Protection of assets Technical Guideline

For safely working near Water Corporation assets

WATER CORPORATION

Contents

1 Definitions

In this guideline the following words and expressions have the following meanings. These meanings do not necessarily align with the meanings given in other Water Corporation publications or in legislation.

Alignment	The line on which the pipes are laid and measured from the adjacent cadastral boundary.
Approval	Approval of a third party to conduct work in, on over, under or within the prescribed proximities to Water Corporation assets.
Assets	Includes any of our water, wastewater and drainage assets, but in this guideline, most commonly refers to water pipelines, sewer pipelines and drainage pipelines and their associated fittings and structures.
Damage	Physical damage to and interference with our assets. Damage includes coating or lining damage, dents, scratches, cracks, bending, displacement, perforation, ruptures, joint opening. Interference includes preventing or restricting access for operation and maintenance. Damage can also include potential impacts that our assets can have on your works.
Design engineer	An engineer who is a suitably qualified with appropriate engineering experience who is responsible for preparing design drawings and documents.
Design standard	Water Corporation's design standard relevant to the works being undertaken.
Distribution main	A water supply pipeline that connects water storage to water reticulation. Distribution mains are typically larger pipelines that have a diameter of 300 mm and greater, and do not normally service individual properties.
Drainage pressure main	A drainage pipeline that operates under pressure.
Main drain	A storm water pipeline that flows by gravity and is controlled by Water Corporation. They tend to be larger in size (greater than 450 mm) and commonly provide an outlet for local authority drainage schemes.
Main sewer	A wastewater collection pipeline that flows by gravity. Sewer mains typically have a diameter of 375 mm or greater, and do not normally service individual properties.
Open drain	An open channel used for discharging storm water.
Prescribed proximities	A proximity, or proximities, to an asset, prescribed by Water Corporation under section 90 of the *Water Services Act 2012* (WA) within which approval is required before a person can undertake certain work.

Reticulation main	A water supply pipeline that services individual properties. They are typically smaller pipelines that have a diameter of 250 mm and smaller.
Reticulation sewer	A wastewater collection pipeline that services individual properties and flows by gravity. This typically includes pipelines that have a diameter of 300 mm and smaller.
Risk	The likelihood of work causing damage to our assets, as well as our assets causing damage to your work.
Services	Includes telecommunications cables, gas mains, power poles and cables, as well as water, wastewater and drainage assets owned by other organisations.
Sewer pressure main	A wastewater collection pipeline that operates under pressure. This includes sewer pipelines that operate under vacuum. Sewer pressure mains do not service individual properties.
Third party	The individual, group of people or organization that is undertaking work near Water Corporation assets.
Trunk main	A water supply pipeline that connects a main water source, such as a reservoir, to water storage, such as a water tank. Trunk mains are typically larger pipelines that have a diameter of 300 mm and greater, and do not normally service individual properties.
Works	The development of all types of buildings, structures, and other obstructions (including residential buildings, pools, sheds, carports, major developments, transport infrastructure, services, stockpiles, ground anchors, trees, equipment installed on our assets), and any work that causes changes to the ground (including movement of heavy vehicles, blasting, pile driving, ground compaction, dewatering, earthworks, open and trenchless excavations).
Zone of influence	The zone of influence is an area extending both horizontally and longitudinally along a buried pipeline. It is the area in which loads from buildings or structures on the surface may potentially cause damage to the pipeline. Settlement or disturbance of the ground within this zone may also cause damage to buildings or structures on the surface above.

2 Introduction to working near our assets

We have developed this guideline to assist anyone who is planning or conducting work near our assets. This includes the development of buildings or structures, and any work that causes changes to the ground, including:

- development of buildings, transport infrastructure and other structures
- earthworks and excavations
- movement of heavy vehicles (other than on permanent roads)
- work causing excessive vibrations (such as blasting, pile driving, ground compaction)
- installing buried and overhead services
- planting and removing trees
- installing equipment on our assets (such as telecommunications antennas on water tanks).

These and other similar activities, can cause damage to our assets which can be expensive, and highly disruptive to the community and hazardous to your employees and the general public. Damage can include physical damage such as rupturing an asset, as well as preventing or restricting access for operation and maintenance.

This guideline provides information and advice about working safely near our assets to reduce the risk of potential damage or injury. It describes:

- when you are required to obtain approval from us

  (if you are undertaking work in, on, over, under or within the prescribed proximities to our assets, you have a statutory requirement under section 90 of the *Water Services Act 2012* (WA) to seek approval from us prior to starting work)
- options for reducing your risk of potential damage or injury
- requirements for protecting our assets.

Please note that in those situations where these guidelines appear to be in conflict with the Utility Code of Practice, the Utility Code of Practice takes precedence.

