



Dŵr Cymru
Welsh Water

Design guide for self-lay providers



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1. SECTION 1 – MANDATORY REQUIREMENTS

1.1 Introduction

This document has been written to reflect edition 3.1 (May 2017) of the national 'Code of Practice for the Self-Laying of Water Mains and Services – England and Wales'. Its purpose is to specify design practice guidance and permissible materials the area served by Welsh Water. This document should be used in conjunction with both the '[Code of Practice for the Self-Laying of Water Mains and Services – England and Wales](#)' and our own process guide.

As an alternative to having new water mains and service connections laid by us, a developer can arrange for the work to be done by a self-lay provider (SLP). All SLP working in Dwr Cymru Welsh Water (Welsh Water) area must have a valid WIRS accreditation. Welsh Water has a right to attend site at any point and any non-compliance will be reported to Lloyd's Register. You can ask a 'New Appointment and Variation' (NAV) to serve your development in a defined area known as an inset. NAVs are companies that have successfully applied to become a new service provider within an existing water company's region. You can find SLPs to contact for competitive quotes on the Lloyd's Register website at lr.org/wirs. Please note, this is a national list, from which you can select providers who are active in our region.

Most activities related to installing water mains and making service connections are known as 'contestable', which means they can be done either by a SLP or by us, however, some aspects are regarded as 'non-contestable' and can only be completed by Welsh Water. In addition to the non-contestable activities detailed in Section 1.8 of the Self-Lay Code of Practice V3.1 Welsh Water would also deem the following activities high risk and therefore non contestable:

- Any mains connection to the live network
- Connection of any non compliant Welsh Water stand pipe to the live network
- Operation of any sluice valves on the live network
- Operation of any pressure reducing valves, zonal boundary valve, district boundary valves, pressure boundary valve, emptying valve or district meter feed on the live network

- Transfer of any live service (consent from Welsh Water and the customer should be obtained first)
- Removal or alteration of any live meter without prior inspection and consent from Welsh Water

If you opt for the design to be undertaken by a suitably qualified SLP:

Upon receipt of your complete application, an initial assessment will be undertaken of the technical acceptability of your water mains and service pipe design. We will carry out this work within 14 calendar days for a development up to 500 houses, or within 28 days for a development of over 500 properties (or where there are engineering difficulties). If any aspects are not technically acceptable, we will notify you and you will have the option of rectifying any faults prior to resubmitting your application. When we are satisfied that the design is technically acceptable, you will be notified accordingly.

Please note that we must approve any revisions to the design throughout the design and construction phase.

If you choose for Welsh Water to undertake your design

If Welsh Water undertake the design on your behalf, we will base our design on the information provided within the application, as listed in the checklist. Once complete, we will send you the detailed drawing of our design and connection point within 28 calendar days of receiving all information for a development up to 500 houses, or within 42 days for a development of over 500 properties or where there are engineering difficulties.

CDM

All construction work is subject to the Construction (Design and Management) Regulations 2015.

The term 'designer' is a defined term under CDM 2015 and has a broad meaning, going beyond the traditional meaning to include anyone who makes input to design decisions and those who arrange for or instruct others to prepare design. All those who contribute to design decisions affecting construction must consider the risks involved. This requires an understanding of construction work, including subsequent activities (maintenance including cleaning, alteration and demolition) and of the types of accidents and health issues that are involved.

The scope of a designer's responsibility under CDM 2015 is explained in L153 (HSE, 2015), with which all practicing designers should be familiar.

In preparing or modifying designs, designers must:

- be satisfied that their clients are aware of their duties under CDM and that the correct steps have been taken (appointment of principal designer where there is more than one contractor involved, notify HSE where required).
- ensure that they have the relevant skills, knowledge and experience and where they are an organisation, the organisational capability to address the H&S issues associated with their design work
- seek to eliminate risks and where this is not possible reduce the residual risks in their design
- co-operate and co-ordinate their work with the principal designer and other designers provide information about significant residual risks, both for construction as 'pre-construction information' and for the future as information for the H&S file.

wish to receive a copy of these please ask your Welsh Water project engineer.

Safe Storage of Materials on Development Sites

All Pipes and fittings used in the provision of the water infrastructure are intended for the transportation of drinking water.

Drinking water is a food product and is defined by the Department of Food and Rural Affairs (DEFRA) as:

'CRITICAL TO HUMAN HEALTH!'

Wherever possible deliveries should avoid prolonged site storage. However the developer must take into account a requirement for the provision of a safe storage area for pipes and fittings where it is anticipated they will remain undisturbed until the time they are needed for construction. They must be kept clear of fuel oils and other contaminants.

It is vitally important that the SLP and developer understands the following in relation to pipes and fittings:

Only personnel trained and competent in hygienic practices are to handle pipes and fittings.

They should hold a valid EUSR National Water Hygiene card. An element of this training is health screening to ensure that the card holder does not carry any diseases or illness that could contaminate a water supply

The SLP must ensure that all pipes and fittings are stored so as to prevent ingress or contamination. Pipes and fittings will not be stored in direct contact with the ground and therefore raised above ground level. All pipe and fitting open ends should be capped or otherwise protected.

If required Welsh Water have prepared some standard site set up requirement drawings. If you



2. SECTION 2 – DESIGN GUIDANCE

2.2 Design Guidance for New Mains

A number of standard design drawings showing Welsh Water requirements are available for use and are shown in the table below.

Design Element	Design Drawing/Document	Comment
Pipe Sizing	Pipe Sizing of Mains and Services.pdf	SLP to submit list of pipes and fittings to Welsh Water prior to ordering
Fire hydrant positioning	Guidelines for the Provision of Fire Hydrants on New Housing Developments.pdf	It is the SLP's responsibility to ensure that the designer submit design drawings to the local fire authority for approval.
Appendix Drawings (found at the end of this document)		
A	Typical Sluice Valve Chamber	E
B	Fire Hydrant / Washout online installation	E
C	Typical Chamber "End of Line" Hydrant	F
D	Meter Chamber detail	F
		Typical combined domestic water supply and sprinkler system boundary box and meter
		Chlorination detail

2.1.1 Welsh Water's materials' specifications

All material used on self-lay schemes must meet Welsh Water's specifications as detailed below:

All pipes must be delivered and stored with end caps; and

All MDPE and HDPE fittings must be delivered and stored in plastic heat sealed bags. The Welsh Government has implemented new legislation for the mandatory installation of fire sprinkler systems for all new domestic properties. Further information can be found on [our website](#).

Mains on non-contaminated sites	All pipes to be DWI regulation 31a approved Mains 90mm and above to be HPPE (PE100) 225mm and above to be at the appropriate pressure for the network application. All pipes must be marked with PN code and SDR on the pipe
Mains on contaminated site	Mains up to 180mm shall be in barrier pipe Mains 225mm and above can be barrier if available or Ductile Iron compliant with BS EN 545 1995 and WIS 4-41-01, the minimum external corrosion protection shall be zinc coated with epoxy to BS EN 545, and all ductile pipes and fittings shall be internally lined
Services on non-contaminated sites	Services up to and including 63mm to be MDPE (PE80) service connections which are larger than 63 mm must be HPPE
Services on contaminated site	Services up to and including 63mm to be MDPE (PE80) barrier pipe
Electro fusion couplings for mains	To be HPPE (PE100) and can be blue or black in colour, all electro fusion fittings to incorporate fusion indicators
Electro fusion tapping saddles for MDPE / HPPE mains	To be self-tapping and of under-clamp bottom loading design, all electro fusion fittings to incorporate fusion indicators No gunmetal tapping saddles to be used on MDPE / HPPE mains
Tapping saddles for ductile iron, cast iron, UPVC, and asbestos mains	All tapping saddles to be made to BS 1400 LG2 C 2789 grade 500/7, and are capable of withstanding pressures of 16 bar.
Valves	Compliant with BS EN 5163, internal and external protection to be blue fusion bonded epoxy powder coating Please refer to the geographical details for valve operations specification in different regions (clockwise & and anticlockwise) within section 1.6 of this guide.

Fire Hydrants	<p>Compliant with BS750. All hydrants to have a gunmetal or epoxy coated stainless steel outlet. The hydrant shall have an automatic frost valve, no water shall escape during operation and the body shall fully drain afterwards</p> <p>All hydrants to be of a fixed jumper design</p>
Chamber sections	<p>Chamber sections to be rectangular and made of pre cast concrete. Square if for Sluice Valves and plinths for stop taps</p>
Chamber covers	<p>All covers shall comply with BS EN 124/ BS 5834</p>
Boundary Boxes Non-contaminated sites	<p>A Single boundary box unit or multi-port manifold may be used. The boundary box must be able to incorporate a manifold meter with 1 ½" thread, stop tap and non-return valve. All boundary boxes must have height adjustment capabilities. Where 32mm combined sprinkler and domestic supply is required, please refer to the boundary box detail contained in Appendix E. Boundary boxes and meters must be sourced from Welsh Water directly. Further information can be found on our website.</p>
Boundary Boxes Contaminated sites	<p>Where boundary boxes are used on contaminated sites they must comply with WIS-4-37-01 be watertight and shall have gunmetal connection fittings that are able to accept either barrier pipe or plastic coated copper pipes. Boundary boxes must be the 'sealed' version with ¾" female connections, ¼ - turn spherical Valve and 1 ½" concentric meter position with check valve. Where 32mm combined sprinkler and domestic supply is required, please refer to the boundary box detail contained in Appendix E. Boundary boxes and meters must be sourced from Welsh Water directly, Further information can be found on our website.</p>
Meters	<p>Meters for domestic water supply only will be issued and supplied by Welsh Water free of charge and conform with the follow specification.</p> <p>Please see the note below for combined sprinkler and supply meters:</p> <p>Meter Specification 15mm/20mm Domestic & Commercial Positive Displacement In-line & Concentric Meters (P)</p> <ul style="list-style-type: none"> • Standards ISO 4064 & EEC Metrological requirements. • Type Model P available for the UK Market for its unique billing application. • IP68 Super Sealed Stainless Steel M3 Register c/w magnified Glass lens. • 10 year warranty against condensation. • IP68 Sealed Pulse under Glass Register (1 Pulse per Litre). • Both pulse and optical output models available. • Maximum Working Pressure 10 bar. • Maximum Temperature 50 degrees C. • Corrosion-proof copper alloy meter body or Welsh Water approved composite body. • Meter must be able to be installed in any position (horizontal, vertical or inclined). • Meter must be full of water while operating. • Prior to installation of a new meter the pipeline must be flushed out. • Welsh Water approved Model P installation Keys required. <p>Larger meters, varying types</p> <ul style="list-style-type: none"> • Individual guidance from Welsh Water to be obtained in regard to other sizes and types of meters. <p>Where 32mm combined sprinkler and domestic supply is required, please refer to the meter detail contained in Appendix E. Boundary boxes and meters must be sourced from Welsh Water directly, Further information can be found on our website.</p>

2.1.2 Pipe Material Selection

All materials and products intended for use in the preparation or conveying of public water supplies must comply with Regulation 31 of the Water Supply (Water Quality) Regulations 2000.

Should specialist pipe or fittings be required to overcome a particular construction problem then consultation must be sought with Welsh Water and all materials approved before use. All materials selected must be approved by Welsh Water to ensure future repair and maintenance can be carried out within the performance requirements imposed upon Welsh Water. This includes consideration of the fittings and spares readily available from Welsh Water suppliers or specialist manufacturers.

2.2.1 New Distribution Mains

Pipe material should be selected according to the environment in which it is to be laid. It should take into account any specific requirements in connection with water quality, as well as:

- Pressure
- Ground conditions and contaminants
- Soil corrosivity, and
- Durability

Generally, only polyethylene, ductile iron, steel and mopc should be considered for the construction of safe water mains.

2.2.2 Existing Pipe Records

Welsh Water's mains record system is available to designers to determine the existing pipe materials present in any particular area.

Whilst every reasonable effort has been taken to correctly record the pipe material and location of Welsh Water assets, Welsh Water provides the information as to the material and position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon. In the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you.

2.2.3 Existing Pipe Materials, Sizing and Pressure Rating

The existing pipe materials and fittings used within our distribution network are varied and were produced by a number of manufacturers and have been introduced to our network over many years.

The most common materials are:

- Cast, spun and ductile iron
- Polyethylene – blue, MDPE and HDPE
- PVC
- Asbestos cement
- Steel
- GRP, and
- Concrete

Sizing of all new and replacement mains should be confirmed by network analysis, including hydraulic modelling, taking into consideration the following:

- Assessed consumption and demand patterns, including peak demands, calculated on a 25 year design horizon to include the potential for growth
- Downstream of Service Reservoir, the assessed consumption and demand patterns must be considered, to ensure pipes are sized to meet the peak day and week flow
- Flow velocities
- Pressure requirements
- Effects on existing system
- Leakage allowance
- Fire fighting requirements
- Known future developments

2.3 Pipe Sizing of Mains and Services

The sizing of mains to New Developments is determined by the requirement that there should be adequate supply to meet customer demands at all times whilst ensuring that water quality is not compromised through the use of oversized pipes.

Welsh Water will provide sufficient flow and pressure at the Point(s) of Connection to enable the designer to design a system that meets the minimum flow and pressure for water used for Domestic Purposes at the proposed service connection locations.

Welsh Water have their own design criteria for allowable minimum pipe sizes for supplying a number of dwellings. As a guide, the typical pipe size for a given number of properties is shown in the Table 1.

