



**Scottish
Water**

Trusted to serve Scotland

Water for Scotland v4.0

The collage consists of several circular images and two large blue central circles:

- Top Left Circle:** A hand holding a clear glass of water.
- Top Middle Circle:** An older couple walking a dog on a beach.
- Top Right Circle:** Two workers in high-visibility vests examining a map or document.
- Middle Left Circle:** A woman wearing a headset, likely a customer service representative.
- Middle Center Circle:** A young boy smiling while holding a glass of water.
- Middle Right Circle:** Two workers standing next to a large solar panel array.
- Bottom Left Circle:** A man in a yellow high-visibility vest holding a hose.
- Bottom Middle Circle:** A woman watering flowers in a garden.
- Bottom Right Circle:** Two people making a toast with glasses of beer.
- Large Blue Circle (Left):** Contains the text "Trusted Putting customers first".
- Large Blue Circle (Right):** Contains the text "Serving Delivering for Scotland 24/7".
- Background Image:** A person fishing in a body of water.

Water for Scotland - A technical specification for developers in Scotland

Version 4.0 – October 2018

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Record of Changes and Amendments

Amendment Number	Amendment Date	Document Section/Clause Reference Number	Document Section/Clause Header	Brief Summary of Change	Document Version Number
1	October 2018	1.1.6	Application of this Document	Details of responsibility in construction	4.0
2	October 2018	2.2.2 (11)	Ground Condition Assessment	Use of Barrier Pipe	4.0
3	October 2018	2.3.2 (9)	Design Considerations	Water mains protection policy referenced	4.0
4	October 2018	2.3.2 (21)	Design Considerations	Use of tracer tape	4.0
5	October 2018	2.3.2 (2)	Design Considerations	Location of Water Mains	4.0
6	October 2018	2.3.3. (3)	Drawings	New Clause. Colour coding of proposals	4.0
7	October 2018	2.3.7 (2)	Service Connections	Distance between connections	4.0
8	October 2018	2.3.7 (4)	Service Connections	Manifold Sizes and number of connections	4.0
9	October 2018	2.3.8 (3)	Material Selection	DOMS Jointing guidance reference	4.0
10	October 2018	2.3.9 (6)	Fire Fighting Supplies	Private Fire Mains to be constructed as per this document	4.0
11	October 2018	2.3.9 (6)	Fire Fighting Supplies	Private Fire mains to be marked	4.0
12	October 2018	2.4.1 (1)	Construction	Pre-start meeting	4.0
13	October 2018	2.4.3	Boundary Boxes	Clarification of requirements in BS 5834	4.0
14	October 2018	2.4.7	Pressure Testing	SW's requirements	4.0
15	October 2018	Bedding Dwg		Tracer and Warning tape added	4.0
16	October 2018	Appendix L		UCP Responsibilities	4.0
17	October 2018	Appendix M		Barrier Pipe Guidance	4.0
18	October 2018	Appendix N		Extract from Policy document added	4.0
19	October 2018	Appendix O		Tracer/Market/Fire Main Tape Requirements	4.0
20	October 2018	Appendix P		EF Jointing Procedure	4.0
21	October 2018	Appendix Q		Pre Start Meeting	4.0
22	October 2018	Appendix R		Pressure Testing	4.0

FOREWORD

The 4th Edition of 'Water for Scotland' takes account of changes to technical standards, new additions to material selection and provides improved clarity on Scottish Water's requirements in terms of specification for the design, construction and vesting of new water infrastructure assets.

This Specification sits within Scottish Water's hierarchy of policy, procedure and general standards and specifications document management system, and is intended to provide developers or other parties involved with supporting new development in Scotland with the technical standards for the development of water infrastructure.

'Water for Scotland' is a design and construction specification that covers the provision of water infrastructure for housing and industry development within Scotland. The document will guide developers through the issues and procedures associated with provision of water infrastructure and further assist those developers laying water mains and services on new developments.

A safe, secure and reliable supply of water is essential for both household and non-household customers. Due to its essential nature, public water supply is highly regulated. Safety and public health are important in the laying of water mains and services whether work is carried out by Scottish Water, a developer or a contractor carrying out the work on behalf of the developer.

There are also important environmental aspects in taking water out of the environment: avoiding leakage and wastage.

In reviewing and updating this Specification we understand that supporting new development and building homes has a national aspect and we have worked closely with WRc plc to ensure, where appropriate, there is a close alignment with the latest technical standards, as applied to the English and Welsh water companies. There are, however, areas where infrastructure in Scotland reflects policy and legislative requirements, and these have been included in this Specification.

In collaboration with the Standards Board and other partners, agreement has been reached to have 'Water for Scotland', 4th Edition made available in electronic format via Scottish Water document management portals. This will enable improved industry-wide accessibility and the mechanism for dynamic review as well as, updates for continual improvements in policy or technical standards. Any addendums, updates, etc., will be published on Scottish Water's electronic information portals.

Small and medium-sized water booster stations serving individual developments play an important part in the water infrastructure network in Scotland. This Specification now provides options and technical solutions to ensure such assets are constructed to a suitable standard and transferred to Scottish Water in accordance with vesting standards.

A key and guiding principle throughout this document is the protection of public health, and the protection of Scottish Water's infrastructure and service to existing customers.

Developers or their representatives will not be given final connection to Scottish Water's live existing water mains until inspection, testing and certification, etc., have been satisfactorily completed, in accordance with this Design and Construction Specification and Scottish Water's Distribution, Operation and Maintenance Strategy (DOMS).

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PART 1 – GENERAL

1.1 APPLICATION OF THIS DOCUMENT

1. 'Water for Scotland' sets out Scottish Water's technical specification for the design and construction of new water infrastructure for housing and industry development in Scotland. It is for use by developers laying water mains and services for new developments, whilst ensuring that the long-term operation of the water distribution system is taken into account. This Specification covers

new water infrastructure only and shall not be used as a definitive design manual for all water-related construction such as rehabilitation.

2. A glossary of terms used in this Specification is provided in Appendix A. All documents referenced in this Specification are listed in full in Appendices B to D.

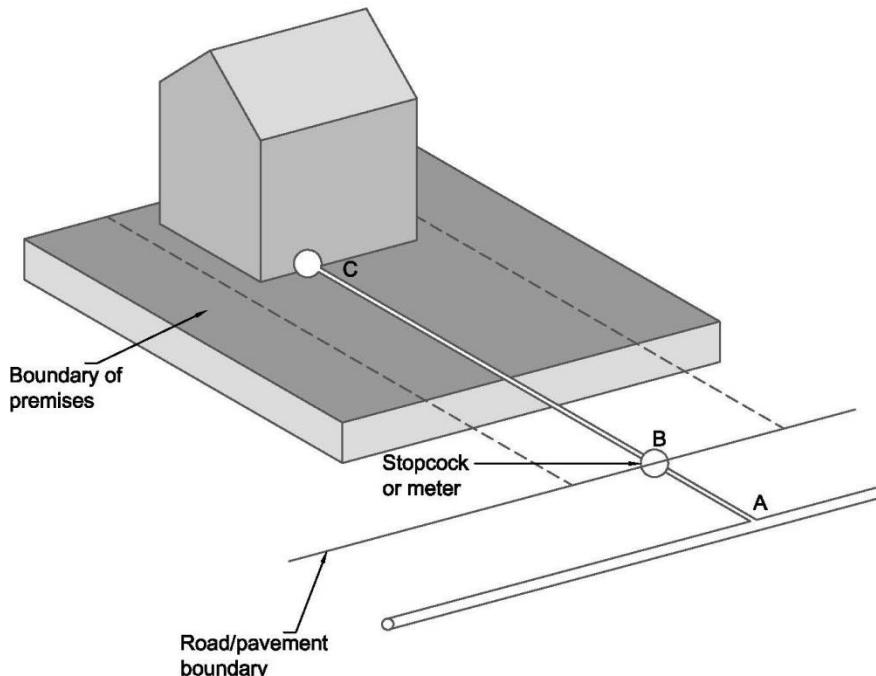
3. This Specification covers the design and installation of new water mains and services (including the boundary stopcock and/or meter chamber on new development sites), and the installation of extensions and diversions from the new development to the existing water distribution system.

4. There shall be no departure from the provisions of this technical specification except where formally confirmed by Scottish Water, such departure being technically justifiable or representing advances in knowledge. Failure to conform to the Specification may result in the developer having to provide the water infrastructure entirely at their own expense, without any contribution being made by Scottish Water.

5. The developer has a responsibility to comply with all National legislation and any Code of Practice called up by that legislation, the provisions of which take precedence over this technical specification. Reference to the developer throughout this technical specification applies equally to a contractor working on behalf of the developer.

6. Figure 1 and Appendix L, details the responsibilities for construction and future maintenance of water mains and connections.

Figure 1 Example service pipe layout to illustrate terminology

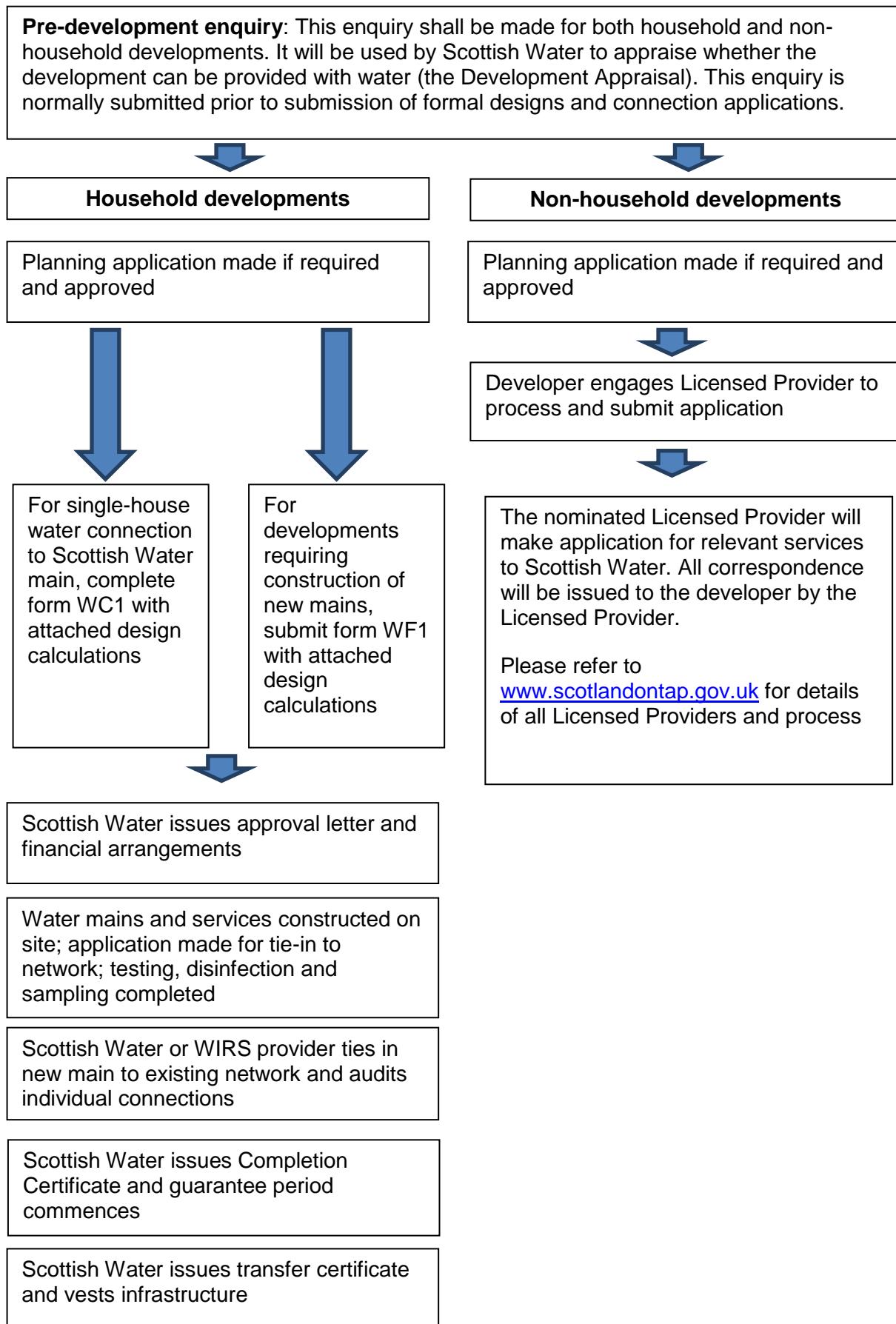


	RESPONSIBILITY		REGULATIONS
	OWNERSHIP	MAINTENANCE RESPONSIBILITY	
A – B Communication Pipe	Scottish Water	Scottish Water	The Public Water Supplies (Scotland) Regulations 2014
Stopcock or meter	Scottish Water	Scottish Water	
B – C Supply Pipe	Property Owner	Property Owner	Water Byelaws
Internal Plumbing	Property Owner	Property Owner	

1.2 PROCEDURE FOR OBTAINING NEW WATER INFRASTRUCTURE

1. An overview of the process for obtaining new water infrastructure for both household and non-household developments is provided in Figure 2. For more detail, the developer is referred to Scottish Water's 'Guide for Obtaining New Water and Waste Water Services' which sets out the overall process by which the developer can obtain provision and vesting of site infrastructure and new connections, and outlines costs, charges and financial contributions that may be applicable.
2. For non-household customers, water services (including customer services and billing) will be provided through a Licensed Provider appointed by the Water Industry Commission. For new connections, the developer shall engage a Licensed Provider to process and submit applications for any non-household development.
3. For household customers, water services will be provided by Scottish Water. Applications for any household development shall be made directly to Scottish Water.

Figure 2 Simplified process for obtaining new water services



4. For non-household customers, water services including customer services and billing will be provided through a Licensed Provider appointed by the Water Industry Commission (WIC) and party to a Wholesale Services Agreement (WSA) with Scottish Water. For new connections, the developer shall engage a Licensed Provider to process and submit applications for any non-household development or a development which includes a non-household element. Where references are made in this document to developers, care shall be taken to consider the role of Licensed Providers.
5. Arrangements have been established to allow suitably accredited entities, which are registered as part of the Water Industry Registration Scheme (WIRS) to undertake new water connection activities and a range of metering activities in Scotland.
6. The scope of activities that may be carried out by the WIRS provider is set out in the WIRS requirements document.
7. The WIRS requirements document sets out the requirements that must be followed by accredited WIRS providers wishing to operate in Scotland. It also contains the main references that govern the activities. WIRS providers will be required to adhere to all of the requirements, scope and governance conditions of WIRS and continue to remain accredited under WIRS in order to continue to undertake the connection activities.
8. The WIRS requirements document requires the WIRS provider to comply with the water company's more detailed local requirements. In the case of Scotland, these more detailed requirements are set out in this Specification, Scottish Water's 'Water Connections Code for Scotland', 2014, (which outlines the requirements for accredited WIRS providers who are undertaking new water supply connections in Scotland) and its companion, the 'Scottish Water Meter Code of Practice', (which outlines the requirements for accredited WIRS providers who are undertaking metering service activities in Scotland).
9. Under the arrangements, participating Licensed Providers (LPs) in the case of new connections to non-household premises, or developers in the case of new connections to household premises may put in place arrangements to allow an accredited WIRS provider to undertake the water connection and, where applicable, the installation of the associated revenue meter. Under these arrangements, the connection services and relevant metering activities must be undertaken by an appropriately controlled and competent Utility Connection Provider (UCP).
10. Scottish Water will continue to undertake connections/permanent disconnections work for developers and LPs. It will also be entitled to intervene and carry out any connection service that it deems necessary for the performance of its statutory duties. Scottish Water is required by law to undertake its duty to supply a safe, secure and reliable supply of water to customers in Scotland.

1.3 Note: Under the Water Services etc. (Scotland) Act 2005, water will continue to be supplied through Scottish Water's network of pipes. Scottish Water remains responsible for maintaining and investing in the network. STATUTORY AND OTHER CONSENTS

1. All necessary consents and other permissions shall be obtained. Relevant bodies include (but are not limited to):
 - Utilities with a statutory right to consultation, including: the British Pipeline Agency, electricity/gas distribution companies and telecommunications companies;
 - Emergency services;
 - Roads Authority (public roads) or road managers (private roads);
 - Local Authority (e.g., for hedge removal);
 - Planning Authority;
 - Scottish Canals;
 - Rail operators, transport companies (e.g., bus operators);

- Historic Environment Scotland, Scottish National Heritage;
 - Private landowners and tenants; and
 - Scottish Environment Protection Agency (SEPA).
2. Approval by Scottish Water shall be sought for any agreements which may impact on future access for maintenance.
3. All agreements shall be provided, in so far as they relate to mains and services, made with third parties and a copy of all such agreements shall be passed to Scottish Water. Such agreements shall clearly state:
- location of land in question;
 - purpose for which the land is required;
 - responsibility for final reinstatement; and
 - any other special conditions.
4. In respect of proposed water main and services to be constructed in land which the developer does not already own and occupy, the developer shall:
- negotiate with the landowner and record that reasonable steps have been taken to resolve the issues before approaching Scottish Water for a Section 23 agreement;
 - unless otherwise agreed in writing by Scottish Water, apply to Scottish Water to authorise him under Section 23A of the Water (Scotland) Act 1980 to construct a water main and/or service pipe;
 - complete and serve a Style Notice to the land owner or occupier (see Appendix J of this Specification);
 - be responsible for the resolution of any objections, all negotiations, and all compensation arrangements in accordance with the standard terms and conditions contained in Scottish Water's Section 23A Authorisation (see Appendix K of this Specification), together with such further conditions as may be relevant in any given case.
5. Prior to commencement of any work, the developer shall:
- provide copies of all notices and relative notice plans served by the developer, duly receipted and signed by the affected owners/occupiers, of the Sheriff's consent to Scottish Water;
 - issue written notice, not later than 28 days prior to the commencement of work, of intention to carry out the water main and/or service pipe construction works to the relevant Planning Authority, together with a copy of the notice plans.
6. In exceptional circumstances, where the developer can provide evidence that the notice procedure is not possible and Scottish Water has consented, the developer shall obtain, at his own expense, all necessary permissions and/or wayleaves. This consent and a Deed of Servitude will always be required where Scottish Water has agreed that the water mains and/or service pipe may be laid in land owned by the developer which will not become public. All wayleaves shall be in accordance with the Style Deed of Servitude contained in Appendix I of this Specification.

1.4 SCOTTISH FIRE AND RESCUE SERVICE LIAISON

1. The Scottish Fire and Rescue Service shall be contacted to confirm fire fighting requirements. Scottish Water shall be party to these discussions where the planned works may impact on fire hydrants in other parts of the water distribution system. Scottish Fire and Rescue Service approval shall be sought and received as part of the application stage and prior to commencement of the work.

2. Further information on the design of systems to incorporate Scottish Fire and Rescue Service requirements is given in Part 2. Scottish Water's guideline agreement with the Scottish Fire and Rescue Service are enclosed in Appendix E.

3. All approvals from the Scottish Fire and Rescue Service shall be copied to Scottish Water for future reference.

4. Local Scottish Fire and Rescue Service office and contact details can be found at www.firescotland.gov.uk/your-area.aspx.

1.5 LIAISON WITH OTHER PARTIES ON SITE

1. The developer shall ensure that there is adequate liaison between all contractors working on the water supply to the development. Only authorised, fully-trained and competent WIRS providers are permitted to operate valves and hydrants, etc., which affect existing customer water supplies and the water quality within individual sites or phasing of site development.

2. The contractors shall minimise the impact of their work on others on the site and existing Scottish Water customers. This includes minimising noise and disruption, communicating appropriately and politely with customers, removing litter and excess materials, and not obstructing access.

1.6 REGULATIONS

1. The developer shall comply with all current relevant UK and Scottish legislation. This includes (but is not limited to):

- New Roads and Street Works Act 1991 (NRSWA) Regulations and Codes of Practice;
- Construction (Design and Management) Regulations ;
- Health and Safety at Work etc. Act 1974;
- The Public Water Supplies (Scotland) Regulations 2014 and Water Supply (Water Fittings) (Scotland) Bylaws 2014;
- Fire (Scotland) Act 2005;
- Fire Safety (Scotland) Regulations 2006;
- Waste Management Licensing Amendment (Scotland) Regulations 2006; and
- Water Environment (Controlled Activities) (Scotland) Regulations 2011.

2. Where sites are subject to the Construction (Design and Management) Regulations , the following information shall be provided to enable Scottish Water to fulfil its duty at vesting under the Regulations:

- name of the project planning supervisor; the CDM co-ordinator (for notifiable projects);
- name of the principal contractor; and
- where appropriate, any relevant section of the Health and Safety File.

1.7 STANDARDS

1. All materials in contact with potable water shall comply with Regulation 33 of The Public Water Supplies (Scotland) Regulations 2014. Technical guidance on the requirements of Regulation 33 (Regulation 31 in England and Wales) can be found on the Drinking Water Inspectorate website (www.dwi.defra.gov.uk).

2. A relevant European Standard (EN) is any European Standard covering the subject which is in force in the European Union. In the UK, ENs are published as BS ENs. A Water Industry Specification may be used when there is no relevant EN, British Standard (BS) or equivalent available.

3. In the case of recently developed or innovative products, no current European Standard, British Standard or equivalent will normally be available. This may not preclude the use of a product where its performance or properties can be determined to align with its intended duty and design life. Careful consideration shall be given to any independent assessment or evidence of product performance.

4. Developers shall discuss and agree the proposed use of newly-developed products with Scottish Water at the earliest opportunity.

Note: Additional quality assurance requirements, including third party certification, may be sought by Scottish Water as a cost-effective means of ensuring compliance with Standards.

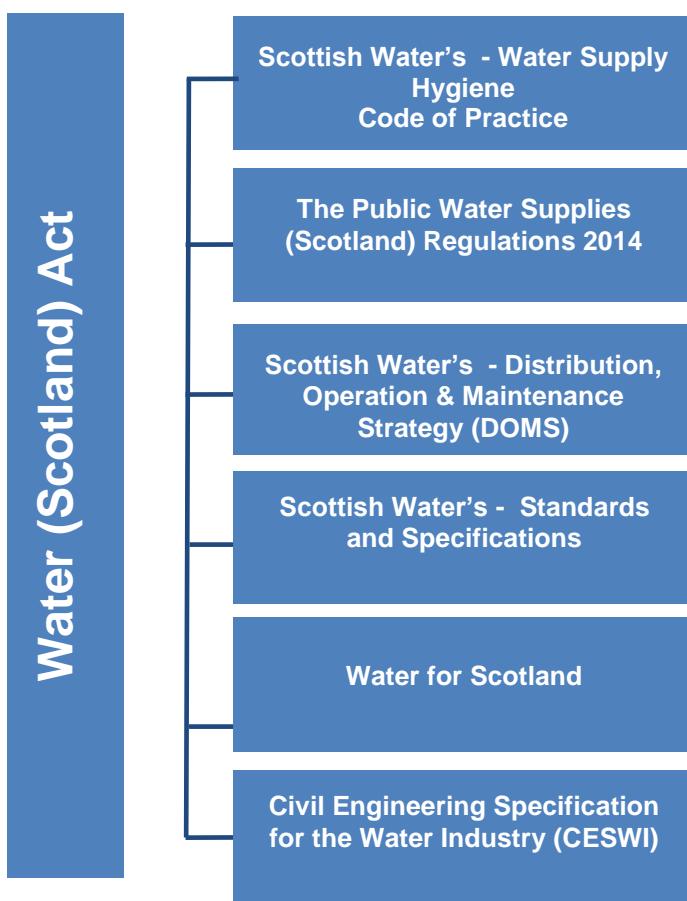
5. Currently, National Regulations apply where European Standards refer to requirements for the effect of materials on the quality of water intended for human consumption.

PART 2 - DESIGN AND CONSTRUCTION REQUIREMENTS

2.1 DESIGN AND CONSTRUCTION PRINCIPLES

1. The developer or their designer is responsible for ensuring that all aspects of the design of the water distribution system comply with National legislation, any Standard or Code of Practice called up by that legislation and best practice documents. The framework of documents is shown in Figure 3. If these legal requirements and standards are not met, Scottish Water is under no obligation to take over the ownership of the new water main.

Figure 3 Framework of documents for the design, construction and commissioning of water mains and services to maintain and meet water quality provisions



2. All layouts shall be designed with reference to the full suite of Standards and Specifications held and updated by Scottish Water.
3. Scottish Water shall establish suitable points for connection of the new mains to the existing local water distribution system. If the developer proposes any connection to a trunk main, special provisions may apply. These points of connection shall provide flows and pressures to meet Scottish Water's guaranteed levels of service (given in Scottish Water's leaflet 'Our Promises to You: Code of Practice') at the point of connection. Consideration shall be given to optimising the cost of any reinforcement required to the existing supply system through alternative hydraulic designs within the new development.

4. All designs are subject to approval by Scottish Water before work commences. Where required, a risk assessment and a site visit may need to be conducted.
5. The developer shall have regard to the Ministerial Guidance issued to Scottish Water on sustainable development which can be found at www.scottishwater.co.uk.

2.2 PRELIMINARY DESIGN INFORMATION

2.2.1 Specific Design Standards

1. Designs shall provide for, but not be limited to:

- compliance with The Public Water Supplies (Scotland) Regulations 2014;
- compliance with all relevant health and safety legislation including the Construction (Design and Management) Regulations ;
- the requirements of British Standard BS EN 805 (Water Supply – Requirements for Systems and Components Outside Buildings);
- Scottish Water's Specification reference SSP-SP-SPE-04000404 - Water Distribution;
- compliance with Scottish Fire and Rescue Service requirements (see Appendix E of this Specification);
- site-specific conditions and requirements;
- minimum pressure of 1 bar and minimum flow of 10 litres per minute at point of connection (single property);
- UKWIR publication 'Guidance for the selection of Water Supply Pipes to be Used in Brownfield Sites' and Scottish Water's Contaminated Land Guidance DOM-WI-PRC-00000202;
- compliance with Scottish Water's standard layouts for water main branch connection, PRV/meter by-pass and hydrant valve set ups. Reference to Appendix H for standard details and Scottish Water's standard detail SSP-SP-DRA-07000722-01;
- any additional requirements set out by Scottish Water.

2.2.2 Ground Condition Assessment

1. The developer is responsible for ensuring that where a site is potentially affected by contamination, a risk assessment to determine the correct selection of pipes and fittings is undertaken to protect the quality of drinking water whilst taking into account the service life of the water distribution system.
2. Guidance for planning, designing and constructing water mains and services in brownfield sites is given in UKWIR report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites'. Supplementary guidance is provided in Scottish Water's 'Guidance for Installation of Water Mains and Fittings – Additional Guidance)".
3. For any site potentially affected by contamination, a desk study (preliminary risk assessment) and site walkover shall be undertaken prior to any design work. This shall include, but not be limited to:

- records of previous (historical) and current land use, presented on a summary map for the site;
- details of adjacent sites in case migration has occurred, or may occur, onto or under the development site;
- details of any pollution event that has occurred on or near the site;
- copies of previous site investigations including locations, depth and chemical results of soil samples (before and after remediation);
- position of any fuel tanks;
- visual and olfactory evidence of contamination.

Note: The developer shall liaise with the Local Authority to capture local knowledge on contaminated land issues.

4. The developer shall prepare a site plan showing site topography (including groundwater, water courses, boreholes, etc.), site boundary, proposed route of the water pipeline and proposed site layout (buildings and roads).
5. Where the site has not been previously developed (i.e. greenfield site), supporting information including historical maps and a recommendation for pipe materials shall be provided to Scottish Water for approval.
6. Where the site has been previously developed (i.e., brownfield site), Scottish Water require an intrusive site investigation to be carried out to identify the presence and nature of contamination which could be detrimental to the integrity of the water mains/services and permeate the pipe and compromise the quality of conveyed water. Guidance on testing and sampling is provided in the documents listed in Clause 2 above.
7. The developer shall provide a copy of the Site Assessment Report including preliminary risk assessment, results of the intrusive site investigation and the final updated risk assessment to Scottish Water.
8. Where it is not possible to avoid contaminated ground in the laying of water mains and services, appropriate measures shall be taken to protect water quality. This may include selection of pipe material, pipe protection, removal of contaminated material or the importation of inert material to surround the pipe. The final risk assessment shall support the choice of measure, including the choice of pipe material.
9. If pipe material selection is potentially compromised by the levels of contamination, then remediation of the land or re-routing of the pipeline may be considered in accordance with UKWIR report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites'. The pipeline construction proposals made by the developer shall prevent pollution of watercourses, sewers and unauthorised discharges of contaminated groundwater, which may result in prosecution of the company or individual by the Scottish Environment Protection Agency (SEPA). Failure to control and dispose of waste correctly may result in prosecution by SEPA.
10. Guidance on the assessment of land for phased developments is provided in Scottish Water's 'Guidance for Installation of Water Mains and Fittings - DOM-WI-PRC-00000202' .
11. Where required, the use of PE Barrier pipe shall comply with the guidance in Appendix M.

2.3 DESIGN

2.3.1 Design Objectives

1. Mains and services shall be designed to achieve the lowest whole-life costs and specifically to:

- provide adequate hydraulic capacity to deliver standards of service to customers, whilst preserving wholesome water quality by avoiding excessive retention or travel times for water supplied;
- minimise the likelihood of future interruptions to supply caused by repair and maintenance activities carried out on the network;
- provide efficient and flexible operation of the water distribution system to mitigate future operational and maintenance costs;
- design out the use of dead ends within the network in order to minimise future water quality complaints and interruptions to supply; and
- provide safe and easy access to valves, hydrants and fittings.

2.3.2 Design Considerations

1. Mains shall be laid in accordance with the ‘NJUG Guidelines on the Positioning and Colour Coding of Underground, Utilities, Apparatus: Volume 1’ for laying services on new developments and the requirements of this specification, and in accordance with clause 2.3.2 (2). Water mains shall be laid in such a position that they shall not interfere with access to other utility apparatus (including sewers). Other utility apparatus shall be positioned with similar regard to water mains and to allow unrestricted future maintenance to the Water assets.