2.1 Safety - Your responsibility

At all times the safety of the general public and your employees for your works remains your responsibility.

- You therefore must determine how to best conduct the work in consideration of the information provided in this guideline, while ensuring that you maintain a safe system of work at all times.
- You have a duty of care to ensure that your works do not damage or interfere with our assets or **cause hazards to any party.**

2.1.1 Potential hazards

Potential hazards associated with Water Corporation assets include, but are not limited to:

- Sudden release of high pressure/large volumes of water which can result in collapse of excavations, traffic hazards or personnel injury
- Release of wastewater, resulting in exposure to biohazards and toxic gasses
- Pits and access chambers which present fall and drowning risks
- Asset specific risks including electric shock, asbestos exposure and falls from heights

Occasionally our assets also fail for reasons that are unrelated to third party works (such as from aging, corrosion or mechanical failures) which can also have hazardous impacts.

2.1.2 Authorised access only

Unauthorised interference with Water Corporation sewers and other assets (including uncovering, opening or repairing) is prohibited and may result in prosecution under the *Water Services Act 2012* (WA) (Act) primarily but not limited to section 88 and section 90.

2.1.3 Responsibility

Parties are also responsible for all **Work Health and Safety and public safety requirements** associated with their works. All works must be carried out in accordance with the relevant acts, regulations standards and codes of practice, as well as arranging any approvals, clearances etc required by other agencies

2.1.4 Liability

Under section 90(2) of the Act:

> A person must not drill, bore, excavate, or use impact equipment within the prescribed proximity to water service works, of a prescribed kind, of a licensee, or engage in any other activity within the prescribed proximity that may damage those works, except in accordance with the approval of the licensee.

Penalty: a fine of $10,000 per offence.

2.1.5 Disclaimer

Any plans or other information provided by Water Corporation must be used as a guide only. Plans (including the location of pipes and other assets) are approximate only and it is your responsibility to locate the exact location of Water Corporation assets before commencing work. Water Corporation does not warrant or make any representation as to the accuracy, completeness, reliability, currency, quality or fitness for purpose of any plans or other information (including, but not limited to, the accuracy of the scale of, or the location of, anything shown on any plan or diagram).

2.2 Who to contact for support

If after referring to this document you are still unsure as to whether or not the work you are doing requires our approval, or you are unsure about any of the information provided, please email us at POS_enquiries@watercorporation.com.au.

Any damages must be reported immediately by calling our 24-hour Faults and Emergencies line on **13 13 75**.

3 Zones around our assets

We will consider the following zones when assessing your application and the risk of potential damage:

1. Zone of influence.
2. Building restriction zone.

These zones are mostly specific to buried pipelines and should be taken into consideration when developing your work plans and work methods.

3.1 Zone of influence

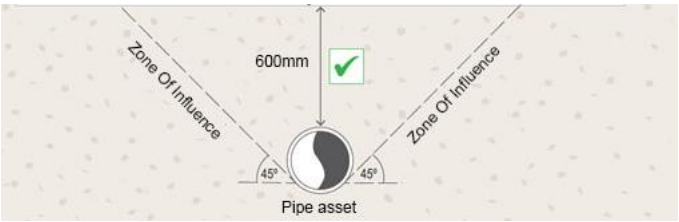


Diagram 1 Zone of Influence

The zone of influence is an area extending both horizontally and longitudinally along a buried pipeline. It is the area in which loads from buildings or structures on the surface may potentially cause damage to the pipeline. Settlement or disturbance of the ground within this zone may also cause damage to buildings or structures on the surface above.

In general, your work must not:

- cause subsidence of soil within the zone of influence
- be reliant on soil within the zone of influence for structural support
- restrict removal of soil within the zone of influence.

Factors which determine the zone of influence are:

1. The building restriction zone: refer to the definition in Section 3.2 below for details.
2. The nature of ground: the boundary of the zone of influence is determined by the angle of repose of the surrounding ground – the angle of repose is the steepest angle at which loose ground material is stable.

We have developed a set of graphs which illustrate the zone of influence for **sewer reticulation, sewer mains** and **main drains** (i.e. pipelines that operate under gravity) that can be used in the context of **residential, commercial** and **industrial buildings** and **structures** (refer to Section 6.10 Supplement 1: Zones around our assets – for buildings and structures).

For all **other types of work** and **other types of pipelines**, the zone of influence can be determined using the illustration below as a guide.

If your work presents a high risk, we may request you to engage a suitably qualified geotechnical design engineer to determine the zone of influence for a particular site.

