Codes for Adoptions

Appendix D
Design and Construction Specification

Contents

Reading this document

Look out for any paragraphs or tables that have a blue vertical or horizontal border. There will be italic writing within these sections to show how Thames Water's requirements may differ to other water companies.

1. Scope

This document has been prepared to assist practitioners with the planning, design, construction and commissioning of a Self-Laid Main and Service Pipes to supply domestic and industrial/commercial properties.

It has been prepared to meet the requirements of the Code and is a template document. The contents of this template are mandatory but there remain a number of areas where there will be variations between individual Water Companies.

This template indicates where there is scope for variation and each Water Company will complete those parts of the document and publish a Water Company specific version on its website. That version will govern the requirements in that Water Company's area.

This document should be read in conjunction with the Water Sector Guidance which can be found on Water UK's website at https://www.water.org.uk/technical-guidance/developers-services/water-asset-adoption/

Over time, it is envisaged that work will be undertaken to reduce the scope of variation between each Water Company's version of this document. This will be done through change requests presented to the Water Adoption Code panel (details of which can be found on the Water UK website).

2. Responsibilities

An SLP and/or Developer wishing to design and/or construct a Self-Laid Main shall comply with the DCS.

It is the responsibility of the Water Company to ensure that the relevant sections of the DCS conform to its design standards, completing the sections highlighted in yellow with their own parameters and inserting text where instructed by the square brackets. Completing these sections will create the Water Company's Design and Construction Specification document which shall be published on the company's website and which form a contractually binding part of the Water Adoption Agreement.

Within this document the words "include" and "including" are to be construed without limitation.

3. Terminology

In this document the following terms have the stated meanings:

Shall: Indicates a mandatory requirement

Should: Indicates a strong preference or best practice

May: Indicates an option which is not mandatory

References to the SLP shall include a reference to its permitted contractor where relevant.

4. Charging

Water Company charges for work relating to the adoption of water assets are based on the Water Company's published charging arrangements.

Funding of any work over and above that which is required to supply a Site (including Network Reinforcement) shall be in accordance with Ofwat's Charging Rules and therefore any work of this type shall be identified during the design stage and funded appropriately by the Water Company.

5. Abbreviations

AC	Asbestos Cement
AOD	Above Ordnance Datum
ACS	Annual Contestability Summary
CDM	Construction, Design and Management Regulations
CESWI	Civil engineering Specification for the Water Industry
CI	Cast Iron
COSHH	Control of Substances Hazardous to Health
DEFRA	Department for Environment, Food and Rural Affairs
DCS	Design and Construction Specification
DI	Ductile Iron
DMA	District Metered Area
DWI	Drinking Water Inspectorate
EA	Environment Agency
EUSR	Energy and Utility Skills Register
FRS	Fire and Rescue Service
HAUC	Highway Authorities and Utilities Committee
HPPE	(PE100) High Performance Polyethylene
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act
ICE	Institution of Civil Engineers
IGN	Information & Guidance Notes
IWater	Institute of Water
LR	Lloyd's Register EMEA
MDPE	(PE80) medium Density Polyethylene
NCO(W)	Water Network Construction Operations
NRSWA	New Roads and Street Works Act
NVQ	National Vocational Qualification
OFWAT	the Water Services Regulatory Authority
PE/AL/PE	Polyethylene Aluminium Composite Barrier Pipe
PE	Polyethylene
PE80	Medium Density Polyethylene
PE100	High Density Polyethylene
PPE	Personal Protective Equipment
PPM	Parts Per Million
PVC	Poly Vinyl Chloride
SDR	Standard Dimension Ration - Outside diameter / Wall Thickness
COMPETENCY	Safety and Technical Competency
WIA	Water Industry Act
WIRS	Water Industry Regulation Scheme
WIS	Water Industry Specifications
WRAS	Water Regulation Advisory Service

6. Nomenclature

v	-	Volume, Litres
A	-	Area, metres squared
V	-	Velocity, metres per second
Q	-	Flow, litres per second
t	-	Time, in seconds
P	-	Pressure, in Bar
H	-	Static Head, in metres
hL	-	Head loss due to Friction, metres
L	-	Length in metres
G	-	Gravitational acceleration, ms-2
D	-	Diameter, millimetres
i	-	Hydraulic Gradient, metres per metre
[]	-	Kinematic viscosity of fluid, m²/s
Ks	-	Effective roughness value, millimetres
Qt	-	Design Flow, l/s
LU	-	Loading Units
E	-	Equivalent length, metres
Ω	-	Soil Resistivity, Ohm -cm

7. Reference Documents

See Appendix 1 for a comprehensive list of reference documents.

The documents in this list are relevant to design and construction standards but may not necessarily be referred to expressly in this DCS.

If there is a conflict between any of those standards and the DCS, the DCS shall take precedence unless otherwise agreed by the parties.

A list of accredited SLPs can be found here:

https://www.lr.org/en/utilities/water-industry-registration-scheme-wirs-wirsae/search/

8. Construction (Design & Management) Regulations 2015 (CDM)

8.1 General

The relevant sections of the CDM Regulations (2015) apply to all design works carried out by or on behalf of the Water Company – both the Water Company's representative (Approving Design Engineer) and the SLP's representative (SLP Designer) are Designers under CDM Regulations when the design of Self-Lay Works is being generated and accepted for adoption. When carrying out work specific to a Site, neither the SLP Designer nor the Approving Design Engineer would be expected to be the Principal Designer. The Client (Developer) has a responsibility to formally appoint a competent Principal Designer and Principal Contractor for the Site. The Principal Designer shall provide oversight of all design activity in accordance with the Regulations.

To comply with CDM Regulations (2015) it is expected that, prior to release for construction, the SLP Designer shall:

- Ensure that the design avoids or addresses at source foreseeable risks to health and safety
- Give priority in the design to measures which will protect all people associated / or affected by the project
- Ensure that the design includes adequate information about any aspect of the project, structure, and all materials which may affect the health and safety of persons during construction and during any subsequent maintenance operations
- Make the Water Company aware of any non-standard method of operation applicable to the Self-Lay Works
- Record non-standard residual risks including chemical or oil pipeline crossing, working at height which cannot be designed out, in the project file, and a copy passed to the Principal Designer and Water Company
- Co-operate with all parties concerned with planning and design for the project

The SLP responsible for the proposed construction shall be made aware of the risks identified by the Designer and the control measures required to reduce the risks to an acceptable level.

A design which is prepared or modified outside Great Britain, for use in work to which CDM 2015 applies, must comply with "Regulation 9 – Duties of Designers" and the person who commissions the work is responsible for ensuring Regulation 9 is complied with.

8.1.1 Pre-Construction Phase Plan

A Pre-construction Phase Plan shall be created at the design stage. This plan shall include the following:

- Description of works.
- Proposed time scales of works within the project.
- Details of risk and required control measures.
- Information required by Principal Contractor to demonstrate competence of resources.
- Information for preparing the health and safety plan for the construction phase

The pre-construction phase plan shall be passed to the Principal Contractor for inclusion and development of their Construction Phase Plan before work commences on Site.

8.2 Collaborative Design

On occasion Water Companies may produce indicative design drawings relative to the proposed Site layout for costing, routing or tendering purposes.

Where this is the case the design drawing should be clearly marked as "Not for Construction" and/or an accompanying document produced which states precisely what has been considered when producing that layout drawing. The Water Company shall detail any services supplied and the rates chargeable in its published Charging Arrangements.

8.3 Contestable Work – Installation of District Meter or Pressure Reduction Equipment

Sites may require a Source of Water Connection from a high-pressure Water Main and, in such a case, the Water Company may require a pressure reducing valve or district meter installation as part of the Non-contestable Work and Services (typically with branch connection). In this instance, the Water Company shall assume Designer responsibility under CDM Regulations for this element of the work solely where it is off Site (outside of the site boundary) and out of scope of the contestable activity to be undertaken by the SLP.

If this installation is required to be installed within the Site boundary due to the proximity of the Source of Water Connection, then design responsibility will be determined between the parties by written agreement.

9. Design Process

9.1 Minimum Information Required from Developers

Appendix E (Minimum Information) of the WSG contains a complete statement of information requirements at all stages of the adoption process. At the design stage, the SLP may be Accredited to carry out the design activity or may request the Water Company carry out this activity if the Water Company offers this service as a Local Practice under section 4.6 of the WSG. An application form available from the Water Company website shall be completed which is used to identify the minimum inflow of information to begin the design process relevant to the route of delivery of the Design.

9.2 Point of Connection (PoC) Requests

At the determined PoC the connection is typically made by an under-pressure connection (UPC) to ensure disruption to existing customers is minimised. However operational considerations may dictate that the Water Company determines that a UPC is not suitable and that the connection will require a tee piece to be installed. This involves isolating the Network and cutting a section of the existing Network out to insert same, and additional valves may also be installed in conjunction, on the existing Network. Such a connection will be considered as Non-contestable work.

Where additional valves on the existing Network, typically installed at the same time as a connection involving cutting in to the existing Network, are not specifically required in the design for the new Self-Laid Main (i.e. to supply a Site) but which the Water Company requires to be installed for operational reasons; then these valves shall be considered as Network Reinforcement work.

The Water Company may identify a supply need in respect of future development that means that it requires Network Reinforcement to be incorporated within the SLP's design (eg. via the planning system, local authority development plans or developer engagement). In these circumstances, the Water Company shall initiate discussions with the SLP when a Point of Connection (PoC) is issued, or at the earliest opportunity if a Point of Connection (PoC) has already been issued.

Similarly, where the Water Company identifies a need for the improvement or upgrade of the Network as part of the Self-Lay Works, the Water Company shall initiate suitable discussions with the SLP when a Point of Connection (PoC) is issued, or at the earliest opportunity if a Point of Connection (PoC) has already been issued. These requirements may be incorporated by agreement into the final SLP Accepted Design.

If an alternative PoC is required and is evident particularly during the early stages of design by the Water Company to a PoC (that may have been provided also by an SLP/Developer) for technical and/or supply reasons the Water Company shall provide the SLP designer with an explanation and identify related options and requirements.

If Network Reinforcement work is deemed necessary by the Water Company relative to supplying the Site this shall be identified by the Water Company to the SLP and/or Developer during the initial design stage; and considered by the SLP designer in designing the layout of the Self-Lay Works.

The requirement for detailed design drawings and related information relative to design and/or construction activities shall be agreed between the parties to the WAA and included in Schedule1 of the WAA.

9.3 Annual Contestability Summary

9.3.1 This section contains information about how the Water Company assesses contestability of particular work categories.

9.3.2 Set out below at Table 9.3 is the summary that all Water Companies will publish at the date of implementation of this DCS and at least annually thereafter. This will be known as an Annual Contestability Summary (ACS) and it will be a Water Company specific variant of the standard template appearing at table 3.2 of the WSG.

9.3.3 No Water Company's ACS will allow fewer activities to be Contestable Work and Services than are set out on that template, as amended from time to time.

9.3.4 Each Water Company's ACS will be accompanied by indicative information about the steps that an SLP would be required to take to carry out the higher risk tasks shaded amber on Table 9.3.

9.3.5 It is expected that over time, the template ACS will be modified in the light of experience and of changing accreditation requirements, to increase the scope of Contestable activities available for SLPs to undertake.

