
Affinity Water Design Construction Specification

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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 distinct to the water company and highlighting these *using this font*, to ensure it is clear to readers which elements are company specific. Completing the DCS in this way creates the Water Company's Design and Construction Specification document and is found on the company's website and which forms 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
TA	Technical Advisor
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, m ² /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.

The need for the plan arises from the requirements of CDM. HSE leaflet INDG411(rev1), published 04/15 states:

“Ensure a construction phase plan is in place

The principal contractor (or contractor if there is only one contractor) has to draw up a plan explaining how health and safety risks will be managed. This should be proportionate to the scale of the work and associated risks and you should not allow work to start on site until there is a plan”

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 Non – 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 (e.g. 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 Schedule 1 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

	Work categories by number of properties potentially affected by work or strategic nature of Existing Main			
	<49	50-199	200-499	500+/Strategic main
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;

- of an under-pressure type connection and/or,
- 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
- 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 In order for an SLP or NAV to undertake: "Valve operation in relation to commissioning new Self-Lay Works" the following criteria will need to be met:

- *Operatives to have a full, live CRMC WIRS Accreditation*
 - *Accreditation must not be under review or on an improvement notice*
- *Newly laid mains only*
- *The Water supply to no properties will be directly affected by the valve operation (i.e. Interruption to supply)*
- *Notification of intent*
 - *Affinity Water must be notified 5 working days in advance of the intent to operate the valve*
- *Real time updates*
 - *Information regarding the operation are confirmed to Affinity Water in real time*
 - *Information is to include date, time and valve location (ideally marked on a construction drawing, however a description will suffice)*

Further details of Affinity Water's Valve Operations by third parties policy can be found in section 11.7.

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 Affinity Water

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.

To promote water efficiency, we will apply a discount to the infrastructure charge for new homes where there is evidence of water efficiency design to a standard of 110 litres (or less) per person per day. For the 2020-21 charging year this discount will be £80 per infrastructure charge.

9.8 Design Proposal

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

Select appropriate materials for the Self-Laid Main and Service Pipes.

Determine the legal land ownership boundary of the Site.

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.

Provide all related material requirements and details as required by this Design and Construction Specification.

Calculate demands and size all Service Pipes in line with this Design and Construction Specification (see also paragraph 10.2).

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.

Identify the agreed Point of Connection and determine by agreement with the Water Company all work that is Contestable and Non-contestable.

Design the appropriate number of Self-Laid Main fittings required to control the Network and the Self-Lay Works.

Identify any sections of Self-Laid Mains that require easements or wayleaves.

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 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
18. North point
19. Site boundary
20. Roads / highways / service strips (adopted or proposed for adoption)
21. Change in ground level
22. Service strips, wayleaves and easements required for the construction, operation and maintenance of the Self-Laid Main
23. Significant environmental and health and safety hazards
24. Contestable / Non-contestable works annotated
25. 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 Drawing 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

- **Water mains:**
 - **Polyethylene (PE)**
Because of its potential use in trenchless installations and its torsional strength negating the need for thrust restraints, polyethylene is the preferred material unless engineering issues dictate otherwise. This should be PE100 (High Performance Polyethylene HPPE, dark blue). The minimum pressure rating is 10 bar unless a higher-pressure rating is required at the design stage.
 - **Polyethylene Barrier:**
Polyethylene Barrier will be specified in areas where ground contamination may pose a risk to water quality. Type A polyethylene barrier system, i.e. appropriate joints, fittings and service pipes must be used, and manufacturer's guidance should be referred to. Type B systems will not be acceptable due to incompatibility.
 - **Ductile Iron (DI):**
Ductile Iron may be taken into consideration as an alternative material for use where contamination may pose a risk to water quality, in particular at larger diameters or where pressure dictates its use. If ductile iron is proposed,

appropriate protection and restraint should be specified in accordance with CIRIA Report

- **Services:**
Service pipes material shall be medium density polyethylene (MDPE) PE80 to BS 6572 and blue in colour. Approved barrier pipe (type A) is to be specified in areas where ground contamination may pose a risk to water quality

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 (mm)	Material	SDR	Pressure Rating
25	PE80	11	12.5bar
32	PE80	11	12.5bar
50	PE80	11	12.5bar
63	PE80	11	12.5bar
90	PE100	11,17	10bar
110	PE100	11,17	10bar
125	PE100	11,17	10bar
160	PE100	11,17	10bar
180	PE100	11,17	10bar
225	PE100	11,17	10bar

Table 10.1 Permitted pipes sizes, materials, SDR and pressure ratings to be used within the Water Company area. *Barrier pipe will be specified in areas where ground contamination may pose a risk to water quality. Other Type A Polyethylene barrier pipe systems may be used with prior authorisation from Affinity Water.*

In some circumstances we may require a pressure rating of 16bar, we will advise you at the earliest opportunity of this requirement