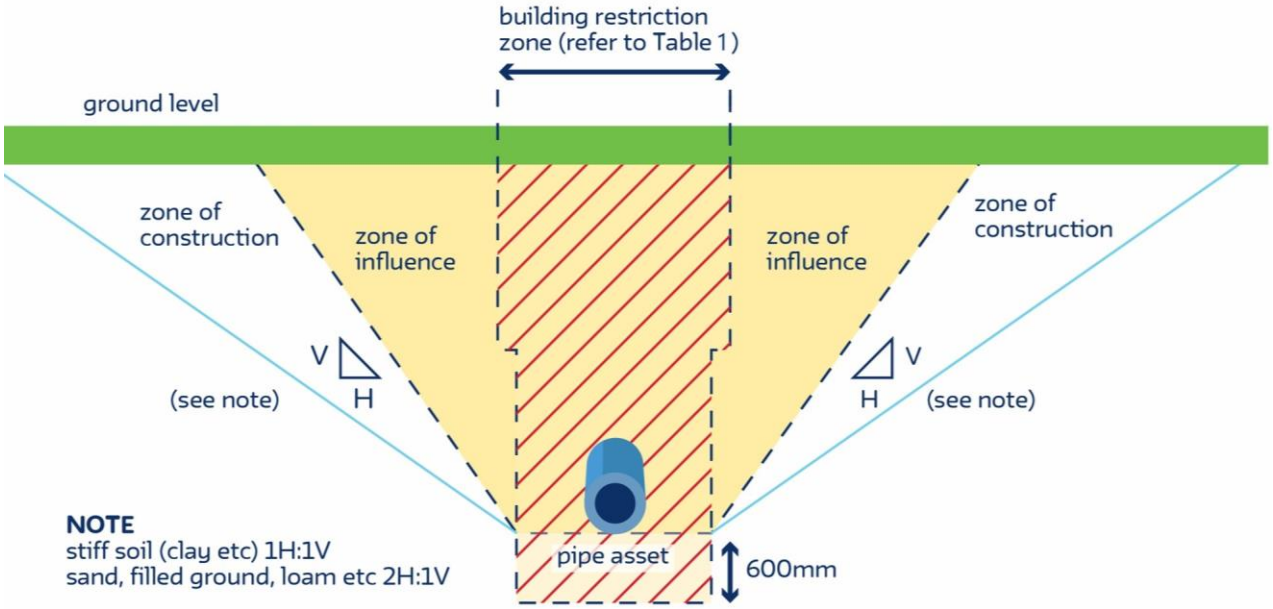


Diagram 2 Zone of influence

3.2 Building restriction zone

A building restriction zone applies to the area directly above, below and adjacent to a buried pipeline. Work is generally not permitted within this zone.

The depth of the building exclusion zone is taken from ground level to 600 mm below the pipeline invert level.

The width of the building restriction zone is the minimum width required to excavate the pipeline (using trench supports) to safely undertake emergency maintenance and repairs, which depends on the size and depth of the pipeline.

The building restriction zones indicated on the graphs contained in Appendix 1 should be used for **sewer reticulation, sewer mains** and **main drains** (i.e. pipelines that operate under gravity) in the context of **residential, commercial** and **industrial buildings** and **structures.**

For all other types of work and buried pipelines, the following building restriction zones apply:

Table 1 Building restriction zones* (to be read with Diagram 2 above)

Pipeline depth	Pipeline size		
	< 300 mm	300–600 mm	> 600 mm
< 3.0 m	1.2 m	2.0 m	2.2 m + pipeline diameter
3.0 – 5.0 m	2.0 m	2.0 m	3.0 m + pipeline diameter
> 5.0 m	3.0 m	3.0 m	4.0 m + pipeline diameter

***Zone width is defined as total width with pipe centrally located**

3.3 Drinking Water Protection Zone

Public drinking water source areas (PDWSAs) are designated groundwater resources and surface water catchments, constituted under legislation, that supply drinking water to public drinking systems. PDWSA boundaries cover the recharge and catchment areas of drinking water sources. Their primary goal is to protect water quality at the source to ensure safe, reliable and clean drinking water to the Western Australian community. PDWSAs are divided into priority areas (1, 2, 3, 3*), each indicating a different level of risk and required management effort.

Within PDWSAs, drinking water assets, such as groundwater bores and surface water dams, have defined buffer zones to prevent contamination from surface and sub-surface activities. These are shown in the table 2 below:

Table 2 Public drinking sources

PDWSA	Groundwater source wellhead protection zone	Surface water source reservoir protection zone
Priority 1	500 m circular buffer	2 km around the high-water mark
Priority 2	300 m circular buffer	
Priority 3 or 3*	300 m circular buffer	

Activities such as development, construction, drilling, dewatering, refuelling etc., can create direct pathways for contaminants to enter groundwater or surface water sources. Due to the risks of contamination, WA's water source protection policies and legislation explicitly prohibit these activities within protection zones.

