Affinity Water

Your local supply, on tap

Affinity Water Limited

Developer Services

Guidance on Self-Lay Design, Permissible Materials and Construction Arrangements

Version 1 February 2018

Status: published

Affinity Water Limited: Guidance on self lay design, permissible materials and construction arrangements

Contents

1 Introduction

This document is a guidance note for Self Lay Providers (SLPs) and should be read in conjunction with the national Code of Practice for the Self-laying of Water Mains and Services – England and Wales edition 3.1.

The guidance note covers the self lay design, permissible materials and construction arrangements as supplementary information for Section 3 of the Code of Practice. We will adopt the standards and requirements of the Code of Practice unless explicitly covered under this guidance. These company specific requirements or operational standards and processes are subject to change and we reserve the right to publish amendments to this document without prior notice to the Self Lay Provider.

The Guidance note applies to all self lay operations in our operational area.

2 Design requirements

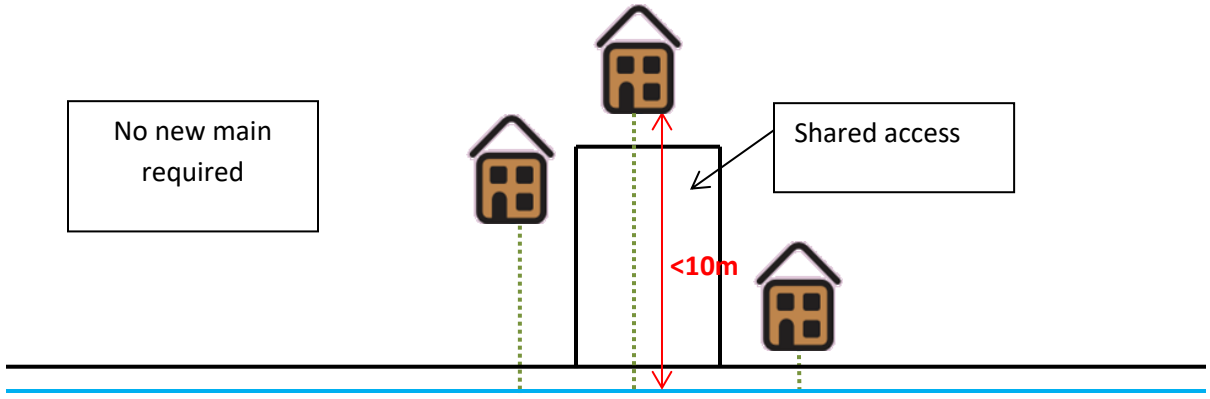
2.1 General

This section provides guidance to designers on all aspects of new development mains including sizing and route design.

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.

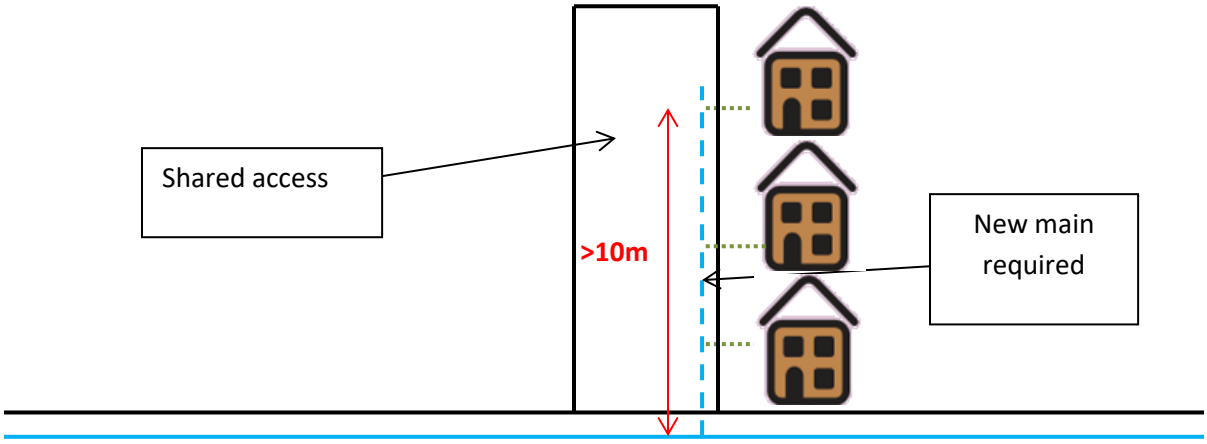
Example where no new main is required

Three properties, but boundary box location for furthest connection point <10m from parent main.