Size	Material	SDR	Pressure Rating
25	PE 80 Barrier Pipe (Type A)	11	12.5bar
32	PE 80 Barrier Pipe (Type A)	11	12.5bar
63	PE 80 Barrier Pipe (Type A)	11	12.5bar
90	PE 100 Barrier Pipe (Type A)	11,17	10bar
125	PE 100 Barrier Pipe (Type A)	11,17	10bar
180	PE 100 Barrier Pipe (Type A)	11,17	10bar
225	PE 100 Barrier Pipe (Type A)	11,17	10bar

Table 10.2 Permitted pipes sizes, materials, SDR and pressure ratings to be used within the Water Company area

In some circumstances we may require a pressure rating of 16bar, we will advise you at the earliest opportunity of this requirement

10.2 Principles of Sizing 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 at a later date, 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.

The sizing of pipes for detailed final design should be based upon a hydraulic calculation using the calculated peak demand and the Hazen Williams Equation. Please refer to New Development Guidance Notes for additional information in Schedule 20.

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 (e.g. 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 Calculators

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

X = Average demand per capita

Y = Average household occupancy rate

Z = Peak flow factor

Demand per capita per day shall be taken as *152 litres* unless evidence to the contrary is provided for the specific development.

Calculation for household occupancy shall be taken as *2.4* persons per household on average unless evidence to the contrary is provided for the Site.

Average daily demand per household is therefore $X \times Y = XY$

To account for diversity in the network, Peak Flow Factors for domestic scenarios shall be taken to be *1.25*.

Peak Demand may be calculated then by multiplying the average day demand per household by the peaking factor.

A site of 'n' Domestic units has a daily demand in litres of $XY \times n = nXY$

This must be multiplied by the peaking factor Z Therefore peak demand in litres per second can be estimated at $nXY \times Z = \text{Peak demand in l/s}$

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

Sizing of industrial supplies will be dependent on design flow rate (l/s) required as specified by the Developer.

If industrial and non-industrial uses are to be fed through one service pipe, the Loading Units required for non-industrial supply should be converted to flow rate (l/s) and added to the design flow rate provided by the customer

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, e.g., 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}

Please refer to New Development Guidance Notes for additional information in Schedule 20

10.7.4 Calculating Headloss Through the Network

For newly designed and constructed Water Mains headloss per 1000m shall not exceed 15mH , target values shall be between 10m/km and 15m/km .

Please refer to New Development Guidance Notes for additional information in Schedule 20

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.

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 Design Accreditation

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 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.

In general, a main should be laid in preference to a service pipe where three or more properties will be served, and the furthest point of connection (to the boundary) is over 10m from the parent main; long services should be avoided where possible. Please refer to Schedule 20 within this document, Code of Practice for Pipe Laying for further guidance.

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 the 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 endeavors 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 2m 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
<150mm OD	4m (2m from the centre line either side of the water main)
150mm – 450mm (6” – 18”)	6m (3m from the centre line either side of the water main)
>450mm (18”)	8m (4m from the centre line either side of the water main)

Table: 11.3 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 be **900mm** 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 900mm 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.

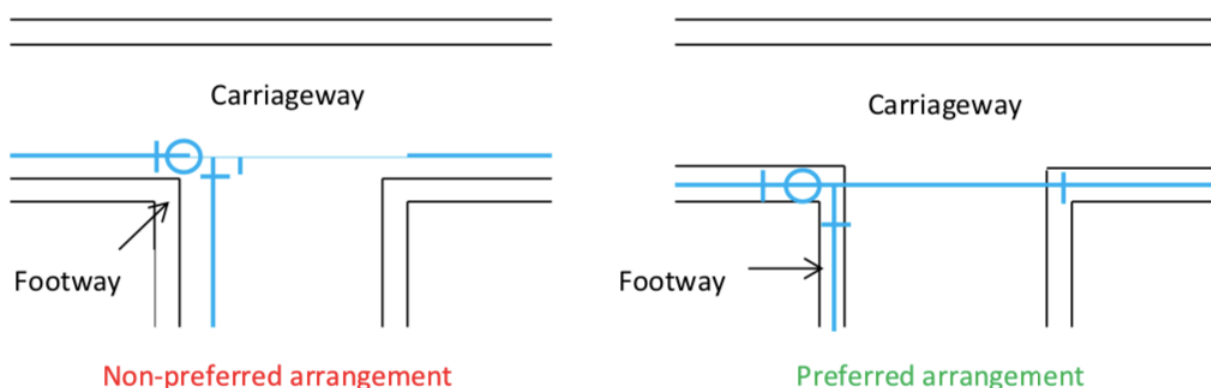
The Developer or SLP shall be responsible for ensuring that all required permits and agreements are in place for identifying where water can be flushed to and for disposal of said water and whether water is required to be de-chlorinated prior to disposal.

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

Where possible, all fittings should be installed where they can be accessed without special arrangements for example traffic management notices, and without placing any operatives or the public at risk during operation, maintenance or repair. Chambers should be located in positions not likely to be inundated by surface water drainage and silt. Where it is required for fittings to be installed in junctions the preferred locations for safer operation are shown below.