9.3.6 The activities appearing in green on Table 9.3 shall always be Contestable (i.e. marked green).

9.3.7 The works and services designated Contestable by a Water Company under its ACS shall not, in any event, be fewer than those permitted to be carried out by SLPs in that Water Company's area before the date on which the Guidance comes into effect.

9.3.8 In advance of publication, the ACS will be discussed with relevant Customers in a Water Company's area. Each Water Company shall publish its ACS on its website no later than four (4) weeks before it takes effect, to allow sufficient time for SLPs to amend their processes, if required.

9.3.9 A Water Company will explain within its ACS where it has used its discretion to include an activity within the red category and ensure this is published on its website.

9.3.10 Where providing an adequate Site supply requires Network Reinforcement, elements of this work should be considered as Contestable subject to the scope of works required and impact on existing end-user customers. This concerns additional works to extend from the nearest Point of Connection of suitable size to a more distant Point of Connection specified by the Water Company. Charges shall by agreement between the SLP and the Water Company and with reference to Water Company Charging Arrangements.

Table 9.3

Thames Water Annual Contestability Summary	Work categories by number of properties potentially affected by work or strategic nature of Existing Main			
	>49	50-199	200-499	500+
Selection of a proposed POC to serve a Site/Development from records of Existing Mains				
Construction of new mains and service connections				
Construction of new mains as part of reinforcement of Network extension or associated Site diversion work				
Design of new water network				
Chlorination and pressure testing of Self-lay Works				
Meter installation in conjunction with new service connections				
Undertaking Water Quality samples				
Analysing Water Quality samples (subject to paragraph 17.3)				
Construction of routine mains connections (CRMC) connections				
Main and/or service connection: **up to 63mm** PE/Barrier pipe to:				

Parent Network: <12" nominal bore* DI/CI/SI/PE/AC/ Barrier pipe/ steel Permanent Connections (Piece through).				
Connection: **63mm to 300mm** PE / Barrier Pipe to: Parent Network: <12" nominal bore * CI/SI/DI/AC/PE/Barrier pipe/steel Operational pressure: up to 50m				
Connections: **63mm to 300mm** PE / Barrier pipe to: Parent Network: 12" nominal bore * to 18" nominal bore * / 300mm to 450mm nominal bore * DI/ CI/ SI/ AC/ PE/ Barrier pipe/Steel Operational pressure: 50m to 75m				
Connections: **over 300mm** to: Parent Network: 18" nominal bore * & above, or high risk parent Network: material (such as steel) Operational pressure: above 75m				
Valve operation in relation to commissioning new Self-Lay Works *				
Self-certification of SLP for Site water distribution systems designs				
Any size connection to GRP / PVC Network				
Design of Network Reinforcement (upsizing of existing assets) and/or design of Network diversion(s).				
Pipe sizing criteria, and the approval of design by others				
Assessment of network risk, & operating live network				
Commission telemetry links (meters / field equipment)				
Connection, commissioning and/or decommissioning of diverted Network				

* Notes:

1 All references to PE are to all Polyethylene pipe materials
2 PE pipe sizes are identified by outside (OD) diameter and other pipe materials and sizes refer to internal (nominal bore) diameters
3 Strategic main defined by reference to potential impact of work on key customer such as a hospital
4 See further paragraph 11.7 of the DCS

9.4 Activities shaded green in the ACS

9.4.1 All activities shaded green in the above table are capable of being performed by SLPs.

9.4.2 These green-shaded activities will apply where the SLP has the relevant WIRS or other accreditation (see section 7 of the WSG). Where further activities are accredited by WIRS, such activities shall be marked as green in the above table once approved by the Codes Panel.

9.4.3 The Water Company will set out the procedures it has in place relating to connections to the Existing Main and the forms supporting this. These will be published on the Water Company's website.

9.4.4 Changes will be brought about by the procedures set out in the Water Sector Guidance Section 11 – Governance.

9.4.5 References to the Final Connection of the Self-Laid Main to the Existing Main on the Network are;

a) of an under-pressure type connection and/or,
b) a connection to a previously installed temporary valve-controlled washout installed in conjunction with the connection to the Existing Mains Network at the POC to supply the Site or Development, and/or

c) a connection to a previously installed valve-controlled washout, which has been installed on a Self-Laid Main for a future connection off such main.

Where references to the Final Connection of the Self-Laid Main to the Existing Main on the Network require a section to be isolated by a shut (to enable it to be cut-out to install a connection point), and/or if a new branch tee is required to be cut into a Self-Laid Main and the relevant assets are subsequently adopted by the Water Company (and therefore forms part of the Network), then such connections are excluded from activities shaded green.

9.5 Activities shaded amber in the ACS

9.5.1 The activities shaded amber shall be capable of being performed by an SLP in the area of an individual Water Company where the SLP complies with the requirements of the Water Company as set out below. Such publication shall include information about control measures required to allow the work to be performed. The following paragraphs set out how publication of such information is to be approached.

9.5.2 The Water Company may require additional evidence of competence to carry out activity and/or require the SLP to follow an operational process equivalent to one that the Water Company's direct labour or term contractor would be required to follow.

9.5.3 The Water Company's requirements will relate to the specific Site and will take account of the type of connection involved; the location of the connection; the strategic importance of the main Network to be connected to; the potential impact on end user customers; risk to water quality and regulatory impact/consideration; and the resources the SLP proposes to use.

9.5.4 The company will set out the information it needs from the SLP regarding its Accreditation and how its general and specific operations, resources, and procedures will protect the company from any risk of interruption of supply to its end-user customers and/or to water quality. These requirements will be equivalent to those that the Water Company's direct labour or term contractor would be required to follow.

9.5.5 The SLP will need to demonstrate its competence or relevant experience to undertake this activity. This may be demonstrated where the Water Company has previously observed relevant Self-lay Works having been carried out by the SLP or by the SLP providing details of similar work that it has carried out to a satisfactory standard for other Water Companies.

9.5.6 Water Company requirements relative to valve operation in relation to commissioning of Self-Lay Works, a contestable activity, shall apply as set out in in paragraph 11.7

9.5.7 The Water Company will set out below the procedures it has in place to allow connections to the Existing Main and the forms supporting this. These will be published on the Water Company's website.

9.5.8 All SLP's must hold the CRUPC endorsement to be able to carry out connections onto an existing main. Any connection to an existing main must be carried out under pressure. The Water Company must provide a 'Permit to Work' operation number before work can commence. The contact details of the relevant Duty Manager will be provided, and they must be contacted on the day when work is about to start and again when the work has been completed.

9.6 Activities shaded red in the ACS

9.6.1 The Water Companies have concluded that connections shaded red in table 9.3 are of such a high risk that they are unlikely to be contestable in most conceivable circumstances

9.6.2 However, if an SLP wishes to carry out this work, it shall contact the Water Company directly to determine whether conditions can be agreed that enable the SLP to carry out the requested activity

9.7 Design Submissions to Water Company

Design submissions shall be submitted to the Water Company along with all supporting information as set out in Appendix E – Minimum Information of the WSG.

Any activity classed as Non-Contestable shall be confirmed in writing by the Water Company following discussion between the Water Company and SLP upon the issue of a Design Acceptance.

9.8 Design Proposal

When preparing a water network design proposal the SLP Designer shall:

1. Select appropriate materials for the Self-Laid Main and Service Pipes.
2. Determine the legal land ownership boundary of the Site.
3. Produce a drawing to an appropriate scale to show the layout and route of the Self-Laid Mains and Service Pipes and proposed meter arrangements (relative to Service Pipe entry points) in accordance with this Design and Construction Specification.
4. Provide all related material requirements and details as required by this Design and Construction Specification.
5. Calculate demands and size all Service Pipes in line with this Design and Construction Specification (see also paragraph 10.2).
6. Size the Self-Laid Mains across the Site as may be required to meet the requirements of the Site and any Development relative to the Site, following discussion with the Water Company. Any Water Company requirements will be communicated after such discussion has taken place. See further section 10.2.
7. Identify the agreed Point of Connection and determine by agreement with the Water Company all work that is Contestable and Non-contestable.
8. Design the appropriate number of Self-Laid Main fittings required to control the Network and the Self-Lay Works.
9. Identify any sections of Self-Laid Mains that require easements or wayleaves.
10. Identify any Special Engineering Difficulties as appropriate.

Water companies shall share with the SLP any pipe size methodology where this is requested by the SLP

9.9 Drawing Standards

The Water Company may supply the SLP with templates to assist in the standardisation of design drawings. If this is not available, then the SLP should provide their own design template.

Design and as-laid (as constructed) drawings shall be submitted to the Water Company electronically in both CAD and PDF format, by agreement with the Water Company, for incorporation into the Water Company's corporate geographical information system (GIS).

Design drawings shall show all asset locations, size and specification in a clear and unambiguous format. Should enlargements, blow ups or schematics be required in order to ensure a clear and unambiguous layout then these shall be incorporated within the design submission.

Design drawings shall include and clearly show, as a minimum:

1. Proposed off-site Self-Laid Mains to Point of Connection to the Network
2. AOD at POC and highest point of the site including Site topography can be provided separately
3. Proposed Self-Laid Mains, including position of sluice valves, washouts, hydrants, air valves and any other fittings required
4. Any requirements for the protection and/or diversion of the existing Network.
5. Material and size of each Self-Laid Main

6. Depth of each Self-Laid Main when installation depth is not in accordance with Streetworks UK guidance (subject to agreement by Water Company).
7. The Self-Lay Works and Water Company Works (Contestable / Non-contestable activities)
8. Position of existing buildings or features relative to the design proposal for reference (minimum of 3 points on the drawing to enable triangulation)
9. Individually numbered plots
10. Location of Service Pipes, showing size if above 25mm
11. Service Pipe entry points
12. Location of boundary boxes, manifold boxes and any meter chambers as applicable
13. Type of service connection for each plot, i.e., wall box, boundary box, manifold, internal
14. Hydrants adoptable by the Fire and Rescue Service
15. Location of any ducts
16. Any Special Engineering Difficulties
17. Areas of contamination where protective pipework is required
18. Future demand, or Development, or phase adjacent to Site as identified by the Water Company or Developer and its Point of Connection relative to the proposed Self-Laid Main
19. North point
20. Site boundary
21. Roads / highways / service strips (adopted or proposed for adoption)
22. Change in ground level
23. Service strips, wayleaves and easements required for the construction, operation and maintenance of the Self-Laid Main
24. Significant environmental and health and safety hazards
25. Contestable / Non-contestable works annotated
26. A drawing legend / title block

The above list represents best practice and in some cases, not all such drawings will be required by the Water Company. Water Companies will justify differences in documentation requirements between requisitioned and self-lay schemes.

9.10 Legend

The drawing legend shall contain:

1. SLP contact details
2. Developer contact details
3. Company carrying out the design (if different to above)
4. SLP Designer name
5. CAD operator name
6. Site name
7. Site address
8. Ordnance Survey coordinates
9. Industry recognised scale of the drawing
10. Drawing / revision reference number
11. Water Company reference number
12. Approval status i.e.
    a) Proposed design (not for construction)
    b) Water Company approved design (not for construction)
    c) Approved (for construction)

9.11 Design & Construction Variations

Changes to the design/construction of the Self-Lay Works (including those due to site conditions, changes to the Site made by the Developer, etc.) which require the re-issue of either the SLP Accepted Design or the Water Company Design shall be considered a Significant Variation. The Parties shall comply with the process in clause 19 of the WAA (Variations).