PDWSA boundaries and Protection Zone spatial layers are publicly available (e.g. Data WA, PDWSA Mapping Tool). If any work is proposed near water supply assets, refer to these layers early to better understand where certain activities might not be allowed to protect our drinking water supply.

For more information, please contact Water Corporation's Source Protection team:

4 Process for working near our assets

Damage can be avoided by carefully planning and conducting your work. The steps below outline the process for working safely near our assets:

Plan	• Submit a **Before You Dig Australia** enquiry to determine the approximate location of our assets (see Section 4.1). • Perform a **site inspection** to identify any surface indicators of underground assets (see Section 4.2 Site Inspection). • Perform a **desktop assessment** of the area, checking whether the work proposed is within a Public Drinking Water Source Area and/or within a Reservoir Protection Zone or a Wellhead Protection Zone
Assess risks and options	• Conduct a damage risk assessment to determine whether your work presents a risk of damage (see Section 4.3 Conduct an Asset Protection Risk Assessment). • Consider what **options** are available to reduce risks to allow work to be carried out safely – our preferred options for reducing risk are defined in Section 9.
Pothole	• At this stage you may be required to confirm the exact depth and location of assets near your work using **potholing** (see Section 4.4)
Develop a safe solution and design	• Develop your **work plans** and **safe work methods** referencing these guidelines. • Work near our assets must meet our technical requirements (see Section 9).
Get approval	• **Request approval** from us if your proposed work is in, on, over; under or within the prescribed proximities to our assets (see Section 5). • We will be in contact within **5 working days** of receipt of your application – please allow up to **28 days for us to review your application and either**: - Approve - Approve with conditions* - Or if the application is not acceptable, we will request you make changes. *a condition may include preparing a **detailed design** for **asset relocation** or **protection** works. Where this is required, you should arrange your schedule to allow for Water Corporation reviews and consultations (NOTE: this process can take several months - an indication of the time to allow will be provided to you once you've submitted your application).
Deliver	• Once your application has been approved **proceed** with your work. • Conduct a **site meeting** with one of our representatives at project start-up and before project close out. • Allow for work that needs to be performed by us such as **asset inspections, isolations** and **connections** (note that **costs may be incurred** – the associated costs will be provided to you once you've submitted your application).
Close out	• Undertake **project close out** – this involves providing us with all documents required for final acceptance including as-constructed drawings.

Also refer to Working near Water Corporation assets planning checklist provided below to help with planning.

4.1 Before You Dig Australia

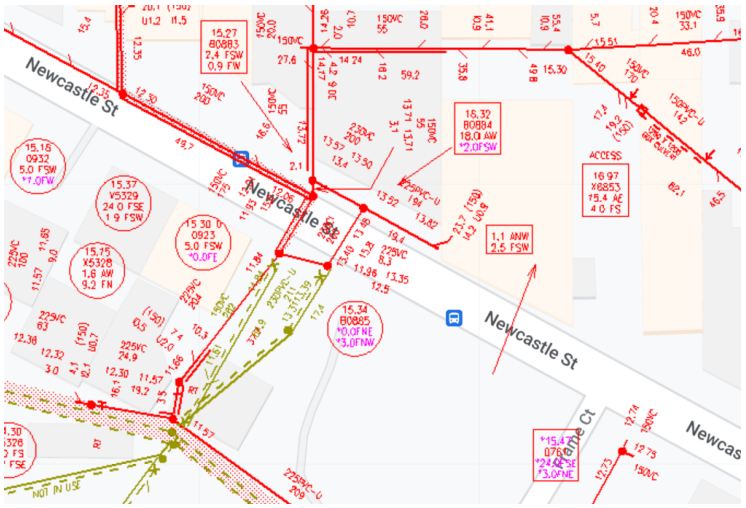
Before you start work you should always submit a Before You Dig Australia (BYDA) enquiry to determine the approximate location of our assets.

BYDA allows you to request plans from multiple asset owners who have assets in the work area. You can request plans on-line at www.byda.com.au/.

The plans are intended to allow you to identify what assets are near your work so you can determine what steps need to be taken to reduce the risk of potential damage. The plans should never be relied on as the sole means of locating assets. Actual asset details and locations should be accurately confirmed using potholing.

The following information should also be considered when you are reviewing the plans:

- Individual sewer and water services to properties are not usually shown on the plans however their existence should be assumed – some properties such as hospitals may have more than one sewer or water service to the property.
- Only Water Corporation owned assets are shown on the plans – there may be other water, wastewater or drainage services not shown on the plans such as drains that belong to local government or Main Roads Western Australia. Information about these services may need to be requested from these agencies if they are not returned with your BYDA enquiry.