The values given should not be a substitute for conducting an adequate hydraulic assessment taking into account all pertinent factors and for verifying the pipe sizing against Welsh Water specific design practice guidance.

Number of Individual dwellings	Typical Pipe Outside Diameter (PE Pipes)	Nominal Bore (Other Materials)
1-20	63 mm	50 mm
20-40	90 mm	80 mm
40-100	110 mm	100 mm
100-300	160 mm	150mm
300-700	250 mm	225 mm

Table 1: Typical pipe sizes against number of individual dwellings

2.3.1 Sizing of Service Pipes

The sizing of service pipes to New Developments is governed by the requirement that there should be adequate supply to meet customer demands at all times whilst ensuring that water quality is not compromised through the use of oversized pipes. Additional requirements such as the need for fire sprinklers (domestic) and firefighting (non-domestic) should be taken into account when selecting the diameter.

Welsh Water have their own design criteria for allowable minimum domestic water service pipes sizes. As a guide, the typical pipe size for a given number of properties is shown in Table 2. The values given should not be a substitute for conducting an adequate hydraulic assessment taking into account all pertinent factors and for verifying sizing for incoming pipes to a property or manifold chamber against the Welsh Water specific design practice guidance.

Where the property is served by a combined sprinkler and domestic supply, this will affect the size of the service pipe needed. Further information can be found on [our website](#).

Number of Individual dwellings	Typical Pipe Outside Diameter (PE Pipes)
1	25 mm
2	32 mm
3-4	50 mm
5-8	63 mm

Table 2: Size of incoming supplies to property or manifold chamber

2.4 Location and Routing of Mains

In urban areas, distribution mains (including mains serving new developments) should, wherever possible, be laid in publicly adopted and maintained highways. Disruption to traffic should be minimised through discussions with the relevant highway authorities – when finalising the precise location.

The preferred route for all mains and services is a:

- Verge
- Footway
- Highway, or
- Cycleway

The route should have a minimum of 2 metres clear width, should preferably be publicly adopted and maintained, and be laid parallel to road kerbs.

Guidance is contained in National Joint Utilities Group guidance "Volume 1 NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus" or "Volume 2 NJUG Guidelines on positioning of underground utilities for new development sites".

Where only a small number of other utilities are involved, a reduction in the route width may be acceptable. It should though, have a clear width of at least 1 metre and prior agreement of all utilities concerned.

Things to consider when selecting a route:

- Adverse ground conditions e.g. rock, groundwater
- Contamination
- Traffic management
- Environmental impact on the works
- Proximity of other utilities
- Ease of access for safe construction and future operation/maintenance of the asset
- Existing and future land use
- Land ownership
- Requirement for air valves, sluice valves etc

2.4.1 Mains Laid in Private Land

This should be avoided, but should it be absolutely necessary please speak to Welsh Water beforehand.

Private land (other than fields in rural areas) should be avoided because of the potential for difficulties between occupants and Welsh Water if access should be required to excavate.

Please provide us with evidence that you have secured the consent of the land owner when laying mains in land not owned by the developer. In these instances, the third party land owner may need to be party to the Self-Lay Agreement.

2.4.2 Mains Laid in Private Drives

Whilst the general laying of mains in private land on residential estates is opposed, it may be unavoidable in types of development which afford shared private drives. In these situations, Welsh Water will use its powers under the Water Industry Act for future access and maintenance.

A water main laid on premises within a private driveway is preferable to multiple separate supply pipes being laid in parallel for more than 30 metres of their run, but for clear guidance:

- where 2 or 3 properties share a private drive for access which is less than 30 meters long, the SLP will need to supply water to boundary of the drive and highway. Individual private supply pipes will need to be installed to the boundary of each property
- where 4 properties share a private drive for access which is less than 30 meters long, Welsh Water will need to consider whether the SLP installs a main within the drive
- where 4 properties share a private drive for access which is longer than 30m, the SLP must install a main within the drive
- where 5 properties or more share a private drive irrespective of its length, the SLP must lay the main within the drive way. The installation of mains within private footpaths is prohibited.

Things to consider for adoption:

- All apparatus to be accessible
- No access restrictions
- No mains or stop tap boxes to be installed in parking bays
- No mains to be installed in driveways that will have specialist finishes, e.g. coloured tarmac
- Adoption is at the discretion of Welsh Water

- Mains laid within adopted highway are preferred
- Mains can only be laid in private drives which serve multiple properties.

2.4.3 Mains and New Industrial Development

Developers should be encouraged to provide publicly adopted carriageways and footways/verges throughout the site so that mains and services can be installed in public areas. This will help to ensure that mains are laid as near as practicable to the properties, minimising the length of service pipe and facilitating the provision of future additional contacts should these be required.

Where a suitable adopted surface isn't available, statutory notices will need to be served. The notices will create protected strips for the water mains and will prevent later development over the strips.

Things to consider for industrial development:

- Finished surfaces, e.g. avoiding reinforced concrete and special paved areas where possible
- Siting of fire hydrants (FH)
- Possible future requirements, e.g. sprinkler, additional units, up-sizing etc
- Access for maintenance
- Traffic loading affecting stop tap and meter locations

Standard drawings illustrate the principles to be adopted when providing mains for new industrial developments and adopted carriageway.

When designing a new or replacement mains system the design should minimise the number of road crossings for mains and services. They may require a main to be provided on each side of the highway, preferably in the verge or footway. For example using an appropriately sized service rail.

Two-way feeds should always be provided wherever possible to ensure interruptions to the supply are kept to a minimum whilst maintenance or repair works are undertaken.

2.5 Pipe Depth

The depth at which a main is laid may be dictated by the method of construction. The key issues are that mains should be laid:

- With an even gradient where possible
- With a minimum depth of 750mm
- At a depth which comfortably allows the installation of chamber covers and frames without interfering with the fitting housed within, and which

prevents valves and fittings, including covers and frames, from sitting proud of finished ground level

- At depths which facilitate access for future maintenance and repair.

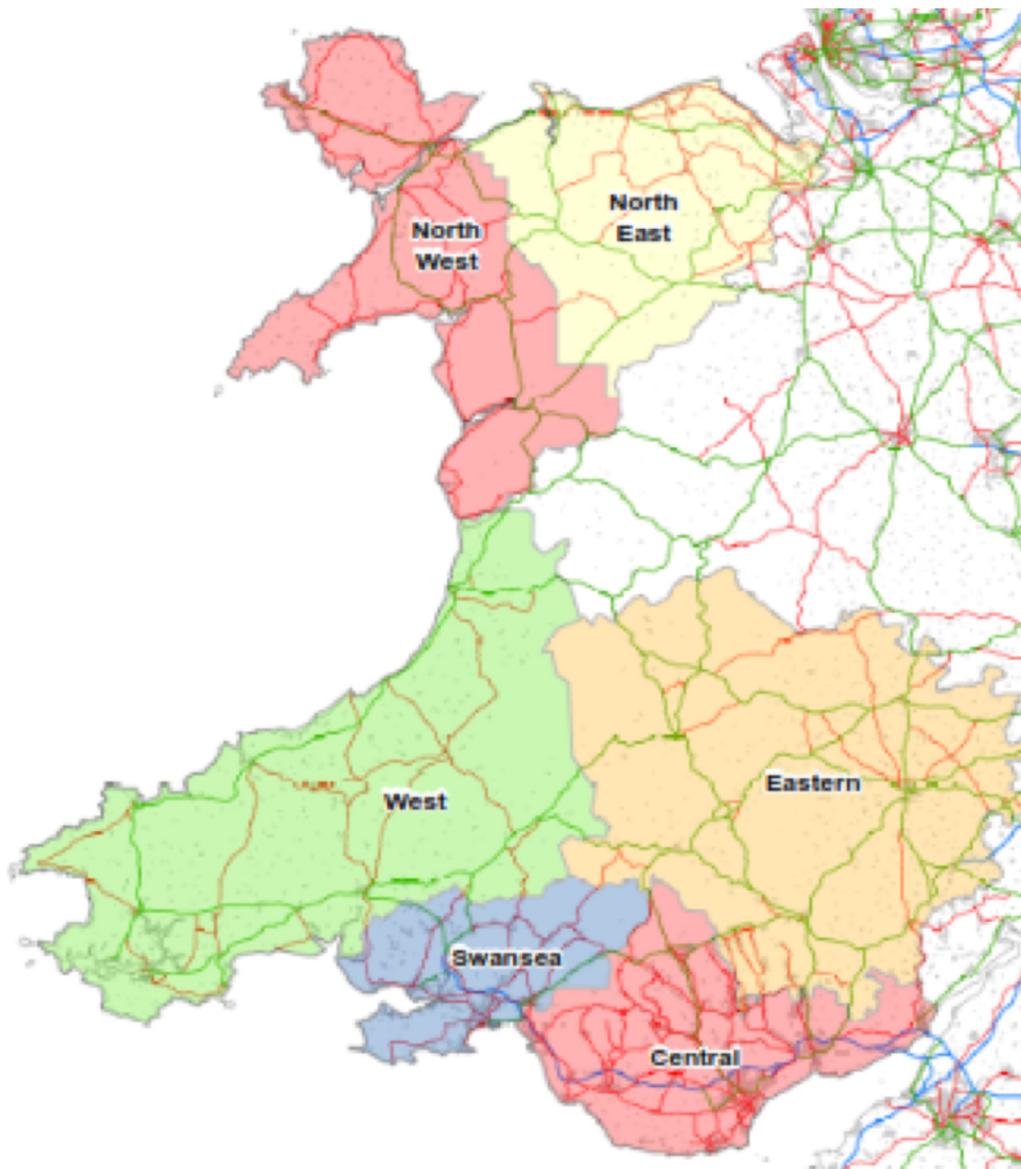
Notes:

1. Additional consideration should be given if mains will be subject to wheel and point loads.
2. The depth of mains at special crossing should be agreed with Welsh Water.
3. Mains may be laid outside the required depths in exceptional circumstances, with the agreement of Welsh Water.
4. Trenchless crossings of major utilities require special consideration and agreement of Welsh Water.

2.6 Valves

Valves should be installed to control the flow within the network and enable all components to be isolated, drained, and recharged for maintenance purposes. Designers should plan the location of valves where they can be safely accessed, operated and maintained. Valves should also be positioned in the verge or footway at all times.

In general, every branch and mains junction should have a valve on each leg to allow complete control of flow and to minimise the number of properties that could potentially be isolated by a valve closure.



2.6.1 Valve Operation

Welsh Water's operating areas span England and Wales which have different requirements for valve handling.

In English Local Authority areas and in Welsh Water's North West and North East Operating areas all valves must be clockwise closing (CWC). For all remaining Welsh Local Authority Areas valves must be anti-clockwise closing (ACC).

2.7 Types of Valves

2.7.1 Isolating Valves (for isolation purposes only)

- These should be provided in agreement with Welsh Water during the detailed design
- The maximum distance between valves in urban areas should not exceed 300m.

2.7.2 Sluice Valves also known as Gate Valves (for isolation purposes)

- Intended to be used in either fully open or fully closed positions
- Must not be used for flow control or for throttled conditions
- They are not intended for frequent use and may only be good for approx 150 operations
- Should be resilience seated, not metal seated
- Valves for services greater than 63mm should be compliant with BS 5163, wedge gate type B, resilient faced, pressure rating PN16, and the caps should be made from ductile iron.

2.7.3 Air Valves (to be used at every high point on larger distribution mains and at sudden changes of pipe gradient)

- It should be ensured that air valves can be isolated and detached without the main being taken out of service
- If an air valve does not have an integral isolation valve then one must be fitted to enable isolation and maintenance. A spade valve or gate valve may be used but only within the limitations of the manufacturer's instructions.
- It should also be ensured that polluted water cannot gain access through the valve. If any other valves need to be used please consult Welsh Water at the detailed design stage.

2.7.4 Washouts

All washouts/hydrants are to be installed with spade valves to enable isolation and maintenance. Refer to Section 2.5.2 Types of Valves – sub-section on Sluice Valves for more information.

Washouts should be provided to allow the main to be flushed and drained at:

- Every low point in the distribution main
- At boundary/kept shut valves (KSV)
- At dead ends, beyond the last service connection
- At air valve locations on larger distribution mains.

Direct discharges into watercourses should be avoided because of the risk of contamination. Provision should be made for discharges to be conducted in accordance with Section 165/166 of the Water Industry Act 1991. Best practice should also be incorporated into the design, which can be found via Public Health and Standards.

Full bore washouts should be used in all circumstances, except for areas considered to be at risk with regard to water quality. Areas considered to be at risk include: heavy industrial sites, car washes, petrol stations, areas liable to flooding, and low points where water may pool.

Please note, the above is not an exhaustive list and individual risk assessments should be completed as required. Queries should be directed to the Asset Improvement Manager, who may discuss this with the Distribution Water Quality Team.

2.8 Pipe Joints

The layout of PE pipe systems should be designed to minimise the number of joints required. The preferred method is butt fusion welded. However, electrofusion or mechanical joints may also be used if circumstances require.

Contractors are required to follow any and all applicable quality control procedures for all joints on PE pipes, be they butt fusion, electrofusion or mechanical, in accordance with CESWI Engineering Specification - Section 5.8.

When an electrofusion or mechanical joint is to be used the designer will detail the position and ensure there is sufficient room to undertake this process.

Post pipe installation, it is the contractor's responsibility to ensure that DCWW's mains and services records are annotated with the type of joints employed in construction.