9.11.1 Minor Variations

Minor variations shall be agreed in writing between the Parties.

Minor variations shall be classed as changes to the proposed Self-Laid Mains and/or Service Pipe design with no significant impact on the maximum scope of work measured by the number of plots on the Site i.e. if there is no change in the number of plots or the financial transaction, the change is classed as minor.

10. Pipe Sizing Methodology

This section covers permitted pipe sizes and methodology of pipe size determination.

10.1 Permitted Pipe Diameters, Pressure Ratings and Permissible Materials.

- *PE80 pipe (note – only for service pipes 63mm & below)*
- *PE100 pipe*
- *Multi-layer skinned PE100 pipe*
- *ALPE PE80 type A barrier pipe*
- *ALPE PE100 type A barrier pipe*
- *Class 1 or 100 cement lined ductile iron up to 200mm in size*
- *Class 64 cement lined ductile iron for sizes 250mm - 400mm*

The below table specifies the Water Company's accepted size and pressure ratings for water pipes. Requests to use sizes and materials other than those listed below must be approved by the Water Company.

Size	Material	SDR	Pressure Rating
90mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
125mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
180mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
250mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
315mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
355mm	*PE100 / Barrier Pipe*	*17*	*10 bar*
90mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
125mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
180mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
250mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
315mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
355mm	*PE100 / Barrier Pipe*	*11*	*16 bar*
80mm	*Ductile Iron*	*N/A*	*16 bar*
100mm	*Ductile Iron*	*N/A*	*16 bar*

150mm	*Ductile Iron*	*N/A*	*16 bar*
200mm	*Ductile Iron*	*N/A*	*16 bar*
250mm	*Ductile Iron*	*N/A*	*16 bar*
300mm	*Ductile Iron*	*N/A*	*16 bar*

Table 10.1 Permitted pipes sizes, materials, SDR and pressure ratings to be used within the Water Company area.

Our preferred material for distribution mains is polyethylene PE100 SDR17 (10 bar) unless the maximum continuous operating pressure (PMA) requires a higher rating (PN).

If there is a specific risk of damage to the polyethylene pipe when being installed by trenchless technology, then SDR11 pipe shall be used.

10.2 Sizing of Water Mains

The Self-Laid Main shall be sized to meet peak hydraulic demands and shall be not oversized such that they fail to satisfy all requirements or conditions to maintain water quality.

The Self-Laid Main shall be sized to take in account the entire development that the Developer and SLP are aware of to avoid unnecessary upsizing later, taking into account:

- The results of any Network modelling by the Water Company relative to an area of Development by reference to information in the public domain and/or by reference to related development enquiries it has received.
- Information from the Water Company relevant to the design of mains and services for a Site and/or a Development.

(Water Companies' Charging Arrangements shall be referred to in relation to the provision of more than a single feed into a Site and/or a Development and/or relating to upsizing of proposed Self-Lay Works).

If the Water Company identifies a need for the betterment of Network or associated activity required on the existing network and has agreed with the SLP that they will undertake this work, or part thereof, then this proposal shall be shown as part of the detailed design of the Network and Service Pipe to supply the development.

The sizing of pipes for indicative design purposes (e.g. for cost estimates or tendering) may be done using a simple table method for number of properties. However, no reliance shall be placed on this indicative assessment for the purposes of any final design as pipes shall be designed in accordance with the principles and criteria stated below.

Our methodology for calculating pipe sizes is based on the Hazen Williams methodology.

10.3 Indicative Pipe Diameter Selection

As an indicative initial assessment of the water network pipe size requirements for a Site, Table 10.3 may be used to determine the size of pipe to supply a given number of residential dwellings. It may also be used as a method of determination of Source of Water requirements on the existing Network.

When a Water Company requires to deviate from these guidelines in determining a suitable PoC (e.g. inadequate capacity in the Network or site-specific constraints including the condition of existing assets) then such additional work would be categorised as Network Reinforcement and funded by the Water Company in accordance with its charging arrangements.

Number of Individual Residential Dwellings	Typical Pipe Outside Diameter (PE Pipes)	Nominal Bore (Other Pipe Materials)
0-20	63mm	50mm
20-40	90mm	80mm
40-95	110mm/125mm	100mm
95-300	160mm/180mm	150mm
300-700	225mm/250mm	200mm

Above Table 10.3: Derived from section A.12 of BS 805:2000

For all developments the Designer shall consider and incorporate spine mains as necessary to allow for additional development or phases of development which are to be connected ideally to at least two points on the Network. The Water Company shall make available information during this discussion and an assessment and advice shall be provided to the Designer of any Network Reinforcement to be considered in a Site design.

Note: Notwithstanding that more than one connection point into a Site may be designed (eg for mitigation of future supply risk) only one of these shall be designated as the Point of Connection of supply to the Site as required by the Sector Guidance). Any additional work over and above that which is required to provide the Site with a water supply shall be categorised as Network Reinforcement and funded by the Water Company in accordance with its Charging Arrangements.

10.4 Domestic Hydraulic Demand Calculations

In this section the Water Company shall specify the following constants:

X = 152 litres - Average demand per capita

Y = 2.3 persons - Average household occupancy rate

Z = Peak flow factor (refer to the table below)

The average daily consumption per household is 340 litres

Utilisation of peak design flows for varying numbers of properties is adopted in preference to consumption values and associated peaking factors. Please refer to the table below:

	Peak instantaneous flow	
No. Households	PID [l/s]	PID [l/s/hh]
1	0.10	0.100
2	0.15	0.075
3	0.2	0.067
5	0.25	0.050
8	0.3	0.038
10	0.35	0.035
12	0.4	0.033
18	0.5	0.028
20	0.5	0.025
25	0.6	0.024

40	0.8	0.020
50	1.0	0.020
70	1.2	0.017
75	1.3	0.017
100	1.55	0.016
125	2	0.016
150	2.25	0.015
200	3	0.015
500	6	0.012
1000	12	0.012
>1000	12	0.012

10.5 Calculations for Multi-Occupancy Building and Industrial and Commercial Domestic Use

Refer to the below table for calculate demand for buildings other than dwellings.

Property Type	Average Daily Demand (l/day)
General Housing (per property)	350
Flat (per property)	350
Primary School (per pupil)	30
Senior School (per pupil)	30
Boarding School (per pupil)	140
Assembly Hall (per seat)	10
Cinema (per seat)	10
Theatre (per seat)	10
Sports Hall (per person)	38
Hotel (per room)	300
Guest House (per room)	160
Motel (per room)	240
Holiday Apartment (per person)	120
Leisure Park (per person)	176
Caravan Park standard (per space)	200
Caravan Site serviced (per space)	360
Camping site standard (per space)	160
Camping site serviced (per space)	280
Public House (per seat)	120
Restaurant/Day Care Centre (per	216
Drive in restaurant (per seat)	304
Hospital (per bed)	450
Nursing/Care Home (per bed)	220
Offices (per m sq)	3
Shopping Centre (per m sq)	2
Warehouse (per m sq)	1
Commercial premises (per m sq)	2
Manufacturing unit (per m sq)	4

GP Surgery	2000

10.6 Process Water

It is expected that the client should provide peak demands given their individual knowledge of the Development. The connection and Self-Laid Mains that are to be installed should then be selected based on their peak demand.

10.7 Pressure and Flow

10.7.1 Source Pressure

For the purposes of designing the network, the SLP shall check with the Water Company to confirm pressure at the source During the design stage, if any constraints, eg, effect on headloss due to an increased AOD relative to a Site and/or Development, are identified by the SLP or the Water Company a workable solution is to be agreed between the Parties.

10.7.2 Pressure and Flow

Reference levels of service shall be used to ensure that networks can supply all properties with a minimum pressure and flow at the customer's communication pipe.

Minimum pressure in communication pipe at boundary of property to be serviced based on Ofwat's Guaranteed Standards Scheme (GSS) is 7 metres head with a flow of 9 litres per minute.

In normal operational circumstances Minimum Pressure at a hydrant or nodal point on the system shall be 15 mH or 1.5 Bar

Maximum Design Pressure (MDP) which is equal to Design Pressure plus allowance for surge, shall not exceed Pressure Nominal (PN) which is the pressure rating of the lowest rated component in the system.

SLP Designers shall clearly state where a component has been used below the Water Company's standard pressure rating to allow standard System Test Pressures (STP) to be adjusted on site.

10.7.3 Velocity

Minimum peak time velocities in all Pipes shall reach *0.4 ms^{-1}*

Maximum velocity in Mains shall not exceed *1 ms^{-1}*

Maximum velocity in Service Pipe shall not exceed *1 ms^{-1}*

10.7.4 Calculating Headloss through the Network

For newly designed and constructed Water Mains headloss per 1000m shall not exceed *2mH, target values shall be between 1m/1000m and 1.5m/1000m*

Thames Water calculate headloss according to the Hazen Williams equation.

10.7.5 Topography

Above Ordnance Datum (AOD) shall be the preferred scale when highlighting level changes on the design drawing.

The effect of increased altitudes on a Site shall be taken into consideration by the SLP Designer when low source pressures have been identified by the Water Company.

The finished floor level of the highest connection shall for the purposes of the design serve as the additional loss of head when ensuring the reference level of service.

10.8 Selection of Materials for Contaminated Ground

Materials for use in contaminated ground shall be selected in accordance with the Water UK Contaminated Land Assessment Guidance. See link in Appendix 1.

10.8.1 Ground contamination during construction

If contamination is suspected during construction of the Self-lay Works the work shall be stopped and be shall be isolated from the potential source of contamination and the incident reported to the Water Company and Developer. An investigation and action plan, which may include a change of pipe material (and/or replacement of the apparatus already installed) shall be agreed with the Water Company before work recommences. The SLP shall ensure that all employees are trained and able to undertake the appropriate actions when working in potentially contaminated land in accordance with health and safety legislation.

Consideration should be given to the effect of permeable surfaces on future contamination risk and documented in section 5 of the Contaminated Land Risk Assessment.

Refer to paragraph 21 for further information.

11. Water Main Design and Construction Principles

General principles in designing Self-Laid Mains shall be that they;

- Minimise whole lifecycle costs and impact on the environment
- Deliver minimum standards of service to customers
- Ensure security of supply so far as reasonably practicable (see section 4 as regards funding of any such additional works)
- Ensure continuing water quality
- Allow for safe and flexible operation of control points and surface assets

11.1 Design Accreditation

The SLP shall demonstrate that it has suitable design Accreditation based on WIRS.

11.2 Construction (pre-start)

Prior to the construction of any Self-Lay Work the SLP shall ensure that any Water Company required approvals have been obtained and that a pre-start meeting between the Parties has occurred when one has been requested by reference to paragraph 24.

11.3 Routing and Positioning Principles

Where the Self-Laid Main is to be laid within an adopted highway, a street, or a dedicated service strip, it should be laid in accordance with the latest Streetworks UK good practice guidance (Volumes 1 to 6) unless the Water Company has indicated its preferred routing and positioning of the Self-Laid Main and Service Pipe. In this case, the Water Company's requirements shall be incorporated into the design by the SLP Designer. Any requirement for preferred routing and positioning will typically be associated with technical requirements that includes future access to assets for maintenance and/or repair. Where the Water Company requests a change to the route due to it not meeting their specific requirements, the costs incurred will be payable by the Water Company. Any such variation will need agreement with the SLP and Developer before works proceed

Design Acceptance will consider any installation route relative to private land, land that is defined as a street and/or which is designated as highway and any requirement for an adoptable service strip or footpath.