Example sewer plan (above)

If you require plans in AutoCAD design format for your work, you can use our online network database system ESInet to extract network data plans.

4.2 Site inspection

A physical inspection of the site where the works are proposed will allow you to assess the working environment and identify any surface indicators of underground assets. Refer to Section 8 of this document for information about the different types of pipeline fittings and structures which may point to the location of buried pipelines.

4.3 Conduct an Asset Protection Risk Assessment

If you have identified Water Corporation assets near your proposed works, conduct an asset protection risk assessment to determine whether your work presents a risk of potential damage. Your risk assessment should consider the following questions in Table 3 Questions to consider when completing a damage risk assesment below.

Table 3 Questions to consider when completing a damage risk assesment

Will the site work…	Yes	No	Not sure
Cause direct contact in any way with a pipeline (including any relatively minor contact with the protective coating)?			
Involve digging adjacent to or otherwise disturbing pipeline foundations, bedding or other support?			
Cause subsidence of a pipeline, supporting material or structures?			
Cause high loads to be applied directly to a pipeline or the soil above it?			
Result in high impacts, shock or vibration near or directly to a pipeline?			
Limit access to a pipeline or other assets for future works or maintenance?			
Cause electrical currents to be directly applied to or induced in a pipeline?			
Interfere with cathodic protection?			
Impact on Water Corporation's ability to maintain its assets?			

If your work presents a risk, consider what options are available to reduce these risks to allow the work to be carried out safely. Our preferred options for reducing the risk of potential damage are defined in Section 9.

4.4 Potholing to locate our assets

The location, depth and direction of all assets near your work must be confirmed using potholing. This is also a requirement under Work Health and Safety (General) Regulations 2022.

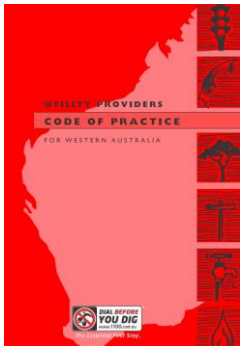
Potholing is the technique of locating buried assets by careful hand digging trial holes or using other non-destructive techniques such as vacuum excavation, air excavation or water excavation. The use of mechanical excavation equipment to pothole is not allowed without an Asset Protection Risk Assessment being endorsed by Water Corporation**.** Hand digging and vacuum extraction methodology for potholing does not require a permit.

Our requirements for potholing include:

- potholing must be undertaken with reference to Before You Dig Australia (BYDA) plans and other information we provide - the amount of potholing required will depend on the size of your work area, density of assets in your work area, and the risk of potential damage associated with your work
- the location of all potholed assets is to be surveyed by a qualified surveyor – all survey coordinates are to be in the MGA94 coordinate system
- potholes must be backfilled once the work has been completed – clean bedding material should be used for the first 300 mm above the exposed asset.

You can engage independent location services to undertake potholing work for you. You can find Skilled Locating Organisation on the BYDA website: www.byda.com.au/services/find-a-skilled-locator/

Electronic detection technology may be used in combination with potholing to positively verify assets. Metallic and reinforced concrete assets which contain steel, may be detected with electronic detection technology, however non-metallic assets cannot be detected by this method. Pipe material may also change over a distance, sometimes changing from metallic to non-metallic material and back again.



The use of a pressure jet to loosen the surrounding soil may be employed where the lance must be producing a maximum pressure of no more than 1500 psi and the flow rate is to a maximum of 50 l/m. The lance must employ a fan nozzle only (no direct jets) and the separation limit from the nozzle is 200 mm above the top of the asset.

For additional information on potholing refer to section 6.3 of the Utility Providers Code of Practice which is available from the utility-providers-code-of-practice-for-wa-2021.pdf

5 Requesting approval

5.1 When you need to request approval

Whether you are a property owner, contractor or developer, you may require approval before working near our assets.

Under section 90 of the Act, we require you to request approval if your proposed works are in, on, over, under or within the prescribed proximities to our assets. The prescribed proximities are summarised in Table 4 Summary of prescribed proximities

For full details of the prescribed proximities and relevant legislation refer to the legal document available on our website.

The Act are supported by Water Services Regulations 2013

In accordance with the Act:

Section 88: Interfering with water service works of licensee

(1) A person must not –

(a) uncover the water service works of a licensee; or

(b) open, shut, damage or otherwise interfere with the water service works of a licensee; or

(c) interfere with the operation of the water service works of a licensee; or

(d) attach a fitting, pipe or other thing to the water service works of a licensee; or

(e) repair, replace or remove a fitting or pipe that is part of the water service works of a licensee; or

(f) place any thing in the water service works of a licensee; or

(g) discharge water, wastewater or any other liquid into, or allow any other thing to enter, the water service works of a licensee, except in accordance with the approval of the licensee or in accordance with any other lawful authority.