For further guidance on butt fusion and electrofusion jointing methods, reference should be made to CESWI and Water Industry Specifications (WIS), specifically WIS 4-32-08 (Issue 3) and WIS 4-32-16.

2.9 Chambers

Chambers are to be designed according to Standard Drawings and Engineering Specifications. Chamber covers and frames will comply with the relevant British Standard applicable to the environment in which they are installed.

Chambers installed in contaminated ground should be constructed from reinforced concrete.

2.10 Marker Posts

Marker posts should be provided to aid future inspection and maintenance:

- at each fence, wall and hedgerow crossing on all cross-country mains and in rural verges to readily identify the route of the main
- at each washout, Fire Hydrant, line and branch valve
- the local Fire Service should be asked if they require posts for Fire Hydrants.

In built-up areas the number of marker posts should be kept to the minimum. These may be limited to fire hydrants and cases of complex installations (with numerous valves and hydrants) where one marker may be used with a printed schematic of the installation.

The posts should be located in positions which will avoid any possible injury to third parties and unnecessary accidental damage.

2.11 Trees and other surface planting

Mains should not be laid in the proximity of any trees that could damage or restrict the access for the future maintenance. See National Joint Utilities Group guidance document "Volume 4: NJUG Guidelines for the Planning, Installation & Maintenance of Utility Apparatus in Proximity to Trees (Issue 1)". The document and an 'Operatives Hand-out' can be downloaded from the NJUG website ([Link](#)) and should be made available during design and construction.

Where planting is to take place after mains are laid it is essential that only grass or ground cover plants with limited root systems are permitted. If trees or shrubs are to be planted in adjacent locations they should be selected and positioned to avoid

both root damage to the main and problems when subsequent excavations are undertaken for repair and maintenance.

Recommendations for tree and surface planting:

- poplar and willow trees have extensive root systems and should not be planted within 10m of the water main
- the following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 m of the pipeline e.g. ash, beech, birch, most conifers, elm, horse chestnut, lime, oak, sycamore, apple and pear
- bearing in mind that personnel should have a clear path to conduct surveys, no shrubs or bushes should be planted within one metre of the centre line of the pipeline
- in cases where both the Company and landowners wish to plant shrubs / bushes in close proximity to the water main for screening purposes the following which are shallow rooting are suitable for this purpose blackthorn, broom, cotoneaster, elder, hazel, laurel, privet, quick thorn, snowberry and most ornamental flowering shrubs.

It is essential that agreement is reached with Welsh Water before or during the design stage on the detailed operational requirements of the main to facilitate its operation, maintenance and repair.

2.12 Use of Ducts

Blue ducting must be used when needed, all ducts must be a minimum of twice the diameter of the pipe that will be inserted within it. Ducts must be laid straight at constant grade and installed in accordance with manufacturers' specifications.

2.13 Sustainable Drainage Systems (SuDs)

Mains should not be laid through or beneath any permeable highway or SuDs feature. Where permeable highways are being installed to serve a new development, suitable utility corridors must be incorporated within the highway's design.



3. SECTION 3 – FIRE SERVICE REQUIREMENTS

3.1 Fire Hydrants

The location of washouts on new mains and on new developments should be designed according to the requirements of Welsh Water. The local Fire and Rescue Service should be invited to adopt whichever washouts they see fit as fire hydrants during the consultation process. Hydrants are adopted by the Fire Service free of charge.

The request for extra washouts specifically to be designated as fire hydrants is subject to negotiation between the designer and the Fire and Rescue Service and, in this instance, the installation is chargeable to the Fire and Rescue Service.

The designer should follow the requirements for fire-fighting as required under Section 43 (1) of the Fire and Rescue Services Act 2004.

Once a SLP's design has been finalised Fire and Rescue Authority requirements should be sought and received by the designer prior to the commencement of any construction work. If we are designing the scheme on behalf of a developer we will issue the design to the Fire and Rescue Authority on their behalf for comment.

Under the Fire and Rescue Services Act a minimum of 42 days' notice should be given to the fire and rescue authority. With a SLP design, the designer is responsible for all Fire and Rescue Authority liaison, and should send copies of the mains design to the Fire and Rescue Authority to ascertain if fire hydrants are required. The SLP should send a copy of the Fire and Rescue Authority response to the Water Company as part of their application.

Welsh Water will only agree to the provision of fire-fighting take-offs on the basis that only water within the capacity of the local distribution system will be required at any given time. Any requests which exceed this criteria will require further discussions.

Fire and Rescue Authorities are responsible for paying for any additions such as hydrants, they specifically require to be incorporated into the design. The SLP is responsible for the implementation and recovery of the costs from the Fire and Rescue Authority of any other changes to the design required as a result of the Fire and Rescue Authority liaison.

3.2 General Specification for Fire Hydrants

The fire hydrant installation should be to BS750 Type 2 specification.

The outlet flange must not be more than 300mm below the finished surface level.

Hydrant indicator plates should all comply with the relevant provisions of BS 3251.

All of the surfaces of the hydrant components should be protected from corrosion either by the nature of their material or should be coated in accordance with WIS 4-52-01. Internal water wetter surfaces should be coated to Class A standard; all other surfaces should be coated to Class B.

All fasteners used in the assembly of hydrants should all be protected in accordance with Clause 2.78 of CESWI.

The frame and cover should all be Grade A to BS 750 and have a clear opening not less than 380x230mm. Hydrant box covers should all be provided with recesses for lifting keys.

Installation of underground washouts, fire hydrants, surface box frames, covers and indicator plates should all comply with the specification set out in BS 5306: Part 1.

Through bore hydrants are the company standard. However, loose jumper hydrants should be installed in areas considered to be at risk of back siphonage resulting in water quality issues or where installed in contaminated ground. Only Welsh Water approved hydrants are to be installed. All washouts/hydrants are to be installed with spade valves to enable isolation and maintenance.

The only exception to this is where the hydrant is supplied by a branch off the main that is controlled by a sluice valve. Refer to Appendices A and B for Standard Drawings.

3.3 Location of Fire Hydrants

Early consultation and site meetings with relevant persons should take place to agree the precise locations.

Hydrants should always:

- Be located where they can be safely operated and maintained, and won't be obstructed by parked vehicles.
- Have a branch less than five metres long, unless there is a service connection between the hydrant and the main (to maintain flow).
- Wherever possible, be out of carriageways.

3.4 Fire Fighting – Flow Requirements

The availability of flow and the flow requirements for firefighting should be subject to close consultation with the Fire Service but it should be noted that there are specific obligations and responsibilities placed upon the various parties to the discussions.

During the consultation process with the fire service as per Section 1.13 of the Water UK Code of practice v3.1 (May 2017), the designer should provide details of the available flow at the point where any new main meets any existing main. The flow rates provided should be an honest indication of flow capability for single and two story dwellings. An approval number from the fire service must then be issued to us as part of this application.

3.5 Covers & Frames

Chambers are to be designed according to Standard Drawings and Engineering Specifications. Chamber covers and frames will comply with the relevant British Standard applicable to the environment in which they are installed.

Generally, chambers in Welsh Water's area, in particular hydrant chambers, are constructed from concrete units as standard. Other forms of construction should be agreed with Welsh Water and approval gained before construction begins. Chambers installed in contaminated ground should be constructed from reinforced concrete.

Covers installed on fire hydrants are to bear the initials 'FH' on their surface.

3.6 Valves

Sluice valves are to be installed on all new installations, 250mm upstream of any new hydrant. Details of the appropriate arrangements can be found in Appendix B & C.

3.7 Fire Hydrant Location Examples

The examples below provide some basic, generic guidelines which allow designers to determine the optimum locations of hydrants on new housing developments. The Fire Authority would then be advised of those locations by letter or e-mail, accompanied by two copies of an annotated plan. After confirmation of their acceptance of the locations, and of those hydrants subsequently being installed to a satisfactory standard, the Fire Service would be expected to adopt the installation.

In each of the examples illustrated, it is recognised that the Fire Authority must be contacted if in any doubt in order that they may carry out a risk assessment if considered necessary.

3.7.1 Example 1

Developments < 20 houses

- If an existing hydrant is situated within 100m of site entrance and on a main > 75 mm diameter, no further hydrants to be installed
- If no existing hydrant is situated within 100m of site entrance, a new hydrant is to be installed as close as possible to the site entrance
- As a general principle, no house to be > 150m from a hydrant
- If any doubt, Fire Service to be contacted for advice and possibly Risk Assessment to be carried out.



3.7.2 Example 2

Developments 20 - 50 houses

- A new hydrant is to be installed as close as possible to the site entrance
- Mains to be minimum 75 mm diameter
- As a general principle, no house to be > 150m from a hydrant
- If any doubt, Fire Service to be contacted for advice and possibly Risk Assessment to be carried out.



3.7.3 Example 3

Developments including Public Buildings - e.g. School

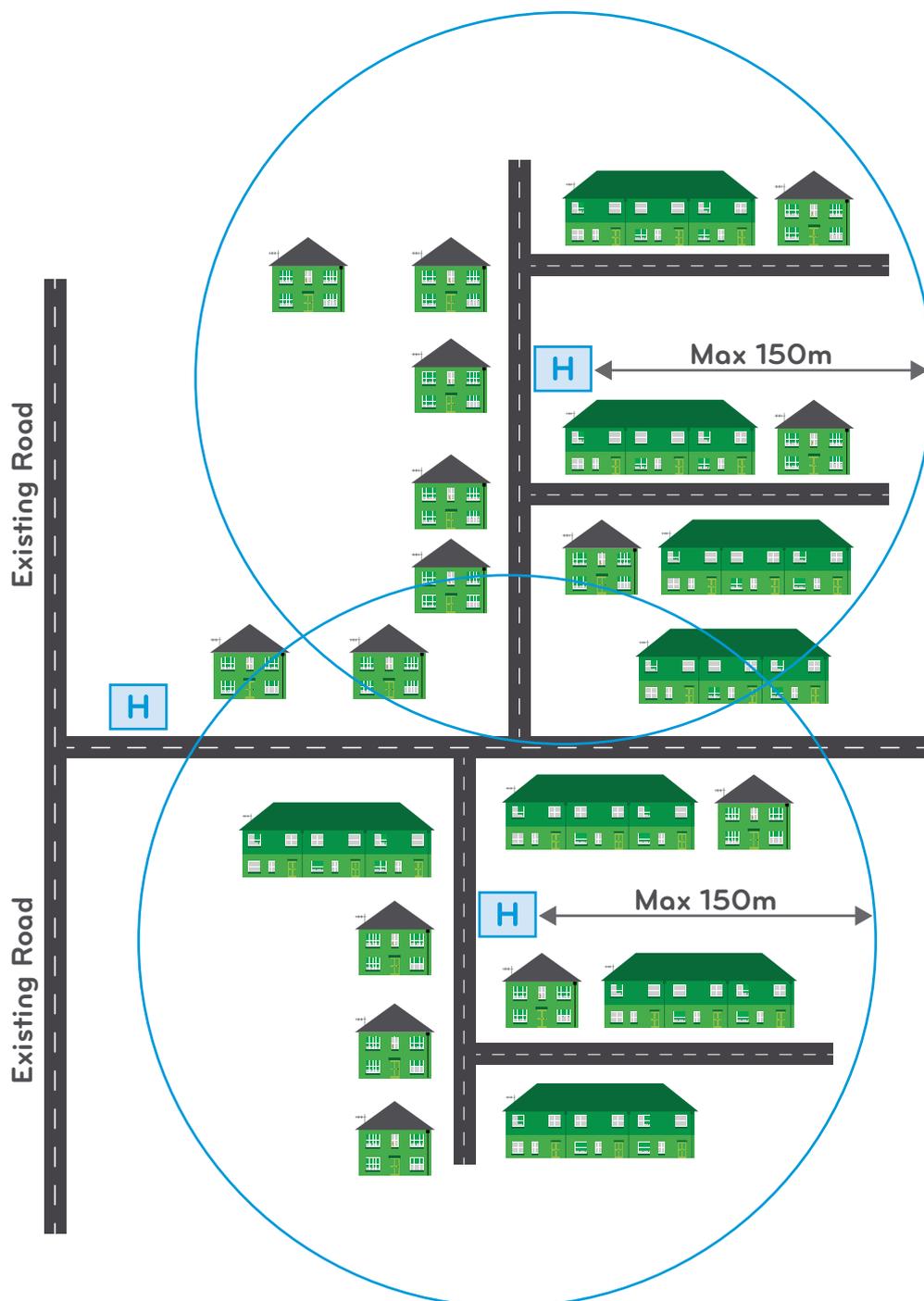
- Hydrants to be installed adjacent or in proximity to Public Buildings etc. in full accordance with CACFOA/ Water UK Guidelines
- Mains to be minimum 75mm diameter
- As a general principle, no house to be > 150m from a hydrant
- If any doubt, Fire Service to be contacted for advice and possibly Risk Assessment to be carried out.



3.7.4 Example 4

Developments > 50 houses

- A new hydrant is to be installed as close as possible to the site entrance
- Mains to be minimum 75mm diameter
- As a general principle, no house to be > 150m from a hydrant
- If any doubt, Fire Service to be contacted for advice and possibly Risk Assessment to be carried out.





4. Communication and Service Pipes

4.1 Communication (service) Pipes – Company

Methods of Service Pipe Entry (domestic)

Water supply pipes must only be installed in compliance with the Water supply (Water fittings) Regulations 1999. Please also refer to the Water Supply (Water fittings) Regulations appendix within the "Connecting to a water main document".