If a change to road layout leads to fittings no longer being in the footway, liaison is suggested in order to move fittings or undertake mains diversion to maintain safe operation.

Isolation Valves should be positioned;

- *On branch mains as close as practicable to the parent main, unless the branch is short and subject to the following provision.*
- *So as to enable isolation of the main(s) in sections not exceeding the lesser the below whilst endeavouring to also locate them close to branches or other apparatus.*
 - *500m in length or*
 - *50 properties served*
- *When operational flushing would be difficult or cause significant issues then a valve-washout-valve XOX arrangement should be installed.*
- *So as to ensure security of supply to Sensitive customers (i.e. Hospitals, Schools etc.).*

Where an isolation valve has been identified as a critical valve (generally between different pressure areas) or as a district valve (DV) then the valve should be installed as part of an XOX arrangement.

Isolation valves shall be of an appropriate size for the size of main installed i.e. no tapering down to valves should be required. The size of valve specified should be marked on construction drawings.

Hydrants/ Washouts should be positioned:

- *At the termination of any main, e.g. in a cul-de-sac.*
- *At locations to enable emptying and flushing sections of main not exceeding 500m in length. In practice this means positioning washouts adjacent to valves and at mains connections.*
- *Adjacent to valves that are normally closed (such as District Valves).*
- *At any position requested by the local fire authority (see section 15.2)*

Air Valves should be positioned:

- *with regard for the topography of the land and crossings of rising structures (e.g. bridges) where there will be insufficient natural venting of any trapped air at high points through customers' service pipes.*
- *In rural areas where there are long lengths of main (typically 500m) without service connections to act as air vents, the main should be designed to have a straight vertical profile between air valves with a minimum grade of 1:500. This may require the route to be surveyed so that long section construction drawings can be produced.*

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.

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.

General Valve operations by a third party are limited to ≤ 3 valves, on a main size ≤ 6 " (150mm) where the valve is not considered critical or the impact on the wider network is considered low (i.e. discoloration, interruption to supply). The work must be planned & executed to ensure the risk to the wider network is minimised and Affinity Water's regulatory responsibilities are maintained.

Permits are to be received in written form only

Training and Competence

- *Any contractor or operative receiving an NW103 permit to operate the network must have: Affinity Water Valve Operations Operative Training*
- *Mains Flushing Training*
- *Valid Manual Handling Training*
- *EUSR card*

Key Responsibilities

Affinity Water Customer Service Technician

- *Plan the isolation and return to service*
- *The isolation and return to service is reviewed on GIS/FIS as meeting the requirements for an NW103 permit (number of valves, valve type, size of main)*
- *The valves are checked on site for accessibility and operability and valve lids sprayed appropriately*
- *The Customer Service Technician plans the sequence of valve operations to isolate the main and the one valve that can be operated to start its return to service*
- *The number of customers to be warned is identified including any key or safeguard registered customers, if the warning of the works is also being delegated these details are added to the NW103 Permit*
- *Issue the permit*
- *Complete the Return to Service*
- *Record details*

Network Operative

- *Review the Permit –*
 - *Ensure the conditions are as expected and understood.*
- *Notify stakeholders of works*
- *Complete the works*
 - *Any issues or concerns regarding the isolation (i.e. exceeding the times on the permit) must be raised with the Customer Service Technician as soon as they are understood.*
- *Record Details*

- *The operatives must notify the Customer Service Technician of the supply interruption details as soon as practicable*

Affinity Water must be notified a minimum of 5 working days of the intent to operate valves. Approval should not be assumed without prior agreement.*

**Due to the regulatory responsibility consideration will be given to the number and types of properties affected, as well as the risk to the wider network of any mains isolation. Details below; -*

- *if a non-household property will have their water supply interrupted, 22 working days' notice has to be given for the work (via Affinity Water's website).*
- *if there is a risk that the isolation may exceed 3 hours then measures may be required to reduce any interruption (i.e. Provision of temporary supplies through Arlington tanks). This may involve third parties who's lead times exceed 5 days.*
- *Contingency plans may be required in order to reduce the risk of an unplanned over-run. The SLP will be required to support these plans (i.e. store contingency fittings onsite)*

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

Affinity Water policy for third party operations on valves can be found in Guidance Notes for Authorisation to Interrupt Supply to Network, Schedule 20

11.8 Washouts and Fire Hydrants

Washouts are to be type 2 – BS 750, PN16 flanged inlet, screw down type body, clockwise closing. See AW4810 "Replacement of BS750 Type 1 Hydrant" for standard construction detail.

They should be positioned:

- *At the termination of any main, e.g. in a cul-de-sac.*
- *At locations to enable emptying and flushing sections of main not exceeding 500m in length. In practice this means positioning washouts adjacent to valves and at mains connections.*
- *Adjacent to valves that are normally closed such as DVs.*
- *At any position requested by the local fire authority (see section 15.2)*

Fire hydrant marker posts and plates may be installed by the Fire Authority.

