and proceed as before: (Note: use a single length of pipe, not three Gibault's).
- Purple pipes (recycled water pipes) for all types of purple pipes same type of purple pipes must be used.

## 4.6. Damage at a Joint

### 4.6.1. Lead Joint

- Clean joint. Wash down with water or wipe with clean rag.
- Use a "knocking up" set of chisels (1 to 5). Knock (push) the lead back into the joint uniformly.
- Commence at the base/invert of the joint.
- Work in a clockwise direction around the joint.
- A clip may be required to hold the lead in.
- On larger mains use a Pneumatic 'knocking up gun'
- For 100mm and 150mm pipes a Bell Joint Clamp is to be used.

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### 4.6.2. Rubber Ring Joint

Cut the joint out and replace with pipe and Gibault's in accordance with Steps 4.4.1- 4.4.9 of this procedure).

## 4.7. Damaged Fittings

### 4.7.1. Leaking from Joint

- Check and replace any damaged nuts, bolts and washers. Then tighten using an even tensioning technique all round.
- If leak continues, loosen and remove nuts, bolts and washers. Replace the insertion rubber/gasket.
- If replacing the insertion rubber/gasket reassemble the fitting using new nuts, bolts and washers.

### 4.7.2. Leaking Fitting (excluding valve spindles)

- Shutdown may be required in order to repair the fitting. Refer to Operating a Valve (shutting Down/Recharging a Main) and Shutdown Notification.
- Unbolt or cut the leaking fitting out using methods outlined in this procedure.

## APPENDIX FOR ALL TABLES.

TABLE 1

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
80 mm CI/CICL	100 mm uPVC	80/100	Y
100 mm CI/CICL	100 mm uPVC	100/100	Y
125 mm CI/CICL	150 mm uPVC	125/150	Y
150 mm CI/CICL	150 mm uPVC	150/150	Y
175 mm CI/CICL	150 mm uPVC	175/150	Y
200 mm CI/CICL	225 mm uPVC	200/225	Y
225 mm CI/CICL	225 mm uPVC	225/225	Y
250 mm CI/CICL	225 mm uPVC	250/225	Y
300 mm CI/CICL	300 mm uPVC	300/300	Y
375 mm CI/CICL	375 mm uPVC	375/375	Y
450 mm CI/CICL	450 mm DICL	450/450	Y

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**TABLE 2**

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
100 mm DICL	100 mm uPVC	100/100	Y
150 mm DICL	150 mm uPVC	150/150	Y
225 mm DICL	225 mm uPVC	225/225	Y
300 mm DICL	300 mm uPVC	300/300	Y
375 mm DICL	375 mm uPVC	375/375	Y

**TABLE 3**

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
40 mm AC	63 mm PE	40/40 (special)	Y
100 mm AC	100 mm uPVC	100/100 S/O	Y
150 mm AC	150 mm uPVC	150/150 S/O	Y
225 mm AC	225 mm uPVC	225/225 S/O	Y
300 mm AC	300 mm uPVC	300/300 S/O	Y

**TABLE 4**

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
50 mm Gal (GWI)	50 mm Gal (GWI)	50/50	Y
80 mm Gal (GWI)	80 mm Gal (GWI)	80/80	Y

**TABLE 5**

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
100 mm uPVC	100 mm uPVC	100/100	Y
150 mm uPVC	150 mm uPVC	150/150	Y
225 mm uPVC	225 mm uPVC	225/225	Y
300 mm uPVC	300 mm uPVC	300/300	Y

**TABLE 6**

Existing Pipe	Replacement Pipe	Gibault's	SS Clamp
100 mm uPVC	100 mm uPVC	100/100	Y
150 mm uPVC	150 mm uPVC	150/150	Y

## 5. Records

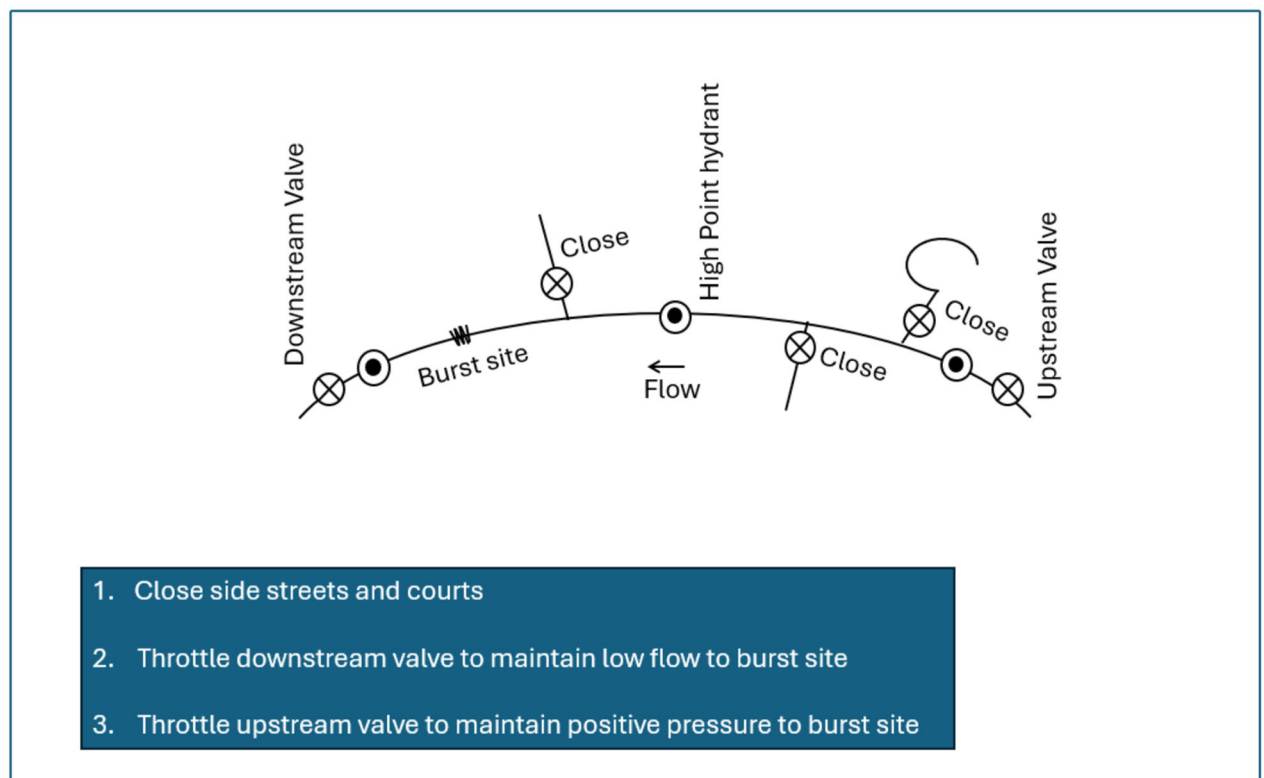
Records are maintained in South East Water's Montage system

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## 6. References

- SEW-PC-2112 Flushing Water Mains
- SEW-PC-2101 Operating A Valve, Shutting Down / Recharging a Water Main
- SEW-PC-2104 Water Main Repair Procedures for Mild Steel Mains
- SEW-PC-606 Excavation
- **Appendix A: Water Main Shutdown and Recharging examples**

Picture 1: Typical Shutoff (burst)



## 7. Supporting Tools

Not Applicable.

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### 8. Version

Version	Changes	Revision date	Revision by
00	Initial Issue	02/09/2022	Michael Spicer
01	Updated for positive flow controls	31/03/2025	Michael Spicer

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## 9. Flowchart