Approved Products – The regulations require the use of specific products when making changes to plumbing systems connected or which could be connected to the water supply. The WRAS website is one of many useful locations for further information regarding approved products.

Pipe Material – External underground pipe should be a MDPE plastic pipe or suitably coated soft copper pipe. *If contaminated land identified – use barrier pipe.*

Excavation Depth – Pipe work should be laid to a minimum depth of 750mm and covered with sand or gravel to protect the pipe.

Entry point to building – The water supply should have a stop tap and drain off valve at skirting level where the pipe enters the building.

Entry ducting – The water supply must pass through a suitably sized duct to accommodate the service pipe with insulation.

Pipe Sealing – Ensure the ends of pipework are sealed, which can prevent the entry of vermin, fluids and contamination.

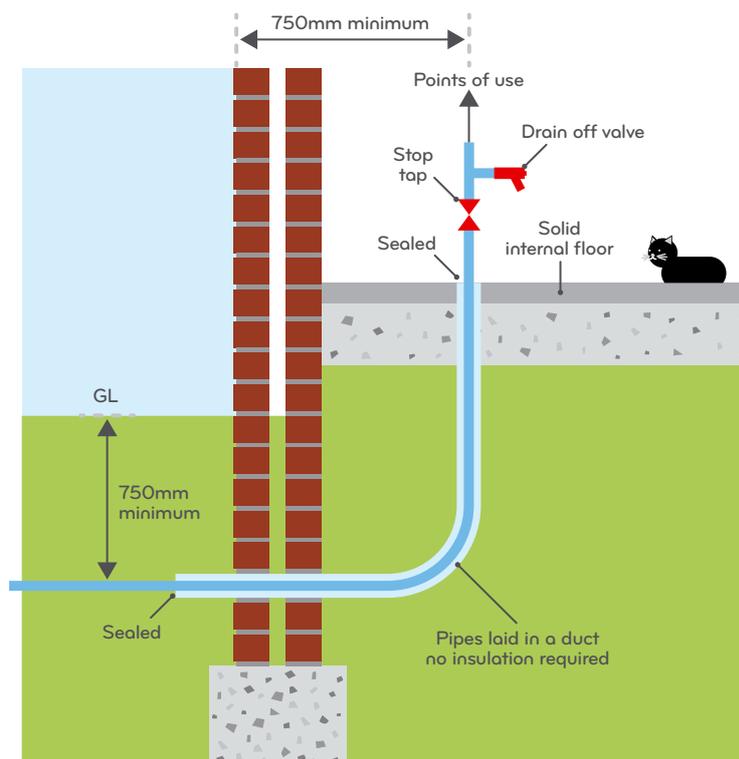
Insulation – If the pipe enters the building less than 750mm from the external wall of the building then it must be insulated in the duct.

Inspection – Whilst we do not carry out trench inspections on all service connections Welsh Water reserve the right to carry out Water Regulation checks on a proportion of services that are laid.

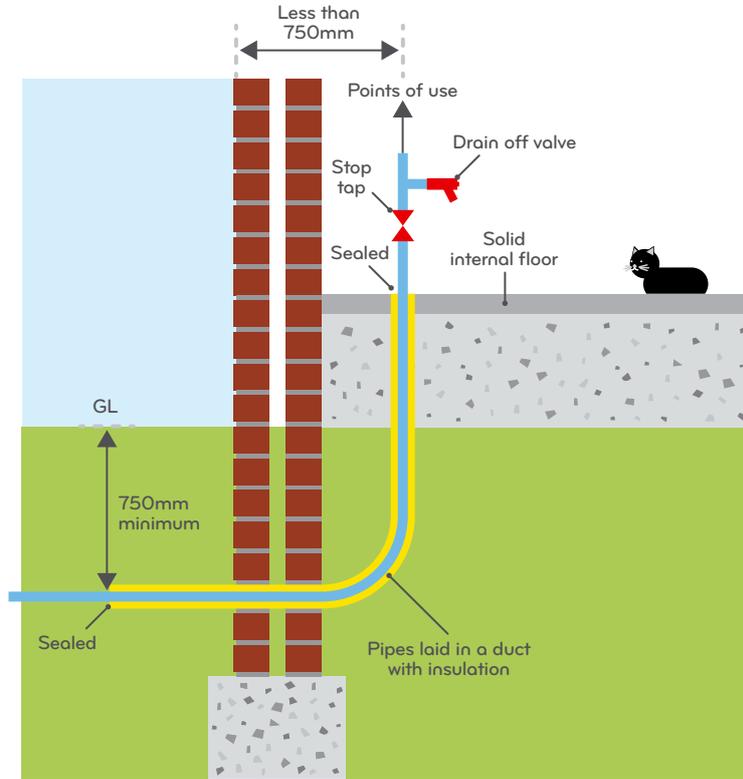
No connection will be made until work is approved for connection.

Highway Excavation – If it is necessary to excavate the public footpath or highway then permission must be obtained from the local authority before any work is undertaken.

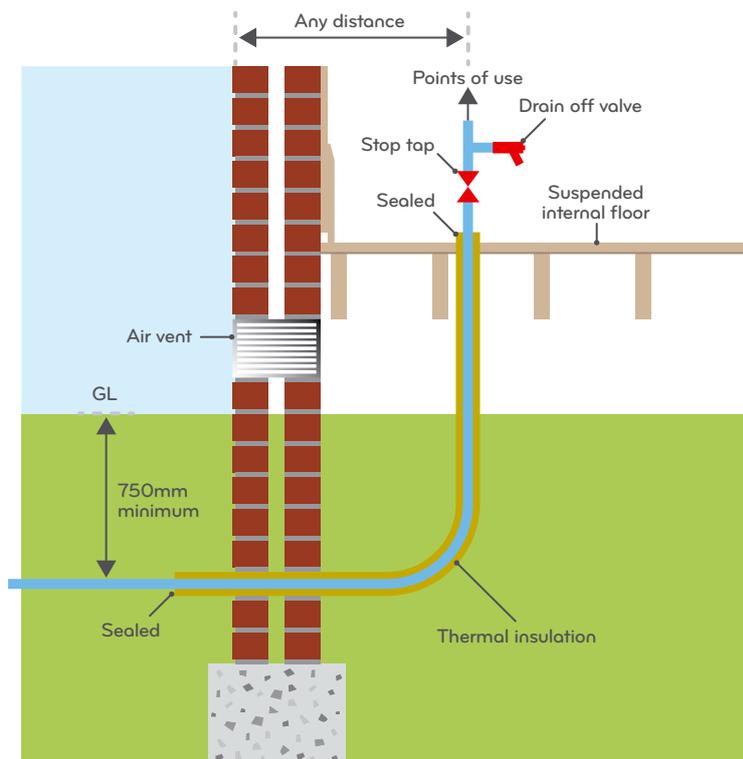
Pipe entering building at the approved depth



Pipe entering building at a distance of less than 750mm from the external face of wall



Pipe entering through a vented or unvented air space (e.g. below an internal suspended lower floor). The pipe should be fully insulated in that air space



Methods of Service Pipe Entry (Industrial/commercial)

Water supply pipes must only be installed in compliance with the Water supply (Water fittings) Regulations 1999. Please also refer to the Water Supply (Water fittings) Regulations appendix within the "Connecting to a water main document".

Approved Products – The regulations require the use of specific products when making changes to plumbing systems connected or which could be connected to the water supply. The WRAS website is one of many useful locations for further information regarding approved products.

Pipe Material – External underground pipe should be a MDPE plastic pipe or suitably coated soft copper pipe. *If contaminated land identified – use barrier pipe.*

Excavation Depth – Pipe work should be laid to a minimum depth of 750mm and covered with sand or gravel to protect the pipe.

Entry point to building – The water supply should have a stop tap, double check valve and drain off valve at skirting level where the pipe enters the building.

Entry ducting – The water supply must pass through a suitably sized duct to accommodate the service pipe with insulation.

Pipe Sealing – Ensure the ends of pipework are sealed, which can prevent the entry of vermin, fluids and contamination.

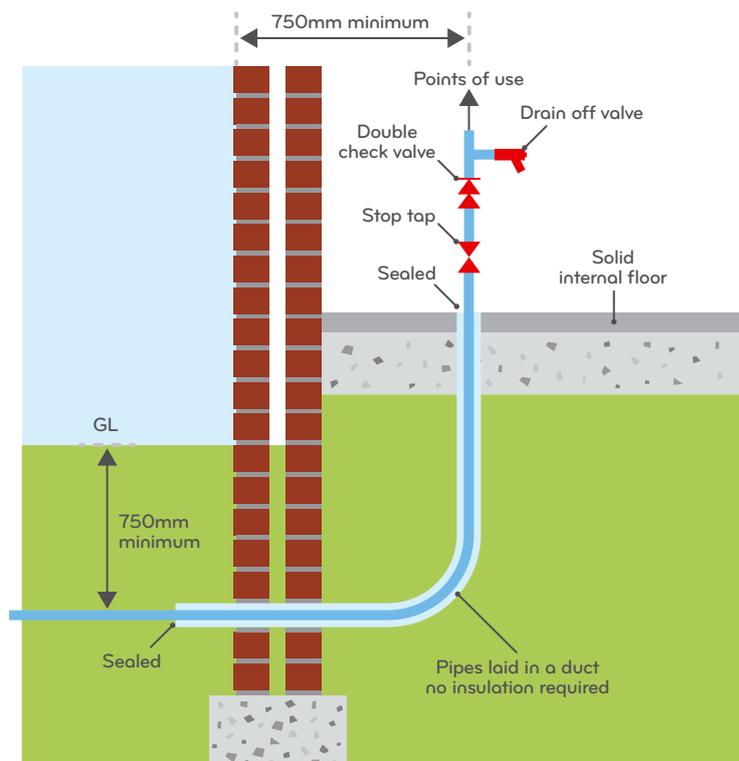
Insulation – If the pipe enters the building less than 750mm from the external wall of the building then it must be insulated in the duct.

Inspection – The new installation must be inspected by Dwr Cymru Welsh Water before the excavation is backfilled and the subsequent connection made in the highway.

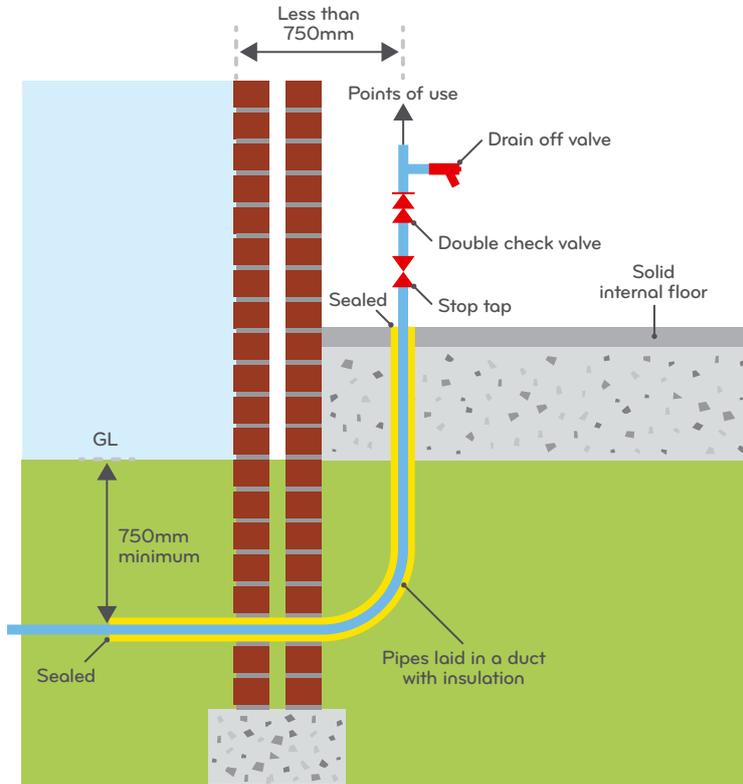
No connection will be made until work is approved for connection.

Highway Excavation – If it is necessary to excavate the public footpath or highway then permission must be obtained from the local authority before any work is undertaken.