Designs for the installation of Self-Laid Main and/or Service Pipe(s) in shared driveways (i.e. where multiple plots are to be supplied) shall be in accordance with the Water Company's criteria.

Private service pipes should be laid in private driveways as do not lay mains in private drives or any surfaces that are not constructed to a highway adoptable standard (with the exception of grass verges).

If it is not possible to follow the Streetworks UK guidance, then the SLP Designer should consult with the Water Company to agree the preferred location.

Any easements required will be obtained by Water Company (at the expense of the SLP/Developer which will include any consideration payable for the grant of easement and all legal costs and surveyors' fees incurred in relation to the documentation required). The easements must be granted direct to the Water Company and be entered into before adoption of the Self Lay Works can occur.

During construction the SLP/Developer shall use reasonable endeavours to ensure that other utility companies' apparatus installed after the Self-Laid Main and Service Pipe shall not restrict or compromise that Self-Laid Main and future access to it.

Self-Laid Mains are to be laid on the side of the road where the housing density is higher to minimise the number of service pipe crossings.

Although not a preferred configuration, the requirement for new Self-Laid dual Main(s) (typically where road construction prohibits utility apparatus at normal depths e.g. shallow drains, permeable paving systems) may be necessary, and in these instances such a technical consideration is to be agreed between the parties.

Security of supply may be increased by linking in the Self-Laid Main when there is a significant number of properties being serviced through a single pipe, provision for flushing in these cases must be made by designing washouts located within 3-way valve arrangements or between in line valves.

To reduce the likelihood of water quality issues from the lack of turnover in the Self-Laid Main to an end hydrant (dead leg) it shall not extend more than 1m past the last service connection.

Self-Laid Mains shall maintain minimum proximity to buildings and structures as specified by the Water Company in the table below:

Nominal Pipe Size mm	Min Proximity required (m) from centre line of Water Main
<299mm	*3 m*
>300mm	*5 m*

Table: 11.1 Minimum strip width required for varying pipe diameters

See also paragraph 13: Designers shall refer to Streetworks UK publication Volume 4: Guidelines for the Planning, Installation & Maintenance of Utility Apparatus in Proximity to Trees when selecting route in proximity to existing trees and if necessary, shall highlight any Tree Protection Orders on the design drawing

No Self-Laid Main shall be constructed unless the design of said main has been approved by the Water Company, and no Self-Laid Main or Service Pipe shall be connected to the Network until all conditions precedent within the WAA have been met.

11.4 Depth of Self-Laid Main

Self-Laid Main(s) shall be installed at the appropriate cover depths in accordance with the minimum and maximum depth range specified in the Streetworks UK guidance relative to the surface in which the Self-Laid Main(s) are to be installed.

The Water Company preferred installation depth (cover to crown of pipe) is *between 900mm -1200mm* for new Self-Laid Main or 900mm where there is a risk of damage e.g. from agricultural activities. All DI mains should be installed at *between 900mm -1200mm* cover.

11.5 Water Quality Considerations

In accordance with the Principles of Water Supply Hygiene and related technical guidance notes listed therein (see Appendix 1-Other documents) the SLP shall ensure that the Developer and the SLP ensure demand is sufficient to allow adequate turnover of water following commissioning of any new Self-Laid Main in order to protect water quality.

Where possible, Development spine roads shall be serviced with two-way fed ring mains to maintain water quality across the Site. The Water Company and SLP Designer shall consult on such proposals and the SLP Designer shall incorporate the Water Company requirements relative to this design consideration into the Site design. The costs associated with this shall be dealt with under the principles set out in paragraph 4 of this document.

Where despite the above, infrastructure is laid in advance of turnover, the Self-Laid Main shall either have artificial load by way of cross connection into the live system or shall have a flushing programme denoted on the design, to be carried out by the SLP.

The Developer or SLP shall be responsible for ensuring that all required permits and agreements are in place for identifying where water can be flushed to and for disposal of said water and whether water is required to be de-chlorinated prior to disposal.

Only standpipes that have been approved by the Water Company shall be used (details of such may be published on the Water Company website).

Operation of valves: The Water Company's specified standards in paragraph 11.7 below for operation of valves and hydrants shall be complied with (including satisfactory completion of any related training in line with guidance material offered by the Company).

11.6 Mains Fittings

Valves, washouts, hydrants, etc. should, as far as is practicable be located in the footpath or verge for both access and safety reasons and to mitigate the effect of traffic, surface water and silting in chambers.

Where there is no option but to design site fittings in trafficked areas, under no circumstances shall they be placed in parking bays or behind any locked access gates.

Please refer to paragraph 21 for further information.

11.7 Controlling Valves and Valve Operation

Mains isolation associated with any planned interruption requiring a shut to an Existing Main valve may be carried out by the Water Company and/or by an SLP subject to the SLP persons involved in the Site works having been authorised by the Water Company to undertake this activity. The Water Company will take into account specific Site constraints or considerations that may impact on the end user customer and/or water quality.

Approval and authorisation by the Water Company may include compliance with specific Water Company approval and authorisation procedures (and training) and completion of Water Company provided training that includes; CALM network training, valve operations, and discoloration risk assessment.

Valve closing directions within the Water Company area are clockwise and all new valves to be installed by an SLP shall be clockwise closing.

Third parties are not permitted to operate valves on the existing or adopted water network unless they are trained and accredited to Thames Water's required standards in Valve Operations. The only exception is when commissioning a new main, and this may either be from a valve controlled spur, or a valve controlled temporary hydrant laid as part of the site installation.

11.8 Washout and Fire Hydrants

You must provide combinations of isolation valves and washouts / fire hydrants to enable the isolation and flushing of sections of the main. Valves should generally be positioned at road junctions and off the branch of all tees, working to the principle that they can be used to isolate no more than 50 properties. The maximum distance between surface fittings (i.e. valves and washouts / fire hydrants) must be no more than 100 metres, so that we can accurately correlate leakage on PE mains.

The maximum distance between fire hydrants must be no more than 180m. This distance is measured as a fire hose length and must follow public streets. Variations to this will require consultation with the relevant fire authority. A washout must be included at every dead end of a main

Washout, valve, washout (OXO) shall be installed every 250m along a straight length of new main in order to disinfect and flush sections of main following any future repair / maintenance purposes.

Hydrants shall be the squat type (nominal size 80mm inlet/65mm outlet) or the 'Through Bore' type (nominal size 80mm inlet/80mm outlet) and suitable for connection to the water mains at a working head of up to 16 bar.

11.9 Air Valves

Air valves are required at high points and at points of significant changes of vertical direction along the network where in either case there is a risk of air locking. The location is to be agreed at design stage.

When installing an 'air valve' within a verge or soft ground, the chamber should be adequately supported - this is achieved by providing a one square metre layer of concrete to 150mm depth around the chamber - this prevents any foliage growth over the chamber, and damage to the fitting when operating.

11.10 District Metered Areas and Boundary Valves

District meter locations shall be agreed with the Water Company. If no information is available, then as a rule where the design exceeds *1500* domestic properties in size or a development size of *1500* properties then a DMA meter is likely to be required. See also paragraph 8.3.

Shut valves will need to be installed if a Site is fed by two separate DMAs via two Source of Water Connections. In this instance their requirement and location shall be agreed at the design stage with the Water Company.

11.11 Sustainable Drainage Systems (SuDS) Considerations

SLP Designers shall ensure relative to the final installation of the Self-Laid Main and Service Pipe that any Sustainable Drainage System (SuDS) shall not be installed above, underneath, or adjacent to the final position of Self-Laid Mains and Service Pipe. The location of any proposed SuDS and permeable surfaces proposed for a Site are to be clearly marked on the proposed design drawing (see also paragraph 10.8).

11.12 Double Spade Valves

The 'double spade valve' is a fitting, which is installed to alleviate the need for 'temporary disinfection fittings' in certain scenarios. It is available for internal diameter mains of 80mm, 100mm and 150mm.

It is a fitting that allows for two steel plates to be inserted and locked into position. The insertion of these two plates stop the flow of water, and subsequently provide a 'gap' between the two plates.

The 'double spade valve' also includes a 63mm inlet & outlet in order that a bypass flow can be obtained in order to carry out the process of 'full contact' disinfection. Once the 'full contact' disinfection has been carried out and 'all' samples passed, the plates are removed, and the main is commissioned

Its installation negates the need to carry out further excavation and connection work following the disinfection of the new main, which when used within the existing public highway, is a benefit to overcoming traffic management issues - the return to site is only for operational actions.

A 'double spade valve' can also be installed on sites where phasing is an issue and roads / footpaths are required to be 'made up' for a future phase or phases i.e. in 'spine' main scenarios.

The fitting is installed between the phased areas stopping up any water to the future phase - this section of main is 'laid dry', and not commissioned.

11.13 Rights of Access

The Self-Laid Main shall, wherever possible, be routed in publicly adopted highways and maintained highways or streets as defined in NRSWA Section 48 (1) and amended under the Traffic Management Act (TMA) 2004. These shall not normally require rights of access. Examples of situations where Self-Laid Mains are to be laid in a street are:

An adopted street on land which is owned by a Local Authority.
A street on land which is owned by the Developer and which may or may not be adopted in the future but serves more than one property.
A street on land which is in joint third-party ownership.

The section 38 Drawing shall be used to highlight any Self-Laid Main installed in third party land, which is not a street and that may require land rights to be obtained and a legal notice to be issued. In these instances, the Water Company shall establish and confirm with the Developer/SLP the right of access and shall normally require an easement to be provided by the land owner. Examples of situations where Self-Laid Mains are not to be laid in a street are:

- Industrial and commercial Site where land is wholly owned by a singular 3rd Party.
- Site access is through a third party's land that does not form part of the development.

In cases requiring the Self-Laid Main to be laid in land not defined as a street all such permissions and rights of access shall be identified before the design is approved.

In the process of designing it may be necessary to obtain other consents for works; these consents include;

- Local Highways by way of Section 50 Agreements
- Other Adopting Utilities where we are laying within an existing easement
- Environmental Agencies and Waterways Authorities
- Rail and Transport Network Operators
- Historical Societies and National Heritage Agencies

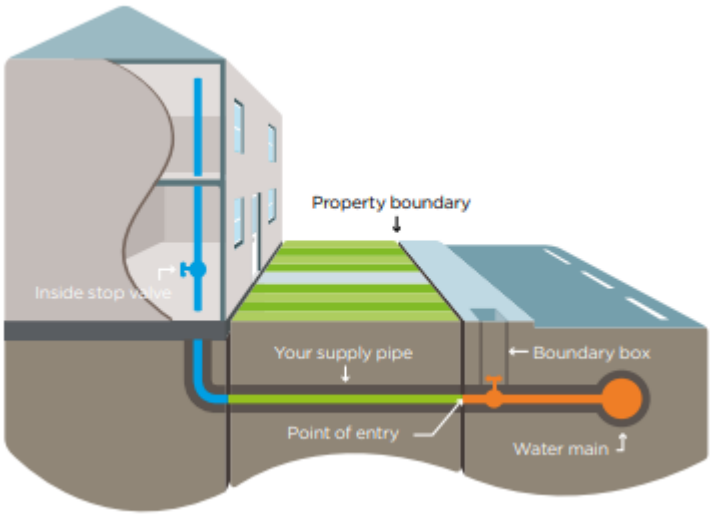
All such servitudes, easements, wayleaves and planning permission required for the Self-Lay Works and land for the siting of equipment shall be obtained prior to commencement of works and in accordance with the Statutory Consents and Land Rights sections of the WAA.