A typical design showing the location of water mains relative to other utility apparatus is shown in Appendix G of this Specification.

2. To permit access and to enable future connections to be made, water mains shall be laid in an adoptable road/footpath or a dedicated service strip. Wherever possible:

- the main is to be laid on the side of the road where the density of housing is greatest to minimise the number of service pipes crossing the road; and
- single as opposed to dual mains layouts shall be specified.

Where multiple utilities may obstruct future access, the main is to be laid on the opposite footpath to provide uncluttered future access with the acceptance that there may be extra service pipe crossings.

3. Each service pipe shall be perpendicular to the main. Where practicable, the service pipe shall not be laid beneath drives and parking areas where leakage and spillage of fuels and solvents may contaminate the ground, resulting in permeation of the buried service pipe with risk of damage to the pipes and unacceptable taste and odour in the water supplies.

Where laying pipes beneath drives or parking areas cannot be avoided, suitable pipe materials, PE Barrier or Copper pipes, shall be used to avoid contamination of the water supply.

4. All service pipes laid outside of an adoptable road shall be laid within land to which the property owner/occupier will have permanent rights of access. Adequate provision shall be made in conveyancing documents to ensure that Scottish Water is afforded perpetual rights to enter the strip in order to maintain their apparatus. In cases where the developer is not the owner of the land abutting the public highway or the property owner does not have access to the land which the service pipe crosses, a Deed of Servitude shall be entered into with the landowner to cover both the initial laying of the service pipe and any future access for maintenance purposes.

5. Bends and road crossings shall be kept to a minimum. Where a number of adjacent services would be required to cross an existing road from a main to a number of new properties, this shall be minimised by the use of a joint communication pipe.

6. Ducts may be permitted for road crossings. They would normally only be required for communication pipes and shall be blue. Approval shall be sought from Scottish Water for such arrangements. When utilised, ducts shall be perpendicular to the main and be for the use of only one connection per duct.

7. Alternative layouts shall be considered to identify the best achievable route that achieves the lowest whole-life costs arising from construction, operation, maintenance and eventual decommissioning of the asset.

8. The developer shall agree with Scottish Water an acceptable horizontal distance between the line of the new water main and the proposed property walls, and any existing structures and features on the site.

9. The developer shall comply with Scottish Water's Policy document "Water Mains Protection Distances". Distances are given to ensure adequate access is maintained between Scottish Water's assets and any buildings and structures that may be erected adjacent to water infrastructure assets. An Extract of the policy document can be found in Appendix N.

10. The design shall cover associated Works such as pipe supports, beds and surrounds, backfill, surface restoration, access arrangements, etc.

11. Service pipes shall be laid in a straight line from the stopcock/meter to the service entry point. Service pipes shall be individually ducted through structures where they enter the property (i.e., they shall not rest on brickwork).

12. Branch connections shall have isolation valves installed to separately control all the flows downstream of the branch. Three-valve set-up at junctions is the minimum requirement to allow future control of the network to minimise interruptions to supply (ITS). This requirement may only be relaxed after full consultation with Scottish Water. The need for additional "in-line" valves is dependent on housing density and operational requirements. Suitable valve arrangements and interdependencies between components are shown on Scottish Water standard detail SSP-SP-DRA-07000722-01.

13. On long lengths of distribution mains, the maximum distance between hydrants shall be 1 km and shall be installed with control valves either side.

14. Air valves would not normally be required for mains on new developments as the frequency of service connections on the top of the mains allows for adequate air release. Where necessary, air valves shall allow air release and entry when charging up or draining down a main, and also to release air that comes out of solution.

15. The mains shall be designed to facilitate the discharge of water from washouts.

16. Additional washouts/hydrants shall be located to allow for draining, purging and flushing of the water distribution system. These would normally be required at the dead end of a main, at low points on the distribution system, to vent air during charging up or admit air during draining down, and adjacent to valve arrangements capable of isolating sections of main and/or creating temporary dead ends to minimise future water quality problems and interruptions to supply (ITS).

17. Valves, washouts, hydrants, etc., shall, as far as is practicable, be located in the footpath or verge for both access and safety reasons, and to mitigate the effects of traffic, surface water and silting on chambers. They shall be located to prevent the fittings becoming submerged.

18. The Water Supply (Water Fittings) (Scotland) Byelaws require backflow prevention into the water distribution system for properties where:

- water is required for non-household purposes such as fixed fire fighting systems (e.g., sprinklers, hose reels); or
- water is supplied from other sources (e.g., rainwater collection or recycled water).

19. Typical details of chambers and fittings are shown in Appendix H of this Specification. No significant departures from these shall be made without approval from Scottish Water.

20. Design calculations shall be included when submitting the design. This will include, the maximum flow rate for the full development together with the highest point of connection (AOD).

21. The use of both types of marker tapes (warning marker tape and detectable marker tape / mesh) must be incorporated in the design of the water main layout to allow future tracability of PE mains laid: warning marker tape should be installed *above* and detectable tape / mesh installed *below* the water

main laid – both tapes must be coloured blue and have a central strip with a clear warning message. Marker tapes must be checked after installation. Guidelines and requirements for using marker tapes is detailed in Appendix O.

2.3.3 Drawings

1. The design shall be submitted relative to Ordnance Datum Newlyn (ODN). Drawings shall be prepared using an electronic system and submitted in standard '.dwg' (drawing) file format as detailed in Scottish Water Specification SSP-SP-SPE-05000501 General Requirements and SSP-SP-SPE-05005017 Provision of Drawing 'CAD Drawing Frames'.
2. Plans shall be clear and unambiguous, showing the position of all new and existing apparatus in relation to all assets affected by the works. A location map shall be incorporated into the plan. Layout plans shall be prepared in accordance with Appendix F in respect of symbols and line styles.
3. To assist the approval process, in addition with Appendix F, the following colours shall be used to identify water apparatus on design drawings:
 - **RED** – Proposed adopted water mains
 - **DARK BLUE** - Existing trunk water main
 - **LIGHT BLUE** – Existing distribution mains
 - **GREEN** - Proposed communication pipes
 - **ORANGE** – Proposed supply pipe
 - **CYAN** - Private water mains including fire mains
4. In addition, the following attributes shall be recorded for the new water main: North point; location; site boundary; individual numbered plots; roads/highways (vested or proposed for vesting); service entry points; change in ground level; nominal size; material; depth; valves, washouts and hydrants; site phases; and date of completion of the work.
5. Where appropriate, any dimensional information shall comprise surveyed distance and angular measurements recorded relative to permanent geographical features which are clearly displayed on digitised OS base maps to 1:500 or a sketched plan. Where the plan provided covers a large area, an appropriate map scale shall be used to display the information.
6. All assets to be included in the design shall have their specification stated on the design.

2.3.4 Cover Depth

1. Unless otherwise approved within the design or subsequently agreed by Scottish Water, the following depths of cover shall apply, measured from the crown of pipes to finished ground level.

Table 1 Cover for mains and services

Pipe Type	Minimum Cover	Maximum Cover
Service Pipes	750 mm	1000 mm
Water Mains	900 mm	1500 mm

2. Water mains or service pipes deeper than shown in Table 1 will require the approval of Scottish Water prior to construction.

3. A greater cover and/or greater strength pipe and/or a higher class of bedding and surround may be required where high traffic loading is anticipated. Depths may be altered to avoid obstructions, following agreement with Scottish Water.

4. The depth of cover to concrete thrust blocks shall not normally be less than 600 mm.

2.3.5 Design and Sizing of Mains

1. The sizing of mains within new developments is governed by the requirement that there shall be adequate supply to meet customer demands at all times and adequate turnover of water to prevent stagnation in the system.

2. This technical specification does not explain basic engineering design methods but highlights the issues that shall be considered.

3. There are five variables governing the hydraulic selection of pipe size. These include:

- demand (including anticipated peak demands and allowance for fire fighting and special household fittings, e.g., fire sprinklers or un-vented heating systems);
- pipe length;
- friction factor;
- flow velocity constraints; and
- maximum permitted headloss.

4. Pipe diameters shall be selected so that flow velocities reside between 0.2 m/s and 1.5 m/s. Additional requirements such as the need for fire sprinklers (household) and fire fighting (non-household) shall be taken into account when selecting the diameter. Fire hydrants shall not be supplied by pipes of less than 90 mm outside diameter.

5. Where there would be insufficient mains pressure to provide an adequate service to higher elevation properties, storage and boosting may be required. It is a requirement that written agreement from Scottish Water is obtained.

6. For new household developments, the following factors shall be taken into account including:

- customer minimum pressure and flow requirements;
- estimated household consumption values;
- house type;
- household occupancy;
- household appliance profiles; and
- peaking factors.

7. As a guide, the typical size of main for a given number of households is shown in Table 2. The values given shall not be a substitute for conducting an adequate hydraulic assessment taking into account all pertinent factors.

Table 2 Typical mains sizes against number of dwellings

Number of Dwellings	Typical Pipe Outside Diameter (PE Pipes)	Nominal Bore (Other Materials)
1-20	63 mm	50 mm
20-40	90 mm	80 mm
40-95	110 mm	100 mm

8. For non-household developments, demands would have to be established which are specific to the proposed customer.
9. When considering the use of thermoplastic pipes (i.e., PE) the effect of internal cyclic loading (e.g., repeat surge associated with pumping regimes or the rapid closure of valves) on long-term performance shall be considered. Guidance is given in IGN 4-37-02.

2.3.6 Sizing of Services - Guidance

1. Generally, communication pipes for a single household property shall be 25 mm diameter polyethylene or 22 mm diameter copper in accordance with the requirements of Part 3 of this technical specification. Communication pipes of 32 mm diameter shall normally be used to supply two household properties (see Clause 2.3.2(5) of this Specification).
2. Where the design includes larger dwellings, flats or where service pipes are in excess of 30 m in length, the size of such pipes may be altered to achieve adequate flow and pressure.
3. Joints shall be kept to a minimum and a continuous length of pipe used where possible.
4. Service pipes and their connections to mains shall be designed to deliver the required flows at the lowest mains pressure specified by Scottish Water.

2.3.7 Service Connections

1. Scottish Water would normally require that every separately occupied household has an individual supply. The use of common supply pipes shall not be allowed.
2. The minimum distance between service connections on the water main shall be 450mm.
3. All non-household premises shall be supplied via a metered supply.
4. For flats and multiple occupancy premises, manifold connections are permitted with a maximum of 3 connections from a 32mm connection. Meters, where requested for household purposes, shall be installed in accordance with Scottish Water's requirements.

2.3.8 Materials Selection: Mains and Services

1. Scottish Water has a statutory duty to provide wholesome water as defined in The Public Water Supplies (Scotland) Regulations 2014. The developer, who is responsible for provision of all materials which shall meet the requirements of Regulation 33, shall have an auditable system in place to trace materials from specification, purchase through to delivery and use on site.

2. Suitable pipe specifications can be found in:

- Scottish Water's Specification - SSP-SP-SPE-04000404 - Water Distribution. This outlines the requirements for acceptable pipe material selection and acceptable pipe jointing techniques;
- Part 3 of this Specification - Scottish Water shall approve the materials for the project as part of the Design Approval. The source and date of manufacture of all materials used in the new connection shall be recorded by the contractor. This provides an audit trail for all components in the new infrastructure, which could be used in the event of product failure.

3. Jointing of pipes shall be carried out in accordance with the requirements of SW's Specification 404 and as per the Jointing Procedure in Appendix P for Electrofusion and the jointing methods as described in Part 3 of this Specification and the manufacturer's recommendations.

Scottish Water may issue a preferred list of materials and sizes. This shall ensure compatibility with materials currently used and allow Scottish Water to minimise stocks held for maintenance purposes.

2.3.9 Fire Fighting Supplies

1. The local Scottish Fire and Rescue Service shall be contacted regarding the provision of Public fire fighting water (including the installation of fire hydrants on new mains).
2. The relevant Scottish Fire and Rescue Service shall on request, supply the flow rates sought for fire fighting purposes. Guidelines are given in Table 3 below.

Table 3 Flow requirements for fire fighting

Property	Conditions	Minimum Flow Through a Single Hydrant
Housing Developments	Detached or Semi-detached, not more than 2 Storeys	Up to 8 litres per second
	Multi-occupied, more than 2 Storeys	20–35 litres per second

Relevant extracts from Scottish Water's Service Level Agreement with the Scottish Fire and Rescue Service are enclosed within Appendix E.

Where supplies are required for fire fighting systems such as sprinkler systems (household or non-household) or hydrants on private premises, guidance shall be sought from the Scottish Fire and Rescue Service as to the flow requirements for that system.

3. The fire hydrants shall be located such that they provide a convenient supply of water for extinguishing any fire that may break out within the development.
4. The location and type of hydrants shall be shown on the design submitted for approval by the Scottish Fire and Rescue Service. Fire hydrants and washouts shall be sited in footways, wherever possible, and shall be located such that access is maintained at all times. Hydrants to be vested by Fire Scotland shall be clearly labelled on the design.
5. Scottish Fire and Rescue Service approval shall be sought and received prior to commencement of work.
6. Private Fire mains and Fire Hydrants, within private curtilage, shall be designed and constructed as per this specification to protect public health as they are connected directly to the public water supply and be designed by and constructed by a WIRS accredited companies.

7. Fire mains must be marked with warning tape coloured red in accordance with Scottish Water Construction of Mains and Use of Detectable Marker Tape App O. Fire mains marker tape shall be wrapped around the entire length of the laid main as per App O.

2.3.10 Environmental Impact

1. The design shall take into account the impact of the works on the environment and the impact of the environment on pipe installation. For example, with particular reference to trees, the effect of the works on existing trees shall be considered and conversely, proposed trees and other planting by the developer shall be selected such that apparatus is not prejudiced or put at any risk by future growth.

2. Scottish Water has legal duties in respect of conservation, preservation of access for the public and facilitation of recreation upon its assets. Therefore, Scottish Water will require an environmental and archaeological screening and, in some sensitive developments, an environmental impact assessment to be undertaken where required by the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011.

3. The design of landscaping shall be undertaken at the same time as the design of the water mains so that the impact of tree roots on water mains can be considered. A water main shall not be located closer to trees/bushes/shrubs than the canopy width at mature height, except where special protection measures are provided. A tree shall not be planted directly over water mains or where excavation onto the water main would require removal of the tree. The following shallow rooting shrubs are generally suitable for planting close to water mains:

- *Berberis candidula*; (Paleleaf barberry)
- *Berberis julianae*; (Wintergreen barberry)
- *Ceanothus burkwoodii*; (Californian lilac ‘Burkwoodii’)
- *Cotoneaster dammeri*; (Bearberry cotoneaster)
- *Cotoneaster skogholm*; (*Cotoneaster x suecicus*, ‘Skogholm’)
- *Cytisus varieties* or *Sarothamnus*; ((Common or Scotch) Broom)
- *Euonymus japonicus*; (Japanese spindle)
- *Euonymus radicans*; Variety of *Euonymus* (Fortune’s spindle or wintercreeper)
- *Mahonia varieties*; can be included in the genus *Berberis*, most common name is *M. aquifolium* (Oregon grape)
- *Potentilla varieties*; most varieties are types of cinquefoil. Also includes common tormentil, silverweed and barren strawberry
- *Skimmia japonica*; (Skimmia)
- *Spiraea japonica*; (Japanese spirea or Japanese meadowsweet)
- *Veronica varieties*; (Speedwell)
- *Viburnum davidii*; (David viburnum)
- *Viburnum tinus*; (Laurustinus)

4. All waste produced as a result of the works shall be disposed of in a manner which would not cause harm to the environment. All appropriate licences/consents shall be obtained prior to temporary/permanent storage and transfer of waste.

5. Environmental impact assessments shall be carried out in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 and shall include but not be limited to:

1. identifying any environmentally and archaeologically sensitive sites;
2. describing the impact of work (if any) on these sites; and
3. listing design actions taken to reduce the impact.

6. The developer shall obtain and provide to Scottish Water consents/licences under the Water Environment (Controlled Activities) (Scotland) Regulations 2011, for any watercourse crossing.

2.4 CONSTRUCTION

2.4.1 General

1. Before work commences on the construction of the works, written agreement to the proposed design will be required from Scottish Water and a Prestart meeting arranged to confirm specification compliance and inform of any phasing/timescale of the construction as detailed in Appendix Q

2. The developer is responsible for ensuring that the mains and services are properly constructed in accordance with current Standards and the agreed design.

3. The developer shall keep accurate records during construction.

4. The developer shall take full consideration of the location of existing Scottish Water infrastructure for distribution, trunk mains and critical water mains. Developers shall comply with Scottish Water's guidance 'Standard Conditions for Works Adjacent to Pipelines'.

2.4.2 Ground Contamination During Construction

1. If contamination is found during construction or anytime throughout the duration of the works, then construction shall cease immediately and the incident reported to Scottish Water. The water supply shall, if possible, be isolated.

2. Scottish Water may require an intrusive site investigation to be carried out, to include but not be limited to:

- nature of contaminant;
- extent of affected area;
- soil sample for analysis;
- risk assessment;
- proposed remedial action;
- proximity to water services;
- materials for service pipes;
- impact on water distribution system if affected main is out of service;
- number of properties supplied by main;
- customer complaints received; and
- any vandalism to local fuel/chemical tanks.

2.4.3 Customer Boundary Boxes

1. Boundary box's shall be installed in the footway or service strip within 750mm from the property boundary and, where possible, sited to avoid vehicle crossing points. The boundary box riser shall be maintained at a depth to provide 750 mm minimum cover to any pipework within the boundary box. Any cutting of the pipe or adjustment of the telescopic riser shall allow for this depth to be met.

2. The rating of the Boundary box tube and the cover shall comply with the requirements of Part 3 of this Specification, namely BS5834 and be utilised as per the gradeings described therein, and as summarised below:

- a. Grade A - Carriageway - DI Cover
 - b. Grade B - Footway/Driveway - DI Cover or Suitably rated Composite
 - c. Grade C - Grass - Suitablely rated composite or plastic
3. On Completion of the service pipe, the UCP shall leave the Boundary box stopcock in the closed position.
4. For the purposes of metered connections, Scottish Water shall state their preferred metering options including meter type and size. Reference is made to Clause 1.2 of this Specification for installation of meters for household and non-household customers.

2.4.4 Connection to Water Distribution System

1. The final connection of a new main to the existing water distribution system shall only be made following:
 - a satisfactory pressure test (see Clauses 2.4.7, 3.5.3 and 3.5.4);
 - satisfactory disinfection of the water main (see Clause 3.5.6) and satisfactory water sample results;
 - provision of as-constructed drawings and associated records (see Clause 2.4.6);
 - installation of marker posts and plates, where required, to mark the position of valves and apparatus; and
 - satisfactory completion of a DOMS Impact Assessment Form (IAF) for all planned and unplanned intervention on the water distribution network.
2. Scottish Water may undertake auditing during the project to ensure full compliance with the design, material and technical specifications, water quality, construction quality and hygiene practices. The auditing procedure shall include inspection of work and shall witness the testing and commissioning of the new mains and service pipes.
3. The mains shall be disinfected in accordance with Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS, copies of which can be obtained from Scottish Water on request.
4. Final tie-in connection to the water distribution system shall be carried out within 14 days from a satisfactory sample being taken. Further testing will be required if this period is exceeded.
5. The individual service pipes shall only be connected to the main, using under-pressure tappings, once the main has passed a water sample of suitable bacteriological quality and has been commissioned. The service connection shall only be made once the supply pipe is connected to a stopcock inside the property and the plumbing conforms to current Water Supply (Water Fittings) (Scotland) Byelaws. The property shall be substantially complete before the connection is made.
6. Service pipes between the boundary and the entry to the premises shall not normally require disinfecting unless the internal diameter is greater than 50 mm and the length greater than 15 m.
7. Adequate notice specified in the water connections code is required by Scottish Water prior to the connection of service pipes to the "live" main.
8. For information on Scottish Water's current Vesting process of new assets, reference shall be made to a 'Guide for Obtaining New Water and Waste Water Services'.
9. WIRS providers and developers shall make reference to the 'Water Connections Code for Scotland'.

2.4.5 Surface Boxes and Markers

1. The developer is responsible for maintaining the correct alignment of all boxes (valve, washout, hydrant and boundary, etc.) including covers and frames until the site is complete and all highways fully surfaced.

Note: Correct alignment means that the sides of the boxes are vertical, the fittings inside the box can be operated and the surface box is flush with the finished ground surface.

2. The developer is responsible for installing valve and hydrant/washout marker posts to the requirements of Scottish Water. The Scottish Fire and Rescue Service are responsible for the supply and fixing of fire hydrant marker plates. Marker posts are to be installed by the developer.

3. The developer is responsible for the cost of any work to rectify the alignment of surface boxes and markers once final site levels have been set.

2.4.6 Data Capture/As-constructed Drawings

1. All Scottish Water data is recorded on a geographic information (digital mapping) or CAD system. Therefore, it is important that the correct information is supplied to Scottish Water.

2. The position of the apparatus shall be recorded to ensure locational accuracy (the position of apparatus relative to fixed geographical features appearing on Ordnance Survey maps). Positional accuracy shall be measured and recorded, wherever practical, to a minimum GPS accuracy of +/- 100 mm to the centre of the apparatus.

3. Surveys shall be carried out using triangulation, i.e., two measurements taken from fixed Ordnance Survey features. They shall intersect at the centre of the asset and be used in the following order of priority:

- corners of buildings; and
- corners of boundary walls.

4. Surveys carried out using offsets, i.e., using a single measurement (usually along the length of the main) shall be used in the following order of priority:

- building lines; and
- kerb lines.

5. Temporary and natural features shall only be used when no other permanent features are available.

6. Scaled survey drawings shall be provided wherever possible. The minimum scale shall be 1:500 to ensure clarity of measurements, features, etc.

7. Material, external and internal corrosion protection of pipe, and the depth of cover to main, where different from standard, shall be identified.

8. All valves, hydrants, meters, ducts, swab access points, tappings, tees services and boundary boxes shall be clearly identified along with the relevant fitting on the plan or in an accompanying legend. The legend shall be consistent with Appendix F.

9. Where a substantial amount of asset information is to be included, suitable enlargements shall be incorporated and clearly referenced as a subset of information from the main plan.

10. The full dimensional references for all pipes and fittings shall be indicated (e.g., material, diameter, SDR). Measurements shall be in millimetres.
11. Clear differentiation shall be made between live and decommissioned mains and associated fittings. Decommissioned mains may be shown on a separate drawing, if required.
12. Three copies of the as-constructed drawings shall be submitted in '.dwg' format to Scottish Water on completion of the scheme. Information shall be submitted and clearly labelled with the developer's name, scheme number, scheme name, scheme type, stage number, date of completion of scheme and date of submission.

2.4.7 Pressure Testing

1. Pressure testing of all mains is to ensure the structural integrity of the constructed asset, and minimise any future leakage. Pressure testing is completed to provide SW with the assurance that the vested asset will have the requisite life span before any SW intravention is required.
2. Pressure testing shall be completed and the associated reporting shall be in accordance with Part 3 of this specification (see Clauses 3.5.3 and 3.5.4) and as described in Appendix R.

SECTION 2A – BOOSTER PUMPING STATION DESIGN

2.5 INTRODUCTION

1. All pumping stations within the scope of this Specification shall be designed to operate with a positive inlet pressure (i.e. not suction lift or sub-atmospheric pipeline pressure).
2. Designers shall ensure that a positive inlet pressure is available under all operating conditions for the relevant system to which the pumping station is connected. This shall involve an analysis of the network system, and particular attention shall be paid to ensure that sub-atmospheric pressures (that could cause groundwater contaminants to enter the pumping system) are not created.
3. Designers shall liaise with Scottish Water or other relevant network design personnel to obtain sufficient information necessary to ensure that a positive inlet pressure can be maintained during all normal operating conditions of the proposed pumping station.
4. In order to provide developers and designers with options for the design and/or supply of compliant water booster stations, the following alternative approaches meet the requirements of Scottish Water:
 - a) A package pumping station in accordance with Scottish Water's Clean Water Booster Set/Pumping Station Standard Product Catalogue, Catalogue particular specification and Catalogue particular data sheet. This would be procured through a Scottish Water Framework agreement.
 - b) A package pumping station in accordance with Scottish Water's Clean Water Booster Set/Pumping Station Standard Product Catalogue, Catalogue particular specification and Catalogue particular data sheet. This would be supplied through a Developer procurement route.
 - c) A bespoke pumping station designed in accordance with Scottish Water's Standards and Specifications. Access to Scottish Water's Standards and Specifications can be given on request to: standardsinfo@scottishwater.co.uk

Note: (At the time of publishing options 4(a) and 4(b) above will not be available until Summer 2015.

2.5.1 Clean Water Booster Set/Pumping Station – Scottish Water Standard Product

1. A package pumping station shall be factory assembled, tested and available for site installation in accordance with Scottish Water's Standard Product Catalogue. The booster pumping station shall comprise Scottish Water Framework components and be transported to site in a series of integrated assemblies.
2. The water booster pumping station shall meet the requirements of Scottish Water's Standards and Specifications and shall require no additional technical approval.
3. The final constructed water booster pumping station shall be subject to a 'Setting to Work' activity, a reduced final commissioning requirement and achieve full vesting.
4. The three sub-assemblies which form the pumping station product are a:
 - a) GRP/steel kiosk with pumps and associated valves, pipework, etc.;
 - b) Manufacturer's proprietary controller;
 - c) Control panel (SW Motor Control Centre (MCC) Product Catalogue).

Figure 4 BS01⁽¹⁾ Booster Set No.1

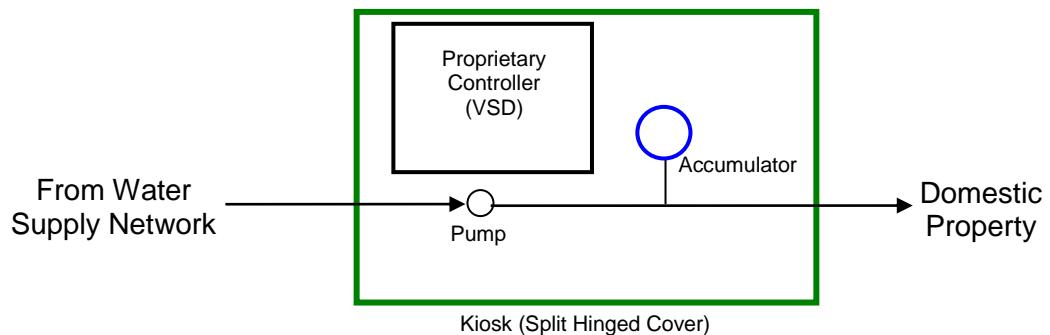


Figure 5 BS02⁽¹⁾ Booster Set No.2

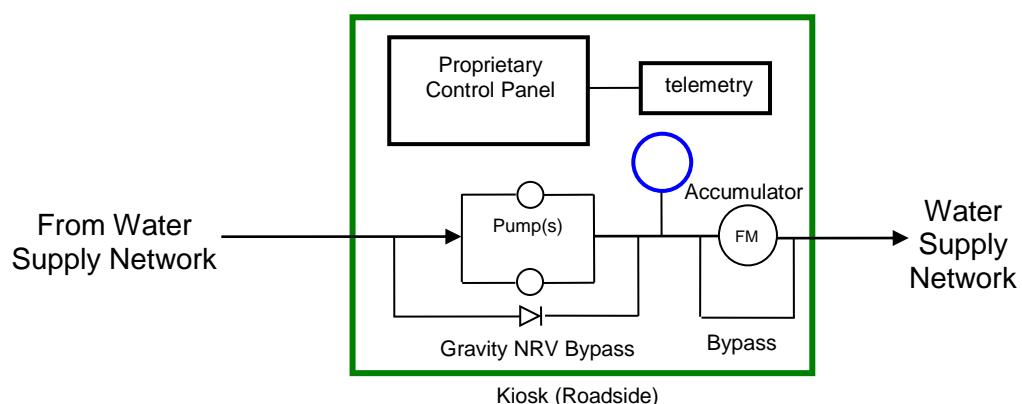
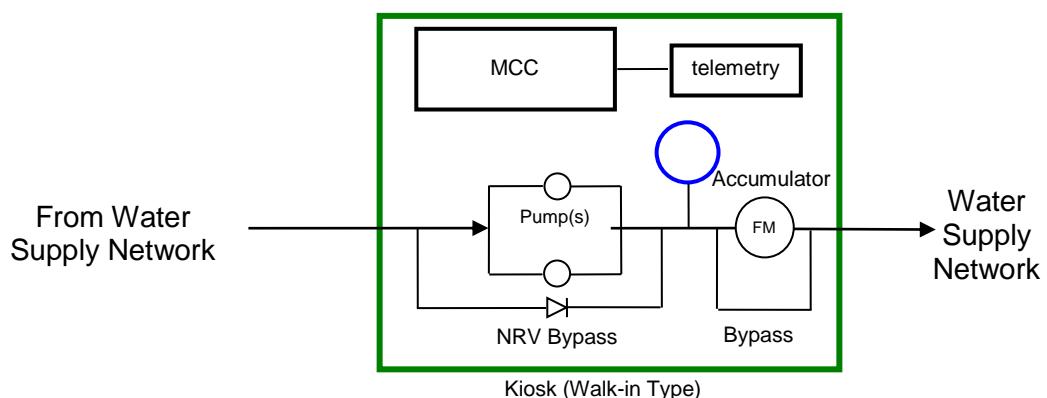


Figure 6 BS03-05⁽¹⁾ – Booster Set(s)/Pumping Station(s) No.3



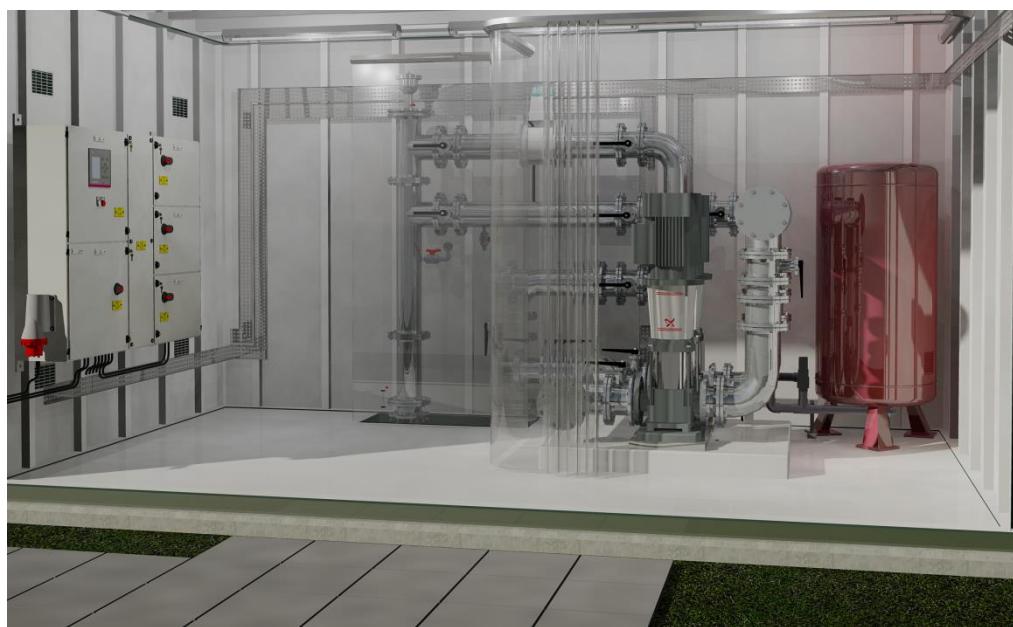
Note ⁽¹⁾: BS01, BS02, etc., are codes utilised for identification of Products within the Scottish Water Product Catalogue(s); BS stands for Booster Set

5. The actual site requirements for these sub-assemblies shall be specified within:

- Clean Water Booster Set/Pumping Station Standard Product Datasheet;
- MCC and Kiosk - SW MCC Product Catalogue Datasheet;

and shall be completed by the designer.