Penalty:

(a) for an individual —

(i) for an offence under paragraph (a), a fine of $5 000;

(ii) for an offence under another paragraph, a fine of $15 000;

(b) for a body corporate —

(i) for an offence under paragraph (a), a fine of $10 000;

(ii) for an offence under another paragraph, a fine of $30 000.

Section 90: Construction etc. over or in vicinity of water service works of licensee

(1) A person must not erect, construct, install, place or demolish any building, plant, wall, fence or other obstruction —

(a) in, on, over or under; or

(b) within the prescribed proximity (if any) to,

water service works of a licensee, except in accordance with the approval of the licensee.

Penalty: a fine of $10 000.

(2) A person must not drill, bore, excavate or use impact equipment within the prescribed proximity to water service works, of a prescribed kind, of a licensee, or engage in any other activity within the prescribed proximity that may damage those works, except in accordance with the approval of the licensee.

Penalty: a fine of $10 000.

…

(5) If a licensee is satisfied that a person has contravened or is contravening subsection (1) or (2) and that the obstruction or activity is likely to interfere with or adversely affect the water service works of the licensee, the licensee may give the person a notice (a compliance notice) requiring the person, within a specified time and in a specified manner, to do one or more of the following —

(a) to cease the activity;

(b) to demolish, remove or alter the building, plant, wall, fence or other obstruction;

(c) to replace excavated material or remove fill;

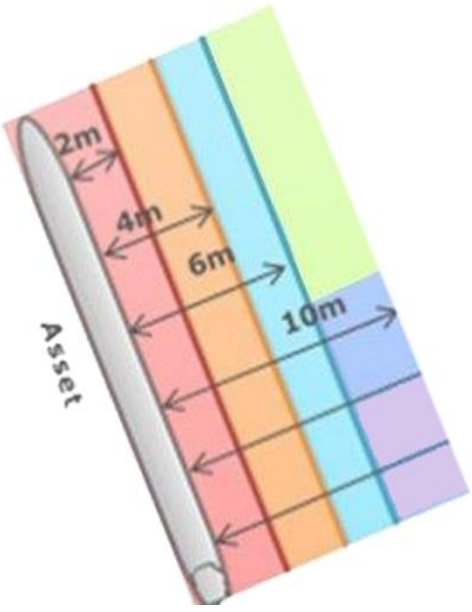
(d) to do any other works necessary to restore, reinstate or protect the licensee's works.

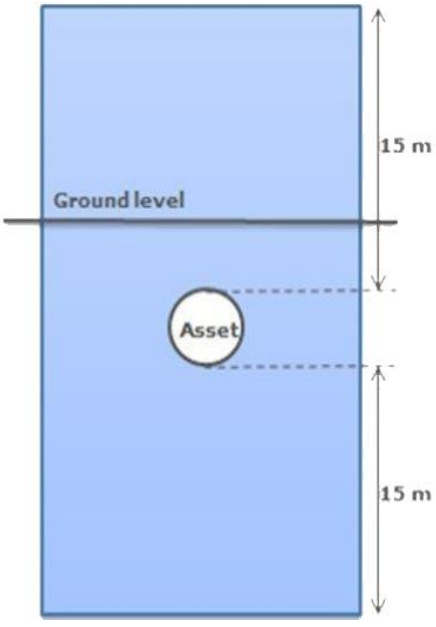
The prescribed proximities have been established to protect our assets and your work from damage, as well as to ensure that you avoid costs and inconvenience associated with ceasing, demolishing, removing or altering your work as necessary to protect our assets.

Table 4 Summary of prescribed proximities

Works within these proximities requires our approval			
Type of works	**Asset type**	**Asset size**	**Prescribed proximity (distance from the asset)**
Ground disturbing works Including movement of heavy vehicles, ground compaction, dewatering, earthworks, open and trenchless excavations	Sewer gravity pipelines	All	2 m
	Main drains	All	
Ground disturbing works	Water supply pipelines	< 300 mm diameter	4 m
Ground disturbing works	Water supply pipelines	≥ 300 mm diameter	6 m
	Sewer pressure mains	All	
	Drainage pressure mains	All	
Ground disturbing works	Drinking water bores	All	300-500 m wellhead protection buffer zone (Dependant on public drinking water source)
Ground disturbing works	Drinking water reservoir	All	2 km reservoir protection zone buffer
Buildings, structures and other obstructions Including residential/commercial/industrial buildings, pools, sheds, carports, major developments, transport infrastructure, services, stockpiles, and ground anchors	All assets	All	10 m both sides of the asset 15 m above & below the asset
Pile driving	All pipelines	All	10 m
Medium and large trees	All pipelines	All	10 m both sides of pipeline (In most cases the tree will be deemed low risk and approval granted, however there are circumstances where this will not be the case)

Prescribed proximities* – plan view (left) and elevation view (right)
**Excludes drinking water bores and reservoirs*





Work not requiring approval*

- Light weight structures, fences and walls that can be readily removed
- Planting and removing trees with a mature height of less than 5 m

Approvals may be required for these types of applications, so we recommend applying to be safe

In most instances work conducted outside of the prescribed proximities will have no impact on our assets, however in all situations you must still assess the risk of potential damage associated with your work. If you have any doubts about the potential for your work to cause damage email us at POS_enquiries@watercorporation.com.au.