In accordance with the WAA, the Water Company shall obtain any required easements to protect its Network, or any future extension of such, and any related and/or incurred costs including third party costs shall be recovered by the Water Company in accordance with its published Charging Arrangements.

12. Service Pipe Design and Installation

Both parts of the Service Pipe shall be appropriately designed, and responsibility for design acceptance typically rests with the party responsible for its maintenance.

The following diagram provides guidance as to the allocation of such responsibilities.



Property owner's responsibility
Property owner's responsibility
Water company's responsibility

The supply pipe shall be the property owner's responsibility and shall conform to the Water Regulations and requirements of the Water Company.

12.1 Routing, Positioning and Location

The Water Company shall specify its policy and installation requirements on the design and installation of Permissible Materials (service pipes, meters, chambers, ducting, etc.) required routing, and location relative also to contaminated ground

Service Pipes shall only be laid through land which either form part of a street or to which the property being served has permanent rights of access.

Service Pipe routes in so far as is reasonably practicable shall follow a straight route perpendicular to the Self-Laid Main and the property to which it services.

Service Pipes shall generally be designed to connect to the nearest Self-Laid Main to the property.

Separate Service Pipes shall be provided to each house or building on the premises, or to those different parts of a building on the premises which are separately occupied by way of multiple supply pipes.

Joint communication pipes may be used to reduce road crossings however each property must receive an individual supply pipe and meters. This can only be used for manifold connections. Single boundary box connections require their own service pipe. The minimum allowable separation between service connection tappings on the main is measured as 300mm from the centre of each ferrule. This allows the structural integrity of the main to remain unaffected, while also ensuring that other tappings in close proximity are not damaged.

Service Pipes shall be designed such that the requirements of Streetworks UK are maintained with respect to separation from other plant and utilities.

12.2 Depth of Services

Service Pipes shall be installed in accordance with the Water Regulations and Streetworks UK guidance.

Service pipes shall be laid with an even grade where possible, with cover between a depth of 750mm to 1350mm from the finished ground level in accordance with Water Supply (Water Fittings) Regulations 1999.

If a boundary box is to be installed on the Service Pipe, the pipe shall be laid with cover between 750mm and 1200mm for a minimum of 1.0 metre on each side of the boundary box.

Service Pipes being designed outside this range shall have special protective measures vetted and agreed by the Approving Design Engineer.

12.3 Sizing of Services

While service connections can only be designed to meet minimum standards at the point of delivery every effort shall be made to ensure that all parts of the service pipe are sized in accordance with industry standards.

Service Pipes shall be sized to ensure the velocity is ≤ *1 ms^{-1}* and that total headloss is ≤ *3mH*

Services to standard domestic properties shall be minimum *25mm OD* and capable of supplying required flow and pressure based on required demand.

Supply sizes are calculated based on loading in accordance with the British Standard EN 806.

Reference should be made to paragraph 15 when domestic usage is being designed in conjunction with fire fighting purposes.

12.4 Location of Boundary Boxes

Boundary boxes should be installed in the adopted service strip or footway situated as close to the property boundary as possible.

Please see paragraph 22 for further information.

12.5 Supplies to Multi Occupancy Buildings

Supplies to multi occupancy buildings where the building does not exceed three storeys, can generally be fed from manifold connections with manifolds located in the footpath or adopted service strip. For buildings over three storeys a bulk supply with internal fit meters should be used with sufficient storage and boosters.

12.6 Services to Multi Storey Buildings

Water Industry Act 1991 - Section 66 states that where the top-most storey in a building is greater than 10.5m below the draw off point the statutory undertaker may require the Developer to fit storage equal to twenty-four hours usage and adequate pumping to reach the highest point.

Supplies to multi occupancy buildings where the building does not exceed three storeys, can generally be fed from manifold connections with manifolds located in the footpath or adopted service strip. For buildings over three storeys a bulk supply with internal fit meters should be used with sufficient storage and boosters.

12.7 Additional Requirements for Supplies to Buildings Other Than Domestic Dwellings

When the Developer's flow rates are in question the SLP Designer shall check that demand was calculated in accordance with BS EN 806.

The design shall include for back flow prevention; at least single check non-return valves.

Demand for process water shall be treated separately when designing the service. The SLP Designer shall investigate any seasonal demand patterns when designing the service.

Supplies for commercial use, such as agricultural, manufacturing and water used for construction shall have double check valves installed.

13. Civil Engineering Considerations

13.1 General

The general specification for civil engineering components and materials shall be that of the document "Civil Engineering Specification for The Water Industry ("CESWI") 7th Edition which is available from the WRc plc.

The Water Company shall confirm its requirements by reference to CESWI and any additional specific requirements and/or include such in the Schedule of Permissible Materials and Construction in paragraph 21, which as a minimum shall include information and requirements relating to;

- Thrust Restraint and Anchorage
- Puddle Flanges
- Self-Anchoring Joints
- Site Conditions and Ground Bearing Capacities
- Thrust Blocks
- Jointing of pipes
- Ground Anchorage

13.2 Marker Tape and Tracer Tape

Marker Tape to be compliant with CESWI and Water Fittings Regulations.

13.3 Indicator Posts and Marker Plates

Indicator Posts and Marker Plates to be compliant with CESWI.

13.4 Chambers and Covers

Water Company to detail Permissible Materials in paragraph 21. Chambers shall be designed and installed to be of an appropriate size to allow operation of the Self-Laid Mains and service fittings.

Covers shall be designed to be capable of withstanding all potential loads placed upon them and shall comply with BS EN 124.

13.5 Bedding and Backfill

Materials used for bedding shall conform to WIS 4-08-02 "Specification for bedding and side fill materials for buried pipelines" and material for backfill material shall be in accordance with the NRSWA 1919 the Specification for the Reinstatement of Opening in Highways (3rd Edition).

13.6 Reinstatement of Highway

Materials and work shall be in accordance with the NRSWA 1991 the Specification for the Reinstatement of Opening in Highways (3rd Edition).

The SLP is responsible for the classification and disposal of waste from excavations in highway accordance with Applicable Law.

13.7 Ducts

SLP Designers shall consult with the Water Company at Design Acceptance stage if ducts are required to be installed by a SLP/Developer.

Where ducts are designed to be laid under major roads or obstructions, they shall be shown to extend beyond the road to ease installation and future inspection.

Service pipe ducting where extending into building to form part of the service entry must facilitate the installation of insulation to Water Fitting Regulations.

All ducting shall be blue, twin-wall rigid duct with smooth internal bore, corrugated external bore and compliant to BS EN 14741. Mains laid in normal situations such as along footpaths, roads etc should not be ducted due to identification requirements, tracing of leaks, connection of new services, and repair and maintenance issues etc. On occasions we can accommodate site road crossings but only following requests from developers / SLP's at pre-start meetings.

A main can also be ducted on a site, which is subject to 'SUDS', in order that we can provide a length of main across the carriageway.

Mains should not be designed as being ducted unless otherwise advised by the Thames Water field representative - these are mainly in 'engineering difficulty' situations. Possible situations could be certain bridge crossings, under rivers, railway lines etc – on contaminated sites where these situations arise, the main should be provided in barrier pipe to ease construction purposes.

If a duct is to be provided, it must be of a suitable size (two and a half times the diameter of the main), and material, and must be identifiable as containing a water main. With any ducting situations, there must be a considerable 'safe working' distance at one end of the duct in order that the pipe work can be 'pushed' through.

14. Metering Requirements

14.1 Standard Domestic Metering for Individual Dwellings and Multi Occupancy buildings

Our Metering policy is referenced in paragraph 22

15. Water for Firefighting

15.1 Fire and Rescue Service (FRS) Consultation

Pursuit to Section 43 (1) of the Fire and Rescue Services Act 2004 a plan showing adoptable washouts shall be sent to the FRS for consultation purposes, along with this plan shall be a location plan and a covering letter.

Water Companies to provides FRS contact upon request from an SLP.

The FRS have the statutory period, 42 calendar days, to respond with their requirements in respect of adopting hydrants for firefighting.

Hydrants to be adopted shall be then marked on the drawing.

15.2 Location and Flow from Hydrants

Ordinarily, water companies do not design distribution networks for firefighting purposes. It should be expected that flow from fire hydrants would be in line with minimum standards on the water distribution network.

See also Water UK Guidance: https://www.water.org.uk/guidance/national-guidance-document-on-the-provision-of-water-for-firefighting-3rd-edition-jan-2007/
(in particular those details referenced in Appendix 5 regards flow from fire hydrants)

Hydrants shall be installed in chambers and located in line with the main. If the line of the main is located in the carriageway, the hydrant should be offset to a safe location for operation.

15.3 Dedicated Fire Mains

Dedicated fire mains shall be designed and constructed in accordance with Water Supply (Water Fittings) Regulations 2016 and fitted with backflow prevention, spiral wrapping and appropriate marker tape.

15.4 Fire Sprinkler Systems

In the absence of any information from the Water Company, SLP Designers shall refer developers to the polices within the building regulations when requests for sprinklers are being made, these documents, "Document B (Fire Safety) –Volume 1: Dwellings and Volume 2: Buildings other than Dwelling houses", can be obtained on the UK Government Planning Portal at
http://www.planningportal.gov.uk/buildingregulations/

It is recommended that the SLP Designer consults with the Developer who is responsible for seeking advice from a specialist provider of sprinkler systems (where one is required) relative to the Site and/or Development. Refer to paragraph 21 for further information.

Fire suppression systems

- All dedicated and combined commercial fire systems must run their fire suppression systems from full capacity storage.

- All blocks of flats must run their fire suppression systems from full capacity storage.
- Domestic fire sprinkler systems shall be combined with the domestic supply. A 50mm supply will be installed in the highway (with a 40mm meter). The developer must lay a 32mm supply on the private side with a reducer to upsize the outlet to 50mm. Where barrier pipe is required, a 63mm pipe will be installed in the highway (with a 40mm meter). The developer must lay a 32mm supply on the private side with a reducer to upsize the outlet to 63mm.

16. As Laid (As Constructed) drawings

The Water Company's asset data is typically recorded on a geographic information (digital mapping) or CAD systems. Therefore, it is important that accurate and compliant location information is supplied to the Water Company in a format agreed with the Water Company and which shall be specified by each Water Company in the Schedule of Permissible Materials and construction.

The approved design drawing shall be updated and amended in accordance with all changes to as constructed installation whenever there is a deviation from the approved design (note: all changes to an approved design shall only be made with the acceptance of the Water Company as per Level of Service measure S2/1b).

The "as-laid / as-constructed" installation shall be in accordance with the approved design and with any changes to same approved by the Water Company as any deviation not agreed by the Water Company from the approved design shall be a Defect and the Water Company may require such to be corrected prior to adoption of the installation.

The position of all installed apparatus shall be recorded to ensure locational accuracy (the position of apparatus shall be recorded relative to a minimum of two fixed (geographical or otherwise) features adjacent to the installed apparatus and the measurements shall intersect the centre of the new asset and if available is to be referenced by British National grid reference).