Figure 7 Extract from the Clean Water Booster Set/Pumping Station Catalogue – BS05



(for illustration ONLY)

6. The Standard Product Catalogue incorporates 5 no. standard sizes of clean water booster sets and pumping stations which shall cover flow of 0 litres/second (effectively) to 53 litres/second. The standard sizes are shown in Table 4.

Table 4 Flow Rates for Standard sizes of clean water booster sets

Pump Station Sizing	Required Flow Rate	
	Flow velocities between 0.7 and 2.0 m/s	Flow velocities between 2.0 and 3.0 m/s
BS01 Pipework 25 mm OD	0.0 to 0.7 l/sec	0.7 to 1.0 l/sec
BS02 Pipework 63 mm OD	1.4 to 3.9 l/sec	3.9 to 5.9 l/sec
BS03 Pipework 80 mm NB	3.5 to 10.0 l/sec	10.0 to 15.0 l/sec
BS04 Pipework 100 mm NB	5.5 to 15.7 l/sec	15.7 to 23.6 l/sec
BS05 Pipework 150 mm NB	12.3 to 35.0 l/sec	35.0 to 53.0 l/sec

7. A package pumping station shall be designed, fabricated and delivered to site for installation and full commissioning in accordance with Scottish Water's Standard Product Particular Specification.
8. The water booster pumping station shall be subject to full Scottish Water technical approval before the design can be finalised and agreement to the full technical submission is granted.
9. The final and constructed water booster pumping station shall be subject to the full site commissioning and acceptance process and procedures to enable full vesting to take place.

2.5.2 Bespoke Clean Water Booster Set/Pumping Station

1. A bespoke pumping station shall be designed, fabricated with full site construction, installation and commissioning in accordance with Scottish Water's suite of Standards and Specifications.
2. The water booster pumping station shall be subject to full Scottish Water technical approval before the design can be finalised and agreement to the full technical submission is granted.
3. The final and constructed water booster pumping station shall be subject to the full site commissioning and acceptance process and procedures to enable full vesting to take place.

2.5.2.1 Scottish Water Specifications

1. The bespoke Pumping Station design shall comply with Scottish Water's Standards and Specifications which includes (but is not limited to) the following documentation:-

LV Specification for Packaged Plant	SSP-SP-SPE-08000304
LV Switchgear and Controlgear Assemblies :	SSP-SP-SPE-06000301
LV Electrical Installations	SSP-SP-SPE-06000302
Electrical Engineering & WIMES Amendments	SSP-SP-ADO-06000300
MCC Signature Solution Drawings	SSP-SP-TEM-07000701
MCC Ticksheets	SSP-SP-TEM-07000701
Instrumentation	SSP-SP-SPE-06000634
Telemetry	SSP-SP-SPE-06000633
Telemetry Signal Selection Workbook	SSP-SP-SPE-06006332
Booster Sets	SSP-SP-SPE-08000112
Kiosks	SSP-SP-SPE-06000609

Note: The documents listed above are available on request from
standardsinfo@scottishwater.co.uk

2.5.2.2 Electrical Assembly

1. The electrical assembly for BS01 and BS02 Pumping Stations shall be Form 2.
2. The electrical assembly for BS03, BS04 and BS05 Pumping Stations shall be Form 4.

2.5.2.3 Mobile Generator Connection1

1. BS02 to BS05 Pumping Stations shall be equipped with a connection for a mobile generator on the incoming section of the electrical assembly. This shall be a 125 A, 5 pole (L1, L2, L3 + N + E), male appliance inlet to BS EN 60309-2. The appliance inlet shall be readily accessible to facilitate the connection of the mobile generator cable.

2.5.2.4 Ingress Protection

1. All electrical equipment and assemblies shall be IP55 minimum or IP54 with additional measures to prevent water spray from reaching the assemblies.

2.5.2.5 Kiosk Metering Compartment

1. BS01 Pumping Station kiosks do not include DNO metering which is required to be located separately.

2. BS02 to BS05 Pumping Station kiosks shall be equipped with internal DNO Metering Compartments .The metering compartment shall only accommodate the following DNO equipment:

- Service Cable Head and Cut-Out Fuses;
- Direct-Connected Electricity Meter;
- 4-pole Switch-Disconnector;
- Main Earth Terminal (except where the type of system earthing is TT).

3. Meter tails and an earth cable from the Control Compartment into the Metering Compartment shall be supplied for termination by the electricity supplier to their equipment.

2.5.2.6 Risk Assessment

1. The supplier shall be responsible for carrying out a Designers Risk Assessment and carrying out a HAZOP study of their bespoke Pumping Station design. A copy of the Designers Risk assessment and HAZOP Report shall be included in the site Health & Safety file.

PART 3 - CIVIL ENGINEERING SPECIFICATION

Part 4 is an extract from UKWIR Civil Engineering Specification for the Water Industry (CESWI 7th edition at the time of publication).

The numbering of the clauses has been altered to suit this document, however they can be found in CESWI 7 available from UKWIR

Any clauses in this Specification which relate to work or materials not required by the Works shall be deemed not to apply.

The Clause headings and marginal 'Notes for Guidance' are not part of the Specification, and are not to affect the interpretation of either the Specification or the other documents comprising the Agreement.

Currently, where European Standards refer to requirements for the effect of materials on potable water quality, National Regulations apply. This document makes reference to the latest edition of British, European and International Standards (except as otherwise stated) including all addenda and revisions which shall also be consulted.

3.1 GENERAL

3.1.1 Quality of Materials

(i) A list of materials approved for use under The Public Water Supplies (Scotland) Regulations 2014 is published by the Scottish Government and Drinking Water Inspectorate (DWI). The latest publication can be viewed directly via www.dwi.defra.gov.uk.

(ii) Under Regulation 33 (1)(b), materials or products with a small surface area in contact with potable water may be assessed by WRAS and listed in the current Products & Materials Database (www.wrass.co.uk/directory). Further guidance on small surface area is given in DWI Advice Sheet No.8.

(iii) Where possible, all fittings used as part of the supply of treated water for household purposes in premises should be approved by WRAS.

(iv) When planning, designing and constructing water mains and/or services in brownfield sites, reference should be made to the UKWIR document "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" and Scottish Water's supplementary Guidance Document - "Guidance for Installation of Water Mains and Fittings – Additional Guidance"

1. Evidence shall be provided of the source and date of manufacture of all materials used in the works.

2. All materials, substances and products which may come into contact with potable water or water to be used for potable supply or for processes to

be used for the treatment of water, shall comply in all respects with Regulation 33 of The Public Water Supplies (Scotland) Regulations 2014 and any amendments.

3. All water fittings used for supply pipes and internal plumbing in connection with the supply and use of water shall comply with the Water Supply (Water Fittings) (Scotland) Byelaws.

4. Any chemicals used in connection with the preparation or conveyance of public water supplies shall comply with the provisions of the relevant European Standard (EN) where one exists.

3.1.2 Existing Water Distribution System

1. Final connection of the new section to the water distribution system shall not be made until satisfactory pressure test and water sample results have been obtained.

2. All connections to Scottish Water's water distribution system shall be made by Scottish Water and/or approved WIRS providers. Service connections to the new main can be connected by approved WIRS providers with Scottish Water's approval.

3. Once a section of self-laid main has been connected it becomes a part of the existing water distribution system and all further mains connections shall be made by Scottish Water.

4. All construction operations shall be carried out with due regard for Scottish Water's DOMS documents (listed in Appendix A, Section B).

5. Whenever the public water supply will be interrupted or affected, Scottish Water are required to give 7 day's notice to customers. Any change to the agreed programme will require a further 7 day's notice. For non-domestic customers, 22 working days notice is required.

3.1.3 British and European Standards and Other Documents

1. Any reference to a Standard published by the British Standards Institution or the specification of another body shall be

(i) Any particular requirements should be described in the Contract after taking due account of the guidance in the Product Specifications and Level of

Attestation at the front of CESWI.

(ii) Where appropriate, use should be made of any technical and advisory services offered by manufacturers.

construed equally as reference to an equivalent one.

2. Design and construction shall be in accordance with the latest published Standard which is current at the date the submission is made.

3.2 STORAGE, HANDLING AND USE OF MATERIALS, PLANT AND COMPONENTS

3.2.1 Storage

1. Plant, materials, substances and components shall be stored in an approved location and in such a manner as to preserve their quality and condition.

2. Storage shall be in accordance with the manufacturer's recommendations, and Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS documents (listed in Appendix A, Section B).

3. Any containers of contaminating substances on site shall be leakproof and kept in a safe and secure building or compound from which they cannot leak, spill or be open to vandalism, and protected by temporary bunds with a minimum available capacity of 110% of the maximum stored volume. Areas for transfer of contaminating substances shall be similarly protected.

4. All pipes and fittings shall be stored off the ground in a clean environment to prevent any contamination of materials prior to their use. All pipes shall be capped at either end until they are used in the works to prevent vermin entering them and contaminating these materials before their use. All fittings supplied in sealed bags shall remain bagged until immediately prior to installation.

5. Any pipes that are subjected to any contamination with hydrocarbon solvents, fuels, oils or sewage shall be removed from site and disposed of. On no account shall these pipes be included in the finished mains or services.

3.2.2 Handling and Use

(i) Where appropriate, use should be made of any technical advisory services offered by manufacturers.

1. Materials and components shall be handled in such a manner as to avoid any damage or contamination, and in accordance with all applicable recommendations of the manufacturers and Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS documents (listed in Appendix A, Section B).

2. The use, installation, application or fixing of materials and components shall be in accordance with all applicable recommendations of the manufacturers.

3.3 MATERIALS AND COMPONENTS SPECIFICATION

3.3.1 Ductile Iron Pipes and Fittings

(i) IGN 4-21-01 deals with ductile iron pipes and fittings.

(ii) The type and class of pipes, joints, fittings, gaskets, nuts, bolts and washers should be detailed in the Contract.

(iii) The required grade and thickness of steel, together with the type and strength of pipe, should be described in the Contract.

(iv) Dimensions are specified in BS EN 545 for integral flanges on ductile iron pipe. Flange facings can either be flat or raised face. Flanges in accordance with BS EN 545 and BS EN 598 are dimensionally compatible with BS EN 1092-1 and BS EN 1092-2.

(v) The nominal bar pressure rating for the pipes should be selected to meet the duty requirements and should be described in the Contract.

(vi) The type of anti-corrosion (barrier) coatings for ductile iron pipes and fittings should be detailed in the Contract, taking into account the requirements of BS EN 545 and BS EN 598. In the UK, three systems of external corrosion protection are employed: zinc spray with bituminous finishing layer with or without overwrapping of polyethylene sleeving, or zinc (or zinc/aluminium) spray with epoxy finishing layer. IGN 4-51-01 deals with external zinc coating of ductile iron pipe which is required on all pipes in the diameter range 80-1600 mm. WIS 4-52-01 and IGN 4-52-02 deal with polymeric anti-corrosion (barrier) coatings.

(vii) Any additional external protection for pipes laid in contaminated land should be described in the Contract.

(viii) Any requirement for coatings to steel pipes should be described in the Contract.

(ix) The thickness of polymeric anti-corrosion (barrier) coatings should be such that the chemical resistance test in BS EN 598 Section 5.6 is met.

(x) In the UK, ductile iron pipes lined with cement mortar may require an epoxy or acrylic seal coat over the

1. Ductile iron pipes, fittings and joints shall comply with BS EN 545 for potable water pipelines.

2. Factory-applied and site-applied (tubular) polyethylene sleeving shall be in accordance with BS 6076. Sleeving for pipes for below-ground use for water intended for human consumption shall be coloured blue.

3. Factory-applied coatings shall be in accordance with BS ISO 8179-1. Where external zinc spray and a bituminous finishing layer are applied, this shall be in accordance with BS EN 545.

4. Cement mortar linings shall comply with the regulatory requirements of BS EN 545.

5. Where a seal coat is required, it shall comply with the requirements of BS ISO 16132 and the complete system shall be approved under The Public Water Supplies (Scotland) Regulations 2014. In addition, the Instructions for Use for Drinking Water Inspectorate approved products shall be followed.

6. Bituminous coatings shall comply with BS 3416.

7. Joints in sleeving shall be taped so as to form a continuous barrier and any damage to the sleeving shall be repaired prior to backfilling.

cement to prevent lime leaching with certain potable waters. This should be described in the Contract.

(xi) The use of polyethylene factory-applied sleeving as an alternative to loose sleeving should be stated in the Contract. IGN 4-50-03 gives operational guidelines for the transportation, handling and laying of ductile iron pipes with factory-applied polyethylene sleeving.

(i) Attention is drawn to the National Annexes to BS EN 12201 which provide information on the selection of materials for the UK.

(ii) For normal ground conditions, the pressure rating should be adequate to sustain the maximum continuous operating pressure as defined in BS EN 805 but in no case should be less than 10 bar.

(iii) For co-extruded polyethylene pipes, identification stripes may be included in the blue outer layer.

(iv) Further guidance on the design and use of PE pipes can be found in IGN 4-32-18.

(v) The required short-term surge pressure resistance and the lifetime at a pressure of 1.2 times MRS (Minimum Required Strength as defined in BS EN 12201-1) to determine the safe duration of pressure tests should be stated in the Contract.

3.3.2 Polyethylene Pipes and Fittings

1. Polyethylene piping systems for water supply shall comply with BS EN 12201-1 and BS EN 12201-2 and be coloured blue. Co-extruded polyethylene pipes may be used for water supply but shall have a blue outer layer on top of blue or black inner layers.
2. Polyethylene fittings for use with cold potable water shall comply with the relevant provisions of BS EN 12201-3.
3. Electrofusion fittings shall comply with the relevant provisions of BS EN 12201-3.
4. All electrofusion fittings shall be of integral wire construction. All fittings shall be of automatic type and fitted with recognition resistors, identifiable by an automatic electrofusion control box, complete with an electronic data acquisition facility for joint data analysis and quality assurance.

3.3.3 Unplasticised PVC Pipes and Fittings

1. PVC pressure pipes, joints and fittings shall comply with the relevant provisions as set out below:

Material	Pipe	Joints and Fittings
PVC-U (Metric blue)	BS EN ISO 1452-2	BS EN ISO 1452-3
PVC-A	PAS 27	PAS 27
PVC-O	WIS 4-31-08 (12.5 and 16 bar only)	BS EN ISO 1452-3

(i) The colour and size limitations for PVC pressure pipes are consistent with the current recommendations of the National Joint Utilities Group (NJUG).

(ii) WIS 4-31-08 deals with molecular oriented PVC-O pipes.

2. Pipes for potable water use shall be coloured blue.

3. Solvent cements for jointing unplasticised PVC pipes shall not be used for below-ground use.

4. Push-fit joints shall be spigot and socket.

3.3.4 Copper Pipes and Fittings

1. Copper pipe for use with potable water shall comply with the relevant provisions of BS EN 1057.
2. Copper and copper alloy compression fittings for polyethylene pipes shall comply with the relevant provisions of BS EN 1254-3.

3.3.5 Flanges for Pipes and Pipeline Fittings

(i) Dimensions are specified in BS EN 545 for integral flanges on ductile iron pipe.

(ii) Flange facings can either be flat or raised face.

1. Flanges for pipes and pipeline fittings shall comply with BS EN 1092-1 for steel and BS EN 1092-2 for ductile and cast iron.
2. Where the working pressure of the pipeline exceeds the nominal flange pressure rating of PN16, a rating appropriate to the application shall be selected.
3. Uni-flange pipe restraints are only permitted for static applications where the degree of maintainability is low.

3.3.6 Gaskets for Flanged Joints

(i) "Double lugged" is an inside-bolt-circle type with the addition of two extended areas, approximately 90 degrees apart, including bolt holes, located as per full face dimensional specifications to facilitate gasket location.

(ii) The information supplied by Scottish Water to the developer should indicate the type of gasket to be used.

(iii) Gasket material and type of ring should be selected for the intended duty.

1. Gaskets for flanged pipe joints shall be either the inside-bolt-circle ("double lugged") type or full face type.
2. The dimensions of gaskets shall comply with BS EN 1514-1.
3. Gaskets shall be manufactured from material complying with the provisions of BS EN 681-1 or BS EN 681-2, as appropriate. Gaskets shall be Type WA with a hardness range of 76-84.

3.3.7 Joint Seals

1. Elastomeric joint seals shall be obtained from the pipe manufacturer and shall comply with the provisions of BS EN 681-1: Type WA.
2. Within BS EN 681-1 there is no microbiological requirement for elastomeric rings. Seals shall be tested in accordance with BS 7874 and shall comply with the following:
 - the average loss in mass (Z) of the test pieces shall not exceed 3.5%; and
 - there shall be no greater release of carbon black or other fillers from the test set than from the control set when the

surface of the specimens is lightly rubbed.

3. In the case of composite seals, the requirements apply only to those components exposed to the contents of the pipeline or pipework.
4. Joint lubricants for sliding joints shall have no deleterious effects on either the joint rings or pipes and shall be unaffected by the liquid to be conveyed. Lubricants to be used for jointing water mains shall not impart taste, colour or any effect known to be injurious to health to water, and shall be resistant to bacterial growth.

3.3.8 Mechanical Couplings for Pipelines and Fittings

(i) It should be noted that all mechanical couplings and fittings are regarded as being in contact with water intended for human consumption and are required to meet the requirements of The Public Water Supplies (Scotland) Regulations 2014.

(ii) The information supplied by Scottish Water to the developer should indicate the pressure ratings required.

(iii) IGN 4-52-02 provides guidance on polymeric anti-corrosion (barrier) coatings and complements WIS 4-52-01.

1. Mechanical couplings and repair clamps for iron pipes shall comply with WIS 4-21-02.
2. Mechanical joints and fittings for polyethylene pipes in nominal size 90 mm or above for use with cold potable water shall comply with WIS 4-24-01.
3. Mechanical joints and fittings for polyethylene pipes less than or equal to nominal size below 63 mm for use with cold potable water shall comply with WIS 4-32-11 or BS EN 1254-3.
4. Fittings for PE80 (MDPE) and PE100 (HDPE) shall be Type 2, fit for the purpose, end-load restraining (except for unusual locations) and have an internal pipe support.
5. All fittings shall be protected against corrosion by the application of a polymeric barrier coating in accordance with WIS 4-52-01. All internal and external surfaces shall be coated to Class B as a minimum.
6. All fasteners shall be protected from corrosion by the application of zinc and a polymeric barrier coating in accordance with WIS 4-52-03.
7. For dedicated couplings and flange adaptors manufactured for a specific pipe material and size, the pressure rating shall be that of the maximum operating pressure of the pipe or its integral jointing system, whichever is the lesser. For wide tolerance couplings and flange adaptors designed to adapt to a range of pipes and materials/sizes, the pressure rating shall be a minimum of 16 bar.
8. Under-pressure tapping tees shall be designed to withstand the loading and stress generated by drilling and cutting without compromising their structural integrity or ceiling performance.

3.3.9 Nuts, Screws, Washers and Bolts

(i) The information supplied by

1. Nuts, screws, washers and bolts shall comply with the relevant

Scottish Water to the developer should indicate the type of nuts, screws, washers and bolts preferred.

(ii) The information supplied by Scottish Water to the developer should indicate the type of corrosion protection system preferred for nuts, screws, washers and bolts.

(iii) The specific environmental conditions on site would determine the grade of the material required.

(iv) Zinc plating is not acceptable as a means of corrosion protection.

provisions of the appropriate Standard, as set out below:

Type	Standard
Metal washers for general purposes High-strength friction grip bolts, nuts and washers	BS 4320 BS 4395-1 or relevant parts of BS EN 14399
Stainless steel nuts	BS EN ISO 3506-2
Stainless steel bolts, screws, studs	BS EN ISO 3506-1
ISO black bolts, screws and nuts	BS 4190
ISO precision bolts, screws and nuts	BS 3692

2. Bolting for pipes and fittings shall comply with the relevant provisions of BS EN 1092-2 except that spheroidal graphite iron bolts for use with ductile iron pipes and fittings shall be manufactured from metal complying with the provisions of BS EN 1563 for Grade EN-JS1050.

3. Bolt length and tightening torque shall be in accordance with pipe manufacturer's recommendations and shall be sufficient to ensure that nuts are full-threaded when tightened in their final position with two threads showing.

4. Where bolting is metallurgically incompatible with the material being fixed, the contact areas shall be isolated either by painting with an approved silicon sealant (and allowed to dry before tightening together) or with suitable isolating washers and sleeves.

5. Washers shall be provided under the head of the bolt and under the nut.

6. Unless manufactured of stainless steel, all fittings shall be protected against corrosion in accordance with WIS 4-52-03.

3.3.10 Valves and Penstocks

1. Valves and penstocks for pipeline installation shall comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Isolating valves for water supply (including wedge gate and butterfly)	BS EN 1074-1 and BS EN 1074-2

(i) The information supplied by Scottish Water to the developer should list: particular requirements

from the options listed in the various Standards, the method used to control and operate valves, the responsibilities for supplying turn keys for operating those valves with caps, and torque requirements for operating valves.

Check/non-return valves for water supply	BS EN 1074-3
Air valves for water supply	BS EN 1074-4
Control valves for water supply	BS EN 1074-5
Cast iron industrial gate valves	BS EN 1171
Copper alloy globe, globe stop and check, check and gate valves	BS 5154/ BS EN 593
Industrial butterfly valves	BS EN 13397
Diaphragm valves (metallic)	BS 5158
Cast iron plug valves	BS 7775
Penstocks	BS EN 12334
Cast iron check valves	BS EN 12288
Copper alloy gate valves	

(ii) BS 6683 deals with the installation and use of valves.

(iii) Clause 3.3.11 gives details of stopvalves.

(iv) BS EN 1092-1 and BS EN 1092-2 deal with flanges.

2. Valve and penstock parts to be in contact with potable water shall meet the relevant provisions as set out below:

Type	Standard
Metallic	DD 256
Non-metallic	BS 6920-1

3. The surfaces of all valves shall be protected from corrosion either by the nature of their material of construction or shall be coated in accordance with WIS 4-52-01. Internal water-wetted surfaces shall be coated to Class A standard, all other surfaces shall be coated to Class B standard.

4. All fasteners used in the assembly of valves shall be protected in accordance with Clause 3.3.9 of this Specification.

5. All gate valves for water distribution systems shall be PN16, unless otherwise agreed with Scottish Water.

6. For valves greater than DN300, Scottish Water shall be consulted for specific requirements.

3.3.11 Stopvalves and Ferrules

1. Stopvalves for underground applications shall meet the relevant provisions of BS 5433 and WIS 4-23-04.

2. Ferrules and ferrule straps for the connection of service pipes to mains shall meet the relevant provisions of WIS 4-22-02.

3.3.12 Hydrants and Surface Boxes for Hydrants

(i) Fire hydrants should be

1. Hydrants, surface box frames and covers shall comply with the

compatible with the requirements of the Scottish Fire and Rescue Service.

(ii) The information supplied by Scottish Water to the developer should indicate: the required type of hydrant; dimensions of surface box frames and covers; size, type and material of hydrant indicator plates; and frost plug/valve, outlet and plunger fixing. In addition, Scottish Water should specify the level of product certification and cover marking.

(iii) Screw-down type hydrants with loose valve plungers may not permit the passage of swabs.

relevant provisions of BS 750 and BS EN 14339. Fire hydrants shall be of the screw down type (Type 2) and close in a clockwise direction.

2. The surfaces of all hydrant components shall be protected from corrosion either by the nature of their material of construction or shall be coated in accordance with WIS 4-52-01. Internal water-wetted surfaces shall be coated to Class A standard, all other surfaces shall be coated to Class B.
3. All fasteners used in the assembly of hydrants shall be protected in accordance with Clause 3.3.9 of this Specification.
4. The frame and cover shall be Grade A to BS 750 and BS EN 14339 and have a clear opening of not less than 380 x 230 mm. Hydrant box covers shall be provided with recesses for lifting keys.
5. Hydrant indicator plates shall comply with the relevant provisions of BS 3251.
6. All hydrants shall be installed in a chamber with its foundation slab above the tee off the main. The chamber shall have minimum internal dimensions of 380 x 230 mm clear opening.
7. All hydrant installations shall be adjusted by means of riser pipes such that the top of their threaded outlet is no deeper than 300 mm below the upper surface of the cover.
8. Hydrants are to be fitted vertical and centralised within the chamber in order that a hose or standpipe can be fixed to the outlet without being impeded by the frame or chamber walls. The developer shall ensure that a valve key can be attached to the spindle cap without being impeded by the frame or chamber walls.
9. Installation of underground washouts, fire hydrants, surface box frames, covers and indicator plates shall comply with the specification set out in BS 5306-1 and BS EN 671 - 1 to 3.

3.3.13 Surface Boxes for Valves

(i) The information supplied by Scottish Water to the developer should list: particular requirements from the options listed in Appendix A of BS 5834-1, and Appendix B of Parts 2 and 3, and dimensions of surface box frames and covers. In addition, Scottish Water should specify the level of product certification and cover marking.

(ii) The minimum clear opening should comply with Scottish Water's standard for new construction.

1. Surface boxes shall comply with the relevant provisions of BS 5834-2 , or WIS 4-37-01.
2. Guards and foundation units for underground stopvalves shall comply with the relevant provisions of BS 5834-1 or WIS 4-37-01.
3. Covers for the surface boxes on water mains shall have either the word "WATER" or the letter "W" cast on the top surface in 75 mm letters, as applicable. Covers for other applications shall similarly be marked: FH (fire hydrant), WO (washout hydrant), SV (sluice valve) and AV (air valve).
4. Covers and frames to be installed in carriageways or other areas with frequent passage of vehicles shall be to the minimum

grade stated in BS EN 124 or Grade A to BS 5834-2.

5. Covers and frames to be installed in all other areas shall be a minimum grade of B 125 to BS EN 124, or Grade B to BS 5834-2.
6. Precast concrete sections for chambers and base units for buried waterworks apparatus up to and including 600 x 450 mm clear opening, shall comply with BS 5834-1 and BS 5834-4. All sections shall be Grade A as defined in that Standard.
7. Chambers of materials other than precast concrete shall meet the loading requirements in BS 5834-2.

3.3.14 Surface (Boundary) Boxes for Meters

(i) WIS 4-37-01 covers the specification of boundary boxes for the metering and control of household and small industrial water services.

1. In addition to the requirements of Clause 3.3.13, Clause 3.3.14(2) below applies to surface boxes for meters.
2. Household water meter boxes shall be of the waterproof type and shall contain an integral shut off valve on the upstream side together with a non-return valve. They shall be suitable for use with concentric type flowmeters. They shall be adjustable for height and slope.

3.3.15 Marker Tapes

(i) The information supplied by Scottish Water to the developer should indicate any requirements for the use of a marker tape.

(ii) The information supplied by Scottish Water to the developer should indicate the requirements of the Scottish Fire and Rescue Service in the case of fire hydrants.

(iii) The information supplied by Scottish Water to the developer should indicate appropriate marker tapes for other buried services, such as fibre-optic cables.

(iv) Polyethylene mesh should only be used as a tracing system and placed beneath the pipework to reduce the risk of future damage to the mesh from excavation.

1. Marker tape for buried water mains shall be blue PVC or polyethylene ribbon at least 150 mm wide, incorporating a corrosion-resistant tracing system and shall be printed with the words "WATER MAIN" in bold capital letters throughout its length and at intervals not exceeding 700 mm.

3.3.16 Marker Posts

(i) If Scottish Water wishes to specify the use of marker posts of alternative materials, their criteria should be stated.