Example where a new mains extension is required

Three properties, boundary box location for furthest connection point >10m from parent main.



2.2 District Meter Areas (DMAs) and Pressure Management Areas (PMAs)

If a new development contains greater than 250 properties and is to be connected directly to a trunk main as the point of connection we will notify you of the requirement for a district meter zone to be established with the necessary flow meters and pressure management facilities required

2.3 Contaminated Land

.
The key factor to be considered is the potential for contamination by permeation from the pipe environment. Further guidance can be found in UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites

Data should be gathered throughout the design process around the presence of key risk factors which could suggest current or historical contamination of the proposed route of the main. These risk factors include but aren't limited to:

- Petrol stations & fuel storage
- Landfill sites
- Large scale dry cleaning
- Former factories
- Mines
- Steelworks
- Refineries
- Aviation fuel or oil pipelines
- Planned future use which may affect contamination

A suitable desk study should also be undertaken to include both current and historic information on:

- Discharge Consents
- Contaminated Land – Register Entries & Notices
- Local Authority Pollution Prevention and Control
- Waste Management/Landfill
- Surface Water
- Groundwater Vulnerability
- Solid Geology
- Heavy Industry/Contamination
- Hazardous Substances

Outcomes from this desk study, site walkover and anecdotal evidence of contamination will together form a Preliminary Risk Assessment (PRA).

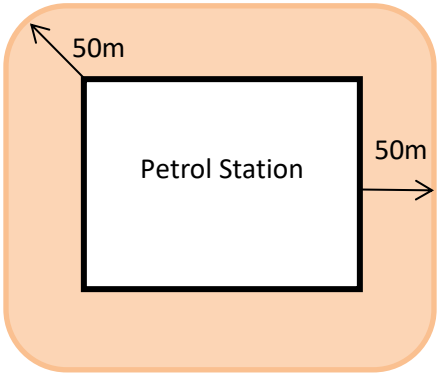
If the need for an intrusive site investigation is identified, the site sampling plan and the analytical data on the samples should be included in a Site Assessment Report (SAR).

If at any stage during installation it is apparent that there is or has been contamination when not anticipated, or that suggests contamination beyond the level expected, installation work must stop immediately and not re-commence until a soil sample has been taken and analysed to determine appropriate material selection.

If future land use will foreseeably include chemical storage or use, or heavy industry, then Part 3 of the UKWIR Guidance should be referred to for material selection, and a proposed material selection provided to AW Water Quality.

Where the route of a proposed main passes by or through a petrol station, bus depot, HGV depot or similar, then an area of influence of 50m from all edges of the forecourt or depot area should be considered.

Therefore, where the proposed pipeline route falls within the orange boundary shown below, barrier pipe should be specified.



Where further guidance is required, our Water Quality Department should be consulted.

2.4 Route of Main

Where possible, mains must be laid in streets (highways), or areas that are defined as streets, with due regard for National Joint Utility Group (NJUG) guidance. Where it is not possible to lay mains in a street (including a footpath), the next preference for location will be grass verge then as a final resort, private land with an easement.

If the layout of the development indicates that mains cannot be installed in streets the designer must liaise with our project manager for the site to agree suitable routes in the verge or private land. Our Legal Department must be consulted to enable appropriate easements to be arranged over the land. An easement may additionally need to be considered if the layout of the area may be prone to change (e.g. retail parks, commercial and industrial areas). Under no circumstances should mains be installed in privately owned domestic land or under structures without an appropriate easement. Where work is to be done on private land our policy on mains laying in private land should be followed and is available on request.