Positional accuracy is to be measured and recorded, wherever practicable, to a minimum GPS accuracy of +/- 100mm to the centre of the apparatus.

Surveys for Self-Lay Works shall be carried out using triangulation, i.e., two measurements taken from fixed features. They should intersect at the centre of the asset in the following order of priority;

- corners of buildings, and
- corners of boundary walls

Surveys done using offsets, i.e., using a single measurement (usually along the length of the Self-Laid Main) in accordance with the following order of priority:

- building lines, and
- kerb lines

Temporary and natural features should only be used when no other permanent features are available, with the agreement of the Water Company.

Scaled survey drawings should be provided. The scale shall be to 1:500 (unless otherwise agreed with the Water Company) to ensure clarity of applicable measurement and features.

Material, pipe size, external and internal corrosion protection of pipe, and the depth of cover to Self-Laid Main (where depth differs from standard) shall be identified.

All valves, hydrants, washouts, meters, ducts, swab access points, tappings, tees, Service Pipe(s) and boundary boxes shall be clearly identified, together with the relevant fitting on the plan and/or in an

accompanying legend. The legend should be consistent with the Water Company' Schedule of Permissible Materials and construction.

Where a number of assets are installed adjacent to each other, suitable asset information (increased scale extracts) are to be incorporated and clearly referenced as a subset of information from the Self-Laid Main "as-laid / as-constructed" drawing.

The full dimensional references for all pipes and fittings shall be indicated (e.g. material, diameter, SDR) at any change in details, and measurements shall be in millimetres.

Clear differentiation should be made between live and decommissioned Water Mains and associated fittings. Decommissioned Network assets may be shown on a separate drawing, if required.

As-laid / as –constructed drawings shall be submitted with any request to commission any completed work. Such shall be clearly labelled with the Developer's name, scheme number, scheme name, scheme type, stage, number, and date of submission.

17. Self-Laid Main and Services Commissioning

To enable the commissioning of new assets to take place the Water Company shall provide its flushing, super chlorination and sampling requirements including minimum training requirements for samplers e.g. as per the Water Regulations under ISO/IEC 17025 may be deemed appropriate.

A compliant pressure test should be carried out which demonstrates the Self-Laid Main to be free of air and leaks. Certificates shall be provided by the SLP to the Water Company confirming a compliant pressure test.

Before flushing into a public combined or surface water sewer the developer shall contact and obtain approval from the local wastewater company, Environment Agency, Highway Authority or other, as appropriate.

In addition, the Water Company may include further guidance in its Schedule of Permissible Materials and construction in paragraph 21.1 setting out its requirements for the provision of Testing and commissioning.

17.1 Mains Flushing

In accordance with the Principles of Water Supply Hygiene and associated technical guidance notes (see in particular TGN02 and TGN03) it is a requirement that there is always a sufficient turnover of water on all potential dead-legs of main or sectional lengths and a regular flushing of these mains shall be undertaken to satisfy water quality requirements.

Accordingly, a suitable flushing regime is to be agreed in respect of the construction programme of the Self-Laid Main. The responsibility for work and related costs is set out in the WAA.

Note: Operation of existing valves shall only be in accordance with the Water Company's published guidelines in this DCS.

The Water Company may seek to recover the cost of flushing work where a delay to the proposed Delivery Date occurs as a consequence of a failed pressure test and/or mains sample. This will likely delay the mains connection date and subsequent installation date of new service connections and hence an appropriate flushing regime to protect water quality will be required to be agreed with the Water Company who reserves the right to revert to a flushing regime operated and managed by the Water Company with costs recovered.

Prior to any end washout on any phase/section of main the SLP may install a temporary or permanent sluice valve and if the washout is to be used for flushing or building water with a standpipe then it shall be an approved metered standpipe in accordance with the Water Company requirements

The SLP is responsible for ensuring that the Developer secures all required permits and agreements for flushing, identifies where water can be flushed to and disposed of and, where the Water Company is to undertake flushing, is able to indicate whether water is required to be de-chlorinated first.

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

The Water Company has a responsibility to ensure that its customers are not affected by discoloured water which may be caused by flushing out mains so when discharging water it is important to keep velocities in the pipe under control to avoid discolouration upstream.

Suggested guideline is to limit flow velocity to no greater than 0.2 m/sec with the need to turn over mains water at least once per week, and examples are detailed in the table below.

Example guidelines

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

17.2 Mains Swabbing

Swabbing (using a chlorinated swab) and flushing twice the mains volume is required prior to disinfection.

17.3 Mains Bacteriological Sampling

All sampling and data relating shall be undertaken by an approved UKAS accredited analytical laboratory that will confirm and provide all results and required reports relative to:

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

You must carry out water quality testing as required in the Drinking Water Inspectorate's Principles of Water Supply Hygiene. Testing must be carried out by a UKAS-accredited laboratory showing the following results:

1) Total coliforms per 100ml (must be zero)
2) E coli per 100ml (must be zero)
3) Turbidity (maximum 4.0 NTU)
4) 37˚C colony counts per 1ml (maximum 200)
5) 22˚C colony counts per 1ml (maximum 200)
6) Total chlorine measured in mg/l (+/- 0.2 mg/l of source water)

Water samples must be set up for analysis within 24 hours of the sample being taken, otherwise the result will default to a failure.

The actual sample quantities of water required for analysis and the bottle types used will be dictated by the laboratory used.

We'll require bacteriological samples to be taken from a 25mm standpipe fitted with a gunmetal bib-tap which does not have an in-line check valve assembly.

We recommend SLPs are equipped with turbidity meters. Turbidity isn't always easy to assess by the naked eye, so we suggest you carry out your own test before taking the physicochemical sample. This should prevent the laboratory you use from failing a sample because the turbidity is too high, which could cause you delays.

We also recommend that samples are kept between 3°C and 7°C during transit, in either a compact fridge or cool box which does not share space with food and drink. We do not require post-connection samples.

We require SLP personnel who are taking samples be able to demonstrate competency - please contact us to confirm arrangements.

If you would like us to take and analyse the water sample for you, we require seven calendar days' notice with a plan highlighting the section of main and terminal end points.

There is a charge for this service.

All taking of samples shall be carried out by accredited persons. Sample point location(s) where samples were taken from must be detailed and cross-referenced with the results and shown on the construction drawing and provided to the Water Company.

All activities are to be carried out in accordance with Principles of Water Supply Hygiene & Technical Guidance Notes (< water.org.uk/publications/reports/principles-water-supply-hygiene>

Prior to accepting a request for any Final Connection to the Network, the Water Company must be reasonably satisfied that the samples have been taken where indicated and have passed water quality requirements such that the Self-Laid Main can be adopted.

As such, the Water Company may (at its own cost) undertake a check sample on the Main post Final Connection, prior to permitting any further connections (mains or services).

In accordance with the Principles of Water Supply Hygiene (TGN02) if the Self-Laid Main is not brought into service within 14 calendar days of a satisfactory sample having been taken, the Main should be flushed with mains water and re-sampled. If contamination is suspected, the Main should be re-chlorinated and sampling carried out as in paragraphs numbered 10 & 12 of the TGN02.

The SLP is advised to contact the Water Company to confirm arrangements for taking samples, sample testing, testing parameters and reporting, and laboratories they intend to use and/or to confirm any requirement for the Water Company to provide (at reasonable cost) any such support services.

17.4 Pressure testing of Self-Laid Main

17.4.1 Pressure testing of pressure pipes and fittings for use by public water suppliers must be carried out as set out in the Water Industry 'Information and Guidance note' (IGN 4-01-03 October 2015: issue 2), available to view online at water.org.uk/publications/wis-ign/general with reference to the following guidance notes: 'Pressure Testing and Disinfection (supplemental) of PE Water Pipelines, Services and Installations'. Pressure data, analysis report/pass certificate and pressurisation/decay graphs are to be provided by the SLP to the Water Company within a handover commissioning suite of information.

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

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

All testing shall be carried out in accordance with IGN 4-01-03, reference should also be made to the Civil Engineering Specification for the Water Industry (CESWI) (with Additional Clauses) and any specific Water Company requirements specified additionally in paragraph 21 Schedule of Permissible Materials and construction.

The following also applies:

1. On-site testing operations will be clearly identified using appropriate warning notice boards.

Mains Disinfection (90mm external diameter and above).

Pipes and fittings must be stored and transported with the minimum risk of contamination. Pipes must remain capped until laid and all associated fittings must be stored directly off the ground and in their sealed delivery bags, where applicable, until installation.

Swabbing (using a chlorinated swab) and flushing twice the mains volume is required prior to disinfection. The complete section of main needs to be dosed with a 50mg/l chlorine solution and left for a contact time of between seven hours (minimum) and 24 hours (maximum).

This must be timed from when the required residual shows at the downstream washout. Following the full contact period, the chlorine residual must be checked. If the residual has dropped below 50 per cent of the original strength, the disinfection process will need to be repeated.

A newly laid main which has been disinfected can remain in its uncommissioned state for a period of up to 14 days. If there is a delay in commissioning, then the main can remain in its uncommissioned state, providing it has been flushed by twice its volume no later than day 14 from the date of disinfection. This process can be repeated every 14 days until the main has been commissioned. We'll require you to demonstrate that you've carried this out, showing dates and flush volumes.

If a flushing operation is missed (i.e. it has been more than 15 days since the initial disinfection), you can flush and re-sample the main. You'll need to show us a satisfactory sample result, after which you can continue flushing within 14 days. If 22 days have passed without sampling or flushing (or you can't demonstrate this), you must re-disinfected and re-sample the main.

Surface (spray) disinfection procedure

The surface or spray disinfection method should be used for localised repairs or on sections of main no longer than 10 meters.

Fittings, valves, manifolds and pipe ends must be fully spray disinfected using a hand-held spray unit or a 'Hozelock' type lance sprayer with chlorine solution at 1,000mg/l. Please make sure that any chlorine solution diluted from a 10- to-15% stock solution to 1000mg/l is only kept for one month. After this, please dispose of the old solution and make a fresh dilution.

Chlorine tablets (Instachlor 1,000s) may also be used.

Dechlorination

This is carried out using sodium thiosulphate, sodium bisulphite or sulphur dioxide. Final chlorine residual of discharge must be no greater than 0.2mg/l.

Disinfection of service pipes

Service pipes up to 50mm external diameter do not require disinfection.

For service pipes of 63mm external diameter, please note the following -

You need to disinfect your pipework prior to connection to the water main, under the Water Supply (Water Fittings) Regulations 1999, to ensure there is no detriment to public health.

63mm supplies should be swabbed (where practicable), flushed, filled with chlorinated water not less than 50mg/l and allowed to stand for one hour. The chlorinated water should then be flushed out, the pipe refilled and a sample taken.

A disinfection certificate should be provided in the format detailed below before connecting to the parent main together with a satisfactory water quality sample pass result.

For service pipes greater than 63mm external diameter, the disinfection process is the same as for mains.