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.

In rural areas where there are long lengths of main (typically 500m) without service connections to act as air vents, the main should be designed to have a straight vertical profile between air valves with a minimum grade of 1:500.

Small orifice air valves are preferred for distribution mains; however, the type, size, and frequency of valves must be selected to suit the anticipated duty and main size.

Air valves should be installed with a separate quarter turn isolation valve below the air valve such that the air valve can be replaced without isolating the parent main. If double air valves are specified these will be provided with a stop cock for water quality sampling.

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 1000 domestic properties in size or a development size of 3000 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

Double spade valves are not to be used on distribution mains within the Affinity Water area

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 landowner. 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.

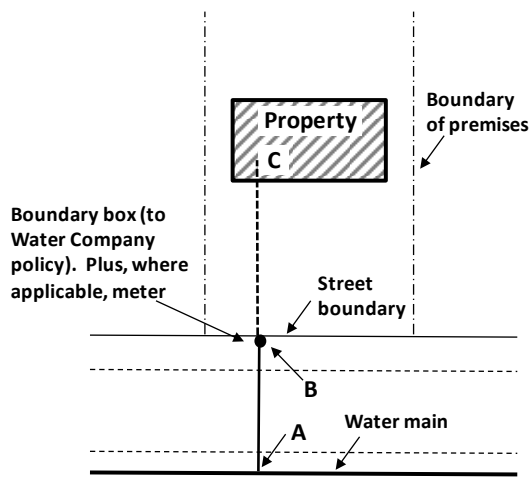
In accordance with the WAA, the Water Company shall obtain any required easements to protect its Network, or any future extension of such, and any related and/or incurred costs including third party costs shall be recovered by the Water Company in accordance with its published Charging Arrangements.

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.

Figure 1



SERVICE CONNECTION PIPEWORK	RESPONSIBILITY		REGULATIONS
	INSTALLATION	MAINTENANCE	
A – B Communication Pipe	SLP	Water Company	Water Supply (Water Quality) Regulations 2016
Boundary box (plus, where applicable, meter)	SLP	Water Company	
B – C Supply pipe	Developer	Property owner	Water Supply (Water Fittings) Regulations 1999 and Water Supply (Water Fittings) (Amendment Regulations) 1999
Internal plumbing	Developer	Property owner	

Layout

In general, service pipes should be laid perpendicular to the parent main and located such that the whole pipe (communication and supply sections) forms a straight line between the main and the point of entry into the building. The number of fittings or joints used to make a connection should be minimised as far as practical and should not be more than 3. Supply pipes should be laid such that no part is in any land not within the boundary of the property being served.

Affinity Water's preference is for installation of the stop tap and meter to be on or within 1m of the boundary. The preference for surface is soft dig public and then footway, and as an exception where these are not possible the order of consideration of other surfaces should be hard dig private, and then soft dig private. Position of stop taps should be designed with future access and maintenance in mind. Refer to Developing and Working Near our pipes and apparatus guidance in schedule 20.

The designer should choose a suitable point of connection on the closest distribution main enabling the above requirements for layout to be met.

Materials

Material selection should be independent of supply type; in order to determine the service pipe material, an assessment of the risk on behalf of Affinity Water is to be made by a competent person.

This risk assessment shall provide the basis for deciding the service pipe material which should be either:

In areas with low risk of contamination - PE80 (Medium Density Polyethylene MDPE, light blue)

In areas with potential for contamination – an appropriate barrier pipe to WIS 4-32-19 Nov 2011: Issue 3.

The preference is for barrier pipe to be specified where contamination is suggested, with intrusive site investigation only being undertaken at the developer's expense where material selection is queried. Affinity Water, Water Quality should be consulted to make a material selection based on ground condition assessment.

Additional pieces of information that may be useful in assessing the need for barrier pipe for services in particular include:

Nearby jobs i.e. service pipe relay in PE

Parent main material i.e. if newly laid in HPPE

Where barrier pipe has been selected for service pipe material, consideration should also be given to continuing protection from contamination beyond the service pipe. Where ground investigations have indicated that there is a risk of the presence of chemicals (such as hydrocarbons), the meter box and connections to it must be compatible with the chosen barrier pipe system and must maintain the barrier to ingress of such chemicals.

Installation

The minimum spacing between external shoulders of tappings should be 300mm (as below).

Due regard should be given to ensuring that the cover chosen for any chamber is suitable for the surface loadings whilst minimising the weight to be lifted for access to the meters.

Service pipe installation technique should be chosen based on the most cost-effective technique available for the specific environment and design considerations (for example location of other utilities). Where possible, the preferred installation technique for services is moling, although this may not be possible for short lengths of pipe, or when other utilities' equipment is present. In these cases, excavation is generally required for installation.