Where laying mains in a new development and other utilities are being laid in addition to water, consideration should be given to making use of a service strip. A service strip is generally a 2m wide strip of land beside the road which is intended to be kept clear for the installation of utilities apparatus (in accordance with current NJUG guidance).

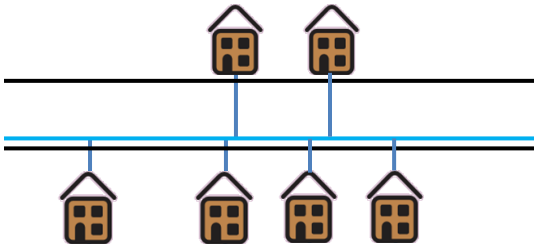
Routes for mains should be laid taking into account:

- Planned construction technique
- Location of other utilities from plans of underground services and trial holes where appropriate
- Minimising number of fittings and joints required when connecting to parent main
- Existing and future land ownership and use
- Ground conditions (i.e. soil type, rock, groundwater)
- Traffic management
- Land with a protected status e.g. Site of Special Scientific Interest (SSSI)
- Trees and tall street furniture where roots and foundations may be disturbed e.g. lamp posts, fences, gate posts
- Watercourses and bodies of water
- Covered footways or carriageways
- Areas of restricted or prevented access (for construction and future operation and maintenance)
- Areas of contaminated land
- Appropriate clearance from existing and future buildings or structures
- Major road crossings
- Avoiding installation in ducts except by agreement and 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 would be required)
    - where there may be prohibitive costs for future road crossings
    - where longitudinal ducts facilitate site access

- Where ducts are deemed to be required because of the reasons above, the design should be appropriate to loading conditions and environment. Where deep road crossings are concerned, there should be appropriate consideration of twinning of mains and/or ducts.

The overriding principle is to design for the most economic layout, with equal consideration to both initial installation cost and whole life operation and maintenance requirements. A secondary consideration should be the resilience of the network.

Mains should be installed on one side of a street or future street and premises on the opposite side of the street will be supplied by long service pipes. The main should be sited on the side of the street with the greatest number of premises to be served to minimise long service pipe crossings. Mains should not be laid in parallel unless in agreement with AW in special circumstances.



At the end of traditional residential cul-de-sacs, the option of either a) short main with long radial service connections (this is the preferred option for Mains Extensions); or b) long main around the turning area with short service connections must be selected to minimise cost, disruption and risk. The main should terminate with a washout 1 metre after the last service or mains connection so that the risk of stagnant water in the main is avoided.

2.5 Depth and Gradient of Main

Mains must be installed so as to give a minimum depth of cover of 900mm and then as close to this depth as possible.

If there are exceptional circumstances that indicate a need to vary significantly from the above requirement i.e. at a depth to crown of < 750mm or >1200mm then the designer must consult with us and confirm details of measures such as protection which may need to be provided.

In rural areas where there are long lengths of main without service connections to act as air vents, the main should be designed to have a straight vertical profile with a minimum grade of 1:500. This may require the route to be surveyed so that long section construction drawings can be produced as is common practice for trunk mains.

2.6 Hydraulic design

The sizing of new mains will be subject to the following aspects:

- Number of household and non-household customers and their demand with loading unit assessment using BS 6700:2006+A1:2009
- Location of point(s) of connection as provided/confirmed by us.
- Available pressure (maximum and minimum) at the designated point of connection.
- Fire flow requirements.
- The pressure within the network being maintained at a minimum of 1.5 bar at all elevations and pressure variations limited to avoid large diurnal pressure changes
- The velocity in the new mains to be between 0.4 and 0.6 m/s during average demand periods and 0.6 to 1.0m/s during peak demand.

Due regard must be given to the risk of water quality issues relating to stagnation of water where a main terminates and few properties are served at its end, and balanced with fire fighting needs (if any).