5.2 How to request approval

There are two different application processes for requesting approval depending on the type of work you are conducting.

Building - lodge your application online through BuilderNet© if your work relates to:

- residential buildings
- commercial and industrial buildings
- sheds
- garages and car ports
- swimming pools and spas
- retaining walls.

For other types of ground disturbing work you can lodge your APRA application via our online application form on our website.

This includes work relating to:

- development of key infrastructure (main roads, railway, bridges, tunnels, major building developments)
- earthworks and alteration of surfaces
- movement of heavy vehicles (other than on permanent roads)
- work causing excessive vibrations (such as blasting, pile driving, ground compaction)
- dewatering
- open and trenchless excavations
- installing ground anchors
- installing buried and overhead services
- planting and removing trees
- installation of noise walls
- installing equipment on our assets (such as telecommunications antennas on water tanks).

6 Technical requirements for protecting our assets – Buildings and properties

This section details technical requirements for common types of work which may be relevant if you are considering the need to work within the prescribed proximities to our assets.

Depending on the specific aspects of your work, **we may identify requirements that differ from those described in the following sections**.

Please read and understand all sections that apply to your work. There may be more than one section that is relevant. If you need further advice on how to apply these requirements, or if you need additional information not covered in the following sections please email us at POS_enquiries@watercorporation.com.au.

6.1 Single storey and multi-storey structures

Typically, structures with a height of 4 m or less are classified as single storey structures, and structures with a height of greater than 4 m are classified as multi-storey structures.

Single storey and multi-storey structures are permanent structures that include:

- habitable buildings
- commercial buildings
- industrial buildings
- carports and garages attached to main buildings
- outbuildings*
- above ground industrial tanks
- fixed plant (permanent machinery and equipment)
- fixed above ground pools
- fences and walls greater than 1.8 m in height.

*Outbuildings are non-habitable buildings detached from main buildings, such as sheds, carports, patios, or gazebos. They are generally classified as being built from masonry walls or are non-masonry with floor areas that exceed 42 m^2. If you are building a non-masonry outbuilding that has a floor area smaller than 42 m^2 refer Section Light weight structures.