1. Valve or pipeline marker posts shall be precast reinforced concrete 1120 mm high. The tops of marker posts shall be fixed so that their finished level is between 500-600 mm above the final surface.
2. Pipeline posts shall have "WATER" cast in and shall be

(ii) Fixings for marker posts of materials other than concrete are available in materials other than stainless steel. Guidance on their use should be sought from Scottish Water.

positioned above the pipeline.

3. Marker posts, where required, shall be fitted with a 180 x 205 mm indicator plate to indicate WO, SV, AV or FH, as appropriate, together with main size and distance from post. Plates shall comply with BS 3251 and shall be fixed to the post with stainless steel fixings.

4. The colour for fire hydrant (FH) plates shall be in accordance with BS 3251 (black letters on a yellow background).

5. Marker posts shall be placed at field boundaries and, in open country, marker posts shall be at intervals of not more than one kilometre.

3.3.17 Pipe Surround

(i) The information supplied by Scottish Water to the developer should indicate any limitations on the size and type of materials.

(ii) IGN 4-08-01 gives guidance on pipe surround materials.

(i) BRE Digest 522-1 and 522-2 deal with hardcore.

1. Processed granular and as-dug bedding, sidefill and surround materials for buried pipelines shall comply with WIS 4-08-02.

2. Recycled materials shall comply with BS 8500-2.

3.3.18 General Filling Materials

1. Hardcore shall consist of clean, hard, durable material, uniformly graded from 200 mm to 20 mm and be free from extraneous matter.

2. Selected fill, whether selected from locally excavated material or imported, shall consist of uniform, readily compactable material. Fill shall be free from vegetable matter, building rubbish and frozen material or materials susceptible to spontaneous combustion. It shall exclude clay of liquid limit greater than 80 and/or plastic limit greater than 55, and materials of excessively high moisture content. Clay lumps and stones retained on 75 mm and 37.5 mm sieves, respectively, shall be excluded from the fill material.

3. Quarry scalpings shall consist of hardstone passing a 38 mm screen and shall contain sufficient dust to enable the material to bind together when consolidated with water and rolled. The clay fraction shall not exceed 10%.

3.3.19 Water

(i) In certain areas, supplementary mains carrying non-potable water have been laid. The use of this water with cement or in contact with potable water mains and installations has been prohibited.

(ii) The information supplied by Scottish Water to the developer

1. Water for use with cementitious material, or in contact with potable water mains and installations shall be of potable water quality.

2. All water for swabbing, flushing and testing shall be wholesome.

3. If water for the works is not available from the public supply,

should indicate alternative provisions to be made where mains water is not available. BS EN 1008 gives details of suitability tests for water for use in making concrete and supercedes BS 3148.

(iii) Scottish Water cannot guarantee flows and pressures available.

(i) The information supplied by Scottish Water to the developer should indicate the ratio of swab length to diameter and the diameter of the swabs for different pipe sizes, together with the swab density and coarseness.

approval shall be obtained from Scottish Water regarding the source of supply and manner of its use. Water from the sea or tidal rivers shall not be used for structural concrete.

3.3.20 Foam Swabs

1. Swabs for cleaning water mains shall be solid, cylindrical polyurethane foam in accordance with BS EN ISO 5999.

3.4 CONSTRUCTION OF WATER MAINS

3.4.1 General Construction

1. The works shall be completed in accordance with the approved drawings and specification.

2. The excavation, pipelaying, jointing, inspection and refilling of trenches shall follow each other closely. Timing shall be carefully considered by multi-laying companies.

3. Mains shall be laid so that they have a generally continuous, but not necessarily uniform, rise from any washout to any air valve.

4. To prevent contamination of water mains, all open ends shall be closed by means of a protective cap, disc or other appliance which shall only be removed permanently when the pipe or fitting which it protects is about to be jointed. Any exposed pipe ends shall be capped when pipelaying is not actively being carried out to prevent vermin or soil entering the pipe work.

5. Suitable measures shall be taken to prevent extraneous material from entering the pipe, and to anchor each pipe to prevent flotation or other movement before the works are complete.

6. Pipes and fittings, including any lining or sheathing, shall be examined for damage and the joint surfaces and components shall be cleaned immediately before laying. Plastics pipes shall be carefully examined for flaws; particular watch shall be kept for signs of impact damage and scoring. No polyethylene pipe shall be installed with scores or cuts penetrating more than 10% of the wall section and/or where surface damage reduces the pipe material design life. If, after installation, scores, cuts or other defects penetrating more than 10% of the wall section are found, the affected lengths of pipe shall be removed. Where repairs are

required, these shall be agreed with Scottish Water.

7. Pipes, valves and fittings shall be thoroughly cleaned immediately before lowering into the trench. Each pipe shall be examined for dirt, which if present, shall be removed with a brush.

(iv) *Marker tape is not applicable to trenchless pipe installation.*

8. Where pipeline marker tape is specified, it shall be laid between 100 mm and 300 mm above the pipe. Where a tracer system is specified, it shall be continuous and adequately secured to valves and fittings.

9. Where a marker tape containing a wire is used, joins in the tape shall be securely made and continuity of tracer wire shall be ensured. Ends of the wire shall be exposed within the chamber just below the cover level.

10. "Squeeze-offs" in polyethylene pipes are permitted provided the following conditions are met:

- limited to pipe up to and including 180 mm outside diameter (OD);
- only purpose-made equipment shall be used with the stops correctly set for the pipe diameter and wall thickness to avoid over-compression of the pipe;
- not to be used within five pipe diameters of a permanent fitting or fusion joint or previous squeeze-off;
- pipe shall be inspected on release of a squeeze-off and any section showing cracking or splitting shall be cut out and replaced;
- pipe of 90 to 180 mm OD, which forms part of the permanent work, shall be fitted with a stainless steel band-clamp over the squeeze-off; and
- pipe less than 90 mm OD shall be clearly and indelibly marked where a squeeze-off has occurred.

11. Surface boxes shall be set to ensure that after any adjustment the cover shall remain in the same plane as the finished surface.

12. Thrust boring, where applicable, shall be carried out subject to adequate trial holing and the feasibility of routes has been proved.

13. All pipes, valves and fittings installed by the developer shall be adequately supported and restrained to resist a pressure compatible with the test pressure of that pipe, valve or fitting before the pipe, valve or fitting is re-pressurised and backfilled. Thrust blocks shall be used where appropriate.

3.4.2 Excavation

(i) *The following publications give recommendations as to standards of good practice for excavation:*

1. Operations shall be carried out in such a manner as to prevent damage to, or deterioration of, the formation of excavations.

- BS 6031;
 - BS 6164;
 - Report R97, 'Trenching Practice' published by CIRIA;
 - Technical Note TN 95 'Proprietary Trench Support Systems', published by CIRIA.
- (ii) Any special requirements for site clearance or for the disposal of excavated materials should be described by Scottish Water.
- (iii) Excavation in carriageways should, wherever possible, be located such that the edge of the opening is at least 1 m from the edge of the carriageway.
- (iv) Care should be taken when siting spoil heaps to avoid damaging trees by impinging on their root spread.
- (v) Excavated material for disposal off site would normally be classified as controlled waste and, under the Environmental Protection Act 1990 and Environment Act 1995, there is a duty of care to ensure that the works are carried out with the legislation relating to the treatment, keeping or disposal of such material.
- (vi) The Finance Act 2014, Landfill Tax (Amendment) Regulations 2013 and Landfill Tax (Qualifying Material) Order 2012 shall be adhered to, as required.
- (vii) A definition of rock shall be included in the Contract.
- (viii) The relevant Highway reinstatement specification roles should be defined in the Contract.
- (ix) Stored excavated granular material may require draining to achieve acceptable water content.

3.4.3 Pipe Bedding

- (i) When puddled clay stanks are required, these should be described in the Contract.
- (ii) Details of pipe bedding, surround and sidefill should be described in the Contract.
- (iii) Refer to BS EN 1295-1 for pipe bedding design details.

2. If unsuitable ground is encountered in the formations or if the formation is damaged or allowed to deteriorate, Scottish Water shall be promptly informed.
3. Excavated material suitable for re-use in the works shall not be removed from the site except on the direction, or with the permission, of Scottish Water.
4. Excavations shall be protected, as far as reasonably practicable, from the ingress of water, and water running into them shall be drained or pumped to an approved disposal point. Any drainage point shall be sited so as to prevent damage to the excavation.

3. Where socketed pipes are required to be laid on a granular or sand bed (or directly on a trench bottom), joint holes shall be formed in the bedding material or excavated formation to ensure that each pipe is uniformly supported throughout the length of its barrel and to enable the joint to be made.
4. Where pipes are required to be bedded directly on the trench bottom, the formation shall be trimmed and levelled to provide even bedding of the pipeline and shall be free from all extraneous matter that may damage the pipe, pipe coating or sleeving.
5. Where the bottom of an excavation is not sufficiently firm and stable to provide a suitable bed for the pipe or fitting, it shall be excavated below the final surface until a firm foundation is reached and the excavation shall be filled up to the final surface with imported material.

3.4.4 Completion of Pipe Surround

- (i) Further guidance is available in BS EN 1295-1.
- (ii) The minimum side gaps for narrow trenching techniques are stated for compaction purposes.

1. Pipe surround material shall, where required, be placed and compacted over the full width of the trench in layers not exceeding 150 mm before compaction, to a finished thickness of between 100 mm and 300 mm above the crown of the pipes.
2. Subsequent filling shall then be carried out as specified in Clause 3.4.8.
3. Where trenching excavators or similar narrow trenching techniques are employed for open dig laying of pipelines, the minimum gap between the pipe barrel and the side of the trench shall be 30 mm for pipe diameters of 280 mm or less, and 50 mm for pipes greater than 280 mm diameter.

3.4.5 Pipe Jointing

(i) Any special requirements for filling the joint annulus should be described in the Contract.

(ii) The remaining flexibility is required for any subsequent settlement or ground movement.

1. Pipe jointing surfaces and components shall be kept clean and free from extraneous matter until the joints have been made or assembled. Care shall be taken to ensure that there is no ingress of grout or other extraneous material into the joint annulus after the joint has been made.
2. Flange faces shall be thoroughly cleaned before jointing. All flanged joints shall be made with great care, and special attention shall be paid to the accurate alignment and levelling of the pipes concerned.
3. Where pipes with flexible joints are required to be laid to curves, the deflection at any joint as-laid shall not exceed three quarters of the maximum deflection recommended by the manufacturer.
4. Flanges shall be properly aligned before any bolts are tightened. Bolt threads shall be treated with graphite paste and the nuts tightened evenly in diametrically opposite pairs.
5. The use of flange adaptors and couplings shall be kept to a minimum when installing branches and bends in connection with hydrants and valves.
6. The number of joints shall be minimised.
7. Where, as part of the work, the protective coating or lining to the existing pipe or the new pipe is damaged, it shall be made good, as appropriate for the protective coating or lining.

3.4.6 On-site Welding of Polyethylene Pipes

(i) Pipe manufacturers offer technical liaison services for the instruction of pipe jointers.

(ii) Scottish Water may wish to audit all aspects of butt fusion and electrofusion jointing procedures and to test specimens of welds executed by the developer. Any additional requirements should be outlined in the information supplied to developers.

1. Fusion welded joints in PE100 and PE80 polyethylene pipes shall be made only between pipes having the same physical characteristics. Joints between pipes from different manufacturers shall only be made with the specific approval of Scottish Water.
2. Electrofusion and butt-fusion jointing shall be made in accordance with WIS 4-32-08, using equipment to WIS 4-32-16.
3. A pipe section containing a completed weld shall achieve the same strength characteristics as the parent pipe.
4. Where PE barrier or co-extruded pipes are used, the jointing system used shall be in accordance with the pipe manufacturer's guidance and all protective systems shall be made continuous across the joint.

3.4.7 Thrust Blocks

(i) Anchorage is not necessarily required at junctions or bends where a fully integrated fusion welded PE pipe system is in place.

(ii) Thrust blocks should be described in the Contract.

(iii) Refer to CIRIA Report TN128 for the construction and design of thrust blocks.

1. Appropriate thrust blocks shall be designed and installed on the main. The minimum depth of cover to concrete thrust blocks shall be 600 mm.

2. Except where welded steel pipelines, welded polyethylene pipelines or self-anchoring joints are used, thrusts from bends and branches in pressure pipelines shall be resisted by concrete thrust blocks cast in contact with undisturbed ground. Anchorage is required for end fire hydrant or washout hydrants, even if temporary.

3. Where thrust blocks are required to resist forces in existing pipelines which have been altered or disturbed, they shall be designed and installed (as appropriate) depending upon the proximity of other services, the operating pressure of the affected apparatus and the bearing capacity of the surrounding ground.

4. Any additional excavation required to accommodate thrust blocks shall be carried out after the bend or branch is in position and the thrust face shall be trimmed back to remove all loose or weathered material immediately prior to concreting.

5. All concrete for thrust blocks shall be medium workability, with cement in accordance with BS EN 12620 and BS 8110, and a maximum aggregate size of 20 mm. Thrust blocks shall be allowed to develop adequate strength before any internal pressure is applied to the pipeline.

6. Rapid hardening cement shall not be used in concrete for thrust blocks to plastics pipes.

7. Plastics pipes shall be wrapped with a layer of plastic sheeting having a composition in accordance with BS 6076 before being surrounded by concrete.

8. Concrete support blocks shall be cast to hydrant tees and sluice valves installed in plastic pipelines in order to resist the torsional forces imposed on the fittings during operation. Support blocks shall be cast in such a manner so as not to interfere with the operation or maintenance of the apparatus and shall be cast in accordance with this clause.

9. Any flanges on riser pipes from hydrant tees or duckfoot bends to the hydrant shall have sufficient torsional stability to resist the operational forces. This shall be through the use of full faced flange gaskets or those where the periphery of the gasket extends at least to the flange bolting pitch circle diameter (PCD).

10. Concrete shall be filled behind and/or around pipes, bends and tapers, generally in accordance with the manufacturer's recommendations. Horizontal bends shall be encased in concrete half-way round their circumference on the outside of

the bend, the concrete being brought up against the sides of the trench and the top surface sloped upwards from the outside of the bend to increase the bearing surface against the solid ground.

3.4.8 Backfilling

(i) Any special requirements for backfilling around mains and services should be described by Scottish Water.

(ii) No materials should be stored on roofs of tanks without the written approval of Scottish Water.

1. Backfilling shall, wherever practicable, be undertaken immediately after the specified operations preceding it have been completed.
2. Backfilling shall not, however, be commenced until the works to be covered have achieved a strength sufficient to withstand all loading imposed thereon.
3. Backfilling shall be undertaken in such a manner as to avoid uneven loading or damage.
4. Excavations in roads shall be filled above the level of any pipe surround required, in accordance with the relevant Highway Reinstatement Specification.
5. Filling material to excavations not situated in the highway shall be in accordance with Clause 3.3.18 of this Specification, placed and compacted to form a stable backfill.
6. Where the excavations have been supported and the supports are to be removed, these (where practicable) shall be withdrawn progressively as backfilling proceeds, in such a manner as to minimise the danger of collapse, and all voids formed behind the supports shall be carefully filled and compacted.

3.4.9 Location of (Other) Utility Equipment

(i) Guidance on location of services is given in HSG47 'Avoiding Danger from Underground Services' published by HSE.

1. Due diligence shall be used when making excavations for water mains and services, and care shall be taken to protect and support all existing services (water, gas, telecommunications and electricity mains) and other works so as not to interfere with the working arrangement of the same.
2. Any damage shall be made good to the satisfaction of Scottish Water or other authority concerned. The final position of the new water main shall be determined when the position of the other services is known.
3. Proprietary cable locators shall be used in conjunction with any free phone facilities in order to determine the position of these services.
4. Water services shall be so laid as not to disturb the established bed of any existing utility service and sufficiently clear of such services as to allow subsequent maintenance and repair work to be conveniently carried out on either, without

interfering with the other.

3.4.10 Dealing with Water

(i) Consent to discharge to a watercourse is issued by the Environment Agency in England and Wales and the Scottish Environment Protection Agency in Scotland.

(ii) Discharge of water from testing and disinfection is covered by Clause 3.5.8 of this Specification.

(iii) The information supplied by Scottish Water to the developer should indicate any requirements for prevention of the deposition of silt and/or protection from erosion.

1. Water shall not be allowed to lie anywhere within the excavations, unless so required by Scottish Water. Any drainage sumps required shall, where practicable, be sited outside the area excavated for the works and shall be re-filled with approved material to the level of the underside of the adjacent permanent works.
2. All necessary precautions shall be taken to prevent any adjacent ground from being adversely affected by loss of fines through any dewatering process.
3. Groundwater shall not be allowed to enter mains to be used for the conveyance of potable water.
4. Where water is to be discharged across road and footpath surfaces and the temperature is forecast to be freezing point or below, then no pumping shall be undertaken.
5. The developer shall provide method statements and details of pollution prevention measures relating to the control and disposal of groundwater from de-watering operations. Discharging shall be subject to the developer obtaining prior written approval from the appropriate consenting body.

3.4.11 Tolerances for Pipelines

(i) The information supplied by Scottish Water to the developer should indicate any requirements for more stringent tolerances.

(ii) The information supplied by Scottish Water to the developer should indicate where a pipeline is to be constructed in ground which is variable or unstable. It may be appropriate for a larger tolerance for line and level.

1. The line and level of any pipeline shall not deviate from that described in the design by more than 20 mm and any combination of such deviations shall not create a reverse gradient.

3.5 TESTING AND COMMISSIONING

3.5.1 Cleansing of Pipes Prior to Testing

(i) The pipeline cleansing system should be appropriate for the pipe material.

1. On completion of construction, and before any disinfection, internal surfaces of pipelines shall be cleansed thoroughly by swabbing, in line with Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS.
2. All swabs shall be recovered and accounted for after mains cleaning and shall only be used once.

3.5.2 Precautions Prior to Pressure Testing Pipelines

(i) See also Clauses 3.4.1 and 3.4.7.

3.5.3 Testing of Ductile Iron, PVC, GRP and Steel Pressure Pipelines

(i) BS EN 805 gives the permissible losses during the test.

(ii) Water needed for testing should be supplied by Scottish Water free of charge, but not necessarily under pressure, for filling the mains.

(iii) Where a pipeline is to be tested in sections, Scottish Water should identify any constraints in length.

(iv) The test pressures should be agreed with Scottish Water.

(v) Testing should be carried out with the pipework isolated from the existing adjacent pipework to prevent the transmission of thrust.

3.5.4 Testing of Polyethylene Pressure Pipelines

(i) Where a pipeline is to be tested in sections, Scottish Water should identify any constraints in length.

(ii) The test pressures should be agreed with Scottish Water.

(iii) Testing should normally be carried out with the pipework isolated from the existing adjacent pipework to prevent the transmission of thrust. However, this might not be appropriate where the test is designed to test the tension capability of welds and the transfer of thrust through the pipeline.

3.5.5 Swabbing of Pipes after Testing

(i) The pipeline cleaning system should be appropriate for the pipe material and should be agreed with Scottish Water.

(ii) Scottish Water should describe the type of swabs and the number of passes.

1. On completion of the hydraulic test on water mains, a foam swab shall be passed through the main in line with Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS.

2. Recovery of swabs shall be witnessed by Scottish Water.

3. Swabs shall only be used once and then disposed of appropriately.

3.5.6 Disinfection, Sampling and Operation of Water Mains

(i) Any specific requirements for bringing water mains back online should be specified by Scottish Water.

(ii) Scottish Water should describe the sampling parameters and timescales for the return of sample results from bacteriological and chemical sampling.

1. The disinfection of a self-laid main shall be carried out in accordance with Scottish Water's 'Water Supply Hygiene Code of Practice' and DOMS documents (listed in Appendix B, Section B).

2. After disinfection and bacteriological and chemical sampling of completed sections of water mains, no valves shall be turned or any other action taken which might interfere with the main or existing network without the prior agreement of Scottish Water.

3. On completion of disinfection, the pipeline shall be left full of water under operating pressure and with sufficient flow or changes of water so as to maintain water quality.

4. Groundwater shall not be allowed to come into contact with the inside of water mains after disinfection.

3.5.7 Water for Testing, Swabbing and Disinfection

(i) Scottish Water should describe any constraints relating to the temporary supply, including flow rate, pressure, location of the supply and period of notice required to make supplies available.

(ii) Any particular requirements for bridging pipework should be agreed with Scottish Water.

(iii) The arrangements for recording and reporting volumes of water used for testing, swabbing and disinfection should be agreed with Scottish Water.

1. Water for testing, swabbing and disinfection of potable water mains and structures shall be taken from the existing potable water supply. Arrangements shall be made with Scottish Water for appropriate supply facilities.

2. The provisions of Scottish Water's 'Water Supply Hygiene Code of Practice' shall be followed at all times.

3.5.8 Disposal of Water from Cleansing, Testing or Disinfection

(i) Consent to discharge to a watercourse is issued by the Scottish Environment Protection Agency in Scotland.

(ii) Water from disinfection is high in chlorine and may have an adverse effect on the environment and the operation of sewage treatment works.

(iii) Flow rates should be specified by Scottish Water for discharges to sewers.

(iv) The allowable quantity of water added is stipulated in Clause 13.3 of BS EN 1610.

1. The provisions for the removal and disposal of water used for disinfection, swabbing or testing shall be stated by Scottish Water.

2. Discharges to sewers shall not take place without the consent of Scottish Water.

3. Water used in the cleansing, testing or disinfection of structures or pipelines shall be rendered safe prior to discharge to the environment.

4. Water used for disinfection shall be dechlorinated prior to discharge to any sewer or watercourse unless agreed with the appropriate authority.

APPENDIX A – GLOSSARY OF TERMS

Communication Pipe	Defined as where any premises supplied with water abuts on the part of the road where the main is laid. The portion of the service pipe as lies between the main and the stopcock, where the stopcock is placed as near the boundary of the road as is reasonably practicable. The portion of the service pipe will be vested by Scottish Water.
Connections to Trunk Mains	Trunk mains can be subject to fluctuations in water pressure and water quantity, and connections are only permitted where no water distribution system local to the development is available. Special design and construction conditions may be applied by Scottish Water.
Customer	An individual or organisation involved with household and non-household development.
Decommissioned mains	Mains no longer in active service but remaining on Scottish Water's asset register.
Deed of Servitude	Legal agreement between Scottish Water and a landowner for rights of access and egress over and across the landowner's property for the purpose of laying inspecting, repairing, maintaining, renewing or replacing.
Developer	An individual or company involved with the housing and non-household development.
Diversion	Re-routed pipeline.
DOMS	Scottish Water Distribution Operation and Maintenance Strategy.
Licensed Provider	A retailer which has received licences from the Water Industry Commission for Scotland to provide water services to non-household users.
Main Under Construction	Any pipe currently under construction and not yet commissioned.
Notification	Written announcement by letter or electronic communication.
Restricted Operations	Any work which may involve direct or potential contact with untreated sources of underground water, with partially or fully treated water within water treatment works, or any surface of an operational asset (including those temporarily out of use) which will itself be in contact with potable water at any stage in its distribution to the point where it is made available to consumers.

Road (as defined by the Roads (Scotland) Act 1984 and New Roads and Street Works Act 1991 Part IV)	Any way (other than a waterway) whether or not there is a public right of passage and whether or not it is being formed as a way. This includes: a square or court; the road's verge and any bridge (whether permanent or temporary) over which or tunnel through which, the road passes; and any reference to a road includes a part thereof.
Scottish Environment Protection Agency (SEPA)	Scotland's environmental regulator.
Scottish Fire and Rescue Service	Organisation responsible for the delivery of fire prevention and response activities for Scotland.
Scottish Water	Water and sewerage undertaker in Scotland established by the Water Industry (Scotland) Act 2002. Scottish Water is the sole undertaker for the provision of the public water and wastewater services in Scotland.
Service Connection	The point of connection (or act of connecting) of a service pipe to a water main.
Service Level Agreement (SLA)	A formal agreement between two or more parties that defines the level of service expected from the service provider in terms of outputs including timescales, deliverables, quality of product etc.
Service Pipe	Any pipe for supplying water from a main to any premises as is subject to pressure from that main, or would be subject to the opening of a tap.
Servitude	A legal right of way over another person's property.
Standard Connection	A water connection of 32 mm diameter or smaller, normally installed under pressure through tapping of an existing live main.
Supply Pipe	The section of water service pipe that is not a communication pipe. The supply pipe remains the responsibility of the customer.
Trunk Mains	Large diameter (>300 mm) mains used for the bulk transportation of water from water treatment works or service reservoirs for strategic customers or centres of population.
Utility Connection Provider (UCP)	A company meeting the requirements for accreditation and which has been assessed as competent in accordance with WIRS. For the purposes of this document, the UCP may also be known as an "Accredited Entity" by Scottish Water to lay mains and services on behalf of a developer (and may be a developer or multi-utility infrastructure provider). In this document the term UCP includes employees and subcontractors.
Vesting	Once assets, e.g., mains are constructed, and if Scottish Water has made an offer to accept the asset, then the responsibility for ownership, operation and maintenance of the assets is transferred to Scottish Water.

Vesting Certificate	Certificate issued on satisfactory completion of the Defects Liability Period, rectification of any defects and satisfactory inspection by Scottish Water.
Water Supply (Water Fittings) (Scotland) Byelaws 2014	Water Byelaws 2014 made by Scottish Water under Section 70 of the Water (Scotland) Act 1980 for the prevention of waste, misuse, undue consumption and contamination of water supplied by them. These Byelaws apply to any water fitting installed or used, or to be installed or used, in premises to which water is, or is to be, supplied by Scottish Water.
Water Connection	Generally described as the service pipe serving a single property. The pipe remains private up to the boundary of the property and the customer is responsible for maintaining this element of the connection. The other part of the connection is the communication pipe that runs from the property's external stop tap to the mains water network in the street. Scottish Water is responsible for maintaining this element of the connection.
Water Distribution System	The network of pipes and ancillaries used to deliver water to the customer.
Water Industry Registration Scheme (WIRS)	Scheme for the technical assessment of the service providers who elect to be assessed for accreditation for works associated with the installation of water infrastructure. The scheme operated by Lloyd's Register on behalf of the water utility companies.
Water Infrastructure	All mains, communication pipes, water treatment (and other similar works) and pumping stations for the treatment and distribution of water.
Water Main	Pipe for the purpose of transporting water to a number of properties, generally equal to or greater than 63 mm diameter. Water mains may be public or private.
The Public Water Supplies (Scotland) Regulations 2014	Regulations covering the supply, quality, monitoring, recording and responsibilities with respect to the supply of water for household purposes.
Whole-life Cost	A method of evaluating or comparing building materials and components by looking at installation costs, operational costs and maintenance costs.
Wholesome Water	Water complying with the requirements of The Public Water Supplies (Scotland) Regulations 2014 for household purposes and/or food production.
WIRS Provider	A company meeting the requirements for accreditation and which has been assessed as competent in accordance with WIRS. For the purposes of this document the WIRS provider may also be known as an "Accredited Entity" by Scottish Water to lay mains and services on behalf of a developer (and may be a developer or multi-utility infrastructure provider). In this document the term WIRS provider includes employees and subcontractors.

APPENDIX B –PUBLICATIONS

(Note: The documents in this list are referenced in Water for Scotland.)

A. GENERAL

Number	Title	Publisher, Date
BRE Digest 522 Part 1	Hardcore for Supporting Ground Floors of Buildings: Selecting and Specifying Materials	BRE, 2011
BRE Digest 522 Part 2	Hardcore for Supporting Ground Floors of Buildings: Placing Hardcore and the Legacy of Problem Materials	BRE, 2011
	Civil Engineering Specification for the Water Industry (CESWI), 7 th edition	UKWIR Ltd/WRC plc, 2011
	Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (10/WM/03/21)	UKWIR Ltd, 2010
	Guidance for Installation of Water Mains and Fittings – Additional Guidance	Scottish Water (www.scottishwater.co.uk)
	Contaminated Land Assessment Guidance. Protocols Published by Agreement between Water UK and the Home Builders Federation	Water UK, 2014
Report R97	Trenching Practice, 2 nd edition	CIRIA, 1983
HSG47	Avoiding Danger from Underground Services 3 rd edition	HSE, 2014
	List of Approved Products for use in Public Water Supply in the United Kingdom	DWI, 2014 www.dwi.defra.gov.uk
	Distribution Operation and Maintenance Strategy (DOMS)	Scottish Water (www.scottishwater.co.uk)
	Guide for Obtaining New Water and Waste Water Services	Scottish Water (www.scottishwater.co.uk)
	NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus: Volume 1	National Joint Utilities Group, 2013
	Precast Concrete Box Culverts: Guide to Site Practice	Box Culvert Association
	National Guidance Document on the Provision of Water for Fire Fighting, 3 rd edition	Water UK, 2007
	Our Promises to You: Code of Practice	Scottish Water (www.scottishwater.co.uk)
Technical Note TN 95	Proprietary Trench Support Systems, 3 rd edition	CIRIA, 1986

Number	Title	Publisher, Date
Technical Note TN128	Civil Engineering Sealants in Wet Conditions: Review of Performance and Interim Guidance on Use	CIRIA, 1987
	New Connections Guide	Scottish Water
	Water Supply Hygiene Code of Practice	Scottish Water
	Scottish Fire and Rescue Service Level Agreement (SLA) with Scottish Water	Scottish Fire and Rescue Service
	Scottish Water Meter Code of Practice	Scottish Water, 2014 www.scottishwater.co.uk
	Stand-off Distances for Existing/Diverted Water Mains	Scottish Water www.scottishwater.co.uk
	Standard Conditions for Works Adjacent to Pipelines	Scottish Water
	Technical Bulletin 1/94 – Periodic Inspection and Testing of Fire Service Equipment	Scottish Fire and Rescue Service
	Products & Materials Database	WRAS www.wrás.co.uk/directory
	Water Connections Code for Scotland	Scottish Water, 2014 www.scottishwater.co.uk
	Clean Water Booster Set Product Catalogue	Scottish Water
	Waste Water Pumping Station Standard Product Catalogue	Scottish Water

B. SCOTTISH WATER'S DISTRIBUTION OPERATION AND MAINTENANCE STRATEGY DOCUMENTS

(Note: The documents in this list are those relevant to design and are not an exhaustive list of DOMS procedures. Further procedures relating to strategy, incident management, operation and maintenance interventions and system-by-system investigation are available on request.)