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

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 meter (if applicable)

Configuration	Guidance
<i>Single domestic supplies- multiple connections for single properties.</i>	<i>Installation of two, four or, six-way manifolds configured for 2, 3, 4, 5, 6 connections usually installed in the highway at the property boundary (see Section 12.4 “Location of Boundary Boxes”. Properties to be individually metered on each individual service outlet.</i> <i>See AW4862: Service Connection - PE pipe and AW4863: Service Connections - Barrier Pipe</i>
<i>12 dwellings or less in a single block (includes single individual units).</i>	<i>Manifolds are to be installed in an external location unless there is an exceptional reason (i.e. Pressure problem) that necessitates the installation of a booster pump by the developer, then the manifold should be located internally.</i>
<i>12 dwellings or more in a single block</i>	<i>Manifolds are to be installed in an internal location. See AW4842: Internal Manifold Layout. Please see section 12.6 “Services to Multi Storey Buildings”</i>

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 850mm 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 velocity is $\leq 1.3 \text{ ms}^{-1}$ and that total headloss is $< 10 \text{ mH}$

Services to standard domestic properties shall be minimum *20mm* internal diameter and capable of supplying required flow and pressure based on required demand.

Methods used for sizing of communication pipes should be in accordance with BS EN806-3 (Pipe Sizing Simplified Method) and/or BS 6700-1997. The calculations should take into account:

- *the fittings to be installed in the property(s)*
- *pressure in parent main to feed service (if unknown, 20m to be assumed)*
- *elevation change between parent main and proposed meter location*
- *length of communication pipe*

If calculations suggest that a communication pipe needs to be >63mm OD, the requirement is for the developer to install a suitably sized tank to ensure sufficient supply or for a mains extension to be considered as an alternative.

Sizing of non-domestic supplies may be dependent on design flow rate (l/s) required as specified by the Developer.

12.4 Location of Boundary Boxes

Affinity Water's preference is for installation of the boundary boxes (and meter) to be on or within 1m of the boundary. The preference for surface is soft dig public and then footway, and as an exception where these are not possible the order of consideration of other surfaces should be hard dig private, and then soft dig private.

Affinity Water should be consulted on any installations that will be in private land.

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

Refer to Developing and Working Near our pipes and apparatus guidance in schedule 20.

12.5 Supplies to Multi Occupancy Buildings

Affinity Water's preference is for each property to have its own service pipe and / or meter. Affinity Water should be consulted in exceptional circumstances (i.e. when this is not possible)

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.

Each property should be individually metered. Internal manifolds should be installed to house the meters to the individual properties. These should be installed:

- *in an area of common access, collectively mounted in a separate cupboard or enclosure - If the cupboard is to be locked then only with the same system in common usage for gas and electricity meters, preferably with standard FB2 locks.*
- *Or in a readily accessible area of a plant room.*

- *At a height no greater than 1500mm or no less than 300mm from the finished floor level to the meter sockets.*

In large properties, several metering installations in different locations may more effectively serve the layout, this is acceptable.

12.7 Additional Requirements for Supplies to Buildings others 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.

All exceptional non-domestic supplies should have a logged meter for leakage purposes, Exceptional can be defined as:

- *Having significant demand compared to the demand of the remainder of the DMA, or*
- *Having significant night use, or*
- *Having significant seasonal variation in demand.*

To facilitate the installation of these loggers, Affinity Water should be consulted when new supplies are proposed for exceptional non-domestic customers.

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.

Affinity Water requirements by reference to CESWI and any additional specific requirements are as follows;

- *Thrust Restraint and Anchorage*
 - *No additional specific requirements*
- *Puddle Flanges*
 - *No additional specific requirements*
- *Self-Anchoring Joints*
 - *No additional specific requirements*

- *Site Conditions and Ground Bearing Capacities*
 - *No additional specific requirements*
- *Thrust Blocks*
 - *The scheme designer is responsible for specifying any necessary thrust blocks*
 - *Where the SLP is the designer, they shall supply details of their thrust block design with supporting calculations to Affinity Water*
 - *The SLP is responsible for constructing thrust blocks in accordance with the design specification*
- *Jointing of pipes*
 - *Where PE mains pipes are used, a fully welded system shall be used, and the number of joints minimised. Butt fusion joints are preferred, and the use of electrofusion couplings shall be limited to that which is essential for the cost-effective construction of the works.*
- *Ground Anchorage*
 - *No additional specific requirements*

For further amendments and additional specifications, please refer to "Affinity Water Civil CESWI Amendments in Schedule 20. In case any of any doubt Affinity Water should be consulted

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

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.

Please refer to "AW4836 Chamber Installation in Soft Ground and Highways" for standard arrangement drawings.

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.