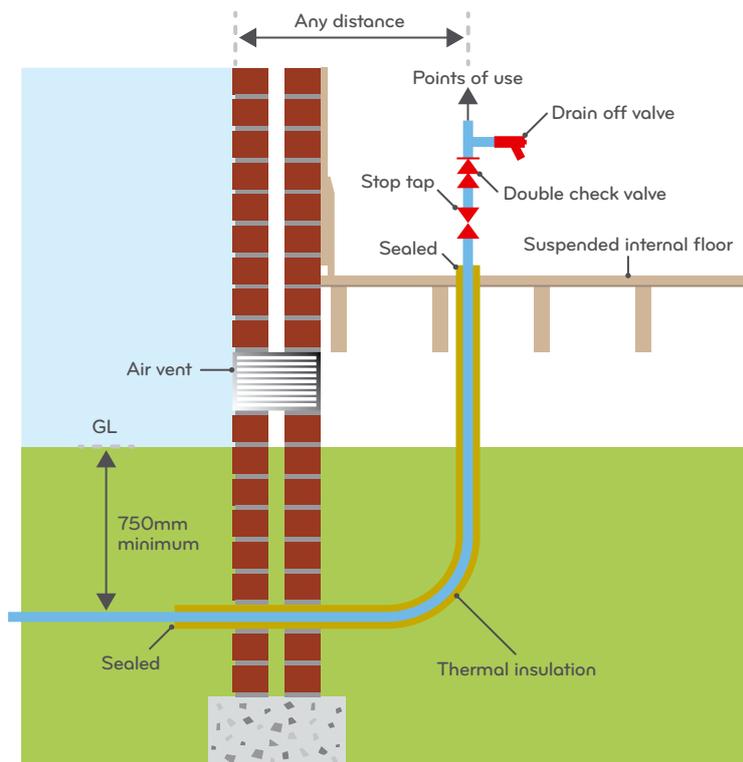
Pipe entering building at the approved depth



Pipe entering building at a distance of less than 750mm from the external face of wall



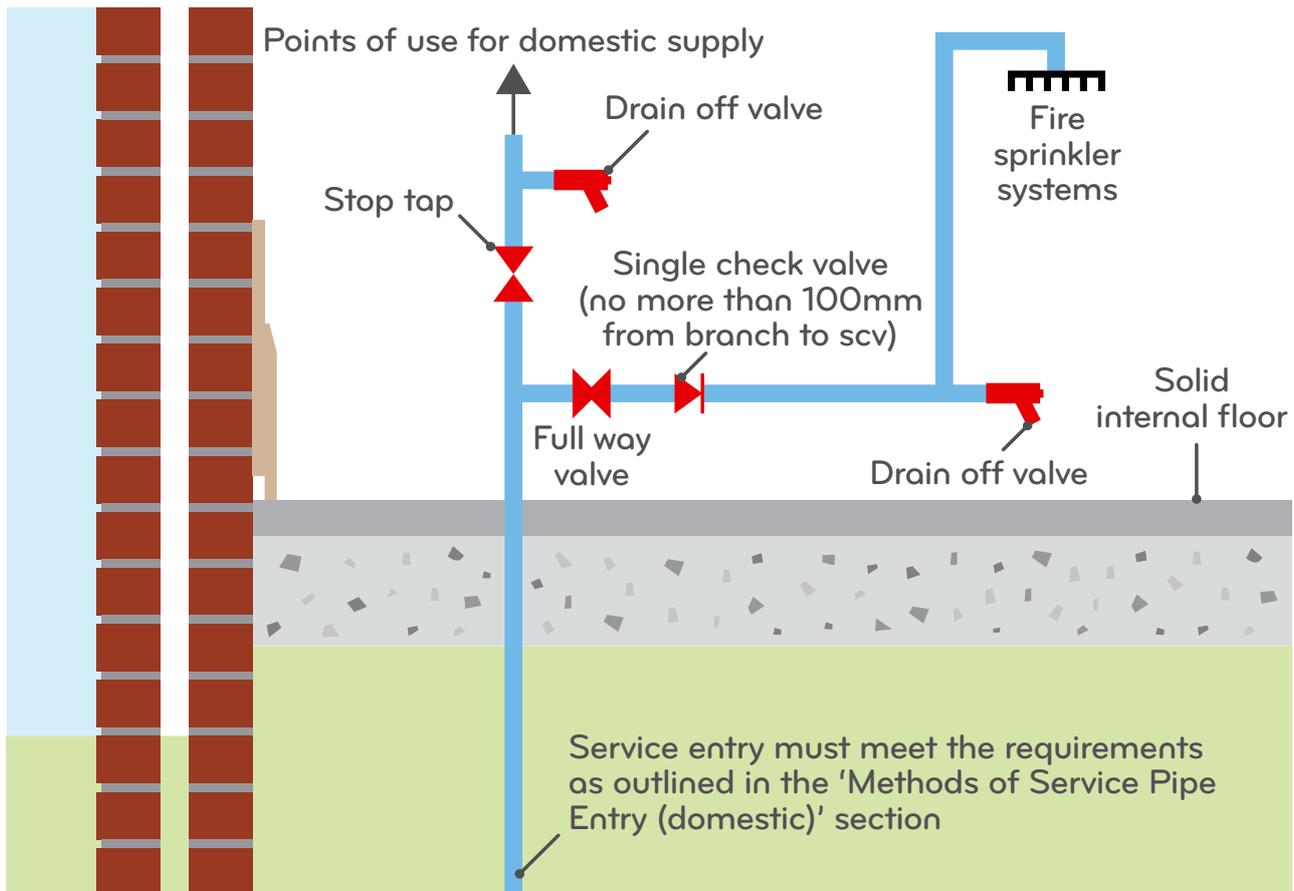
Pipe entering through a vented or unvented air space (e.g. below an internal suspended lower floor). The pipe should be fully insulated in that air space



4.2 Entry point - Domestic Fire Sprinkler Systems

The following diagram shows the requirements for fittings at the service entry point which enters a premises. Please note that the single check valve must be located within a maximum of 100mm off

the branch connection point of the fire sprinkler supply with the domestic water supply pipework (to prevent backflow or backsiphonage of any stagnant water).



4.2.1 Multiple plots

If there are multiple dwellings / plots being applied for connection, each trench / service entry should be clearly marked to identify each dwelling it is serving. If any of the service connections are to be made using manifold systems, they must be requested within the same application and all be ready for connection prior to visit.

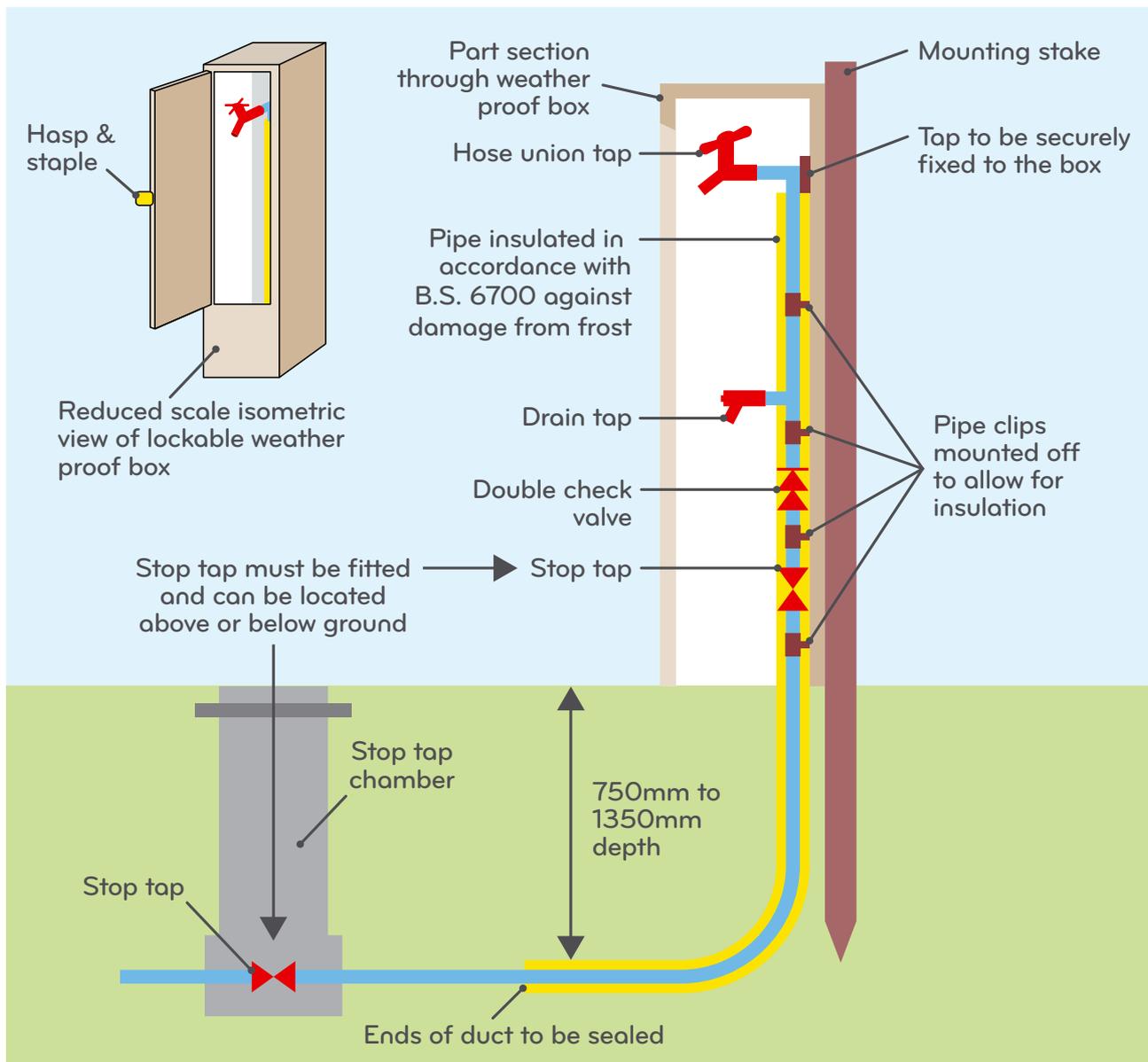
4.2.2 Chlorination

Pipes that are 63mm OD and above need to be chlorinated and follow the process as outlined by developer services for submission of chlorination certificates.

4.2.3 Temporary Building Supplies

A temporary supply must be installed as per the diagram. This accounts for construction purposes, if the supply is to be used for domestic purposes (e.g.

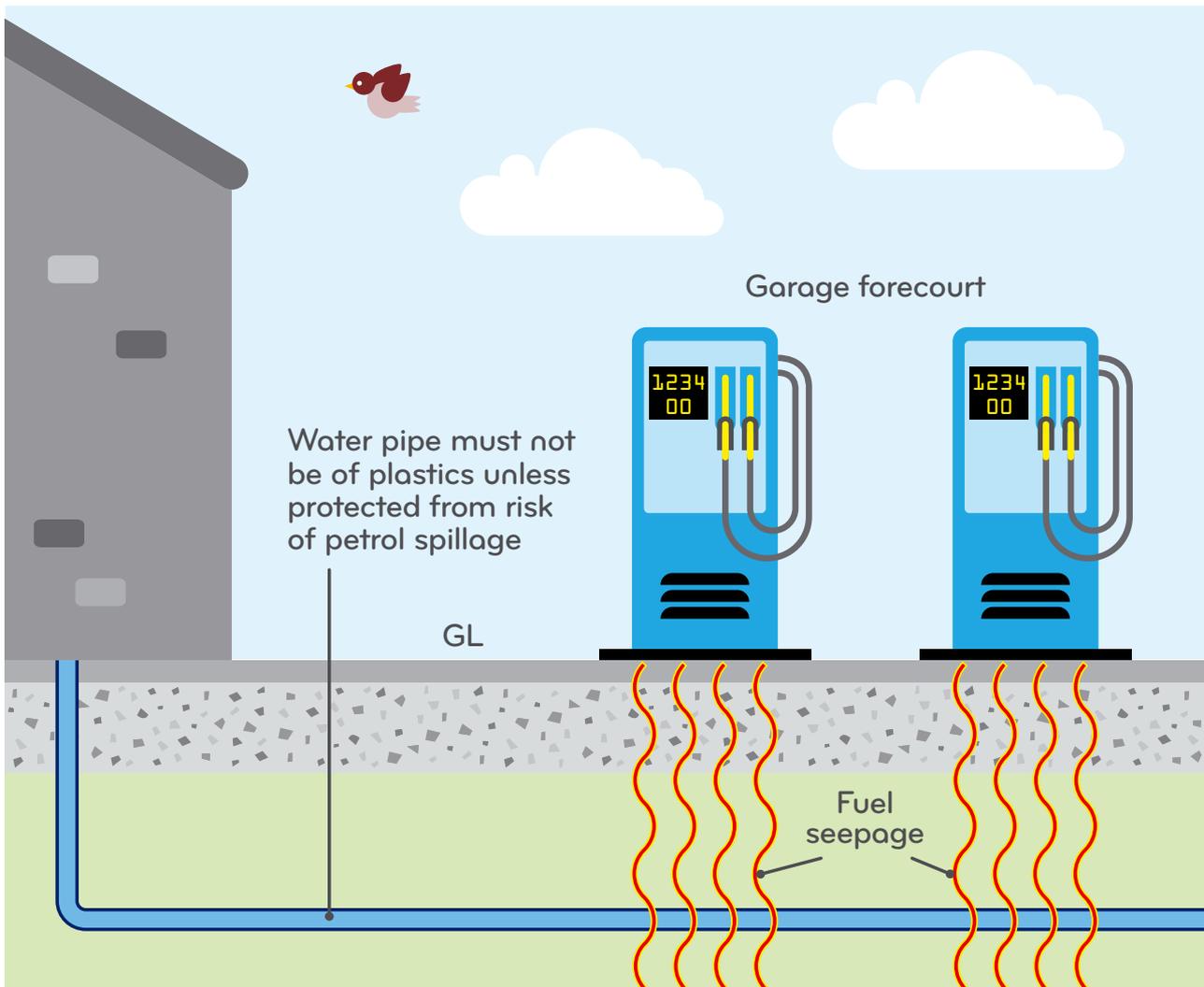
site cabins, canteens etc) this must be protected from potential contamination from water used for construction.



4.2.4 Barrier Pipe

Plastic pipes must not be laid in the ground that may be subject to spillages of hydrocarbons including petrol, creosote, and oil. In those circumstances barrier pipe systems should be used. The new connection application form requires notification of developments planned on contaminated land sites.