Process	Number	Procedures/Work Instruction
Water Supply Hygiene	DOM-WN-PRC-00000101	General Requirements for Hygiene
	DOM-WN-PRC-00000102	Hygiene Requirements for the Use of Multi-Functional Resources
	DOM-WN-PRC-00000103	Emergency (Temporary) Treated Water Supplies
	DOM-WN-PRC-00000104	Materials in Contact with Treated Water
	DOM-WN-PRC-00000105	Sampling and Bacteriological Testing/Acceptance for Bringing into Supply
	DOM-WN-PRC-00000106	Disinfection of Water Mains and Service Pipes
	DOM-WN-PRC-00000107	Enforcement of the Water Byelaws

	DOM-WN-PRC-00000108	Water Quality Failure Action Triggers
	DOM-WN-PRC-00000109	High Level Response to Water Quality Sample Failures
	DOM-WN-PRC-00000110	New Mains (Customer Connections) and Mains Rehabilitation New Mains – Approval to Connect
	DOM-WN-PRC-00000202	SW Guidance for Installation of Water Mains and Fittings
	DOM-WN-WIN-00000101	Hygiene Facilities for Personnel
	DOM-WN-WIN-00000102	Use and Disposal of Chlorine Solution
	DOM-WN-WIN-00000103	Authorisation Card Issue Process
Network Design and Operability	DOM-WI-PRC-00000201	New Mains and Rehabilitation
	DOM-WI-WIN-00000201	Prevention of Contamination during Construction
	DOM-WI-WIN-00000202	Commissioning of Mains
	DOM-WI-WIN-00000203	Actions Following Commissioning Failure
	DOM-WI-WIN-00000204	Connection to the Live Network
	DOMS-WI-WIN-00000205	Abandoning of Water Mains and Fittings
	DOMS-WI-WIN-00000206	Laying Mains in Potentially Contaminated Ground

C. SCOTTISH WATER'S STANDARDS AND SPECIFICATIONS

(Note: The documents in this list are referenced in Water for Scotland and/or are key reference material).

Number	Title	Owner
SSP-SP-GUI-04000404	Water Network Rehabilitation Guidance	Scottish Water
SSP-SP-SPE-04000404	Water Distribution Specification	Scottish Water
SSP-SP-SPE 05000501	General Requirements	Scottish Water
SSP-SP-ADO-05000502	Scottish Water Amendments “The Civil Engineering Specification for the Water Industry” (CESWI 7)	Scottish Water
SSP-SP-SPE-05005017	Provision of Drawing ‘CAD Drawing Frames’	Scottish Water
SSP-SP-ADO-06000300	Electrical Engineering & WIMES Amendments	Scottish Water
SSP-SP-SPE-06000301	LV Switchgear and Controlgear Assemblies	Scottish Water
SSP-SP-SPE-06000302	LV Electrical Installations	Scottish Water

Number	Title	Owner
SSP-SP-SPE-06000609	Kiosks	Scottish Water
SSP-SP-SPE-06000632	Telemetry Signal Selection Workbook	Scottish Water
SSP-SP-SPE-06000633	Telemetry	Scottish Water
SSP-SP-SPE-06000634	Instrumentation	Scottish Water
SSP-SP-TEM-07000701	MCC Signature Solution Drawings	Scottish Water
SSP-SP-TEM-07000701	MCC Ticksheets	Scottish Water
SSP-SP-DRA-07000720	Standard Detail HPPE Water Main with DI Fittings and Marker Post	Scottish Water
SSP-SP-DRA-07000721	Standard Detail Ductile Iron Water Main Fittings and Arrangements	Scottish Water
SSP-SP-DRA-07000722	Standard Details Water Main Component Interdependencies	Scottish Water
SSP-SP-DRA-07000724	Standard Details Thrust/anchor blocks Horiz. & Vert. upturn bends sheet 1	Scottish Water
SSP-SP-DRA-07000725	Standard Detail Thrust/anchor blocks Horiz. & Vert. upturn bends sheet 2	Scottish Water
SSP-SP-DRA-07000751	Standard Detail Flexible Pipe Bedding Details	Scottish Water
SSP-SP-SPE-08000112	Booster Sets	Scottish Water
SSP-SP-SPE-08000304	LV Specification for Packaged Plant	Scottish Water
SSP-SP-STA-09000001	Standard Product Motor Control Centre (MCC) Product Catalogue	Scottish Water
SSP-SP-STA-09000202	Clean Water Booster Set/Pumping Station – Product Catalogue	Scottish Water
SSP-SP-STA-09000203	Clean Water Booster Set/Pumping Station – Standard Product Specification	Scottish Water
SSP-SP-GUI-09000900	MCC Standard Product Guidance	Scottish Water
Asset Policy Standard	Water Mains Protection Distances	Scottish Water

Copies of these documents and other associated Standard and Specification documents are available from Scottish Water.

APPENDIX C – STANDARDS REFERENCED IN THIS SPECIFICATION

Standard Types:

BS	British Standard
BS EN	European Standard adopted as a British Standard
BS EN ISO	International Standard adopted as a British Standard
CP	Code of Practice
DD	Drafts for Development
ISO	International Organisation for Standardisation
PD	Published Documents
prEN	Draft European Standard
PAS	Product Assessment Schedule
WIS	Water Industry Specification
IGN	Water Industry Specification Information Guidance Notes

Standard Type	Number	Title	Clause
PAS	27	Unplasticized poly(vinyl chloride) alloy (PVC-A) pipes and bends for water under pressure	3.3.3
BS EN	124	Gully tops and manhole tops for vehicular and pedestrian areas. design requirements, type testing, marking, quality control	3.3.13
DD	256	Assessment of the potential for metallic materials to affect adversely the quality of water intended for human consumption. Specification	3.3.10
BS EN	545	Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods	3.3.1, 3.3.5
BS EN	593	Industrial valves. Metallic butterfly valves	3.3.10
BS EN	598	Ductile iron pipes, fittings, accessories and their joints for sewerage applications. Requirements and test methods	3.3.1
BS EN	671	Fixed fire fighting systems. Hose systems	
	Part 1	Hose reels with semi-rigid hose	3.3.12
	Part 2	Hose systems with lay-flat hose	3.3.12
	Part 3	Maintenance of hose reels with semi-rigid hose and hose systems with lay-flat hose	3.3.12
BS EN	681	Elastomeric seals. material requirements for pipe joint seals used in water and drainage applications	
	Part 1	Vulcanized rubber	3.3.6, 3.3.7
	Part 2	Thermoplastic elastomers	3.3.6
BS	750	Specification for Underground Fire Hydrants and Surface Box Frames and Covers	3.3.12, Appendix E
BS EN	752	Drain and sewer systems outside buildings	3.4.1

BS EN	805	Water supply. Requirements for systems and components outside buildings	2.2.1, 3.3.2, 3.5.3
BS EN	1008	Mixing water for concrete. Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete	3.3.19
BS EN	1057	Copper and copper alloys. seamless, round copper tubes for water and gas in sanitary and heating applications	3.3.4
BS EN	1074	Valves for water supply. fitness for purpose requirements and appropriate verification tests	
	Part 1	General Requirements	3.3.10
	Part 2	Isolating Valves	3.3.10
	Part 3	Check Valves	3.3.10
	Part 4	Air Valves	3.3.10
	Part 5	Control Valves	3.3.10
BS EN	1092	Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated	
	Part 1	Steel Flanges	3.3.1, 3.3.5, 3.3.10
	Part 2	Cast Iron Flanges	3.3.1, 3.3.5, 3.3.9, 3.3.10
BS EN	1171	Industrial valves. Cast iron gate valves	3.3.10
BS EN	1254	Copper and copper alloys. Plumbing fittings	
	Part 3	Fittings with compression ends for use with plastics pipes	3.3.4, 3.3.8
BS EN	1295	Structural design of buried pipelines under various conditions of loading	
	Part 1	General requirements	3.4.3, 3.4.4
BS EN ISO	1452	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure. unplasticized poly(vinyl chloride) (PVC-U)	
	Part 2	Pipes	3.3.3
	Part 3	Fittings	3.3.3
BS EN	1514	Flanges and their joints. dimensions of gaskets for PN-designated flanges	
	Part 1	Non-metallic flat gaskets with or without inserts	3.3.6
BS EN	1563	Founding. Spheroidal graphite cast irons	3.3.9
BS EN	1610	Construction and testing of drains and sewers	3.5.8
BS	3148	Methods of test for water for making concrete (including notes on the suitability of the water). (Replaced by BS EN 1008)	3.3.19

BS	3251	Specification. Indicator plates for fire hydrants and emergency water supplies	3.3.12, 3.3.16
BS	3416	Specification for bitumen-based coatings for cold application, suitable for use in contact with potable water	3.3.1
BS ISO	EN 3506	Mechanical properties of corrosion-resistant stainless steel fasteners	
	Part 1	Bolts, screws and studs	3.3.9
	Part 2	Nuts	3.3.9
BS	3692	ISO metric precision hexagon bolts, screws and nuts. Specification	3.3.9
BS	4190	ISO metric black hexagon bolts, screws and nuts. Specification	3.3.9
BS	4320	Specification for metal washers for general engineering purposes. Metric series	3.3.9
BS	4395	Specification for high strength friction grip bolts and associated nuts and washers for structural engineering	
	Part 1	General grade	3.3.9
BS	5154	Specification for copper alloy globe, globe stop and check, check and gate valves. (Partially replaced by BS EN 12288)	3.3.10
BS	5158	Specification for cast iron plug valves	3.3.10
BS	5306	Code of Practice for fire extinguishing installations and equipment on premises	
	Part 1	Hose reels and foam inlets	3.3.12
BS	5433	Specification for Underground Stop valves for Water Services	3.3.11
BS	5834	Surface boxes, guards and underground chambers for the purposes of utilities	3.3.13
	Part 1	Specification for guards and plinths	3.3.13
	Part 2	Specification for surface boxes	3.3.13
	Part 3	Specification for large surface boxes	3.3.13
	Part 4	Specification for utility chambers	3.3.13
BS EN ISO	5999	Flexible cellular polymeric materials. Polyurethane foam for load-bearing applications excluding carpet underlay. Specification	3.3.20
BS	6031	Code of Practice for earthworks	3.4.2
BS	6076	Specification for polymeric film for use as a protective sleeving for buried iron pipes and fittings (for site and factory application)	3.3.1, 3.4.7
BS	6164	Code of Practice for health and safety in tunnelling in the construction industry	3.4.2
BS	6683	Guide to Installation and use of valves	3.3.10
BS	6920	Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water	

	Part 1	Specification	3.3.10
BS	7775	Penstocks for use in water and other liquid flow applications. Specification	3.3.10
BS	7874	Method of test for microbiological deterioration of elastomeric seals for joints in pipework and pipelines	3.3.7
BS	8010	Code of Practice for pipelines. Pipelines on land: design, construction and installation	
	Part 2.1	Ductile iron	3.4.1
	Part 2.5	Glass reinforced thermosetting plastics	3.4.1
BS	8110	Structural use of concrete	3.4.7
BS ISO	8179	Ductile iron pipes. External zinc-based coating	
	Part 1	Metallic zinc with finishing layer	3.3.1, 3.3.1
BS	8500	Concrete. Complementary British Standard to BS EN 206-1	
	Part 2	Specification for constituent materials and concrete	3.3.17
BS EN	12201	Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE)	3.3.2
	Part 1	General	3.3.2
	Part 2	Pipes	3.3.2
	Part 3	Fittings	3.3.2
BS EN	12288	Industrial valves. Copper alloy gate valves	3.3.10
BS EN	12334	Industrial valves. Cast iron check valves	3.3.10
BS EN	12620	Aggregates for concrete	3.4.7
BS EN	14161	Petroleum and natural gas industries. Pipeline transportation systems	3.4.1
BS EN	14339	Underground fire hydrants	3.3.12
BS EN	14399	High-strength structural bolting assemblies for preloading	3.3.9
BS EN	13397	Industrial valves. Diaphragm valves made of metallic materials	3.3.10
BS ISO	16132	Ductile iron pipes and fittings. Seal coats for cement mortar linings	3.3.1
BS EN	60309	Plugs, socket-outlets and couplers for industrial purposes	
	Part 2	Dimensional interchangeability requirements for pin and contact tube accessories	2.5.2.3
IGN	4-01-03	Pressure testing of pressure pipes and fittings for use by public water suppliers	3.5.2
IGN	4-08-01	Bedding and sidefill materials for buried pipelines	3.3.17
IGN	4-08-01A	Amendment to: Bedding and sidefill materials for buried pipelines	
WIS	4-08-02	Specification for bedding and sidefill materials for buried pipelines	3.3.17
WIS	4-08-02A	Amendment to: Specification for bedding and sidefill materials for buried pipelines	

IGN	4-21-01	Ductile Iron Pipes and Fittings	3.3.1
WIS	4-21-02	Specification for mechanical couplings and repair clamps for iron pipes for the conveyance of cold potable water (underground use) for the size range 40 to 1600mm/1.5 to 48" inclusive	3.3.8
WIS	4-22-02	Specification for ferrules (tapping tees) and ferrule straps for underground use	3.3.11
WIS	4-23-04	Specification for underground stop valves, including spherical valves, for potable water services for nominal sizes up to and including 63 and nominal pressures of 10 bar minimum and made principally of metal or thermoplastics	3.3.11
WIS	4-24-01	Specification for mechanical fittings and joints for polyethylene pipes for nominal sizes 90 to 1000.	3.3.8
WIS	4-31-08	Oriented polyvinyl chloride (PVC-O) pressure pipes for underground use	3.3.3
WIS	4-32-08	Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials	3.4.6
WIS	4-32-11	Specification for thermoplastic end load resistant mechanical fittings for polyethylene pipes of nominal size ≤ 63	3.3.8
WIS	4-32-16	Specification for butt fusion jointing machines	3.4.6
IGN	4-32-18	The choice of pressure ratings for polyethylene pipe systems for water supply and sewerage duties	3.3.2
WIS	4-37-01	Specification for boundary boxes for the metering and control of domestic and small industrial water services	3.3.13
WIS	4-37-01A	Amendment to: Specification for boundary boxes for the metering and control of domestic and small industrial water services	
IGN	4-37-02	Design against surge and fatigue conditions for thermoplastic pipes	2.3.5
IGN	4-50-03	Operating guidelines for the use of site-applied, factory applied, and reinforced factory applied polyethylene sleeving on ductile iron pipeline systems	3.3.1
IGN	4-51-01	External zinc coating of ductile iron pipe	3.3.1
WIS	4-52-01	Specification for polymeric anti-corrosion (barrier) coatings	3.3.1, 3.3.8, 3.3.10, 3.3.12
WIS	4-52-01A	Amendment to: Specification for polymeric anti-corrosion (barrier) coatings	
IGN	4-52-02	The use of polymeric anti-corrosion (barrier) coatings	3.3.8
WIS	4-52-03	Specification for anti-corrosion coatings on threaded fasteners	3.3.8, 3.3.9
WIS	4-52-03A	Amendment to: Specification for anti-corrosion coatings on threaded fasteners	

Copies of these documents can be obtained from www.water.org.uk

APPENDIX D – PARLIAMENTARY ACTS AND REGULATIONS REFERENCED IN THIS SPECIFICATION

Title	References
Arbitration (Scotland) Act 2010	Appendix I
Construction (Design and Management) Regulations	1.6, 2.2.1
The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013	1.16, 2.3.10
Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011	2.3.10
Environmental Protection Act 1990	3.4.2
Environment Act 1995	3.4.2
Finance Act 2014	3.4.2
Fire (Scotland) Act 2005	1.16
Fire Safety (Scotland) Regulations 2006	1.6
Health and Safety at Work etc. Act 1974	1.6
Landfill Tax (Amendment) Regulations 2013	3.4.2
Landfill Tax (Qualifying Material) Order 2012	3.4.2
New Roads and Street Works Act 1991	1.16, Glossary, Appendix E
Roads (Scotland) Act 1984	Glossary
Water Supply (Water Fittings) (Scotland) Byelaws 2014	Figure 1, 1.4, 1.6, 2.3.2, 2.4.4, 3.1.1
Title Conditions (Scotland) Act 2003	Appendix I
Waste Management Licensing Amendment (Scotland) Regulations 2006	1.6
Water Environment (controlled Activities) (Scotland) Regulations 2011	1.6, 2.3.10
Water Industry (Scotland) Act 2002	Glossary, Appendix I
Water (Scotland) Act 1980	1.3, Figure 2, Glossary, Appendix J, Appendix K
Water Services etc. (Scotland) Act 2005	1.2
The Public Water Supplies (Scotland) Regulations 2014	Figure 1, 1.6, 1.7, 2.2.1, 2.3.8, 3.1.1, 3.3.1, 3.3.8, Glossary

APPENDIX E – SCOTTISH FIRE AND RESCUE SERVICE REQUIREMENTS

Extracts from the Service Level Agreement (SLA) between the Scottish Fire and Rescue Service and Scottish Water. *(At time of publishing the SLA between the Scottish Fire and Rescue Service and Scottish Water is being reviewed and will be available by Summer 2015)*

1. NEW HYDRANT LOCATION

The relevant Scottish Fire and Rescue Service shall be supplied with the following whenever new mains are to be laid and/or existing mains are to be diverted:

- a) Two copies of a plan indicating:-
 - (i) Site location and extent of development;
 - (ii) Location of existing mains in the area, proposed mains and apparatus.
- b) Where development is to be phased, details of future proposals and developers shall be provided, when available.
- c) The anticipated commencement date for the works.
- d) Scottish Water can provide, where requested and available, information on approximate available static water pressures and flow rates at strategic points within a development and details of any pressure reduction measures to be employed.

The Scottish Fire and Rescue Service shall respond by returning one copy of the plan within 28 days of receipt of notice from Scottish Water, marked to indicate the location of hydrants required. Scottish Water will then incorporate these requirements within the design and confirm the same to the Scottish Fire and Rescue Service in writing within 14 days of receiving the copy plan. Alternative locations will be agreed between the parties, when and if required, within a further 14 days prior to the date of commencement.

2. MATERIAL AND/OR DESIGN AND CONSTRUCTION STANDARDS

All fire hydrants installed by Scottish Water and/or their contractors or agents, as requested by the Scottish Fire and Rescue Service, will be constructed using materials that are fit for the purpose and, where appropriate, in accordance with the appropriate British Standards approvals. Whilst the materials supplier may change from time to time, Scottish Water will (at all times) ensure that materials used meet with the site-specific needs and the agreed material specification.

All fire hydrants will be to BS 750 (inline or terminal) installed in accordance with this Specification.

All construction work will be carried out in a safe and competent manner using recognised working practices. Where the installation is within a roadway or surfaced footpath, the work and subsequent reinstatement will be undertaken in accordance with the requirements of the New Roads and Street Works Act 1991.

3. INSTALLATION OF HYDRANTS

Terminal Hydrants

Where it is expedient for the Scottish Fire and Rescue Service and Scottish Water to share a terminal hydrant, the costs of provision will be shared equally between the Scottish Fire and Rescue Service and Scottish Water.

Inline Hydrants

The Scottish Fire and Rescue Service and developer are required to agree the location of inline hydrants and inform Scottish Water as part of the site layout approval process.

4. NEW INSTALLATION – VESTING PROCEDURE

Scottish Water shall notify the Scottish Fire and Rescue Service in writing that the hydrant is available for inspection and test. This will be when the roads and footpaths in the development have been constructed to subgrade level. Subgrade level is defined as the stage at which the unbound compacted sub-base for roads and footpaths is constructed using granular Type 1 or Type 2 material raised to the level required to accept bituminous-bound or equal approved, pavement course for vehicles and pedestrian traffic. The Scottish Fire and Rescue Service shall carry out the inspection and confirm in writing to Scottish Water within 28 days of the Notification whether they are satisfied with the installation. If the Scottish Fire and Rescue Service report any defects within the 28-day period, then Scottish Water shall notify the relevant contractors. Once the Scottish Fire and Rescue Service Scotland have notified Scottish Water of their willingness to adopt the hydrant, the invoice will be issued.

Scottish Water will inform the Scottish Fire and Rescue Service in writing when the marker post and plate have been installed on a completed development. The Scottish Fire and Rescue Service will then have 28 days from the date of the letter to inspect the installation and to confirm in writing to Scottish Water that the work is satisfactory.

If prior to vesting of the development any defects are found, the relevant site contractor shall be notified in writing by Scottish Water to make good all necessary repairs and all costs will be borne by the site contractor.

5. INSPECTION AND TESTING PROCEDURES

Vesting Test Procedures

The Scottish Fire and Rescue Service may test hydrants prior to vesting in accordance with Technical Bulletin 1/94 – Periodic Inspection and Testing of Fire Service Equipment.

Flow (Full Bore) Tests

Flow tests will not normally be undertaken. However, if it is considered necessary, electronic flow measuring equipment shall be used whenever possible. The Scottish Fire and Rescue Service will, where possible, inform Scottish Water by telephone, 24 hours in advance, of the location and time of proposed flow tests. Tests shall be undertaken during the day, when the distribution network is under normal load. Where this is not possible, testing can be implemented at other mutually acceptable times. In certain circumstances, Scottish Water will require to jointly undertake said tests with the Scottish Fire and Rescue Service to minimise customer disturbance and maintain quality standards.

6. STANDARD SPECIFICATION FOR FIRE HYDRANT INSTALLATION

The hydrant shall be to the BS 750 Type 2 specification installed on the water main in such a position as will ensure that the longest face will be presented to the flow and line of traffic.

The hydrant chamber should be constructed in accordance with the figure as detailed in Appendix H.

Attention is drawn to the following points:

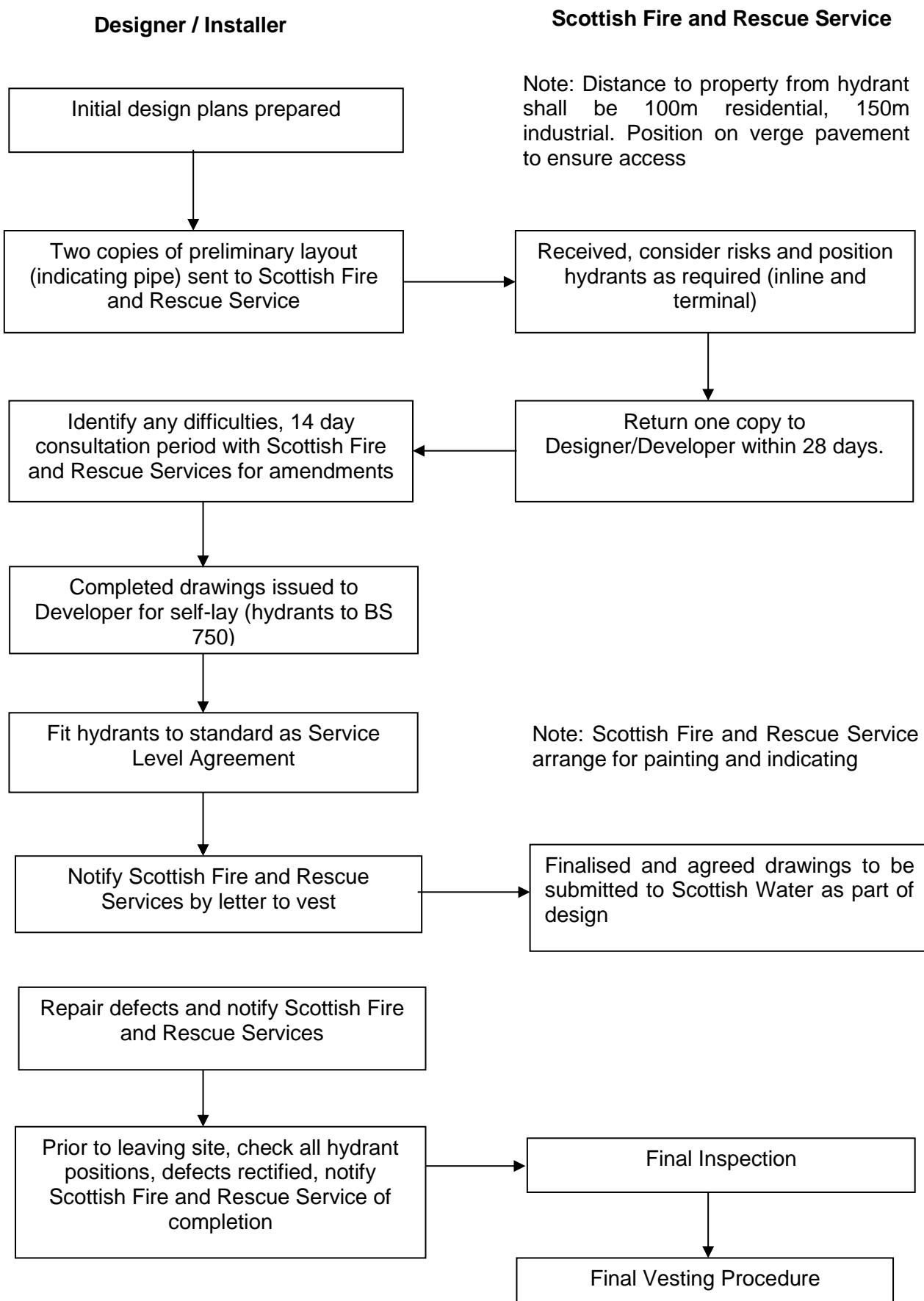
- Where possible, the hydrant shall be positioned on the footpath or roadway clear of all driveways or vehicle access points to buildings, car parks, etc.
- In rural areas, the hydrant shall be positioned (where possible) on the road verge, roadway and clear of field entrances.
- The surface box must be of the medium/heavy-duty type as agreed with the Scottish Fire and Rescue Service and held as a stock item within Scottish Water stores.
- The hydrant chamber is to be built with a concrete base and interlocking concrete frames, and adjusted to allow the surface box to be positioned flush with the surrounding ground/road level.
- Care shall be taken to ensure that the chamber is built on a foundation which will eliminate the danger of the surface box subsiding below the finished surface level.
- Under no circumstances shall packing materials, slates, tiles, wood, etc., be inserted between the surface box and frame to facilitate adjustment to the required finished level.
- The depth below finished surface level and the outlet flange of the hydrant must not exceed 450 mm or be less than 300 mm. Extension pieces shall be fitted between the tee and the hydrant to facilitate these parameters.
- The hydrant chamber must be clear of all building material or rubble and be clearly visible.
- The location of each hydrant must be clearly indicated by a marker plate fixed firmly to a boundary wall or fence. Where this is not feasible, the plate shall be fitted to a marker post and positioned as near as possible to the hydrant location.
- The concrete marker post must be embedded to a depth of 450 mm and be firmly set in concrete.

The following information shall be displayed on the marker plate:

- The internal diameter of the main in millimetres; and
- The distance in metres between the post and the centre of the fire hydrant surface box.

ACCEPTANCE OF A FIRE HYDRANT INSTALLATION SHALL BE REFUSED IF THE INSTALLATION DOES NOT COMPLY FULLY WITH THE ABOVE SPECIFICATION.