Disinfection certificates

Disinfection certificates for mains and services above 50mm must contain the following information:

- *Length of pipe*
- *Size of pipe*
- *Flush time prior to disinfection (min)*
- *Flush rate prior to disinfection (l/min), where practicable*
- *Disinfection dose (mg/l)*
- *Standing time exposed to elevated disinfection concentration (h)*
- *Residual at the end of disinfection time (mg/l)*
- *Flush time to clear elevated disinfection concentration (h)*
- *Residual after flushing of disinfectant (mg/l)*
- *Date of disinfection*
- *Disinfectant used*
- *Confirmation that the pipe was capped after disinfection, if necessary*
- *Company or individual who carried out the disinfection*

18. Water Company Key Contacts

Water Companies to publish key contacts on its website.

19. Local Practices

By reference to the Water Sector Guidance, the Water Company may insert here a permitted local practice using the terminology in the WSG.

19.1 Meter Pairing and Commissioning

Where applicable within the area we may retrofit 'local communication equipment' to meters previously installed to enable continuous reads.

19.2 Timing of the Generation of Plot Reference Numbers

Not applicable

19.3 Water Company Design Service Offerings

Not applicable

19.4 Design Self-Certification Scheme

Not applicable

20 Design and Construction Specification Appendices

Water Company may insert appendices into this document within the following paragraphs 21 to 24 only in the form of text or “object” file.

21. Schedule of Permissible Materials and Construction

Materials

Mains

Our preferred material for distribution mains is polyethylene PE100 SDR17 (10 bar) unless the maximum continuousoperating pressure (PMA) requires a higher rating (PN).

All pipes must be marked with the standard dimension ratio.

High-performance polyethylene (HPPE) must be blue in colour,as per NJUG guidelines Volume 2. HPPE pipe must be designed in 90mm, 125mm, 180mm, 250mm, 315mm and 355mm external diameter.

Marker tape must be used within the trench in order to provide a means of tracing HPPE pipe.

Services

Our preferred material for service pipes is polyethylene PE80 SDR11 (12.5 bar) unless the maximum continuous operating pressure (PMA) requires a higher rating (PN).

Medium-density polyethylene (MDPE) should be used for service connection pipes up to and including 63mm.

Neither HPPE mains nor MDPE service connections are to be laid in sites which have been deemed contaminated following analysis of the site-specific soil report.

If service pipes are to be laid in ducts, the duct must be blue in colour. All services must be laid perpendicular to the parent main.

Valves / air valves

Valves should comply with BS EN 1563, and internal and external protection must be provided by blue fusion-bonded epoxy powder coating. All valves should be right-hand (clockwise) close only, and of the sluice variety.

Valves and air valves don’t require marker posts.

Washouts and fire hydrants Washouts and fire hydrants must be the squat type (nominal

size 80mm inlet/65mm outlet) or the through bore type (nominal size 80mm inlet/80mm body/65mm outlet) and suitable for connection to the water mains at a working head of up to 16 bar.

Washouts and fire hydrants should generally be located in footpaths or verges and not in carriageways. Fire hydrant covers must be yellow in colour. If this isn't applied at the factory then yellow lining paint can be used in situ.

Fire hydrants need to be appropriately marked with a polymer type marker post and plate by the fire authority.

Washouts don't require a marker post.

Duckfoot bends

The Fusion duckfoot bend kit is our standard for duckfoot bends to be used with PE pipe. The kit comprises a duckfoot bend with an electrofusion socket at each end together with a PE pupped flange which can be cut to the desired length for the riser. Kits are available up to 180mm in size.

This kit has the advantage of eliminating at least one flanged joint on the assembly, reducing the potential for leakage.

In certain circumstances, such as congested working areas, ductile iron pipework may be more suitable. Our preferred sizes are 80, 100, 150, 200, 250mm and 300mm internal diameter.

Ground contamination

Pipes and fittings must be stored and transported with the minimum risk of contamination. Pipes must remain capped until laid and all associated fittings must be stored directly off the ground and in their sealed delivery bags, where applicable, until installation.

Please refer to the following documents:

• UKWIR report 10/WM/03/21 Guidance for the selection of water supply pipes to be used in brownfield sites, 2010

• CIRIA publication C682 VOCs Handbook: Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination

• Water UK Contaminated Land Assessment Guidance, 2014

Wherever contamination is identified, new mains and service connections must be in plastic barrier pipe. Please note that polyethylene is our preferred material for barrier pipe.

For service connections where the pressure is greater than 12.5 bar, you must use copper pipes to BS EN 1057 R220, coated with factory-applied PVC or equivalent approved material.

Construction

It is assumed that pipe laying for the vast majority of new development work will be by open cut trench. You must notify us if you plan to use an alternative method, as this may require a technical assessment.

If you're planning significant work near our assets, it's important you minimise the risk of damage. We'll need to check that your development doesn't reduce capacity, limit repair or maintenance activities, or inhibit the services we provide in any other way. This is important so that we can meet our obligations under Section 174 of the Water Industry Act 1991.

Whether you're working near our pipes, building over them, or need to request a diversion, please read our guidance notes on our web-site to understand the process you'll need to follow:

www.developers.thameswater.co.uk/Self-lay-providers/Planningyour-development/Working-near-our-pipes

Jointing of pipes

Pipelines shall be designed to minimise the number of joints. For PE pipes see clause 5.7 (3) in CESWI 7th edition. For steel pipes consideration shall be given to the use of welded joints. All flanged joints, flange adaptors and couplings shall be protected against corrosion, see clause 5.14 in CESWI7 and AM-DES-CIV-02 Civil Specification

Butt fusion is our preferred method of jointing polyethylene pipe, which must be of identical diameter and pressure rating. Butt fusion can only be carried out outside the trench, and electrofused couplings should therefore be employed where butt fusion is not practicable. Electrofusion couplings can be either blue or black in colour.

Chambers

When installing a valve/air valve within a verge or soft ground, the chamber should be adequately supported. This must be achieved by providing a one-square-metre layer of concrete to 150mm depth around the chamber, to prevent foliage growing over the chamber and damage to the fitting when operating.

Thrust Block

All water mains that have un-restrained joints shall be provided with thrust restraint at bends, junctions, line valves, changes in diameter, etc. Should thrust restraint be required at any point of the water main network either for new or existing mains, these shall be provided in accordance with C02 Civil Specification.

'Thrust blocks' are constructed in-situ of concrete, and their size depends on the bearing capacity of the soil. The force within the pipeline is resisted by concrete 'thrust blocks' which are cast in contact with undisturbed ground.

The concrete shall be of medium workability, the cement in accordance with BS EN 12620 & BS 8110, and a maximum aggregate size of 20mm. The concrete must develop adequate strength before any pressure is applied - the strength of the concrete should be 25N/mm2.

Rapid hardening cement should not be used in concrete for plastic pipes, and any plastic pipe should have a layer of plastic sheeting applied (composition in accordance with BS 6075) before coming into contact with the concrete.

The inclusion of a 'thrust block' within design is primarily for

- Alterations to the existing mains network where suitable jointing to prevent separation of existing pipe cannot be achieved
- Behind every new tee connection into an existing main*
- Behind every subsequent tee connection into new mains where 'temporary disinfection fittings' are to be installed*

*Note - The installation of a 'thrust block' behind new tee connections is to alleviate any separation of pipe whilst the 'gap connection' exists, and because the flanged adaptors, which are used as connectors to 'make up the gap', will not provide sufficient restraint

For diversionary work, it is prudent to allow for two 'thrust blocks' at each end of the diversion at the connection point to the existing main.

For in-line connections, if a bend is installed within the immediate vicinity of the point of connection, it is prudent to allow for a 'thrust block' to be installed behind the bend.

New HPPE mains incorporating electro-fused fittings or butt fusion joints will not usually necessitate the need for 'thrust blocks'.

Thrust per 1 bar (10.5m head) internal pressure in Newtons

Dia (mm)	90 deg bend	45 deg bend	22.5 deg bend	11.25 deg bend	Tee / Cap
80	711	385	196	98	502
100	1110	601	306	154	786
150	2498	1353	690	347	1767
200	4443	2404	1226	616	3134
250	6942	3757	1915	962	4907-699
300	9998	5411	2758	1386	

Bedding, surround & backfill

'Bed and surround' is required to be provided within the trench in order to protect the pipe from damage and loading. 'Bed and surround' consists of 6-10mm sized 'pea shingle', which provides an even distribution of load acting on the pipe.

There should be an evenly distributed 'bed & surround' of 100mm around the main. On top of the 'bed and surround' some 'warning tape' should be laid to identify that there is a water main in that location

Backfill

In on-site conditions, selected 'as dug' material should always be used as backfill providing it has a suitable baring capacity. If the baring capacity is unsuitable, then 100% imported backfill (type 1) should be used

Under NRSWA, existing footpaths and roads are required to be backfilled to existing 'make up' conditions - whatever is excavated, should be put back, unless otherwise specified.

Unmade ground which will become verges should be backfilled with selected 'as dug' - however, any verges which are within 1m from the edge of a carriageway, should have 100% imported backfill (type 1) which may already be the case dependant on the existing material.

Agricultural land, parkland, and soft landscaped areas must be backfilled with the ground replaced in the same sequence as excavated - this ensures that any fertile 'top soil' is at the top and the land retains its growing properties.

22. Meter and Service Pipe Policy and Installation

Meter installation

It is our policy to have individual meters for all properties. Newly-fitted meters must comply with our standard approach for installing permanently sited meters used for billing purposes and non-revenue bulk meters.

Standard installations include:

• Internal installation of:

– concentric meters of size Q3 2.5 m3 /hr in a meter manifold
– in-line meters up to Q3 of 6.3 m3 /hr where a stop value is required before and after the meter and a drain valve immediately after the meter
– in-line meters over Q3 of 6.3 m3 /hr where a stop value is required before and after the meter
• External installation of:

– concentric meters of Q3 2.5 m3 /hr that are fitted in a boundary box or multi-box

– in-line meters of greater than Q3 2.5 m3 /hr that are fitted in a meter chamber
All newly installed meters used to calculate the consumption at an individual property must be reasonably accessible to the customer and must not require the permission of a third party to gain access.

Internal meters must:

• Be situated such that the centre line of either a horizontally or vertically orientated meter is no more than 1.5m above floor level, with a distance from the floor to the meter of no less than 300mm
• Have the orientation of the register facing upwards or outwards
• Have a clear distance from the outer edge of the meter to any fixed installation including pipework of no less than 30mm, and the connecting pipework must have a clearance of no less than 150mm
• Have adequately supported pipework, to prevent vibration
• Have no excessive strain on the fittings
• Have a stop valve installed either side of the meter
• Be tagged prior to installation, detailing which unit it supplies
Where the preferred options are not feasible, you'll need to consult with us on alternative locations before installing the meters.

Meter location

Please make sure you follow this order of preference for locating meters:

1. External installation in new boundary box / meter chamber in the public highway
2. External installation in new boundary box / meter chamber on private property
3. Internally in a common service area (flats only)
4. Internally within the customer's property
For new connections to large blocks of flats, our policy is to fit single internal meters for each flat and fit a bulk meter at the point of supply. Where it's impractical to install a meter at the individual flats, you should agree an alternative proposal via your scheme designer in advance.

For properties where the supply connects to multiple properties, we may choose to install a bulk meter for demand monitoring purposes. In this case, the consumption will not be used for billing purposes.