Laying Water Mains in ducts should be avoided and will only be considered in exceptional circumstances, for example:

- *at road crossings where damage by construction traffic is a risk*
- *at road crossings where main is to be laid particularly deep (i.e. where shuttering required)*
- *where longitudinal ducts facilitate site access*

Where a Water Main is laid in a duct, it should be highlighted on the aslaid drawing submitted to Affinity Water

14 Metering Requirements

14.1 Standard Domestic Metering for Individual Dwellings and Multi Occupancy buildings

The following general principles should be adopted for the design of metering installations

<i>Configuration</i>	<i>Requirement</i>
<i>Block of flats- 12 dwellings or less.</i>	<i>External meters to be installed to our policy for single domestic supplies. Manifolds to be used where practicable Busk supply is only considered in exceptional circumstances.</i>
<i>Block of flats or greater.</i>	<i>Provision of a bulk supply is the norm</i>

	<i>Internal metres to be fitted in accordance with our policy.</i>
<i>Single domestic supplies- standard single connection</i>	<i>Installation of a combined boundary box with meter usually in the highway at the property boundary.</i>
<i>Single domestic supplies- multiple connections for single properties.</i>	<i>Installation of two, four, six-way manifolds configured for 2, 3, 4, 5, 6 connections usually installed in the highway at the property boundary. Properties to be individually metered on each individual service outlet.</i>
<i>Single domestic supplies- wall mounted boxes.</i>	<i>Approved wall boxes are permitted. Meter to be fitted in the wall box.</i>
<i>Non-domestic large supplies- all connections.</i>	<i>Affinity Water to be consulted on positioning. Bespoke design according to the anticipated water demand. Information available on request. Liaison before undertaking any chamber design is recommended</i>

All meters must be fitted in a position where they can be easily read and accessed for inspection (appropriate depth), testing and maintenance purposes

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 Company to provide 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)

Adopted Fire Hydrants must be positioned after liaison and agreement with the relevant Fire Authority.

The designer should endeavour to position Fire Hydrants so that they may also be used effectively and safely for operational purposes, so as to minimise installations and street furniture 'clutter.' Fire hydrants should be positioned clear of vehicular traffic routes or parking areas where practicable. Where possible the siting of hydrants on branches should be avoided and alternative locations sought.

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 policies 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.

All sprinkler systems must be notified to Affinity Water under the Water Supply (Water Fittings) Regulations 1999; the notification must include full mechanical drawing showing pipe runs and a fittings schedule.

Fire supplies for the purpose of fire sprinkler systems will not be metered for billing, however where required, a check meter may be installed on fire sprinkler supplies so long as this installation does not impinge on the ability of the sprinkler system to operate. A check meter would be a meter installed by us to monitor potential illegal usage or for leakage monitoring purposes, where no standing or volumetric charge is made.

An isolating valve and an appropriate backflow prevention device must be fitted between the mains supply and the sprinkler installation. Maintenance of this device is the sprinkler user's responsibility and is subject to inspection by our water quality regulation inspectors.

Sprinkler systems are generally either direct feed, or fed from a storage tank (by gravity or pumped). Sprinkler systems may only be fed via a direct mains connection where:

- *The pressure and flow requirements of the sprinkler installation do not exceed the available flow and pressure within the water mains under normal operating conditions.*

Pumps on direct feed fire service pipes are not permitted without Affinity Water consent. Consent will only be provided if:

- *It can be proved that the network will not be compromised by the pump or booster when operated at its design limit;*
- *Suitable measures are in place to ensure that the pump will not induce negative pressure in the parent main;*

- *Installation of a pump has been agreed with us prior to installation, following receipt of full details, drawings and fittings schedule.*

Where our existing network is unable to provide sufficient pressure or flow a direct fire supply booster consent will not be provided and the requirement for network reinforcements or the installation of sufficient storage will be set.

Fire supplies may either be supplied by a) a dedicated independent fire connection to the parent main or b) a single point of connection to be used for both fire and general water supply. Our preference is for b) a single point of connection to be used for both fire and general water supply provided no firefighting water passes through a meter.

For direct feed sprinkler systems (with or without a booster), sizing is dependant on the peak flow rate (l/s) of the sprinkler system to be installed, and this figure should be provided by the developer or building owner.

For sprinkler systems fed from a storage tank, the developer or building owner should determine what size tank is required to give fire cover, and how quickly the tank would need to be refilled. This will enable the peak flow rate to be calculated.

Where fire sprinkler systems are installed, we are only required to provide the minimum supply requirements for pressure and flows. Mains water supplies may also be interrupted for maintenance work or because of a failure in the supply system.

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.

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 Affinity Water'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 (three times 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 N/A

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.

Laboratory Testing		On Site by Sampler / Chlorinator	
<i>Total Coliforms</i>	'0'	<i>Odour</i>	
<i>E. Coli</i>	'0'	<i>Taste</i>	
<i>2-day plate count (37* C)</i>	<i>No abnormal change</i>	<i>Free Chlorine</i>	
<i>3 -day plate count (22* C)</i>	<i>No abnormal change</i>	<i>Total Chlorine</i>	
<i>Turbidity</i>	<i><1 NTU</i>	<i>Turbidity</i>	<i><1NTU</i>
<i>pH</i>			
<i>Electrical Conductivity</i>			

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 Affinity Water 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.