Figure E.1 Scottish Fire and Rescue Service liaison for self-laying of water mains



APPENDIX F – STANDARD SYMBOLS AND LINE STYLES FOR USE ON DRAWINGS

Existing Water Main



Proposed Water Main



Pumping/Booster Main



Abandoned Main



Double Air Valve



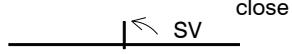
DAV

Single Air Valve



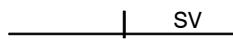
SAV

Sluice Valve (anti-clockwise closing)



close

Sluice Valve (clockwise closing)



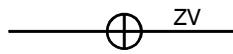
SV

Zone Valve (anti-clockwise closing)



ZV

Zone Valve (clockwise closing)



ZV

Pressure Reducing Valve



Reflux/Non-Return Valve



Hydrant



Meter



Capped End



Stopcock



Route Marker Post



Pumping Station



Booster Station



Scour Hydrant



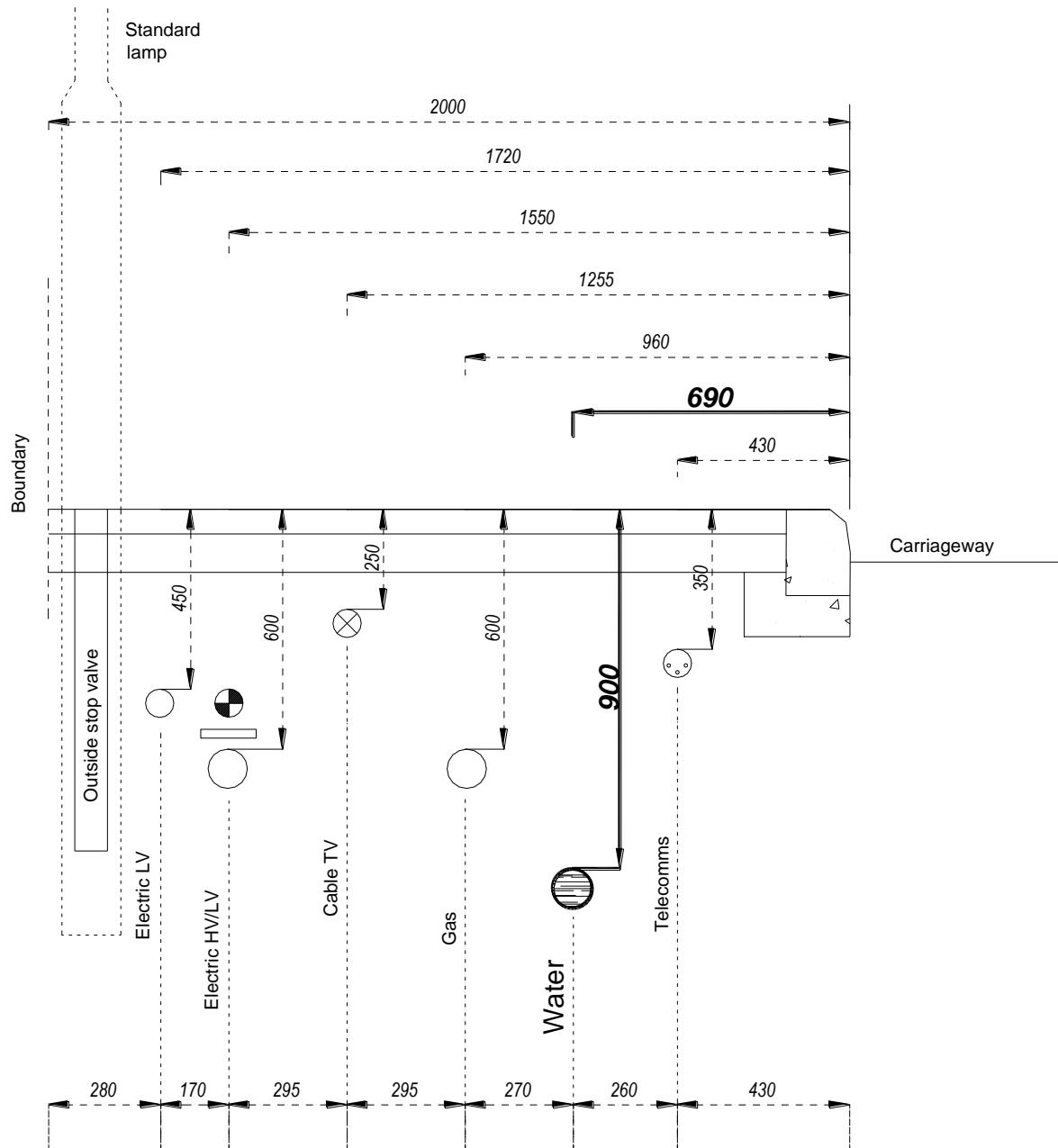
Fire Hydrant



Shared Hydrant

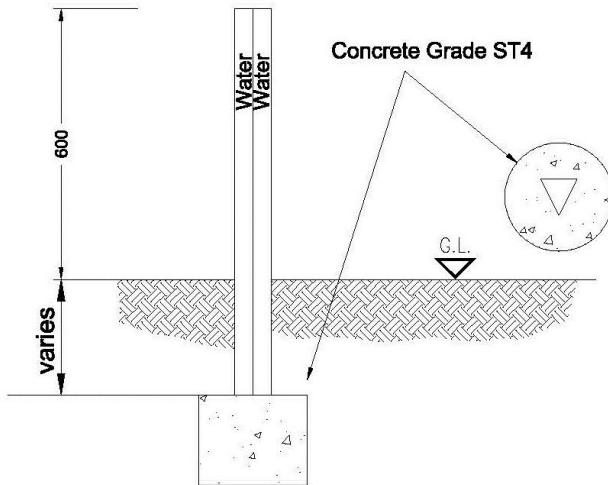


APPENDIX G – RECOMMENDED WATER MAIN POSITION RELATIVE TO OTHER UTILITY APPARATUS IN FOOTWAYS

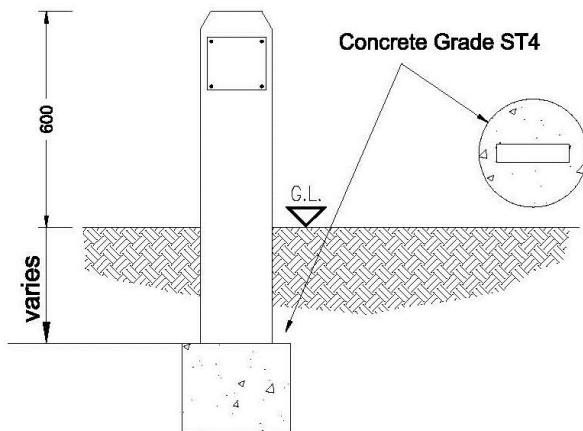


APPENDIX H – STANDARD DETAILS

MARKER POSTS



WATER MAIN LINE MARKER POST

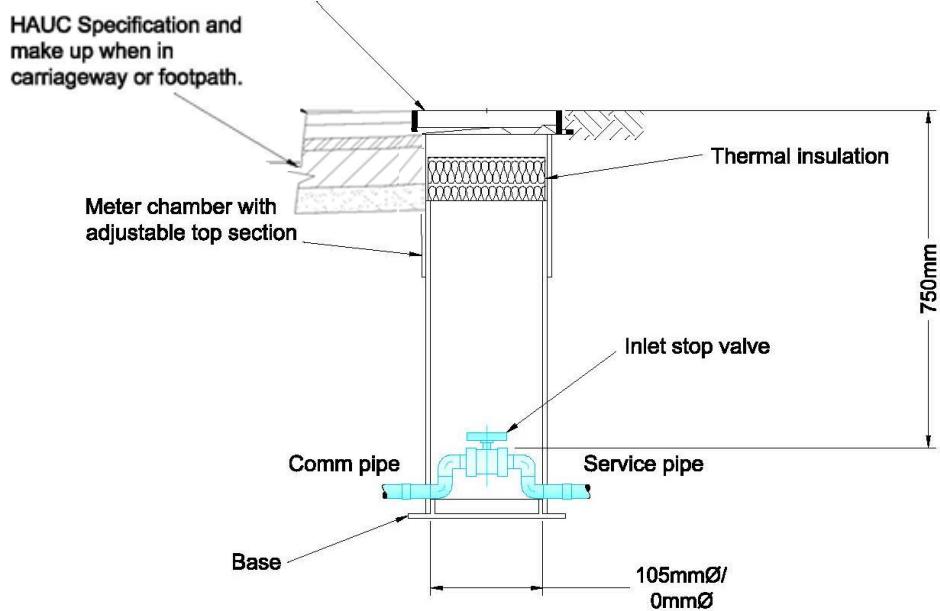


VALVE/HYDRANT MARKER POST

Not to Scale, dimensions in millimetres
Full set and standard details, please contact Scottish Water

BOUNDARY BOX

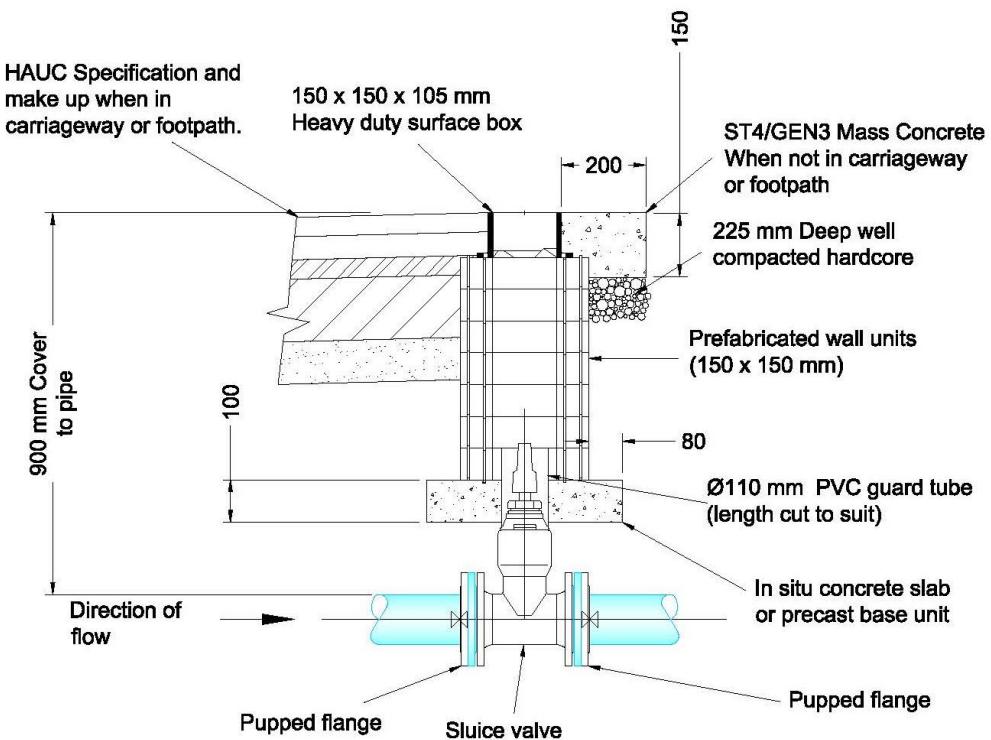
Plastic cover for verges and garden areas only. Suitably rated composite or DI cover required for footpath and roadway



BELow GROUND BOUNDARY BOX

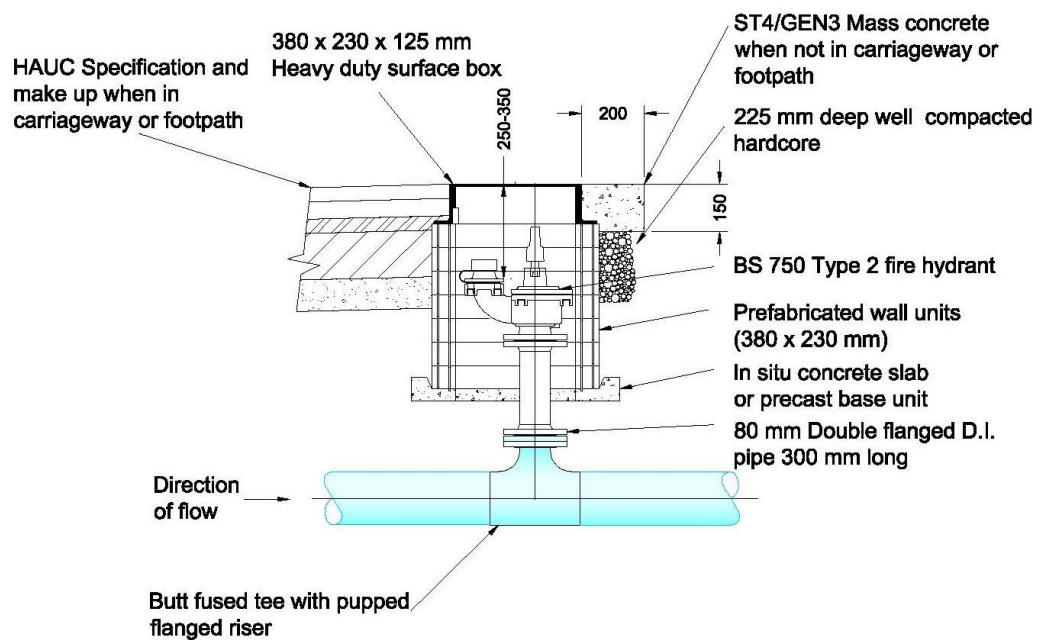
Not to Scale, dimensions in millimetres
Full set and standard details, please contact Scottish Water

SLUICE VALVE



Not to Scale, dimensions in millimetres
 Full set and standard details, please contact Scottish Water

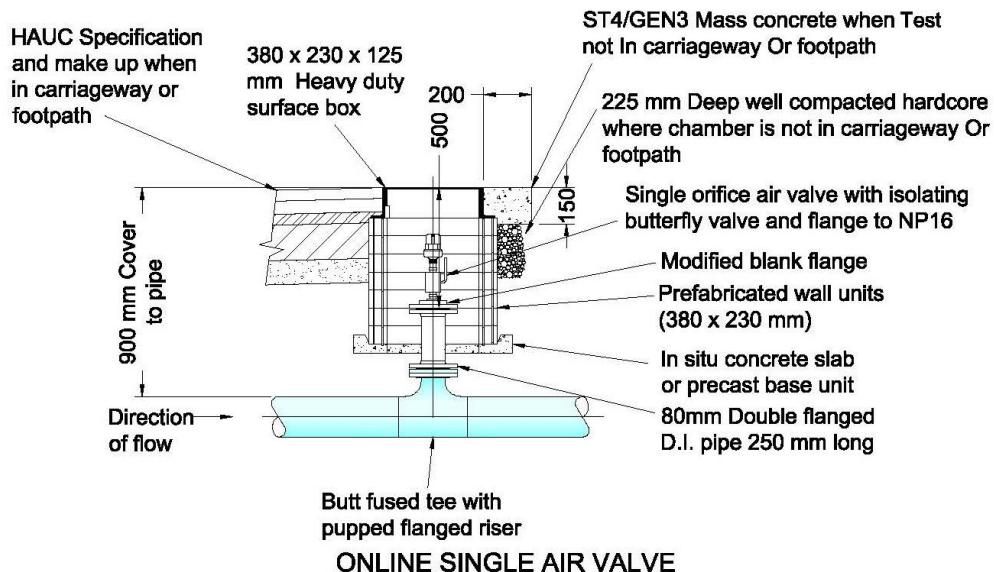
FIRE HYDRANT



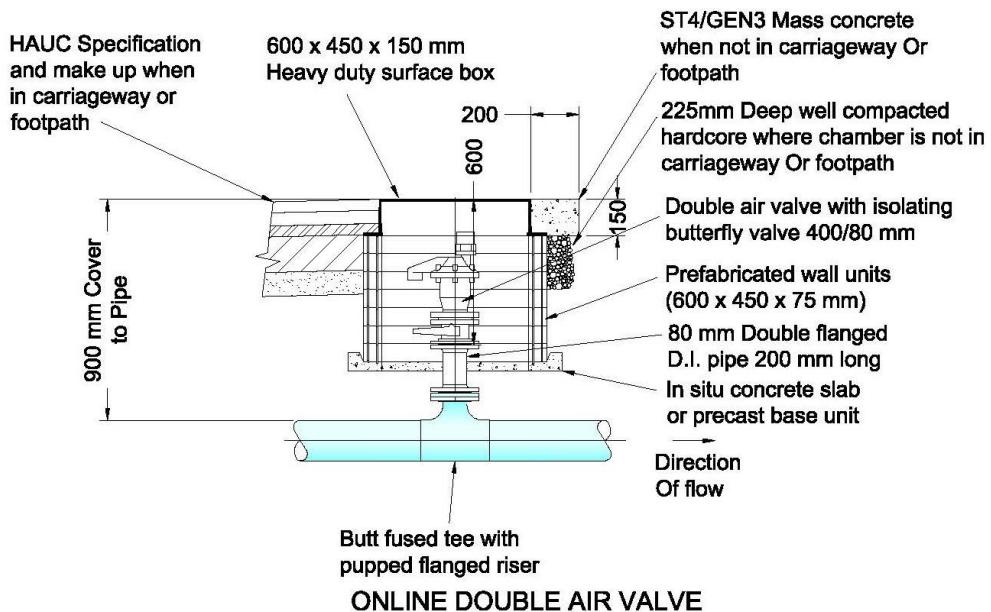
Not to Scale, dimensions in millimetres

Full set and standard details, please contact Scottish Water

AIR VALVES



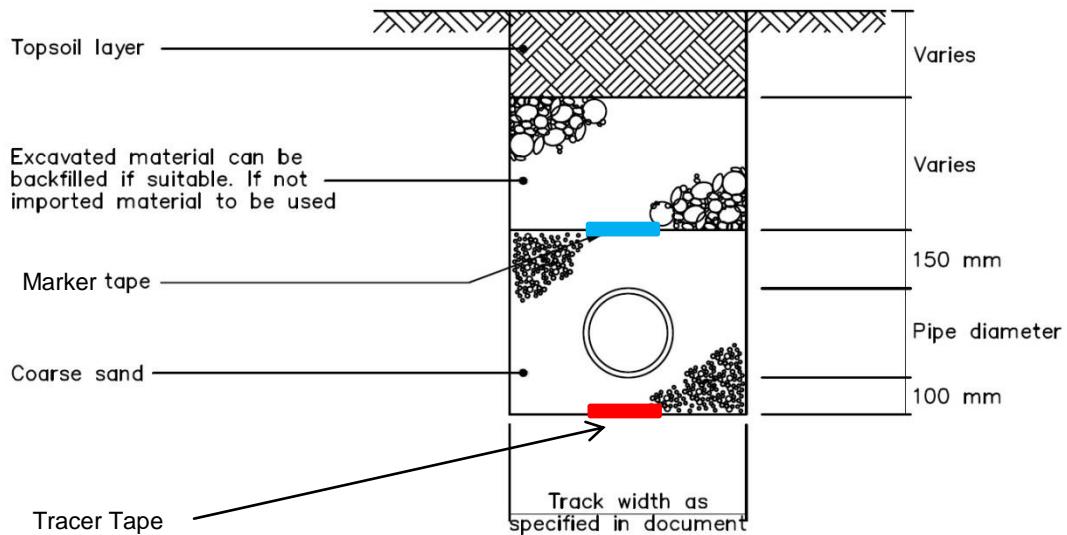
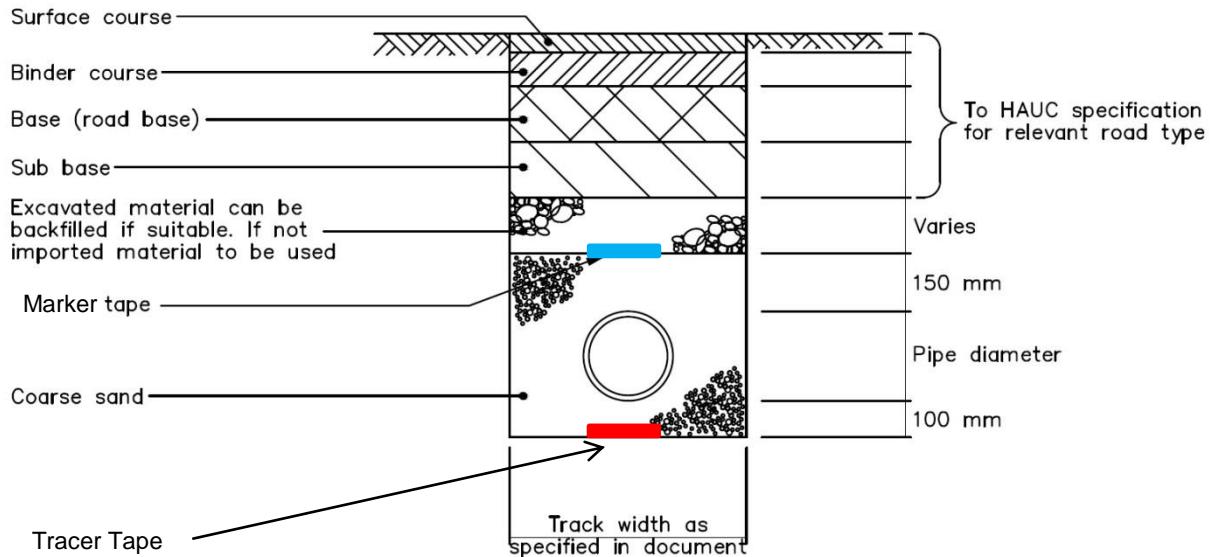
ONLINE SINGLE AIR VALVE



ONLINE DOUBLE AIR VALVE

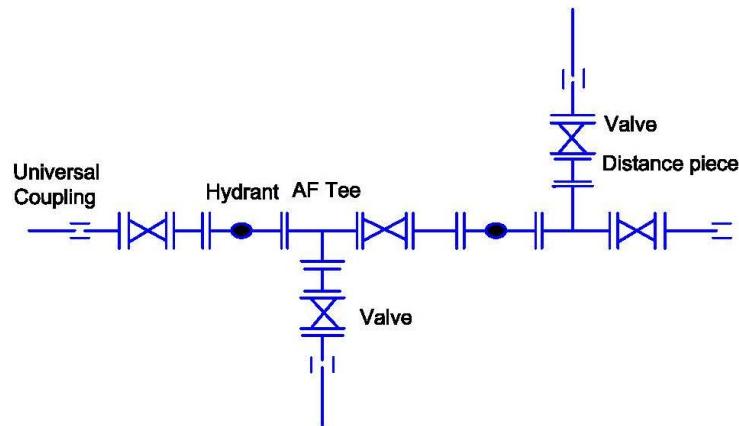
Not to Scale, dimensions in millimetres
Full set and standard details, please contact Scottish Water

BEDDING

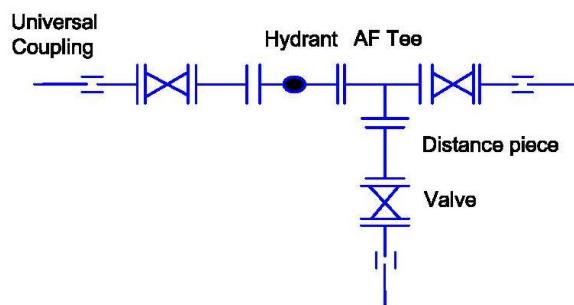


Not to scale, dimensions in millimetres
Full set and standard details, please contact Scottish Water

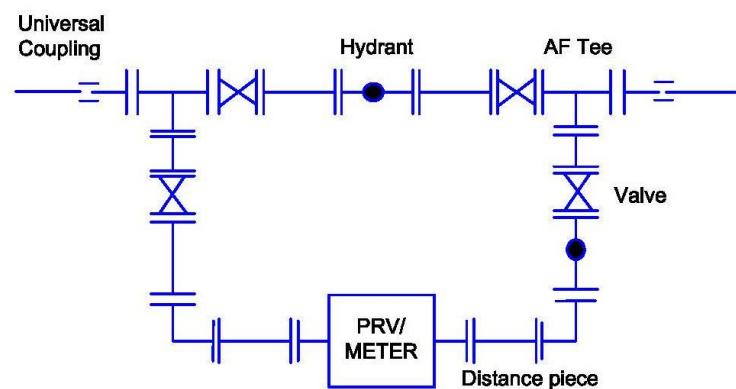
COMPONENT INTERDEPENDENCIES



MULTIPLE SITE CONNECTIONS



TYPICAL 3-WAY VALVE SET UP



TYPICAL PRV and/or METER SET UP

Not to Scale, dimensions in millimetres
Full set and standard details, please contact Scottish Water

APPENDIX I – STYLE DEED OF SERVITUDE

DEED OF SERVITUDE

by

[] LIMITED

in favour of

[] LIMITED

[with the consent of

[] LIMITED]

Property: []

DEED OF SERVITUDE by

[] **LIMITED**, incorporated under the Companies Act 2006 (Registered Number []) and having its Registered Office at [] (the "**Burdened Owner**")

in favour of

[] **LIMITED**, incorporated under the Companies Act 2006 (Registered Number []) and having its Registered Office at [] (the "**Benefited Owner**")

[with consent of

[] **LIMITED**, incorporated under the Companies Act 2006 (Registered Number []) and having its Registered Office at [] (the "**Consentor**")]

1. Definitions and Interpretation

1.1 Definitions

In this Deed:-

"Benefited Property" means ALL and WHOLE [];

"Burdened Property" means ALL and WHOLE [];

"Pipe" means a pipe laid for the purpose of giving a general supply of water as distinct from a supply to individual consumers, and includes any apparatus used in connection with such a pipe;

"Schedule" means the schedule annexed to this Deed of Servitude;

"Servitude Area" means that area or strip of ground [X] metres in length and having an average width of [Y] metres, all as shown delineated [colour] and coloured [colour] on the plan annexed and signed as relative hereto and forming part of the Burdened Property;

"Servitude Condition(s)" means the conditions under which the Servitude Right(s) [is][are] to be exercised set out in Part 2 of the Schedule; and

"Servitude Right(s)" means the Servitude Right(s) set out in Part 1 of the Schedule.

1.2 Interpretation

Save to the extent that the context or the express provisions of this Deed otherwise requires, in this Deed:-

1.2.1 words importing any gender include all other genders;

1.2.2 words importing the singular number only include the plural number and vice versa;

1.2.3 where at any one time there are two or more persons included in the expression "Benefited Owner" or "Burdened Owner" [or "Consentor"], obligations contained in this Deed which are expressed to be made by the party denoted by the expression in question are binding jointly and severally on them and their respective executors and representatives whomsoever without the necessity of discussing them in their order;

1.2.4 words importing individuals include legal persons and vice versa;

1.2.5 references to this Deed or to any other document are to be construed as reference to this Deed or to that other document as modified, amended, varied, supplemented, assigned, novated or replaced from time to time;

1.2.6 any reference to a Clause, Schedule or Part of the Schedule is to the relevant Clause, Schedule or Part of the Schedule of or to this Deed;

1.2.7 any phrase introduced by the words "including", "include", "in particular" or any similar expression is to be construed as illustrative only and is not to be construed as limiting the generality of any preceding words; and

1.2.8 any rights reserved to the Benefited Owner are exercisable by the tenants, agents, employees, workmen and others authorised by them from time to time.

1.3 Headings

The headings in this Deed are included for convenience only and are to be ignored in construing this Deed.

1.4 Schedule

The Schedule forms part of this Deed.

2. Grant of Servitude

[IN CONSIDERATION of the sum of [] £([]) STERLING paid to the Burdened Owner by the Benefited Owner,] the Burdened Owner [with the consent of the Consentor for its interest in the Burdened Property] grants the Servitude Right(s) but subject always to the Servitude Condition(s) (if any).

3. Date of Commencement of Servitude

The Servitude Right(s) granted by this Deed will be exercisable with effect from [] notwithstanding the dates hereof.]

4. Costs

[The Benefited Owner will pay on demand the reasonable legal and surveyor's costs necessarily incurred by the Burdened Owner in connection with the negotiation and completion of this Deed, together with all disbursements incurred by the Burdened Owner and [all irrecoverable] Value Added Tax on such of the foregoing costs and other items as bear it. Such costs and others will include all (if any) stamp duty land tax payable.]

5. Consent to Scottish Water Taking Over the Pipe[s] in the Servitude Area

The Burdened Owner consents to the vesting of the pipe[s] in the Servitude Area in Scottish Water, established under the Water Industry (Scotland) Act 2002 and having its principal office at Castle House, 6 Castle Drive, Carnegie Campus, Dunfermline, Fife, KY11 8GG, as [a] public water main[s] under the relevant statutory powers and for the future operation and maintenance of [it][them] as part of the public water supply system, all as subject to the statutory rights and duties of the said Scottish Water, and that once the said Scottish Water has agreed to take over the said pipe[s].

6. Arbitration

Any dispute arising under this Deed of Servitude shall be determined, in default of agreement, by a single arbiter to be appointed by the parties hereto or, failing agreement, to be appointed on the application of any of the parties (after notice in writing to the other parties) by the Chairman of the Scottish Branch of the Royal Institution of Chartered Surveyors and the provisions of the Arbitration (Scotland) Act 2010 and any statutory modification or re-enactment of the said Arbitration (Scotland) Act 2010 for the time being in force shall apply to any such reference or determination.

7. Warrantice

The Burdened Owner grants warrantice.

8. No Applications

No application may be made to the Lands Tribunal for Scotland under section 90(1)(a)(i) of the Title Conditions (Scotland) Act 2003 in respect of the servitudes set out in this Deed for a period of five years after the [registration of this Deed in the Land Register of Scotland] [recording of this Deed in the General Register of Sasines]. IN WITNESS WHEREOF

This is the Schedule referred to in the foregoing Deed of Servitude by [] in favour of [] [with consent of []].

[NOTE: THE PROVISIONS OF PARTS 1 AND 2 OF THE SCHEDULE ARE MERELY SUGGESTED CLAUSES/WORDING AND ARE, IN SOME CASES, INCOMPLETE. DETAILED CONSIDERATION NEEDS TO BE GIVEN TO EACH CASE.]

Part 1

The Servitude Right(s)

The following Servitude Right(s) [is][are] imposed on the Burdened Property in favour of the Benefited Property:-

[A Servitude Right of access and egress at all times and for all purposes for pedestrians and vehicles (including heavy vehicles) over and across the Burdened Property.]

[A Servitude Right to lay a pipe not exceeding [] in width under the Servitude Area.]

[A Servitude Right of access to the [Burdened Property] [Servitude Area] for the purpose of laying inspecting, repairing, maintaining, renewing, replacing [] subject to giving to the owner for the time being of the Burdened Property at least [] day's written notice (except in emergency).]

[OR SPECIFY OTHER SERVITUDES IN QUESTION]

Part 2

The Servitude Conditions

The Servitude Right(s) created by this Deed [is][are] subject to the following Servitude Conditions:-

1. [The owner for the time being of the Benefited Property will:
 - 1.1 make good on demand all damage caused to the [Burdened Property] [Servitude Area] by reason of the exercise of the Servitude Right[s] by the owner for the time being of the Benefited Property or their tenants, agents, employees, workmen and others authorised by them from time to time, to the reasonable satisfaction of the owner for the time being of the Burdened Property;
 - 1.2 procure that the Servitude Right[s] [is][are] exercised so as to cause the minimum disturbance, nuisance or annoyance reasonably practicable to the owner for the time being of the Burdened Property and their tenants or occupiers, and all other adjoining or neighbouring proprietors, tenants or occupiers; and
 - 1.3 indemnify the owner for the time being of the Burdened Property in respect of all claims, demands, expenses, liabilities, actions or others arising in consequence of the exercise of the Servitude Rights by the owner for the time being of the Benefited Property.]

APPENDIX J – STYLE NOTICE TO BE SERVED BY DEVELOPERS ON OWNERS/OCCUPIERS

[Recorded Delivery]

STATUTORY NOTICE

[Name of Developer]

WATER (SCOTLAND) ACT 1980

[Name, Address]

WHEREAS under Section 23A(1) of the Water (Scotland) Act 1980 (“the 1980 Act”) [Name of Developer] has been authorised by the [] of Scottish Water to construct a water main and or communication pipe as described below, NOTICE IS HEREBY GIVEN by [Name of Developer] (“the Developer”) under Section 23(1)(a)(ii) of the 1980 Act that the Developer intends to construct a water main and/or communication pipe in, on or over that part of [*your land/the land occupied by you*]* shown on the plan, and described in the Schedule, both attached to and signed as relative to this Notice.