Table 4 of the "Code of Practice" provides minimum pipe sizes that conform to our standards. Noted in the code is the requirement for "adequate hydraulic assessment taking into account all pertinent factors."

2.7 Non Household properties

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

2.8 Services

Household communication pipe sizes range from 25mm-63mm.

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

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

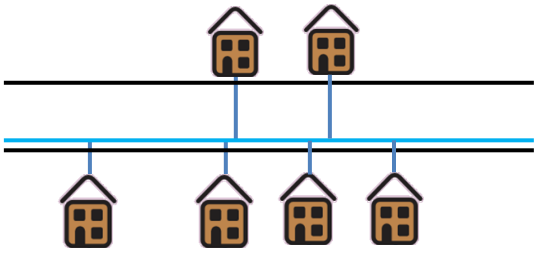
The information that is required in order to size the communication pipe is:

- the fittings to be installed in the property(s) or development (from the developer, applicant, or property owner)
- 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

- meter size

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.



The depth of the service will to an extent depend on the depth of the parent main. Notwithstanding this, service pipes must be installed so as to give a minimum depth of cover of 750mm and then as close to this depth as possible in particular at the position of the boundary box. If there are exceptional circumstances that indicate a need to vary significantly from the above requirement i.e. <750mm or >1200mm then the designer must consult with us and confirm details of measures such as protection which may need to be provided.

Service connections shall be made by electrofusion saddle or mechanical ferule strap to the top of the main. The service connections shall only be made to live mains.

The minimum spacing between external shoulders of tappings should be 300mm.

For household supplies, each property should have its own service pipe and meter except in exceptional circumstances (we should be consulted if this is the case). However, for low-rise buildings with shared occupancy, the number of separate service pipes should be minimised ensuring that all occupancy units have separate meters inside the building.

2.9 Metering policy

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

Configuration	Requirement
Block of flats- 12 dwellings or less.	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.
Block of flats. 12 dwellings	Provision of a bulk supply is the norm

	Internal metes to be fitted in accordance with our policy.
Single domestic supplies- standard single connection	Installation of a combined boundary box with meter usually in the highway at the property boundary.
Single domestic supplies- multiple connections for single properties.	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.
Single domestic supplies- wall mounted boxes.	Approved wall boxes are permitted. Meter to be fitted in the wall box.
Non domestic large supplies- all connections.	Bespoke design according to the anticipated water demand. Information available on request. Liaison before undertaking any chamber design is recommended

All meters are to be supplied by us 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) installed in boundary boxes, QN1.0 and QN2.5
- In line (positive displacement) size 25mm to 40mm
- Flanged helical turbine size 50mm to 150mm
- Flanged electromagnetic size 80mm and above

2.10 Boosted supplies

If there is a considerable length of supply pipe, or significant elevation change following the boundary box, consideration shall be made of the size of supply pipe needed or the requirement for storage or boosting.

This is of particular relevance for high rise properties where, to ensure sufficient pressure to all floors of a high rise building, developers may propose that storage and/or boosting should be installed. The arrangement of this should be in accordance with The Water Supply (Water Fittings) Regulations 1999 and notified in accordance with the regulations.

Where a developer proposes the use of a private communal boosted network (i.e. one storage tank and booster serving a number of high rise or other buildings) this may be allowed in exceptional circumstances by agreement with us.

- Properties will still be fed by their closest suitable distribution main in order that it is clear where interruptions are caused by private booster or where caused by interruptions to the distribution network

- It is clear that properties are within the same development and thus have shared ownership of infrastructure and its maintenance
- Individual meters shall be provided in accessible areas.
- There is a management company in existence to provide maintenance to the booster on behalf of the communal residences.

2.11 Fire Supply

All sprinkler systems must be notified to us 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.

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.

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 our 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 fire fighting water passes through a meter.