Please refer to our metering policy for further information. https://www.thameswater.co.uk/media-library/home/developers/larger-scale-developments/clean-water/installing-water-meters/metering-policy.pdf

23. Standard Arrangement Drawings

A range of standard detail drawings covering the most common development applications are available: www.developers.thameswater.co.uk/Self-lay-providers/Mains-design-andpoints-of-connection/Our-technical-drawings

DS-DRG-WN-02220	Water main bed & surround.pdf
DS-DRG-WN-02250	Extension spindle details.pdf
DS-DRG-WN-02251	Covers 1 – 150x150 & 225 x 225,pdf
DS-DRG-WN-02252	Covers 2 – 380x230x125.pdf
DS-DRG-WN-02253	Covers 3 – 600x600 & 675x675.pdf
DS-DRG-WN-02254	Covers 4 – 600x450.pdf
DS-DRG-WN-02255	Covers 5 – 900x600.pdf
DS-DRG-WN-02270	Covers 1 – 150x150 & 225 x 225,pdf
DS-DRG-WN-02251-01	Standard tee connection setup.pdf
DS-DRG-WN-02251-02	Standard washout & fire hydrant setup.pdf
DS-DRG-WN-02275	Large communication pipe.pdf
DS-DRG-WN-0301	Install two temporary fittings – Option A long sider.pdf
DS-DRG-WN-0302	Install one temporary fitting – Option B short sider.pdf

DS-DRG-WN-0306	Double spade valve installation.pdf
DS-DRG-WN-0307	Extending in-line and retain fire hydrant or washout.pdf
DS-DRG-WN-0312	Self lay installation.pdf
DS-DRG-WN-0313	Bridge crossing.pdf
DS-DRG-WN-0314	Terminating a phased main.pdf
DS-DRG-WN-0318	Self lay spur connection - Option A long sider.pdf
DS-DRG-WN-0319	Self lay spur connection – Option B short sider.pdf
DS-DRG-WN-0320	Self lay double spade valve installation – dry main.pdf
DS-DRG-WN-0321	Self lay double spade valve – Option A long sider.pdf
DS-DRG-WN-0322	Self lay double spade valve - Option B short sider.pdf
DS-DRG-WN-0404	Services – dedicated domestic connection.pdf
DS-DRG-WN-0405	Services – dedicated fire connection.pdf

24. Construction Pre-Start Meeting Agenda

A pre-start meeting shall only be required if one party to the WAA submits a written request to the remaining Parties notifying them that it requires a pre-start meeting.

However, such meetings are viewed by Water Companies as a key means of helping to achieve good Health and Safety outcomes, of securing timely, cost-effective delivery and ensuring smooth adoption and handover. For this reason, they will generally be requested by Water Companies

In more detail, such meetings will allow the following aspects of the project to be addressed:

- Site-specific Health & Safety and site management issues
- Confirmation of the identity of the Principal Contractor under CDM Regulations
- Introduce site personnel and establish their individual roles and responsibilities
- Establish local lines of communication between site and Water Company staff
- Assess any associated construction activity that may need accommodating in the SLP construction programme
- Discuss issues relating to the distribution that have the potential to affect the project.

The Parties shall agree the date of the pre-start meeting and shall record the minutes of the meeting and circulate such within 5 calendar days. The pre-start meeting shall include the 'pre-start information' listed below.

Where no pre-start meeting is required by a party, the SLP and/or Developer shall, if requested by the Water Company, prior to the commencement of the Self-Lay Works, provide the following pre-start information in any event.

'Pre-start information' includes as a minimum:

1. Confirmed arrangements for CDM 2015 Regulations and other H&S requirements.
2. Future contact arrangements and authorised parties for giving instructions, agreeing "right day" for SLAs, making variations, and exchanging information regarding progress with all parties' works.
3. Confirmation of line and level of Self-lay Works.
4. Confirmation of national (Street-Works) and local (Water Company) design requirements.
5. Overview of process for dealing with variations/ and changes to the Site layout and associated approved design drawing (revisions and impact on design, co-ordination and charges etc.).
6. Confirm and detail the Source of Water for testing and mains connection Delivery Date.
7. Confirm latest design approved drawing, and any revision, and drawing for construction.
8. Process for submitting as-laid drawings.
9. Identify any potential site hazards or constraints (such as existing Network considerations, including protection, diversion or renewal)
10. Confirm that access is approved relative to any land rights, statute, and third-party consents.
11. Contact details.

12. An indication of when any new service connections are required by and if any new property is to be fed from the Network.
13. Confirmation that the Agreement has been signed by all Parties.
14. Completion and issue by the SLP and/or Developer and/or the Water Company of all risk and method statements relative to design and/or construction activities.
15. Arrangements for co-ordination of activities.
16. Arrangements for supply of proof of WIRS Accreditation, personnel qualifications and/or certification documents (i.e. Hygiene Code of Practice).
17. Arrangements for water sampling and requirements for certification and accreditation of results, pressure testing, and disposal of water.
18. Arrangements for Water Company approved standpipe supply if required.
19. Confirmation of all required Regulatory requirements, arrangements, permits and consents relative to the construction, flushing (and any future arrangements to maintain water quality), and commissioning of the Self-lay Works.
20. Confirmation of any requirement for a Water Company post commissioning check sample by the Water Company in accordance with the Code Procedures.
21. Arrangements and contact details for future management of Defects and/or damage following adoption.
22. Confirmation of how the SLP proposes to demonstrate to the Water Company that the materials and products intending to be used (and on completion of work all actual materials used in case of divergence from the intended list) in the installation of Self-lay Works complies with Regulation 31 of The Water Supply (Water Quality) Regulations 2016 before commencement of any work. This confirmation may consist of the SLP providing the Regulation 31 appropriate identifier relative to the materials proposed.

Appendix 1

WIS & IGNs

Number	Title
WIS 4-08-02	Specification for bedding and sidefill materials
IGN 4-37-02	Design against surge and fatigue conditions for thermoplastic pipes
IGN 4-01-03	Guide to Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers
IGN 4-01-03	Water Industry Information and Guidance note - Guide to Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers
IGN 4-08-01	Bedding and sidefill materials for buried pipelines
WIS 4-08-02	Specification for bedding and sidefill materials
WIS 4-21-02	Mechanical couplings and repair clamps for iron pipes for the conveyance of cold potable water (underground use) for the size range 40 to 1600mm
WIS 4-22-02	Specification for ferrules (tapping tees) and ferrule straps for underground use
WIS 4-22-02	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
WIS 4-52-03 & 4-52-03A	Specification for Anti-Corrosion Coatings on Threaded Fasteners. See also amendment 4-52-03A
WIS 4-32-08	Specification for the fusion jointing of polyethylene pressure pipeline systems using PE80 and PE100 materials..
WIS 4-32-11	Specification for thermoplastic end load resistant mechanical fittings for polyethylene pipes of nominal size < 63mm. Note with outside diameters to BS 5556 (metric)
WIS 4-37-01	Specification for boundary boxes for the metering and control of domestic and small industrial water services.
WIS 4-32-16	Specification for butt fusion jointing machines.

WIS 4-37-01	Specification for boundary boxes for the metering and control of domestic and small industrial water services (see also British Standards).
IGN 4-37-02	Design against surge and fatigue conditions for thermoplastic pipes.
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
IGN 4-51-01	External zinc coating of ductile iron pipe.
WIS 4-52-01	Specification for polymeric anti-corrosion (barrier) coatings.
IGN 4-52-02	The use of polymeric anti-corrosion (barrier) coatings.
IGN 9-04-05	Report of the expert group on the risks of contamination of the public water supply by backflow at: *http://wras.co.uk*

British Standards (BS) & BS EN Standards

Number	Title
BS EN 124	Gully tops and manhole tops for vehicular and pedestrian areas
BS5834-2	"Meter chamber" - Boundary box - (and when for use in areas subject to occasional vehicular access relevant aspects of this BS apply) with anti-slip lid design to BS 7976 Part 2 Internal fitted NRV in accordance with WIS 5-11-01(BS EN 13959 and shut off device rising-spindle with WIS 4.23.04.
BS EN 805	Water Supply – Requirements for systems and components outside buildings
BS 8588	Polyethylene pressure pipe with an aluminium barrier layer and associated fittings for potable water supply in contaminated land. Size 20 mm to 630 mm
BS 8561	Specification for mechanical fittings for use in the repair, connection and renovation of pressurized water supply pipelines. Requirements and test methods
BS EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines. Requirements and test methods.
BS 750	Specification for underground fire hydrants and surface box frames and covers.
BS EN 805	Water supply. Requirements for systems and components outside buildings.

BS EN 806	Specifications for installations inside buildings conveying water for human consumption. Operation and maintenance.
BS 1042-2.2 1983 & ISO 7145 1982	Measurement of fluid flow in closed conduits and Determination of flowrate of fluids in closed conduits of circular cross selection – Method of velocity measurement at one point of cross-section.
BS EN 1295	Structural design of buried pipelines under various conditions of loading. General requirements.
BS 3251	Indicator plates for fire hydrants and emergency water supplies. Part 1: Hose Reels and Foam Inlets.
BS 9295	Guide to the structural design of buried pipelines.
BS EN 12201	Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). General. Part 2: Pipes. Part 3: Fittings.
BS PD 855468	Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages.

Other documents

Number / Date	Title
10/WM/03/21	Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites
CESWI	Civil Engineering Specification for the Water Industry 7th Edition (or later version thereof) ("CESWI") together with any Water Company amendments (to be published on Water Company website with DCS).
2009/03	Guidance Note On Notification of Methods of Reinstatement using EToN available at: http://hauc-uk.org.uk/
Published January 2014	Contaminated Land Assessment Guidance: Protocols Published by Agreement Between Water UK and the Home Builders Federation https://www.water.org.uk/guidance/contaminated-land-assessment-guidance/
Water UK/HBF	Water UK/HBF National Joint Committee 2014 (available free of charge at: http://www.water.org.uk/publications/water-industry-guidance
Volumes 1 - 6	Streetworks UK (formally National Joint Utilities Group) Guidance Publications available at: http://streetworks.org.uk/resources/publications/
Principles of Water Supply Hygiene	Principles of Water Supply Hygiene & Technical Guidance Notes (available from Water UK online at water.org.uk/publications/reports/principles-water-supply-hygiene

Drinking Water Safety - Guidance to health and water professionals	DWI, Available free of charge at: http://dwi.defra.gov.uk/stakeholders/information-letters/2009/09_2009Annex.pdf
Drinking Water Safety - Guidance to health and water professionals	Specifications for PVC pipe and fittings:- https://bpfpipesgroup.com/support-downloads/technical-guidance/
Report R97	Trenching Practice (2nd edition) CIRIA, 1983 Available at: https://www.ciria.org/ItemDetail?iProductCode=R97D&Category=DOWNLOAD&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91
Report 128	Guide to the Design of Thrust Blocks for Buried Pressure Pipelines CIRIA, 1994 Available at: https://www.ciria.org/ItemDetail?iProductCode=R97D&Category=DOWNLOAD&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91
HSG 47	Avoiding Danger from Underground Services HSE Books, 2014 Available free of charge at: https://www.hse.gov.uk/pUbns/priced/hsg47.pdf
Specification for the Reinstatement of Openings in Highways (3rd Edition)	Department of Transport 2010 Available at: https://www.gov.uk/government/publications/specification-for-the-reinstatement-of-openings-in-highways
Water supply to domestic fire sprinkler systems	Available free of charge at: https://www.water.org.uk/publication/water-supply-to-domestic-fire-sprinkler-systems/

Version Control

Version	Sign-off By	Date	Comments
1	Tom Pitts	10/11/2020	