Where the storage of oil-based fuel is proposed within the curtilage of the property (domestic or commercial), all below-ground water supply pipework/fittings must be resistant to permeation by hydrocarbon contaminants – i.e. an approved PE/AL/PE barrier pipe system.



4.3 Communication (service) Pipes – Company

The section of the supply pipe connecting the main to the meter/controlling stop tap or property boundary is called the 'communication pipe'. The communication pipe is the responsibility of Welsh Water.

New Company communication pipes should:

- be laid at right angles to the main and ferrules
- be a minimum of 20mm nominal bore
- be a minimum of 300mm apart
- connect to customer service pipes through a Company Boundary box/Stop tap

Long Side communication pipes crossing major roads (Type 0, 1 and 2) and junctions should be installed in a duct to allow ease of replacement and up sizing in the future.

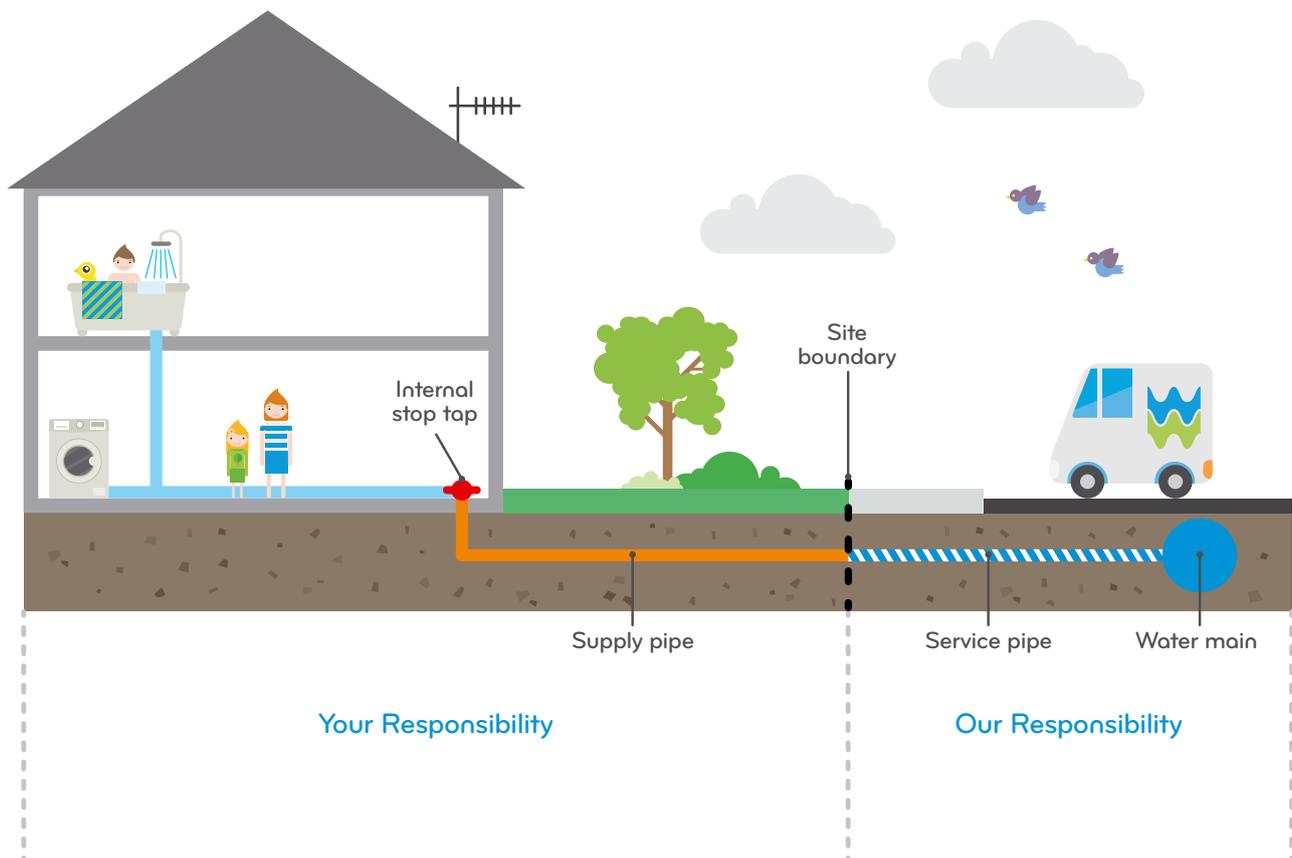
Where two Company pipes are to share a common trench, their respective customer service pipes should be laid no more than 1 m apart where they cross the boundary of the street.

Boundary boxes / stop taps should be installed in the adopted service strip, easement or footway, situated no more than 150mm from the footway boundary and a minimum of 150mm apart. Where multiple connections to the same point are required a multi manifold control and metering system should be installed where possible. This ensures reinstatement can be carried out to the correct standard.

Developers should be encouraged to install a customer service pipe of at least the same size nominal bore as the company communication pipe and will be required to submit proposals in line with the new supplies procedure.

Separate Company communication pipes should be provided to non-domestic properties.

Plot Connection Layout



4.3.1 Domestic Properties (other than Flats)

New company communication pipes for domestic properties should serve one house or dwelling. For large Domestic Properties reference should be made to BS 6700 for guidance on the determination of pipe size.

For short side services where the main is on the same side of the proposed highway as the properties to be served, separate Company service pipes should be provided.

4.3.2 Flats and Communal Buildings

Living units in flats and communal developments should be taken as the equivalent of one house each for the purpose of sizing the Company communication pipes or designed based on BS 6700.

Low rise blocks or maisonettes (3 stories or less)

Separate Customer service pipes should be provided.

4.3.3 Low rise blocks or maisonettes (3 stories or less)

Separate Company communication pipes are preferred. Joint Company communication pipes may be provided by agreement with STW where the Company considers it unreasonable to install separate pipes. A manifold with stop taps contained in one chamber, can be used. External manifolds should only be used for 4 or 6 properties. Unused outlets are not permitted.

Manifolds should be used only with a maximum of six outlets of 20 mm nominal bore each off any one inlet of 57mm nominal bore. See Standard drawing database.

4.3.4 Service Pipes – Customer

Separate customer service pipes should be provided in all cases.

4.3.5 High rise block and/or bed-sitter type buildings (Multi-Occupancy)

Separate Company communication pipes should be installed where separate customer service pipes are laid to the boundary of the property.

Welsh Water requires separate metered water services to flats and apartments. When installing individual water services into a block of flats or apartments, each supply should have a stop valve located in the communal area of the building. This is so that in the event of the flat occupier not being present, the supply to that flat can still be isolated

by others without entering the flat, in the event of a water leak coming from that area. The mains water service pipework in blocks of flats or apartments should be located either in communal areas of the building or in purpose made service ducts. The services must not pass through flats, and all mains water services must be accessible at all times.

If external water meters are not possible for each flat, Welsh Water will allow internal meters to be fitted within a communal area of the building. If internal meters are installed, the developer will install a WRAS approved manifold to house the meters. Welsh Water will supply and fit the meters into the manifold.

4.4 Service Pipes – Non Domestic Properties

All new supplies to non-domestic properties should consist of separate Company and Customer service pipes to each property to be served. A meter should be installed on every service, outside each property.

Boundary boxes/stop taps should be installed in land adopted by the Highway Authority unless (and only in exceptional circumstances) when a Protected Strip has been created.

Except where a service strip abuts land adopted by the Highway Authority, where a main has been laid in a Protected Strip, Company communication pipes should terminate with a boundary stop tap within the Protected Strip and as close as practicable to the main.

Where a service strip abuts adopted land, Company communication pipes on that side may be terminated at the distant edge of the adopted land.

Likely consumption and the required size of the service pipe should be calculated by the developer in accordance with the requirements of BS 6700 and notified to Welsh Water's New Connections team.

The feasibility of meeting the developer's calculated demand and maximum flow rate, and the size of the company communication pipe, should be determined by the designer.

4.4.1 Service Pipes - Materials

Under normal conditions blue medium density polyethylene (MDPE) to British Standard BS 6572 should be used. (Note: this pipe may only be laid above ground provided it is not exposed to direct sunlight and is adequately protected to prevent freezing.)

Alternative pipes should be used where the ground is contaminated with organic compounds the following pipe materials should be used:

- Metal sheathed MDPE. This is standard MDPE pipe factory-sheathed with an aluminium barrier coating protected with an outer layer of blue MDPE incorporating 4 brown identification stripes. Sizes are available between 25 – 110mm nom bore.
- Copper tube (to BS 2871 Table Y for underground use) factory coated with blue PE for protection and identification. The pipe should bear a BS Certification Mark which states that it has been effectively cleaned internally.

4.5 Joints, valves and fittings

4.5.1 Jointing

Electrofusion couplers should be used for all new PE service joints. They should be capable of interfacing with auto recognition control boxes. Mechanical fittings conforming to BSEN 1254-2 should be used for jointing copper service pipe. Where PE service pipe is jointed to copper, galvanised iron, lead or LDPE service pipes, mechanical fittings conforming to relevant parts of WIS 4-32-11, BSEN 1254-2, BSEN 1254-3 and BS 5114 should be used.

4.6 Connections

Ferrules should be used for connecting the service pipe to the main and are designed for fitting 'under pressure' i.e. the water main continues in service and is not isolated or drained down whilst the connection is made. Various types of ferrule are available depending upon the material of the water main.

4.6.1 Connections to Iron Mains

Ferrules for connections to iron mains should be of the 'swivel' type and be capable of being installed under pressure with either a Talbot or Pass-Peart Drill and Tapping machine. The minimum size of the connection should be a 1/2" BSP thread into the main and the minimum outlet to suit 20 mm nominal bore service pipe. The diameter of the tapping should not exceed D/4 for cast iron or D/6 for ductile iron, where D = the nominal diameter of the main. Should these limits be exceeded then it is recommended that a repair collar be used appropriately drilled to suit the size of the ferrule.

4.6.2 Connections to PVC Mains (PVC-U, PVC-A and MOPVC)

Connections to mains should be made by the use of self-tapping ferrule straps.

4.6.3 Connections to PE Mains (MDPE, HPPE and Coated PE)

Connections to polythene mains should be made by the use of self-tapping electrofusion saddles (tapping tees), minimum 32 mm outlet. Ferrule straps, or saddle straps are not to be used. Any coating / sheath should first be removed. Tapping saddles may either be of the 'bottom-loading' or 'top-loading' type and capable of interfacing with an auto-recognition control box. Saddle straps and hot-plate fusion ferrules are not to be used.

4.6.4 Connections to Asbestos Cement Mains.

Only Welsh Water is able to work on asbestos mains. Please alert us immediately if you discover any water asbestos water mains which are not correctly identified on our Public Record.

4.6.5 Sluice Valves

Valves for services greater than 63mm, including for large industrial supplies, should be:

- compliant with BS 5163
- wedge gate Type B
- resilient faced
- pressure rating PN16

Valve caps should be manufactured from Ductile Iron Please see appendix.

Where 32mm combined sprinkler and domestic supply is required, please refer to the meter detail contained in Appendix E. Boundary boxes and meters should be sourced from Welsh Water directly. Further information can be found on [our website](#).

4.6.6 Boundary Boxes

Boundary boxes will be fitted to all single Company communication pipes, up to and including 32mm, and should comply with WIS 4-37-01A. They should be rigid Type R. Where a single communication pipe supplies more than two properties a multi-manifold control should be used.

The box should provide continuously variable height adjustment up to 150mm. Boundary boxes intended for installation where the final ground level is indeterminate should provide continuously variable height adjustment. Boxes for installation in normal conditions should be Class 2 with 25mm MDPE tails, and in contaminated ground should be Class 1 sealed units with metal union connectors.

It is important that the designer indicates the boundary box positions on the design drawings

(if different to what the approved design drawings show, this must be agreed with Welsh Water).

This should ensure the following (please refer to Appendix D & E):

- Service/Boundary Box/chamber supplies the correct property
- Service/Boundary Box/chamber is within the acceptable depth
- The Boundary Box/chamber is at the correct position (within 150mm of property boundary line)
- Boundary Box/chamber is vertically aligned & free of debris
- Boundary Box/chamber is in good condition with no visible signs of damage
- Boundary Box/chamber frame & cover is supported by a concrete plinth

4.6.7 Stop Cocks (Taps)

Underground Stop cocks should conform to BS 5433 or WIS 4-23-04. They should only be used for nominal supply pipe diameters of 50mm and above. They are to be contained within a plastic tube of 160mm minimum diameter and mounted on a suitable base.

4.6.8 Multi Manifold controls

If any of the service connections on site are to be made using 4 or 6 way manifolds, the service connections for all of the properties served by each manifold must be installed at the same time and they must all be connected in one visit.

It should be noted that these controls cannot be used in areas where contaminated ground is present.

4.6.9 Covers and Frames

Covers and frames for boundary boxes should be Type 135B2H in accordance with BS5834: Part 2. Ductile iron covers and frames should be used for in areas subject to vehicle loading including driveways, car parking the carriageway and the footpath adjacent to the carriageway. In grass verges or footpaths not adjacent to the carriageway plastic covers and frames may be used.

Covers and frames for stop tap tubes should be ductile or grey iron Type 135B1H or B2H in accordance with BS5834: Part 2.

Please note that Manifold connections cannot be provided where your site is subject to the 'Domestic Fire Safety (Wales) Measure' that became Law in January 2016.