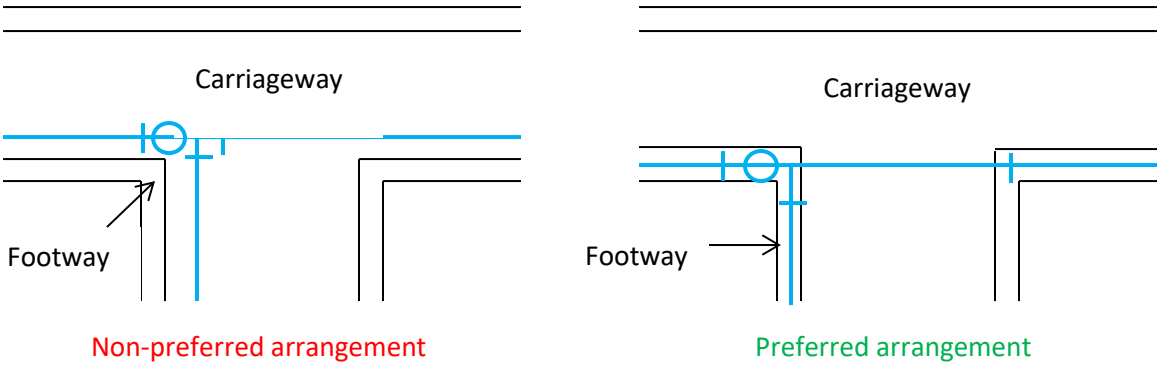
For direct feed sprinkler systems (with or without a booster), sizing is dependant on the peak flow rate (l/s) of the sprinkler system to be installed, and this figure should be provided by the developer or building owner.

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.

2.12 Fitting arrangements

This section provides guidance to designers on minimum specification and frequency of fittings on our mains, as well as providing details on special installations.

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.



Non-preferred arrangement

Preferred arrangement

The maximum distance between surface fittings –valves, washouts, fire hydrants etc. shall be 100m to ensure effective correlation of leakage in the future.

Isolation Valves and their chambers

Isolation valves shall be clockwise closing sluice (gate) valves with resilient seating, flanged for PN16 unless the designed pressure regime requires otherwise.

Isolation valves must be used in conjunction with proprietary telescopic extension spindles in preference to pre-formed chamber units wherever possible.

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.

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.

Air Valves and their chambers

Air valves must be installed 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 as is common practice for trunk mains.

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.

Washouts and their chambers

Hydrants within washout assemblies will be of the screw down type with fixed jumper (Type 2) and will be clockwise closing. 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. This effectively means positioning washouts adjacent to valves and at mains connections.
- Adjacent to valves that are normally closed such as DVs.

- At locations where filling/flushing points will be needed for successful testing and commissioning of new mains.

Washouts must be located to suit operational and hydraulic convenience, including giving consideration to how any wash out water will be drained. Consideration must be given to the likelihood of damage or pollution that may be caused by any discharge from a washout and if damage or pollution is probable then the washout should be re-sited to reduce this risk. Examples of areas with the potential for damage or pollution from wash out water are areas:

- Adjacent to watercourses, particularly with soft banks,
- At the top of embankments,
- Near electrical or telemetry kiosks,
- Adjacent to rail tracks.

Fire Hydrants and their chambers

Where a washout is to function as a Statutory Fire Hydrant it must be positioned after liaison and agreement with the relevant Fire Authority. Fire Hydrants are located 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. The siting of hydrants on branches should be avoided and alternative locations sought.

District Meters

Where a new installation of a district meter is required as part of new mains installation the following should be included as a minimum:

- A bypass of a sufficient size as to supply area during maintenance,
- A hydrant online, and a hydrant on the bypass,
- A logger capable of fast logging,
- A transmission post.

In addition, the following should be considered for installation:

- A probe point/quadrina 32mm tapping with 63m gate valve for the calibrating meter (this will be supplied by us).
- Where possible, a kiosk should be installed in preference to a transmission post.