All pipework must be laid in a clean and hygienic condition. New mains pipework must be pressure tested, swabbed, flushed, disinfected and satisfactory samples obtained before being brought into service. During installation, the pipe ends must be capped using freshly disinfected plugs/cap ends or temporary washouts whenever work stops. Following completion of satisfactory pressure testing, the main should be swabbed and flushed until on-site turbidity <1NTU using potable water.

All HPPE mains and MDPE mains are to be pressure tested in accordance with IGN 4-01-03:A5. Ductile iron mains will be subject to a one-hour static test at pressure of 1.5 times the working pressure or 10 bar, whichever is the greater.

Swabs are to be inspected for soiling and swabbing continued until swabs are clean. All swabs to be retained for inspection. Flushing is then required using 3 pipe volumes

or greater until the turbidity is less than 1NTU. Chlorine is injected at a concentration between 50 and 60 mg/l. The required contact time is to be greater than 30 minutes.

De-chlorination is required until the residual chlorine is equivalent to the network chlorine residual and is consistent over a length of time. The on-site turbidity must be <1NTU and then left to stand for 30 minutes before sampling. Once the sample has been approved then the connection must be made within 14 days of the sample date.

All fittings should be sprayed internally and externally with a freshly made chlorine solution of 1000mg/l. The external surface of the pipe connected to the fittings should be sprayed with a chlorine solution of 1000mg/l prior to connecting to the fittings.

Services Connections =>63mm should be subject to the above disinfection procedure. Service Connections <63mm require an on-site odour check unless a risk assessment identifies the need for further checks. Such checks may include on-site turbidity, free and total chlorines, taste and odour and laboratory analysis of bacteriological and physical parameters.

Affinity Water must be reasonably satisfied that the samples have been taken where indicated and have passed water quality requirements before services are tapped. For Affinity Water's policy on disinfection of new mains and services, please refer to "Network Disinfection"

2. Service test: All new Service Pipe connections must undergo a service test. The procedure is also defined in Water Industry Information & Guidance Note (IGN 4-01-03) 'Pressure Testing of Pressure Pipes and Fittings for use by Public Water Suppliers'.
 - The system test pressure shall be 18 bar.
 - The service shall not have been tapped prior to this test being conducted.

18 Affinity Water Key contacts

Affinity Water Key contacts are available on our website.:

<https://www.affinitywater.co.uk/developing/contact-developer>

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

Not Applicable

19.2 Timing of the Generation of Plot Reference Numbers

Applicable

Affinity Water will issue a plot reference number under Water UK obligations associated with Levels of Service Metric SLPM S7/1

<https://developerservices.water.org.uk/public/metrics>

19.3 Affinity Water Design Service Offerings

Applicable

Customer's wishing for Affinity Water to carry out design activity should submit an application via the Affinity Water Developer Service's portal.

<https://affinitywater.custhelp.com/>

19.4 Design Self-Certification Scheme

Not Applicable

20 Design and Construction Specification Appendices

Please refer to Self-Lay Codes for Adoption section of our website here:

<https://www.affinitywater.co.uk/developing/adoption-codes> for the following documents;

Network Disinfection

New Development Guidance Notes

Developing and Working Near our pipes and apparatus

Affinity Water Civil CESWI Amendments

Code of Practice for Pipe Laying

Guidance Notes for Authorisation to Interrupt Supply to Network

21 Schedule of Permissible Materials & Construction

Materials & Construction

List of permissible materials for use during construction can be located under the relevant section above and in the relevant standard arrangement drawings listed in Section 23

As laid Drawings (continuation of Schedule 16)

The as-laid records submitted by the SLP shall be in two forms: electronic 'As-laid' drawings, and, electronic 'GIS files' outputted from the GPS geospatial survey data in compatible formats that enable direct upload into Affinity Water's GIS system.

As-laid drawings shall be produced from geospatial survey data within a GIS or CAD system and saved in PDF or a similar acceptable format as agreed by Affinity Water. The as-laid drawings shall be produced at scale and show the full extent of the survey. The drawings shall be capable of being legible when printed on either A4 or A3 paper. Where the area of survey is extensive, multiple drawings shall be produced. Where necessary detail 'cut out' boxes must be used to show further detail of apparatus installed, particularly at busy junctions or where the network is complex. The background Ordnance Survey geography ('MasterMap' product) must also be shown; this data can be provided in electronic format to the SLP upon request.

Affinity Water's GIS system requires ESRI 'Shapefiles' to be submitted from the raw survey data. Affinity Water's Geographical Analysis Team can provide, upon request a Feature Code Library (FCL) detailing which apparatus and what specific attributes should be recorded in the GPS survey; this will ensure the GIS file output matches Affinity Water's existing asset database when uploaded.