4.6.10 Combined Domestic/Fire Sprinkler installation

If the connection is for a combined domestic/fire sprinkler installation, a single check valve must be installed on the fire sprinkler supply pipe at the branch connection point to the domestic water supply pipework. The owner/purchaser of the premises must be informed that it is a regulatory requirement that the single check valve is replaced not less frequently than every 5 years. Evidence of each replacement should be retained for possible inspection by this company. Further information can be found on [our website](#).

4.7 Occupancy of new properties

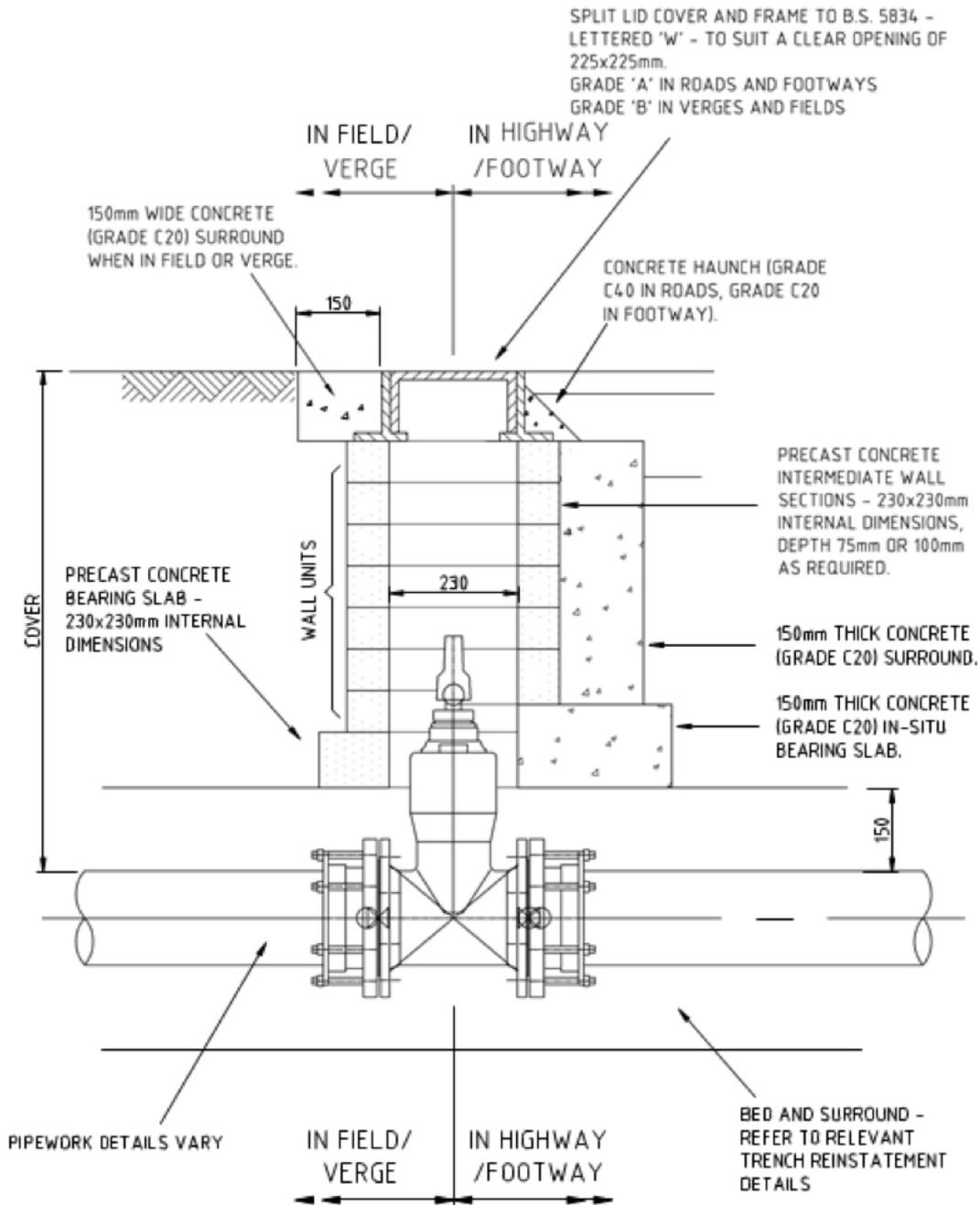
The developer will be charged for any standing charges and water consumption until Welsh Water is informed of the new occupant's details.

When notifying Welsh Water of a new occupant the following information will be required:

- Plot number
- Occupier's name
- Full postal address of property
- Date of occupancy
- Occupier's previous address
- Meter serial number and reading



5. Appendix A – Typical Sluice Valve Chamber



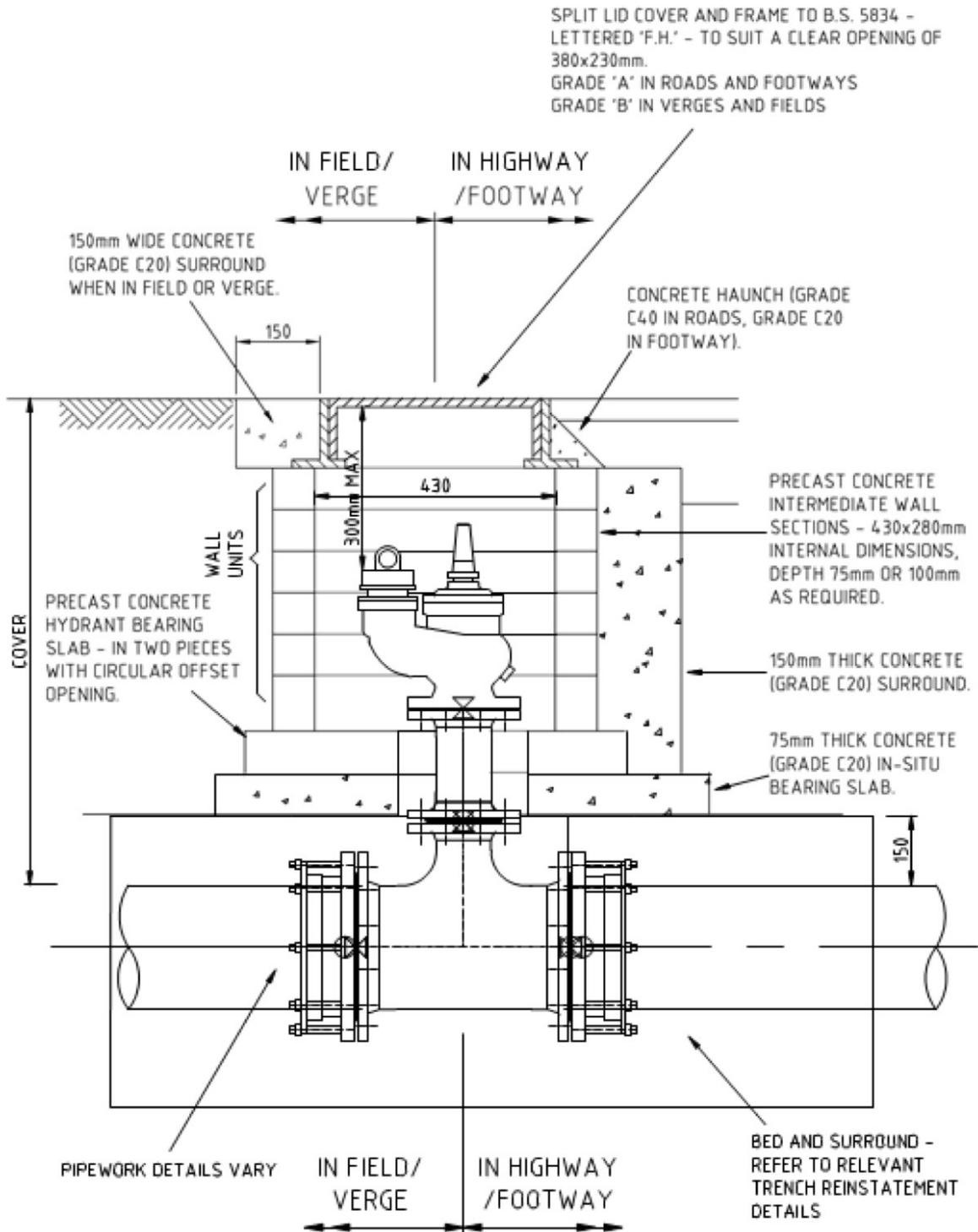
NOTE

1. CHAMBER DIMENSIONS SHALL BE INCREASED TO ACCOMMODATE GEARING WHERE REQUIRED.

					Project		STANDARD DETAILS			Operational Services Players Ind. Est. Clydach Swansea SA6 5BQ Tel: +44 (0)1792 841000 Fax: +44 (0)1792 841001	
C1	CONSTRUCTION ISSUE	BRJ	CA	HL	26/07/19	Title		TYPICAL SLUICE VALVE CHAMBER CONSTRUCTION UPTO 150mm Ø PIPE		Project Code	Drawing No.
A1	APPROVAL ISSUE	BRJ	CA	HL	20/06/19					SV_001	C1
A	FIRST ISSUE	BRJ	CA	HL	24.05.19						
Issue	Descrip. bn	Aut. I.	Skd.	Appd.	Da. Im.						
Scale A4		Da. Im.									
NOT TO SCALE											