You have a right to object to the proposed works within two months after the date of service of this Notice. If you object, the Developer shall not proceed to execute the works but may refer the matter to the Sheriff who may grant consent to the proposed works, either unconditionally or subject to such terms and conditions as he thinks just, or may withhold his consent. Any objections should be submitted in writing to [provide contact name and address].

Under Section 23(2) of the 1980 Act, you are entitled to compensation for any loss, injury or damage sustained by you by reason of the exercise by the Developer of the authorisation under Section 23A of the 1980 Act. If you wish to claim compensation, your claim should be submitted to [provide details] within twenty-four months of the claim arising.

Copies of the text of Sections 23 and 23A of the 1980 Act are attached for your reference.

Dated this [] day of []

[Name, Address and Designation of Signatory]

APPENDIX K – STYLE SECTION 23A(1) AUTHORISATION

Dear Sirs

DRAFT PRO FORMA SECTION 23A(1) AUTHORISATION

In terms of Section 23A(1) of the Water (Scotland) Act 1980 (“the Act”) and on behalf of Scottish Water I hereby authorise [insert name and address of developer] (“the Developer”) to construct a water main and/or communication pipe along the line(s) coloured [insert colour] on the plan annexed and signed as relative hereto.

This Authorisation is given strictly on the basis that the Developer complies with the following conditions, namely:-

1. The Developer submits all plans in connection with the design and layout of the proposed works to Scottish Water, as required by Scottish Water, for written approval by Scottish Water prior to the commencement of work;
2. The Developer submits:
 - a) any necessary planning application in respect of the proposed works and exhibits to Scottish Water any necessary planning approval prior to the commencement of works;
 - b) any application for a road opening permit and exhibits the approval to Scottish Water;
3. The Developer pays to Scottish Water all costs incurred by Scottish Water during the course of construction or on the completion of the works, the nature and extent of any inspection being a matter within the sole control of Scottish Water;
4. The Developer complies with all relevant provisions of the Act including, without prejudice to the foregoing generality:
 - a) giving notice as required by any rule of law, failing which reasonable notice to the Roads Authority, person responsible for the maintenance of the road or the owners of the solum of the road as appropriate pursuant to Section 23(1)(a) of the Act;
 - b) the due service of notice on all land owners and occupiers of the land in which the water main and/or communication pipe is to be constructed, pursuant to Section 23(1)(b) of the Act, in accordance with the Style Notice attached to this Authorisation;
 - c) the settlement by the Developer of all compensation claims under Section 23(2) of the Act at the instance of any party affected by the works carried out under this authorisation or otherwise, howsoever arising, from implementation of the works. The Developer will, on request, produce evidence of the settlement of any such claims;
 - d) indemnification of Scottish Water by the Developer against any claims against Scottish Water for damages or compensation, howsoever arising, in connection with the construction of the water main and/or communication pipe;

5. The Developer is required to notify all land owners and occupiers affected by the proposed works of the name and address of the contractor who will carry these out prior to the commencement of any work within the land affected;
6. The Developer may not grant consent to another party to erect a building or construct an embankment over, or in such a way as to interfere with or obstruct access to, the water main and/or communication pipe;
7. Unless otherwise agreed, the Developer shall be responsible for all costs, fees and outlays associated with and arising directly or indirectly out of the works;
8. Notice is also hereby given on behalf of Scottish Water in terms of Section 23(4) of the Act that the water main will not vest in Scottish Water until the date stated in the Transfer Certificate;
9.
 - a) Scottish Water may, before completion of the main and/or communication pipe, and after giving notice, determine that it or part of it shall vest in the person who laid it and that person shall have sole responsibility for its maintenance and renewal;
 - b) in the event that the main or communication pipe does not connect with a main vested in Scottish Water the main shall vest in the person who laid it and that person shall have sole responsibility for its maintenance.

The Developer will accordingly remain responsible for the water main and/or communication pipe constructed by or on behalf of the Developer until such time as the works have transferred to Scottish Water in terms hereof.

Yours faithfully

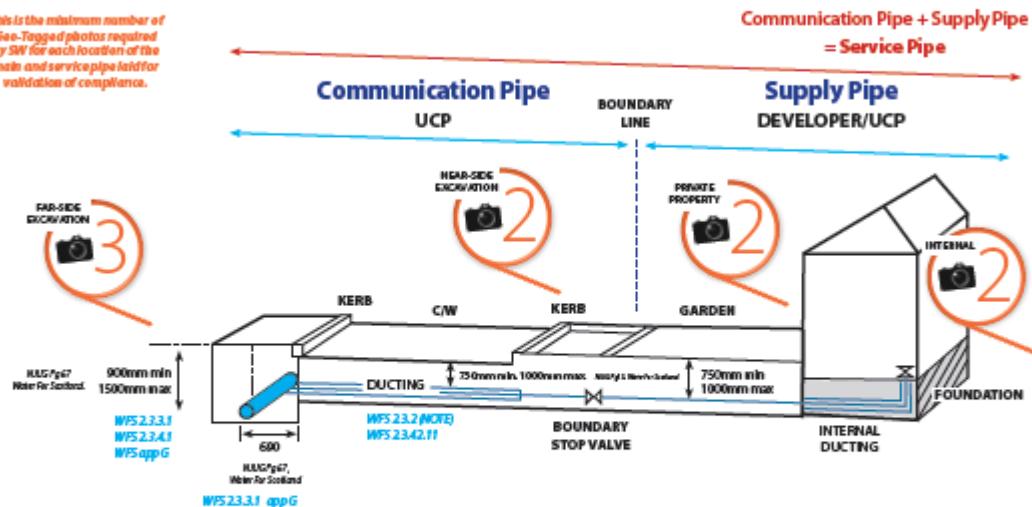
For and on behalf of [] of Scottish Water

SIGNED

APPENDIX L – CONNECTION OVERVIEW

OVERVIEW OF FAR-SIDE SERVICE CONNECTION

This is the minimum number of Geo-Tagged photos required by SW for each location of the main and service pipe laid for validation of compliance.



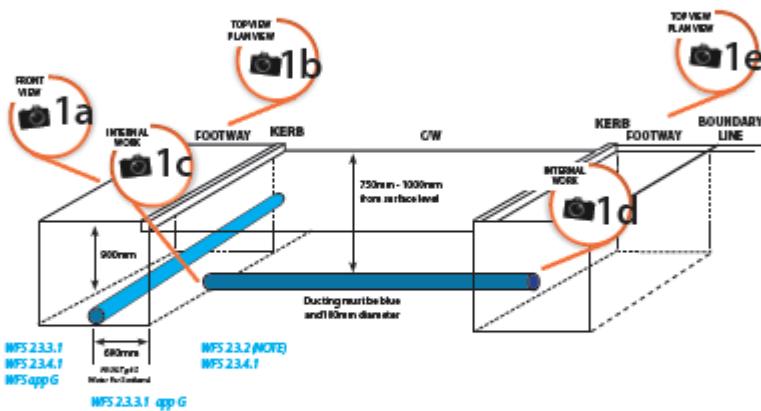
PLEASE NOTE

- Photographs are now required to confirm the correct compliance on site with SW Water For Scotland & SW DOWS documentation.
- All photographs taken must Geo-Tagged and be legible and clear with all the required points asked for in appendix.
- Each Far side connection requires a minimum of 9 Geo-Tagged photographs in total to demonstrate compliance with Water for Scotland by either the WRS Provider and/or the Developer and their ground workers with the installation of the entire 'Service Pipe' (Supply pipe & Comm Pipe).
- All mains laid shall have a minimum depth of cover of 900mm and a maximum depth of cover of 1500mm with 300mm clearance distance from any other utilities.
- All Service pipes laid shall have minimum depth of cover of 750mm and a maximum depth of cover of 1000mm.
- Any Service or duct not laid to the correct depth or line into the property will not be vested by SW.
- Any Communication pipe or supply pipe incorrectly laid in a driveway will not be vested by SW. (Unless agreed with SW at Technical Approval stage)
- Where laying a 'Communication' pipe or 'Supply' pipe in a parking areas or drive ways cannot be avoided then the correct pipe materials must be used for the entire length of the service pipe (a barrier pipe).



FAR-SIDE SERVICE CONNECTIONS

This is the minimum number of Geo-Tagged photos required by SW for each location of the main and service pipe laid for validation on compliance.



PLEASE NOTE

- All far side connections require a minimum of 5 Geo-Tagged photographs showing the position of the main and the line of the communication pipe (as per above diagram).
- All photographs taken must Geo-Tagged and be legible and clear with all the required points asked for in appendix.
- Photos are required to confirm the location and depth of the main, depth of duct for the communication pipe.
- Line of the communication pipe at 90 degrees from the main to the boundary of the property, the location of other utilities in relation to the water main.
- Any Service or duct not laid to the correct depth or line into the property will not be vested by SW.
- Any Communication pipe or supply pipe incorrectly laid in a driveway will not be vested by SW. (Unless agreed with SW at Technical Approval stage)
- Where laying a 'Communication' pipe or 'Supply' pipe in a parking areas or drive ways cannot be avoided then the correct pipe materials must be used (a barrier pipe).



Photograph examples & explanation

FAR-SIDE CONNECTIONS



1st Photograph Far-side 1a A photograph showing the line of the communication pipe from the far-side excavation to the near side, excavation. The communication pipe must be at 90° degrees from the main to the Boundary stop valve.

2nd Photograph Far-side 1b A photograph showing the excavation with the position, location, depth, size and diameter of the main laid and the point of connection. The photo should also be able to show the position of the other utilities and services within the excavation. Any new main laid shall have a minimum of 300mm distance of clearance from other utilities for future repairs and maintenance.

3rd Photograph Far-side 1c A photograph showing the duct entering the far-side excavation. The third photo is required to confirm the size of duct 100mm. The colour of the duct (blue only) as well as the position, depth and location of the duct within the far-side excavation.

4th Photograph Far-side 1d

A photograph showing the duct entering the near-side excavation. The colour of the duct (blue only) as well as the position, depth and location of the duct within the far-side excavation.

5th Photograph Far-side 1e A photograph showing the location of the boundary stop valve and any other utilities within the near-side excavation.

6th Photograph Far-side 1f One photograph from the boundary line / stop valve showing the entire length and line of the supply pipe laid within the property up to the foundation of the property as it enters the building.

7th Photograph Far Side 1g A photograph showing the supply pipe entering the property at foundation level showing the correct depth with insulation within the duct.

8th Photograph 1h A photograph showing the internal plumbing within the property showing the double check valve, stop valve and drain valve.

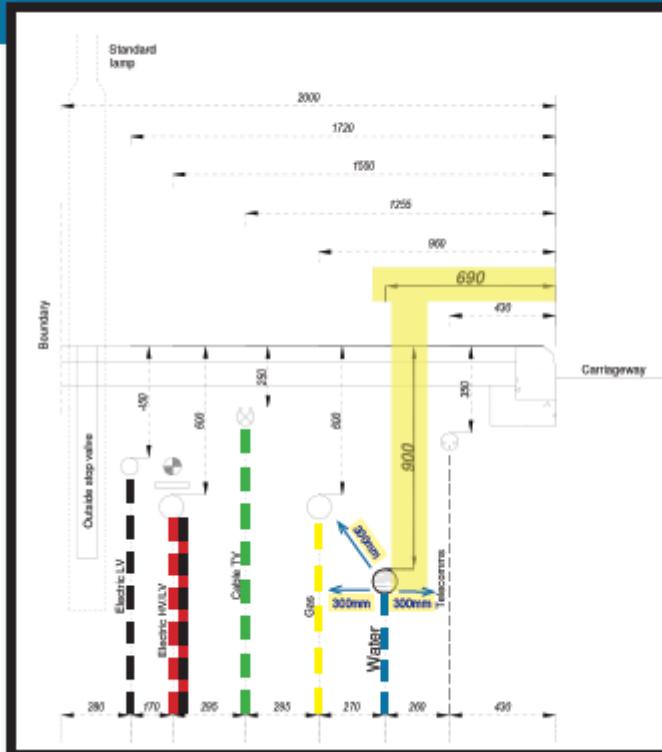
9th Photograph 1i An internal photograph showing the internal plumbing double check valve, stop valve and drain valve within the kitchen area & or a Photo showing the plot number for each individual property.

10th Photograph 1j All final connections made to the live main / network must be photographed by the UCP making the final connection to confirm compliance with DOMS / Water For Scotland, i.e. Comms pipe service saddle / ferrule installed correctly on top of the main at 12 noon and boundary stop cock fitted with no other utilities affecting future repairs etc.



Scottish Water requires Geo-Tagged photographic evidence for each location of the entire main and service pipe (communication pipe / Supply pipe) laid for validation on compliance with its DOMS documentation and with Water For Scotland for depth for frost protection and any future repairs and/or maintenance.

Diagram A.



NJUG Guidelines on the positioning and colour coding of 'Underground Utilities Apparatus'.

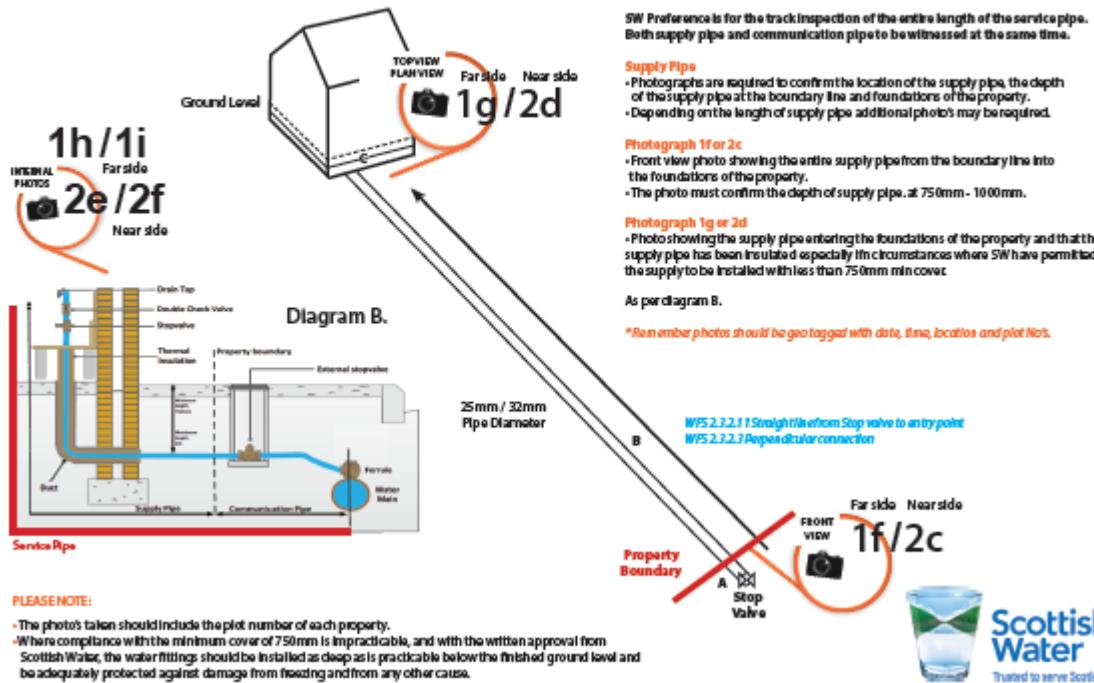
Any new watermain laid shall be laid 650mm from the kerb line from the carriageway.

Any new main laid shall have a minimum of 300mm distance of clearance from other utilities for future repairs and maintenance.

No other utility shall be laid directly above the main.

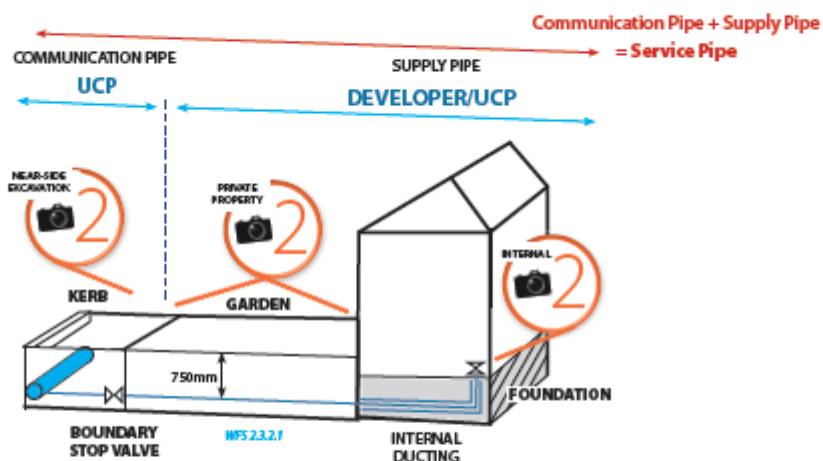


TRACK INSPECTIONS



OVERVIEW OF NEAR-SIDE SERVICE CONNECTION

This is the minimum number of Geo-Tagged photos required by SW for each location of the main and service pipe laid for validation on compliance.



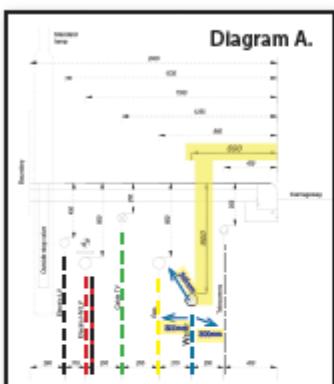
PLEASE NOTE

- Photo graphs are now required to confirm the correct compliance on site with SW Water For Scotland & SW DOMS documentation.
- All photographs taken must be Geo-Tagged and be legible and clear with all the required points asked for in appendix.
- Each Near-side connection requires a minimum of **6 Geo-Tagged photo graphs** in total to demonstrate compliance with Water For Scotland by either the WIRS Provider and/or the Developer and their ground workers with the installation of the entire 'Service Pipe' (Supply pipe & Comm Pipe).
- All mains laid shall have a minimum depth of cover of 900mm and a maximum depth of cover of 1500mm with 300mm clearance distance from any other utilities.
- All Service pipes laid shall have minimum depth of cover of 750mm and a maximum depth of cover of 1000mm.
- Any Service or duct not laid to the correct depth or line into the property will not be tested by SW.
- Any Communication pipe or supply pipe incorrectly laid in a drive way will not be tested by SW. (Unless agreed with SW at Technical Approval stage)
- Where laying a 'Communication' pipe or 'Supply' pipe in a parking areas or drive ways cannot be avoided then the correct pipe materials must be used for the entire length of the service pipe i.e. barrier pipe.

Ref. Pg 2 Water For Scotland



NEAR-SIDE SERVICE CONNECTION



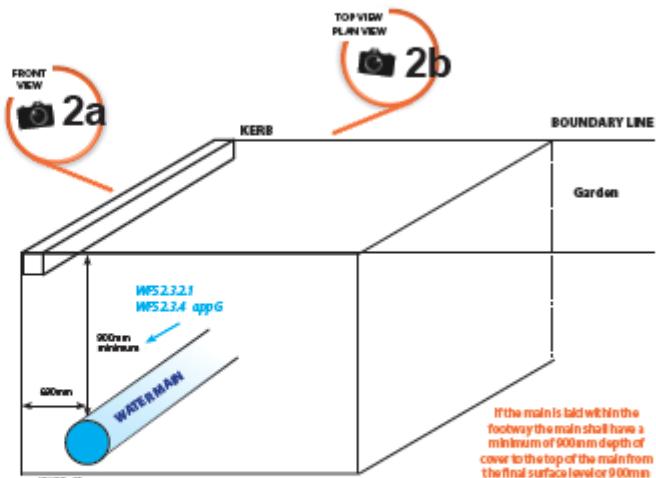
Minimum 6 Geo-Tagged Photographs required for near side connections.

1st: Minimum 1 photo showing position of water main and Communication Pipe. 2nd: Photo requires depth confirmed and distance from gas main or the other utilities within the excavation.

This is the minimum number of Geo-Tagged photos required by SW for each location of the main and service pipe laid for validation on compliance.

- Front view all service connections must be at 90 degrees and perpendicular from the main.
- Front View should include line of Communication pipe & Supply pipe into property and property number.
- Plan View After connection to main has been completed 1 photo showing position of boundary stop valve.
- Where laying a 'Communication' or 'Supply' Pipe in parking areas or driveways cannot be avoided then the correct pipe material must be used for the entire length of the service pipe i.e. 'BARRIER' Pipe.
- Installing a boundary stop valve inside private property may only occur with a agreement and authorisation by SW in writing at Technical Approval stage.

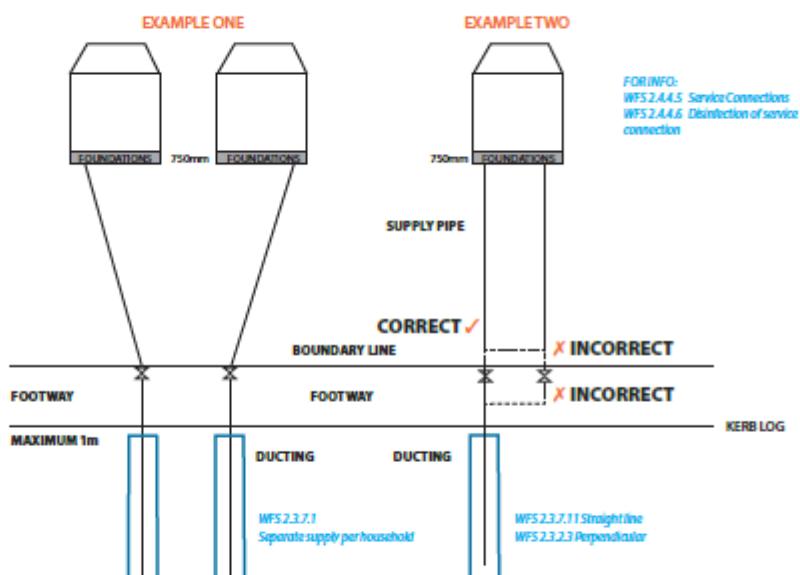
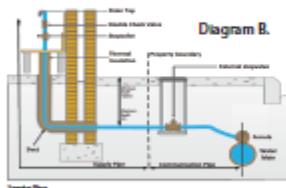
ADDITIONAL NOTE: Any Stop Cock laid inside property boundary or any service connections laid in driveways that have not been formally agreed in writing by Scottish Water in advance of the connection being undertaken and completed WILL NOT be tested by Scottish Water.



If the main is laid within the footway the main shall have a minimum of 900mm depth of cover to the top of the main from the final surface level or 900mm from the carriageway final surface level.



SUPPLY PIPES



Supply Pipe

- The Supply pipe should run in a straight line from the entry point into the property to its foundations to the boundary stop valve.
- A single dedicated duct is to be installed for each separate individual Communication Pipe.
- Any Communication pipe not laid correctly will not be tested by Scottish Water.

Ref: Pg 12 Water For Scotland

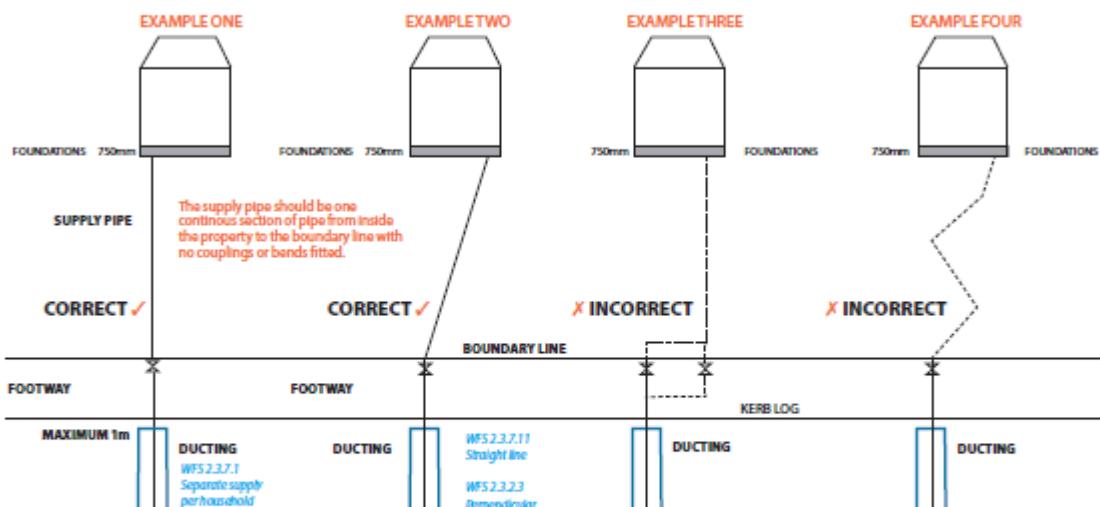
The Supply pipe should run at an alternative angle from the foundation to the boundary line within the property boundaries however, all communication pipes must be 90° perpendicular from the main.

The supply pipe should be one continuous section of pipe from inside the property to the boundary line with no couplings or bends fitted.

Communication pipes must not run along the public footway.



EXAMPLES OF HOUSE CONNECTIONS - NEW DEVELOPMENTS



Supply Pipe

- The Supply pipe should run at an alternative angle from the foundation to the boundary line within the property boundaries however, all communication pipes must be 90° perpendicular from the main.
- Communication pipes must not run along the public footway
- The Supply pipe should run in a straight line from the entry point into the property at its foundations to the boundary stop cock.
- A single dedicated duct is to be installed for each separate individual Communication Pipe.
- Any Communication pipe not laid correctly will not be vested by Scottish Water.
- When connecting the supply pipe to the communication pipe where possible, there must be no joints created. If joints must be created, they should be kept to a minimum throughout the length of the pipe.

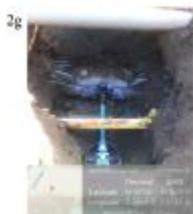
Ref Pg 12 & 15 Water For Scotland



Trusted to serve Scotland

Photograph examples & explanation

NEAR-SIDE SERVICE CONNECTIONS



1st Photograph near-side 2a FRONT VIEW

A photograph showing the line of the communication pipe from the main to boundary/stop valve. This should confirm the position of the communication pipe being at 90° and perpendicular from the main and the depth of the communication pipe at 750mm - 1000mm.

2nd Photograph near-side 2b TOP VIEW / PLAN VIEW

A photograph showing the near-side excavation with the position, location, depth, size and diameter of the main laid and the point of connection. The photo should also confirm the location and position of other utilities and services within the near side excavation.

3rd Photograph near-side 2c One

photograph from the boundary line / stop valve showing the entire length and line of the supply pipe laid within the property up to the foundation of the property as it enters the building.

4th Photograph near-side 2d

A photograph showing the supply pipe

entering the property at foundation level showing the correct depth (750mm) with insulation within the duct.

5th Photograph near-side 2e A photograph showing the internal plumbing double check valve, stop valve and drain valve.

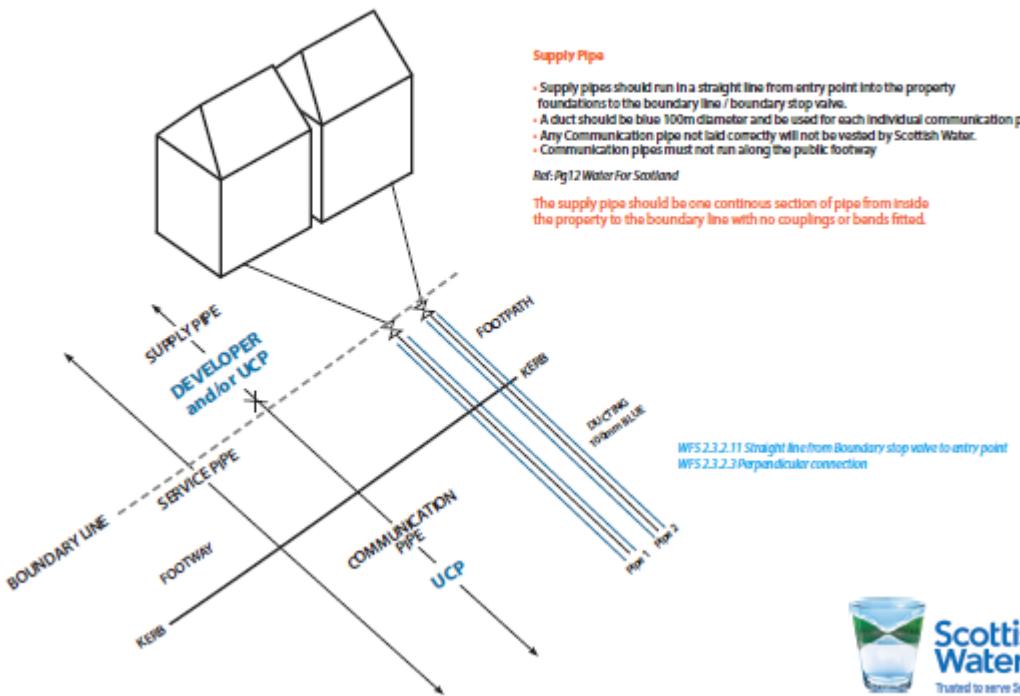
6th Photograph near-side 2f An internal photograph showing the internal plumbing double check valve, stop valve and drain valve within the kitchen area & or a photo showing the plot number for each individual property.

7th Photograph near-side 2g All final connections made to the live main / network must be photographed by the UCF making the final connection to confirm compliance with DOMS / Water For Scotland. i.e. Comm pipe service saddle / female installed correctly on top of the main at 12 noon and boundary stop cock fitted with no other utilities affecting future repairs etc.