The meter should be installed online rather than on the bypass except in situations where safer operation could be obtained by installing the chamber in the footway rather than carriageway, or where congestion of other utilities makes it impractical to install online. Installation on the bypass should be as an exception and by agreement with AW.

Where district meters are installed on plastic mains, standard flange adaptors should not be used. Flexible joints with tensile restraint are required. As a minimum, all district meter installations should have one flexible joint.

Sizing of the district meter should be based on duty i.e. the flow rate based on the number of properties being served and the meter specification from the supplier. As a general principal, the meter will be the same size or one size down from the parent main.

We will provide further guidance on preferred arrangements and options for meters.

Pressure Control Valves

Where the need for a PCV (either a PRV or PSV) has been identified the pressure control installation should include as a minimum:

- A bypass of a sufficient size as to supply area during maintenance,
- A hydrant online, and a hydrant on the bypass,
- A logger capable of fast logging,
- A transmission post.

In addition, the following should be considered for installation:

- A probe point/quadrina 32mm tapping with 63m gate valve (supplied by us).
- Pilot rails to provide both H&S benefits and practicality in operating pressure control valves. These pilot rails will be provided by us during the commissioning process.
- Where possible, a kiosk should be installed in preference to a transmission post.

Consideration should also be given to the different requirements for Pressure Reducing Valves and Pressure Sustaining Valves when specifying orifice plates and control valves.

Sizing can be undertaken through the use of manufacturer's sizing process where available, although a PCV of the same size as the district meter should be considered initially. We will notify you of the size of any PCV.

3 Construction

3.1 Depth of mains

Mains installed using offline techniques must be installed so as to give a minimum depth of cover of 900mm and then as close to this depth as possible.

If there are exceptional circumstances that indicate a need to vary significantly from the above requirement i.e. at a depth to crown of < 750mm or >1200mm then the designer must consult with us and confirm details of measures such as protection which may need to be provided.

3.2 Pressure testing and Disinfection

The main must be laid in a clean and hygienic condition. New 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 clean bags 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 of 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 than1NTU. Chlorine is injected at a concentration between 50 and 60 mg/l. The required contact time is to be greater than 30 minutes. Dechlorination 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.

3.3 Construction details

The following standard details are available on request:

AW4800-2015-01: maximum trench width, bedding and side fill material.
AW4802-2015-01: typical thrust block details for bends and tees.
AW4803-2015-01: mains connections arrangements.
AW4812-2015-01: double washout detail with gate valve.
AW4819-2015-01: 80-300mm fire hydrant or washout installation.
AW4837-2015-01: marker plate and post details.
AW4839-2015-01: single and double air valve installation.
AW4840-2015-01: stop tap and sluice valve chambers.
AW4842-2015-01: internal manifold layout.
AW4843-2015-01: 25mm single new and existing service connection with boundary box.
AW4844-2015-01: 32mm single new and existing service connection with boundary box.
AW4860-2015-01: 50mm single service connection with meter chamber.
AW4861-2015-01: 63mm single service connection with meter chamber.
AW4840-2015-01: stop tap and sluice valve chambers.

4 Materials

4.1 General

Material selection will be based on:

- Pipe environment and any risks to the pipe or to water quality
- Pressure capacity required
- Minimum designed life of 50 years

4.2 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 128.

4.3 Services

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 contaminated ground.

4.4 Valves, air valves and washouts

Valves

Isolation valves shall comply with BS EN 1563 and be clockwise closing sluice (gate) valves with resilient seating, flanged for PN16 unless the designed pressure regime requires otherwise. External protection is provided to WIS-4-52.01 B+.

Air valves

Air valves shall have separate isolating valves below and be sized to either single or double.

Washouts and hydrants

Hydrants are to be type 2 –BS 750 type 2 PN16 flanged inlet, screw down type body, clockwise closing.

Fire hydrant marker posts and plated may be required by the Fire Authority and must be installed to Fire Authority specification.

Nuts, bolts, washers and screws

These must be stainless steel or mild steel coated with epoxy resin, Rislan nylon or zinc plating.