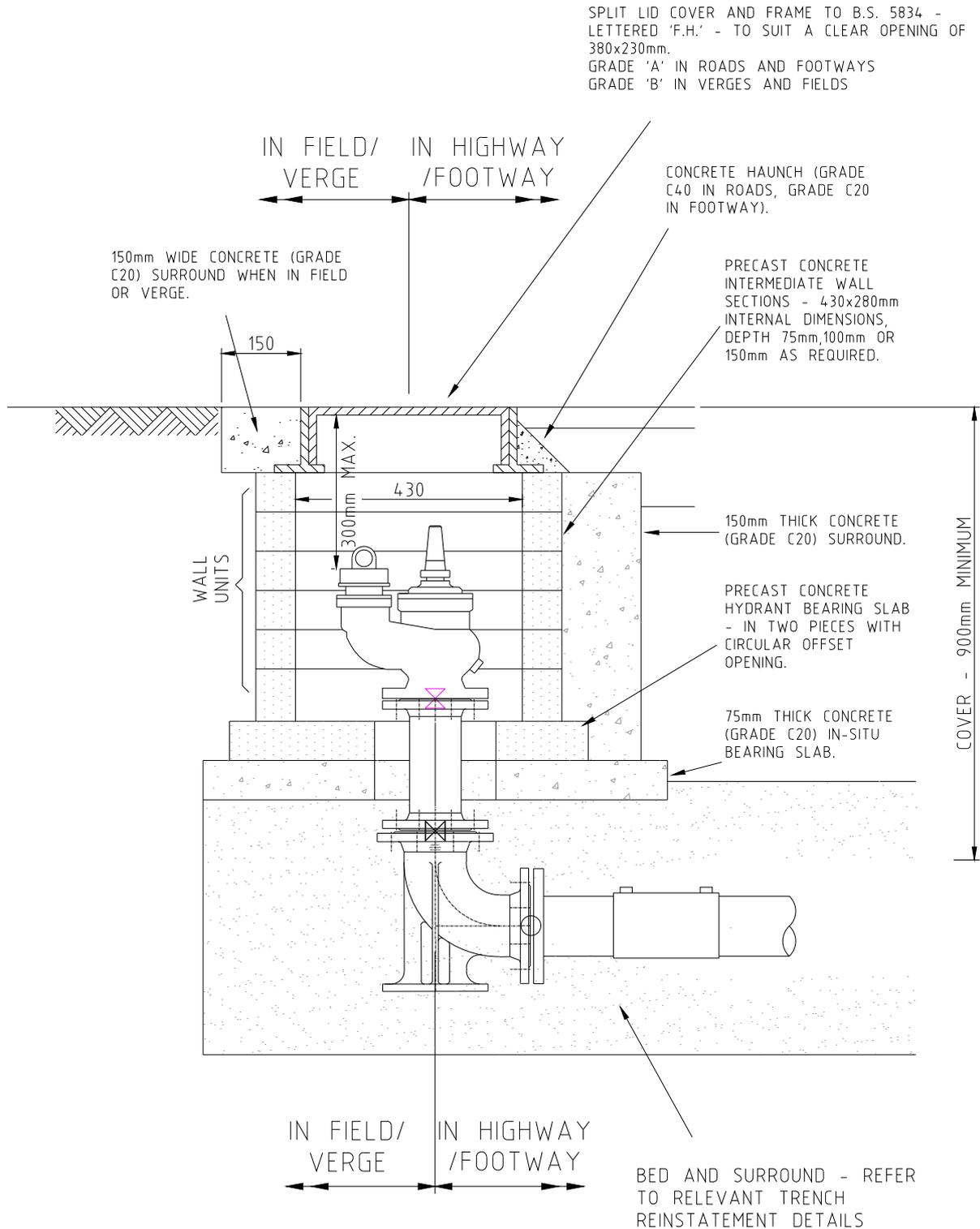


6. Appendix B - Fire Hydrant/Washout online installation



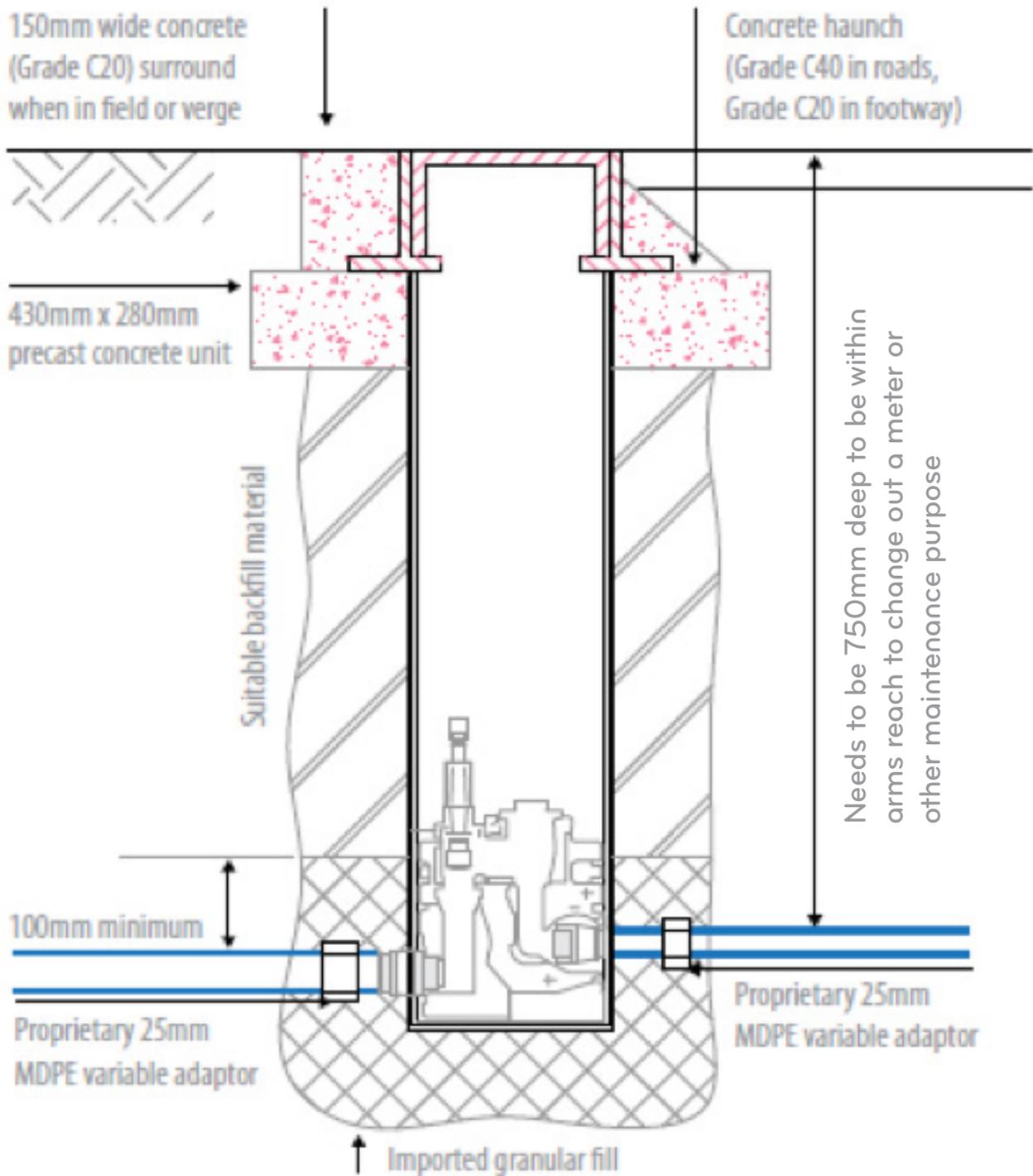


7. Appendix C – Typical Chamber to “End of Line” Hydrant



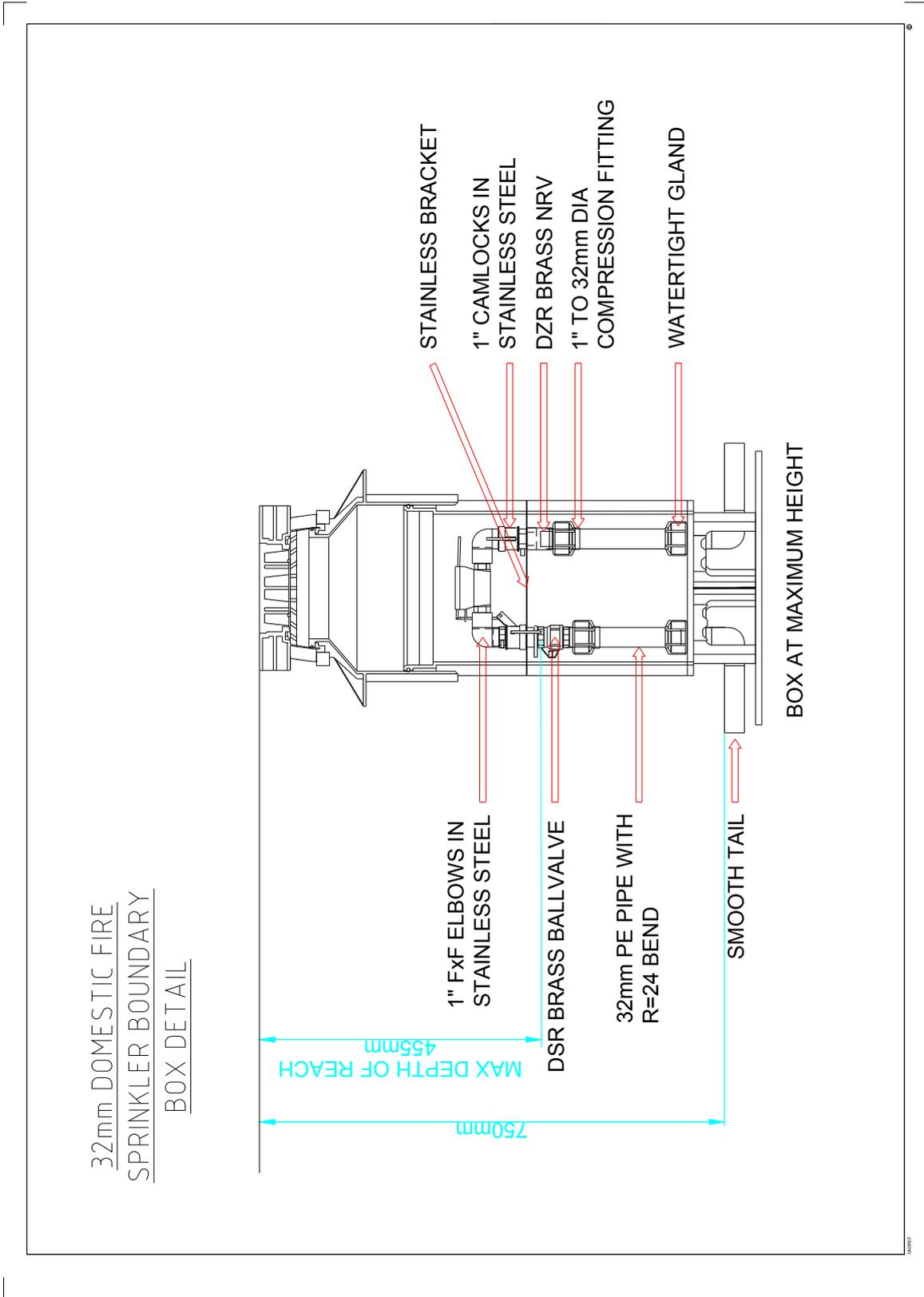


8. Appendix D – Meter Chamber detail





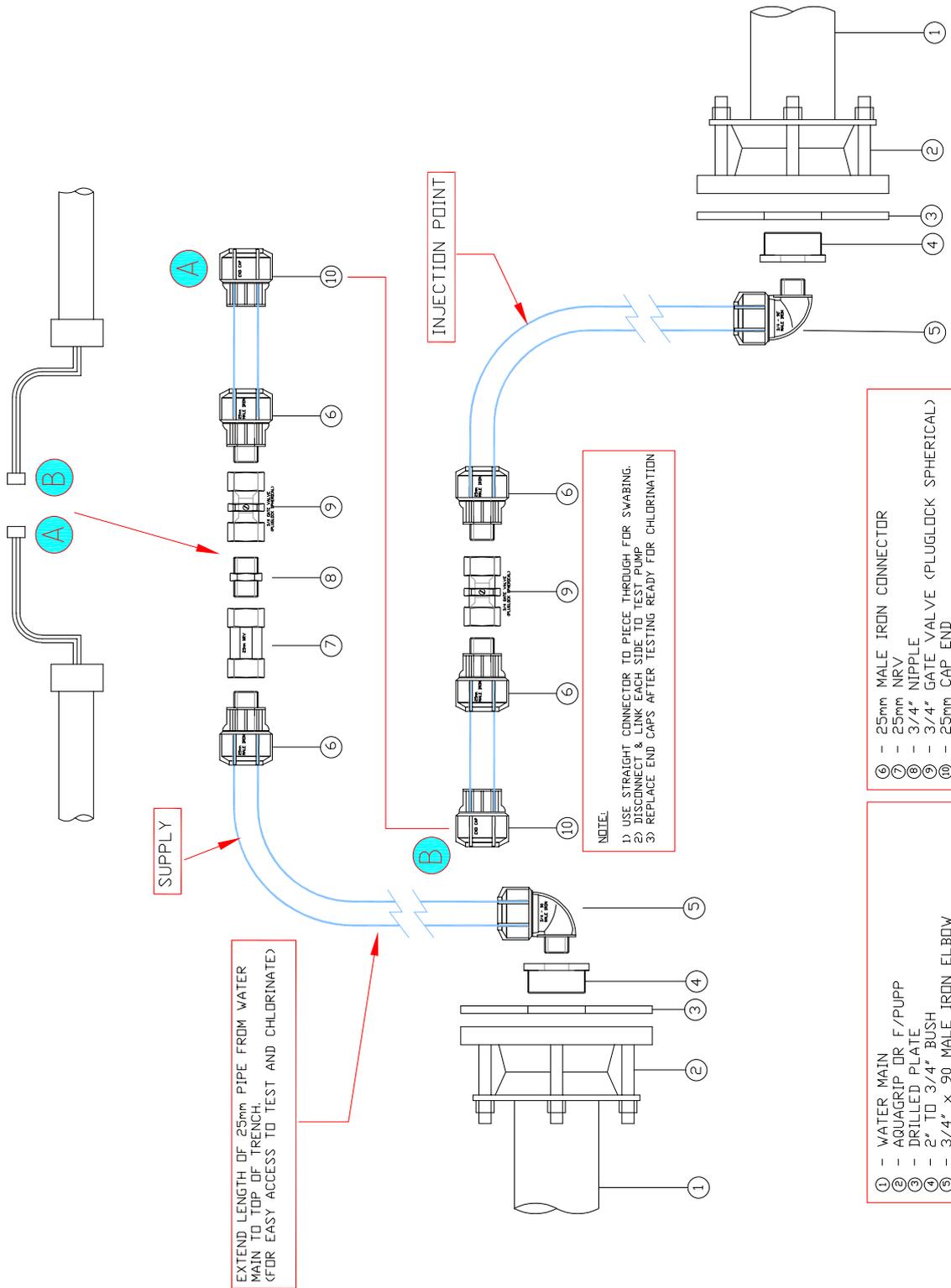
9. Appendix E – Typical combined domestic water supply and sprinkler system boundary box and meter





10. Appendix F – Chlorination detail

BACK TO BACK CHLORINATION
SEE EXPLODED DETAIL BELOW FOR REQUIRED APPARATUS



EXTEND LENGTH OF 25mm PIPE FROM WATER MAIN TO TOP OF TRENCH. (FOR EASY ACCESS TO TEST AND CHLORINATE)

SUPPLY

INJECTION POINT

NOTE:
1) USE STRAIGHT CONNECTOR TO PIECE THROUGH FOR SWABING.
2) DISCONNECT & LINK EACH SIDE TO TEST PUMP
3) REPLACE END CAPS AFTER TESTING READY FOR CHLORINATION

- ① - WATER MAIN
- ② - AQUAGRIP OR F/PUPP
- ③ - DRILLED PLATE
- ④ - 2" TO 3/4" BUSH
- ⑤ - 3/4" x 90 MALE IRON ELBOW

- ⑥ - 25mm MALE IRON CONNECTOR
- ⑦ - 25mm NRV
- ⑧ - 3/4" NIPPLE
- ⑨ - 3/4" GATE VALVE (PLUGLOCK SPHERICAL)
- ⑩ - 25mm CAP END



Contact Us:

We're always here to help...

Call

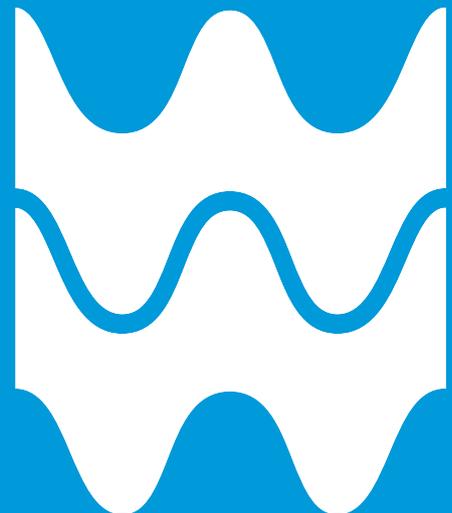
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