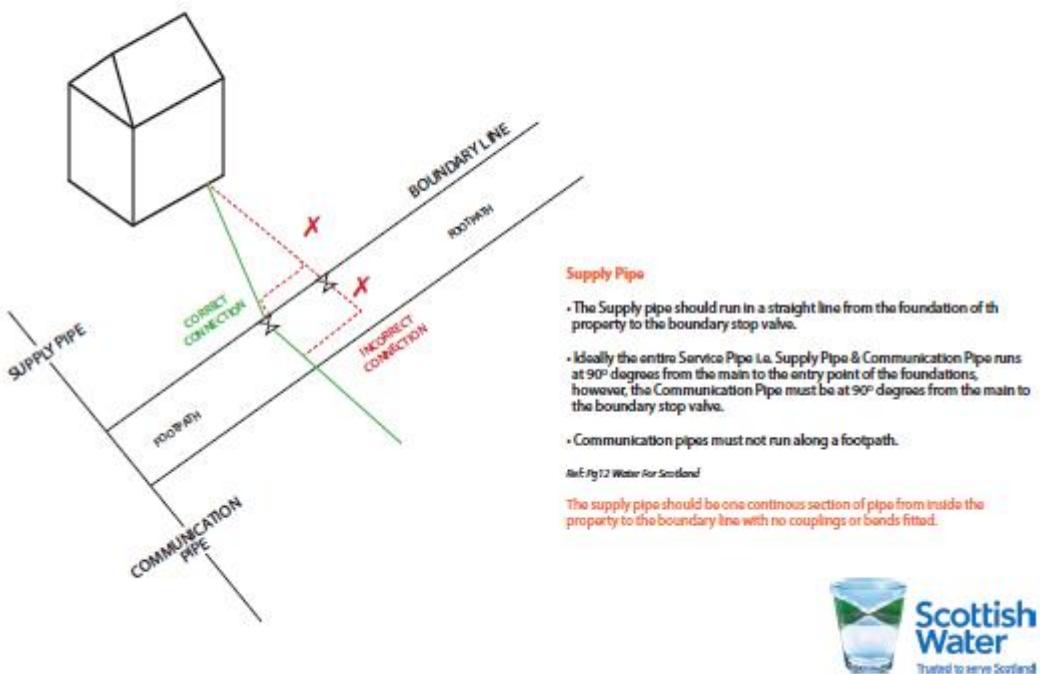
Scottish Water requires Geo-Tagged photographic evidence for each location of the entire main and service pipe (communication pipe / Supply pipe) laid for validation on compliance with its DOMS documentation and with Water For Scotland for depth for frost protection and any future repairs and/or maintenance.



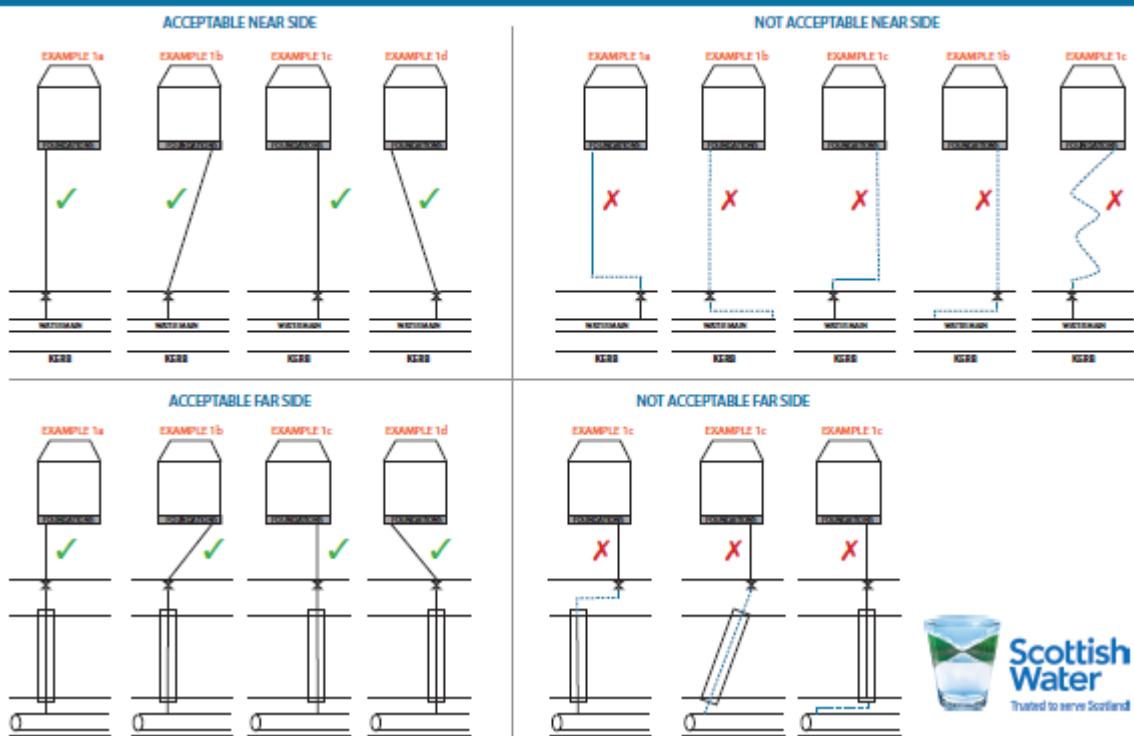
SUPPLY PIPES



SUPPLY PIPES



EXAMPLES OF HOUSE CONNECTIONS - NEW DEVELOPMENTS



The original slide pack is available from Scottish Water.

APPENDIX M – PE BARRIER PIPE

This is an Extract, the full document is available from Scottish Water.

1.0 Pipe Material Requirements

Scottish Water has approved the use of Polyethylene Barrier Pipe systems as adoptable assets within the Standards and Specifications in April 2008.

Polyethylene water pipelines can be affected by certain chemicals in contaminated land. These may be harmful to the pipe material but also cause taste and odour problems after permeating through the pipe wall. Where pipe work is to be laid in land potentially contaminated which can include 'brownfield' and 'greenfield' sites', polyethylene pipe incorporating an impermeable aluminium layer is an alternative material for construction.

Water Industry Specification (WIS) 4-32-19 published in November 2007 is the standard for polyethylene barrier pipe systems.

Within the requirements of WIS 4-32-19 Scottish Water has assessed the water quality implications of available pipe systems and laying techniques. The following barrier pipe systems and jointing techniques are approved for use as adoptable infrastructure assets.

- Barrier Pipe Systems must comply with Regulation 33 of "The Public Water Supplies (Scotland) Regulations 2014.
- Barrier Pipe Systems must comply with WIS 4-32-19.
- Both Type A and Type B pipe systems as defined in WIS 4-32-19 are approved by Scottish Water.
- **The following joint systems are approved by Scottish Water:-**
 - Mechanical (fluid) compression joint system - (Redman type or approved equal)
 - Mechanical fittings with full end loading bearing (WIS 4-24-01 Type 1) – GPS type fittings or approved equal

The use of barrier pipe must provide a complete Barrier System incorporating barrier pipe, proprietary jointing system, service pipe work and appropriate tapping tees for service connections. The full barrier pipe system must provide full barrier protection and meet the requirements of WIS 4-32-19 without the need for external wrapping

All polyethylene (PE) pipe work systems installed in contaminated land must comply with the requirements of WIS 4-32-19 and all related National or European standards. In addition all materials likely to come in to contact with potable water must comply with the requirements of Regulation 27 of The Water Supply (Water Quality) (Scotland) Regulations 2001.

Approval for use of barrier pipe materials in accordance with the Regulations is mandatory.

1.1 Water Mains and Service Pipework Compatability

All water mains and service pipework materials must be supplied from an compliant single source manufacturer to provide an overall acceptable system.

2.0 WIS 4-32-19 Compliant Barrier Pipe Products

WIS 4-32-19 specifies the materials and physical / mechanical performance for barrier pipe systems using polyethylene pipes with aluminium barrier layer for potable water supply in contaminated land

together with associated fittings and joints in nominal sizes from 25mm service pipe work up to and including 630mm mains pipe work.

This is available as a download from www.wis-ign.org

Two types of pipe construction / design are available:-

- Type A – Where the aluminium layer and outside polyethylene layer are regarded as non-stress bearing. This is a standard PE pipe with an external aluminium layer encapsulated with an additional external layer of PE. Has a slightly larger external diameter than standard PE pipe.
- Type B – Pipes where one or more polyethylene layers and aluminium layer are stress bearing. Has an aluminium barrier encapsulated within main body of a standard PE pipe.

Scottish Water only approves the use of Mechanical Jointing/ Fittings, as detailed in Clause 1.0, which are full barrier fittings available for pipe sizes 90 to 180mm dia and to suit SDR and PE classifications. This arrangement provides exceptional permeation resistance for entire pipe systems and eliminates the need for any external wrapping.

As part of each manufacturer pipe systems, proprietary mechanical compression fittings are available for service pipe work in sizes 25mm to 63mm. Tapping tees are also available suitable as part of barrier pipe systems.

All pipe work has external brown stripes for identification as a multi-layer structured pipe in accordance with National Joint Utilities Group (NJUG) regulations.

All polyethylene barrier pipe systems, within the site, must comply with WIS 4-32-19 and be supplied from a single manufacturer. Barrier pipe installed using composite materials from more than one manufacturer is NOT acceptable and such pipe work will NOT be permitted to connect to the public water infrastructure system.

3.0 Water Quality Benefits

WIS 4-32-19 provides the focus on the quality of product testing and compliance and provides the necessary national standard for maintaining water quality. Utilising proprietary mechanical jointing system and service tapping tees provides a high level of pipe system confidence and security of water supply.

Due to the typical layout of carriageways/footpaths and service strips which are used to locate water mains, barrier pipe will provide an alternative material for construction. This will provide flexibility in site laying techniques and can deliver effective engineering solutions.

The inclusion of a barrier pipe system in the Standards and Specifications supports and compliments Scottish Water's Distribution Operations Maintenance Strategy (DOMS) policy.

4.0 Fittings for Private Mains

Scottish Water have assessed polyethylene barrier pipe systems when installed as a private main and the requirements for acceptable pipe fitting suitable for connection to the public water infrastructure system.

In order to provide due diligence and meet Scottish Waters duty of care, all private water mains must be pressure tested and disinfected in accordance with Water for Scotland, Hygiene Code of Practice and DOMS procedures. This is also a mandatory requirement of the Scottish Water Byelaws 2004.

Private water mains must also comply with WIS 4-32-19 and be supplied from a single manufacturer. Barrier pipe installed using composite materials from more than one manufacturer is NOT acceptable and such pipe work will NOT be permitted to connect to the public water infrastructure system.

For private mains **ONLY** butt-fusion and electrofusion jointing system will be acceptable where manufacturers recommendations are followed and in accordance with WIS 4-32-19. Such joints and pipe fittings **MUST** be suitably protected externally using an aluminium tape wrapping followed by a proprietary waterproof petrolatum tape applied in accordance with manufacturer recommendations.

All private mains will require a double check valve to be installed in line at the boundary directly before connection to the public water main.

APPENDIX N – WATER MAIN PROTECTION POLICY

This is an Extract, the full document is available from Scottish Water.

1. Introduction

Scottish Water (SW) has a legal requirement to maintain a supply of wholesome water to customers. We do this using our network of water mains, some of which may be located within land proposed for development. This document outlines SW Policy for all developers' contractors and infrastructure providers when designing developments around existing water pipelines.

To ensure SW can maintain, repair, refurbish and replace water mains, it requires access to them. The majority of mains have a level of statutory protection which ensures access is maintained and restricts development above and in close proximity to them. This policy document sets out SW's minimum level of access required to deliver its statutory duties.

SW's water network operates at significant internal pressure and has the potential to damage properties in close proximity to mains should they fail. SW aims to manage this risk by ensuring adequate distance is maintained between SW's assets and proposed buildings and structures that may be erected. This policy document sets out SW's recommended minimum stand-off distances to minimise the risk of damage to property.

2. Definitions

2.1 Access Distance

The Access Distance is the legally supported distance, required to facilitate future SW access to allow repair, maintenance or renewal of the water main in every direction (e.g. at the end of a water main or at changes of direction). The Access Distance will be measured from the outside of the pipe.

No buildings, structures or other developments that will restrict our access or put at risk the integrity of our assets is permitted within the Access Distance.

Our minimum access requirements are set out in Table 1 below. SW reserves the right to adjust the required Access Distance from that stated in Table 1, according to local circumstances and operational considerations. Reasons the Access Distance may be increased at the discretion of SW, include:

- a) The topography makes access for maintenance and repairs more difficult and / or requires larger items of plant and equipment.
- b) Site specific SW operational considerations.
- c) The water main is deeper than 2 metres to invert level.

Table 1 – Access Distances**Notes**

- a) Distances are **minimum** based on a pipe invert level up to 2 metres deep.
- b) Increases in depth within the main may result in an increase of the Access Distance.
- c) Final Access Distance will depend on site specific topography.

Internal Pipe Diameter Range	Minimum Access Distance ⁽¹⁾ Distance from edge of pipe (no existing physical site restraints)	Access Distance Distance from edge of pipe (Existing Physical restraint – e.g. Urban Roads)
Up to 180mm	3m	NJUG Guidelines in pavement ⁽²⁾
>180mm up to 14"/350mm	4.5m	NJUG Guidelines in pavement ⁽²⁾
>14"/350mm up to 18"/450mm	6m	See below ⁽³⁾
>18"/450mm up to 24"/600mm	8m	See below ⁽³⁾
>24"/600mm	Minimum 10m ⁽⁴⁾ dependent on specific site conditions	

⁽¹⁾ Scottish Water will apply the minimum Access Distance at all times.

⁽²⁾ National Joint Utilities Group.(NJUG) guidelines are to be followed for small diameter distribution mains in footpaths in urban situations.

⁽³⁾ For larger diameter mains in constrained urban roads a detailed risk assessment and method statement (RAMS) will be required to protect adjacent and new properties.

⁽⁴⁾ For major strategic mains >600mm – a detailed design, Risk Assessment and Method Statement and consideration of the “Washington Suburban Sanitary Commission - Pipeline Design Manual” WSSC2012 will be required, dependant on the criticality of the infrastructure and technical considerations including flood/damage risk and repair method statements.

2.2 Stand-off Distance

The Stand-off Distance is the minimum distance, that SW recommend habitated properties and structures, should be located away from the water main to prevent them being damaged due to a water mains burst. The distance is based on the operating pressure of the main, and the crater size calculations derived by the "Washington Suburban Sanitary Commission - Pipeline Design Manual" (WSSC).

The Stand-off Distance will **vary according to the pressure** within the pipe and should be checked with SW prior to assigning a Stand-off Distance. The Stand-off Distance stated in Table 2 is for guidance only and specific final Stand-off Distance shall be agreed with SW for each individual development. These recommended distances may be adjusted, according to local circumstances and operational considerations.

Reasons for stand-off distances to be increased at the discretion of SW include:

- a) The water main operates at a high pressure or is at a deeper than 2 meters to invert level.
- b) Properties are deemed to be at an increased risk of flooding or damage in the event of a mains failure.

Table 2 – Stand-off Distances

Notes

- a) Stand-off Distances are **minimum** based on a pipe invert level up to 2 metres deep.
- b) Increases in depth or high pressure may result in an increase of the Stand-off Distance.
- c) Final Stand-off Distances will depend on site specific assessment.
- d) Recommended indicative Stand-off Distances, are based on the WSSC Pipeline Design Manual

Crater size based on WSSC 2012 calculations	
Pressure within the Pipe	Recommended Stand-Off Distance (Max Crater Size from side of pipe)
2 bar	2.5m
4 bar	5.0m
6 bar	7.5m
8 bar	10m
10 bar	12m
12 bar	14.5m
14 bar	17m
16 bar	19.5m
18 bar	22m

APPENDIX O – TRACER AND MARKER TAPE (TBC)

This Appendix is still under development. A copy of the most recent Draft copy is available from SW

APPENDIX P – JOINTING PROCEDURE

Electro-Fusion Welding Procedures

All Electro-Fusion Welding that will be vested by Scottish Water will be undertaken by qualified personnel trained in accordance with the requirements of Water Industry Specification WIS 4-32-08 and using smart-box welding control boxes as detailed below:

- The electro fusion box must have right angled 447 lead ends, to allow for welding of fittings with both 4.7 mm and 4.0 mm terminals
- The electro fusion box should be fitted with an ambient temperature sensor
- The electro fusion box must be configured to record the Welders data via an operator card or similar
- The electro fusion box should have ‘error lock out’ configured to capture all critical errors throughout the weld process
- Each supervisor must possess a valid operator card to unlock after critical error lock out
- All joint data must be downloadable via USB key
- The electro fusion box must be suitable for 40V fittings up to 450 mm with long burn facilities (i.e. 9999 seconds)
- The electro fusion box must be IP65 rated

The Smart-Box system is an intelligent control system which will automatically prevent many of the common causes of failure in Electro-Fusion welding, however this system needs to be combined with precise and clearly understood site operating procedures in order to fulfil its potential. The method by which an Electro-Fusion weld shall be undertaken is outlined below. Note that these steps are in addition to other requirements such as DOMS or traffic management.

This procedure is to be read in conjunction with the WIS 4-32-08 speciation.

EF Welding Procedure

1. On arrival at the site, or at the start of each shift, the welding squad shall check all equipment is in place and in good working order, including ancillaries:
 - a. Smart-Box, complete with connector leads and spares
 - b. Mechanical pipe scraping tool
 - c. Hand-scraping tool (for use only in situations where it is impossible to use a mechanical scraper and requires site supervisor approval)
 - d. Pipe cutters appropriate to the diameter and material of pipe to be welded
 - e. Pipe clamps
 - f. Pipe straightener (if deemed necessary for type of pipe being welded)
 - g. Welding shelter appropriately sized for pipe being welded
 - h. Clean baseboard or ground sheet appropriate to the site conditions
 - i. Generator
 - j. Fuel for generator (sufficient to allow a full welding cycle)
 - k. Indelible pens for marking pipe insertion depths
 - l. Approved ‘wet wipes’ consisting of pre-impregnated lint free cloths soaked in a 90% isopropanol / 10% water mixture
2. If any of the above required items are missing or in unsatisfactory condition, the site work shall not start until the items are replaced or repaired

3. The site shall be assessed to ensure there is sufficient working space. Where the weld is to be completed in a trench a minimum clearance of 150mm is required all round the pipe. In the case of larger diameters, this minimum space may need to be increased.

4. If welding in a trench, the trench must be dewatered and any loose detritus removed. The invert of the trench should be levelled as far as is reasonably practical prior to laying a clean groundsheet below the proposed weld

5. Pipe and pipe fittings shall be visually checked to ensure they are of the same size, SDR rating and pressure rating. Pipe fittings shall remain bagged until immediately prior to the weld being made. In the event that a fitting is not bagged on delivery to site, it shall not be used.



- Photographic evidence is required to show steps 3, 4 & 5 i.e. workg area including equipment, have been completed and should be submitted when welding records are requested by SW

6. A welding shelter or tent shall be erected around the proposed weld / over the trench ensuring that it closes around the Smart-Box, the operator, pipe and fittings to prevent rain, dust or other debris reaching the weld during the process

7. The pipe end to be welded shall be cut square and any burrs removed

8. The pipe end shall be assessed for ovality, particularly on coiled pipes, and re-rounded using specifically designed tools where required

9. Using the mechanical scraper, remove a layer of between 0.2 and 0.4mm of material uniformly from the entire surface of the pipe, in excess of the pipe-end penetration depth (into the proposed fitting). Pipe surfaces shall only be prepared immediately prior to welding.

Note: in some cases due to working around other services, etc. it may be necessary to use hand-scraping tools to prepare the pipe. This shall only be permitted with the express permission Scottish Water.

10. The pipe end shall be wiped clean using approved wet-wipes to ensure all traces of dirt, mud or other debris are removed, beyond the full length of the clamping area. Separate wetwipes shall be used for each end of pipe and fitting. All surfaces shall be allowed to dry prior to insertion of pipe in to fitting. Where there is heavy contamination of the pipe or fitting or where the contamination cannot be removed using the wet-wipes, the pipe shall be re-cut or the fitting discarded. In no circumstances shall a joint be attempted with any form of contamination present in the weld zone.



- Photographic evidence is required to show steps 9 & 10 i.e. Pipe ends scraped and clean, have been compleed and should be submitted when welding records are requested by SW

11. Immediately after preparing one pipe end, the bag shall be opened at one end of the Electro-Fusion fitting and the pipe end inserted until it rests firmly against the fitting 'stop'. Using an indelible marker pen, the insertion depth shall be marked on the pipe by drawing a continuous circle around the edge of the fitting. The prepared pipe end or inside face of the fitting shall not be touched. If the prepared end of the pipe or inside face of the fitting is inadvertently touched or otherwise contaminated during this process, then it shall be cleaned using approved wet-wipes prior to insertion

12. Steps 7 to 11 shall be repeated for the other end of pipe to be jointed

13. Once both ends of the pipe are inserted into the fitting, the pipe shall be placed into the restraining clamps and a visual check undertaken to ensure that the pen markings on the two pipe ends have not moved relative to the fitting. In the event that they have, the clamps shall be removed

and the pipe re-inserted into the clamps. If correct alignment cannot be achieved then the pipe ends need to be cut back and re-prepared by repeating steps 7 to 12 before re-inserting into the fitting

14. The appointed welder shall ensure the control box is connected to the generator, switched on and ready to start a weld cycle

15. The appointed welder shall scan his own barcoded identity card into the control box thereby linking the subsequently recorded weld data to them

16. The welder shall then scan the barcode on the electro-fusion fitting which will automatically set the correct welding parameters on the control box

17. The welder shall take photographic evidence (with date and GPS location stamp) of the clamped pipe and fitting from sufficient angles to show that the weld has been properly set up, including evidence of scraping and insertion marking, and that there are clamps, groundsheets and protective tent in place



- Photographic evidence is required to show step 17 i.e. pipe securely in the alignment clamps, has been completed and should be submitted when welding records are requested by SW

18. The welder shall feed the requested data into the smart box to confirm that the various steps have been completed and shall start the weld process

19. On completion of the weld, including the necessary cooling or 'soak time' the welder will check that

- a. the control box has recorded no error messages,
- b. there has been no movement of the pipe in relation to the fitting (compared against the pen markings)
- c. the melt indicators on the fusion coupling have risen
- d. there are no signs of melted plastic having exuded beyond the ends of the coupling

20 (i). In the event of any negative returns from the above set of checks, the joint shall be cut out, beyond the previously scraped pipe, and the joint re-made following the steps above. Under no circumstances will a second attempt be made to weld a joint which has not passed the quality checks

20 (ii). On completion of the weld, the welder shall seek the approval of the site supervisor who shall sign-off each individual weld (or condemn it if not deemed to be acceptable – in which case the weld shall be cut out and re-made)

21. The recorded weld parameters – downloaded from the control box – along with the photographs taken for each weld and a copy of the supervisor 'sign-off' shall be uploaded and stored on an appropriate data handling system as a permanent record of each weld

Site Auditing

1. Contractor or UCP auditors will liaise with SW (QCA's of FCA's) to ensure a sensible, non-disruptive programme of site audits is agreed. This may take the form of sharing findings from individual audits or working together to combine audits and minimise site 'down-time'

2. Auditors will review the uploaded data from the smart boxes and photographic evidence firstly to check that the expected level of data is recorded, including site supervisor sign-off for each joint.

In the event that any anomalies are discovered (e.g. no data uploaded when welding work is known to have been scheduled on a site) the auditors will speak to the site supervisor for an explanation. In the event that a plausible reason is given (e.g. the works were cancelled) then the auditors will double check this via other records / senior management / site visit).

Where there is no good reason for data anomalies, the auditors will investigate fully and ultimately have the authority to order the re-excavation and removal for testing of any joints for which there are no records.

Data will also be analysed for trends such as a recurring issue with a particular squad or control box and use this data to initiate further investigation. The results of these investigations may be the identification of further technical or behavioural training requirements, identification of faulty equipment which needs to be replaced, or an additional or revised procedural step to take account of particular issues such as geographical location

3. SW auditors will arrive at sites known to be undertaking Electro-Fusion welding and observe the process being carried out in addition to general observation, the auditors will work through the same pre-start checklist as the welding squad would have, to ensure that all necessary equipment and ancillaries is available on site

SW Auditors may also at any time instruct the welder to cut-out a completed weld prior to backfilling, and remove the joint for full laboratory testing.

4. In the event of any failures of welds being reported (i.e. leaks) the joint will be re-excavated, cut out and sent off for a full suite of tests at the expense of the contractor or UCP.

It is inevitable that a small percentage of failures can occur as a result of material faults (pipe, fitting or welding equipment). If this is found to be the cause of the failure, then the contractor or UCP will immediately report their findings to the suppliers and work with them to reduce the likelihood of the incident re-occurring.

If a failure is attributed to poor workmanship, the contractor or UCP responsible for the costs of replacing the joint.

APPENDIX Q – Pre-start meetings (TBC)

This Appendix is still under development. A copy of the most recent Draft copy is available from SW

APPENDIX R – PRESSURE TESTING

This is an Extract from the SW Hydrostatic Pressure Testing – Water Mains document available from Scottish Water.

Introduction

The purpose of this hydrostatic pressure testing procedure is to ensure that all hydrostatic pressure tests undertaken on all new mains installed within Scottish Water are conducted safely and effectively.

The purpose of pressure testing any new water main or service connection is primarily to identify its structural integrity for any leakage and also for verifying the performance of the new main or service laid for adoption and acceptability.

Hydrostatic pressure testing is used to identify if there are any faults, leaks or defects from,

1. Poor pipe laying procedures or workmanship during the construction of the main or pipe.
2. Damaged to any pipework, materials or fittings during construction.
3. Non-conforming fusion joints or tapping bands or saddles, flange sets, or mechanical joint.
4. Any manufacturing defects of Mains, Pipe, Materials or Fittings.

Hydrostatic Pressure Test

SW requires that hydrostatic pressure testing of all PE mains & pipe work must be tested using a TYPE 2 test and is carried out in strict accordance with IGN-4-01-03 – Issue 2 – Pressure Testing of Pressure Pipes and Fittings for Use by Public Water Suppliers.

Ductile Iron & Steel mains shall be Pressure tested using the Volume of added Water & Volume of Water Loss methods.

There are a number key factors which must be consider below which will affect both the choice of test section and its length and also the results of a hydrostatic pressure test these include but are not limited to,

- The length and diameter of main being tested and the number of joints and fittings.
- The availability of a suitable potable water supply to fill and pressure test the main.
- The location of a suitable discharge point for the water used after testing.
- To prevent an Environmental Pollution Incident (EPI)
- Any difference in elevation to meet the System Test Pressure (STP) and or the % of trapped Air within the main.
- Any temperature variations on site especially for PE pipelines and creep factors.
- The size of pump and its capacity including its maximum pressure and flow.

Main Rehab

The above mains rehabilitation techniques require a separate type of hydrostatic pressure test to be undertaken which is a 10 minute test which is suitable for mains up to 180mm outside diameter and 200mtrs in length with a low number of joints.

Anywhere a new main is being inserted into a host main as the new main can be damaged by existing services or where the existing main has been cut out for new service to be reinstalled or from shards from pipe bursting etc.

Larger diameters mains or longer section of mains shall be undertaken using the type 2 pressure test. Any new mains laid as part of mains rehabilitation program using the Open Cut method shall be pressure tested using a type 2 pressure test.

Safety Note

This document sets out the requirements for undertaking, checking and validating pressure tests in Scottish Water using industry best practice. It also provides the basic guidelines for the safety and protection of personnel on site and the general public during pressure hydrostatic test. It is the responsibility of the individual hydrostatic pressure testing company and its staff to further develop its own appropriate generic and or site specific safety plans and control measures and with their implementation to safely carry out hydrostatic pressure testing of Water Mains & Fittings in Scotland as well as complying with any other appropriate legislation or documentation relating to hydrostatic pressure testing in the UK. i.e. The Health Safety Executive, Safety requirements for pressure testing Guidance Note GS4

Hydrostatic Pressure Test

Scottish Water requires its new Pressure Test proforma to be completed to allow SW to standardise testing, improve, validate and reduce the need for SW staff to be onsite for all witness testing and to give quicker authorisation for connection to the live distribution network .

SW requires a more robust process with either supplementary Video or Photographic evidence provided for each of the various elements of a hydrostatic pressure test that includes full analysis in both an electronic format and PDF and to check and confirm the results in compliance with this procedure for SW authorising a Pass to any pressure testing that is undertaken.

Any pressure test submitted without the new SW Pressure test proforma and either No Video or Photographic evidence will result in SW being unable to confirm compliance and validation of the pressure test and will deem the pressure test as having failed and will be required to be undertaken again with an onsite witness test by SW staff.

SW requires its new pressure test proforma to be completed for all pressure test undertaken which requires site specific information recorded by the company carrying out the pressure test.

The proforma can and should be used as a check list for all staff on site to correctly check and implement the control measures required to mitigate any issues which will affect and prevent a pressure test being undertaken successfully.

The company carrying out the hydrostatic pressure test is also required to submit and confirm all the recorded measurements, Data of the pressure and water flow and volumes used during the pressure rise phase (Ramp Up).

Electronic copies of the hydrostatic pressure test submitted must include the pressure tests Incremental readings (i.e. print outs 20sec), Pressure Decay Graphs, Flow meter readings with the relevant supporting video or photographic evidence for validation.

SW also requires a site drawing with the highlighted section of main / mains being tested. Geo tagged Photographic & or Video evidence Must now be provided with all hydrostatic pressure test submission and include the following:

- Hydrostatic Pressure test set up.
- SW Licenced stand pipe and serial number.
- Bored & Tapped Blank Plates used with additional valves to allow the safe removal of air.
- Electronic Data Logger with serial number & the calibration date.
- 200mm Pressure Gauges or calibrated digital gauges.
- Flow Meter.

Dual Functional Logger if applicable with serial number & the calibration date.