22 Meter and Service Pipe Policy and Installation

All meters are to be supplied by Affinity Water and are shown on our approved materials list obtainable on request. Meters sized according to the requirements for each property. The four different types of meter used are:

- Manifold (positive displacement)*
- In line (positive displacement)*
- Flanged helical turbine*
- Flanged electromagnetic*

Service pipes material shall be medium density polyethylene (MDPE) PE80 to BS 6572 and blue in colour. Approved barrier pipe is to be used in areas where ground contamination may pose a risk to water quality.

23 Standard Arrangement Drawings

*AW4800: maximum trench width, bedding and side fill material
 AW4801: Pipe protection under ditches and streams
 AW4810: Replacement of BS750 Type 1 Hydrant
 AW4834: Telescopic Valve Spindle Details
 AW4836: Chamber Installation in Soft Ground and Highways
 AW4837: marker plate and post details
 AW4839: single and double air valve installation
 AW4842: internal manifold layout
 AW4843: 25mm & 32mm single new and existing service connection with boundary box
 AW4860: 50mm single service connection with meter chamber
 AW4862: Service Connection - PE pipe
 AW4863: Service Connections - Barrier Pipe
 AW4870: Contaminated Ground - Barrier Pipe Service Connections
 AW4871: Sluice Valve Installation
 AW4901: Pressure Reducing Valve and DMA Meter Installation on Main
 AW4902: Pressure Reducing Valve and DMA Meter Installation on Bypass to Main*

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 Affinity Water 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 Affinity Water, 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:

- Confirmed arrangements for CDM 2015 Regulations and other H&S requirements.
- 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.
- Confirmation of line and level of Self-lay Works.
- Confirmation of national (Street-Works) and local (Affinity Water) design requirements.
- 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.).
- Confirm and detail the Source of Water for testing and mains connection Delivery Date.
- Confirm latest design approved drawing, and any revision, and drawing for construction
- Process for submitting as-laid drawings.
- Identify any potential site hazards or constraints (such as existing Network considerations, including protection, diversion or renewal)
- Confirm that access is approved relative to any land rights, statute, and third-party consents.
- Contact details.
- An indication of when any new service connections are required by and if any new property is to be fed from the Network.
- Confirmation that the Agreement has been signed by all Parties.
- Completion and issue by the SLP and/or Developer and/or Affinity Water of all risk and method statements relative to design and/or construction activities.
- Arrangements for co-ordination of activities.

- Arrangements for supply of proof of WIRS Accreditation, personnel qualifications and/or certification documents (i.e. Hygiene Code of Practice).
- Arrangements for water sampling and requirements for certification and accreditation of results, pressure testing, and disposal of water.
- Arrangements for Affinity Water approved standpipe supply if required.
- 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.
- Confirmation of any requirement for a Affinity Water post commissioning check sample by Affinity Water in accordance with the Code Procedures.
- Arrangements and contact details for future management of Defects and/or damage following adoption.
- Confirmation of how the SLP proposes to demonstrate to Affinity Water 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	4-23-04	Specification for underground stop valves, including spherical valves, for potable water services for nominal sizes up to and including 63 and nominal pressures of 10 bar minimum and made principally of metal or thermoplastics
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
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British Standards (BS) & BS EN Standards

Number		Title
BS EN 124		Gully tops and manhole tops for vehicular and pedestrian areas
BS		
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 section – 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 7 th Edition (or later version thereof) ("CESWI") together with any Affinity Water amendments (to be published on Affinity Water 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 National Joint Committee 2014 (available free of charge at: http://www.water.org.uk/publications/water-industry-guidance)	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 & 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 polyethylene pipe and fittings: - https://bfpipesgroup.com/support-downloads/technical-guidance/ t. Specifications for PVC pipe and fittings: - https://bfpipesgroup.com/support-downloads/technical-guidance/	
Report R97	Trenching Practice (2 nd edition)	CIRIA, 1983 Available at: http://www.ciria.org/ItemDetail?iProductCode=R97&Category=BOOK&WebsiteKey=3f1_8c87a-d62b-4eca-8ef4-9b09309c1c91
Report 128	Guide to the Design of Thrust Blocks for Buried Pressure Pipelines	CIRIA, 1994 Available at: http://www.ciria.org/ItemDetail?iProductCode=R128&Category=Emory=PHOTOCOPY
HSG 47	Avoiding Danger from Underground Services	HSE Books, 2014 Available free of charge at: http://www.hse.gov.uk/pubs/priced/hsg47.pdf

	<p>Specification for the Reinstatement of Openings in Highways (3rd Edition)</p>	<p>Department of Transport 2010</p> <p>Available at: https://www.gov.uk/government/publications/specification-for-the-reinstatement-of-openings-in-highways</p>
	<p>Water supply to domestic fire sprinkler systems</p>	<p>Water UK June 2015 (and earlier documents)</p> <p>Available free of charge at: http://www.water.org.uk/publications/policy-positions-and-briefings/water-supply-domestic-fire-sprinkler-systems</p>