6.1.1 Requirements

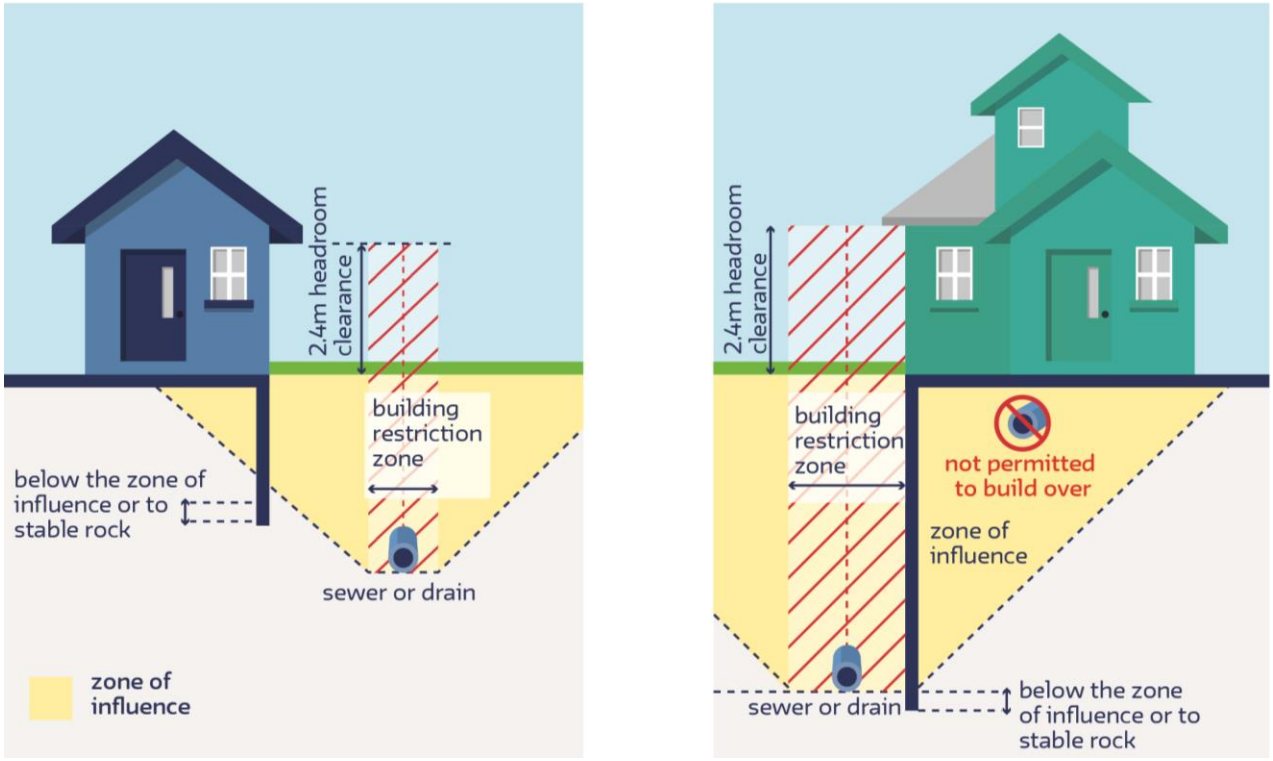


Diagram 3 Single storey buildings (left) and multi-storey buildings (right)

Single storey and multi-storey structures are generally not allowed within the prescribed proximities to any of our pressurised pipelines (this includes water supply pipelines, sewer pressure mains and drainage pressure mains). Where you consider there are no alternative options, please seek special advice from us at POS_enquiries@watercorporation.com.au.

Single storey and multi-storey structures within the prescribed proximities to our sewer reticulation, sewer mains and main drains may be considered subject to the following requirements:

- The structure must be self-supporting within the zone of influence: commonly achieved using foundation supports such as piles which extend to a depth below the zone of influence or to stable rock (refer to Section 6.4 for guidance on pile design).
- The structure must be outside the building restriction zone: if all other options have been exhausted we may allow tunnels to protect against additional loading from single storey and multi-storey structures inside the building restriction zone, however this option is only permitted as a last resort (refer to Section 7.2.3 for guidance on tunnel design).

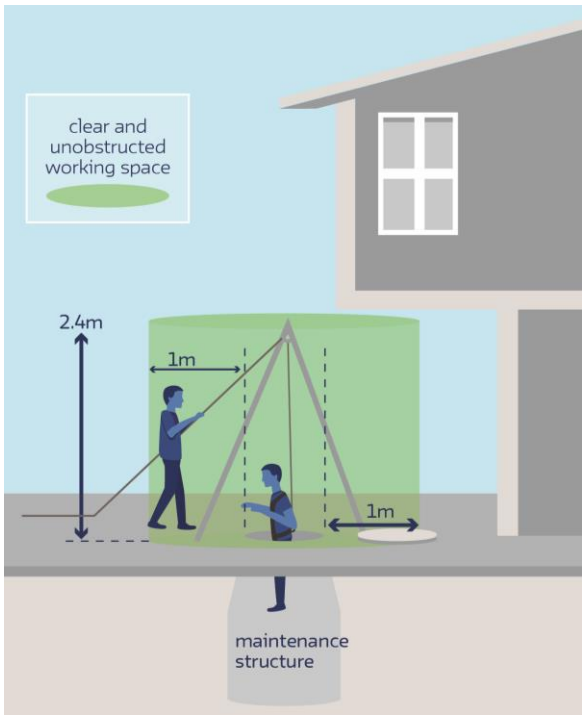


Diagram 4 Access clearances around sewer and drain maintenance structures

- Where a sewer or drain passes between two structures 2.1 m access passage must be always maintained between the two structures.
- Unconfined access way at least 1.0 m wide must be maintained around the edge of sewer and drain maintenance structures at all times (see Diagram 4).
- A headroom (clearance between finished ground level and the underside of an overhanging structure such as a roof) of at least 2.4 m must be maintained at all times (see Diagram 4).

6.2 Cantilevered ground floor slabs

Applications to cantilever ground floor slabs for step out robes, bay windows and short intrusions (3 m) over sewers and drains may be considered subject to the following:

- The asset has a diameter of 300 mm or less.
- The ground floor slab extends no further than the pipeline centreline.
- The ground floor slab is supported by a continuous wall which is supported on a strip footing that extends below the zone of influence or to stable rock (see Diagram 5).

These slabs are not suitable for kitchens, bathrooms or any other use which needs internal plumbing being placed over the sewer

Ground floor slabs not meeting these requirements will be considered in special situations and will require a detailed design by a qualified structural engineer.

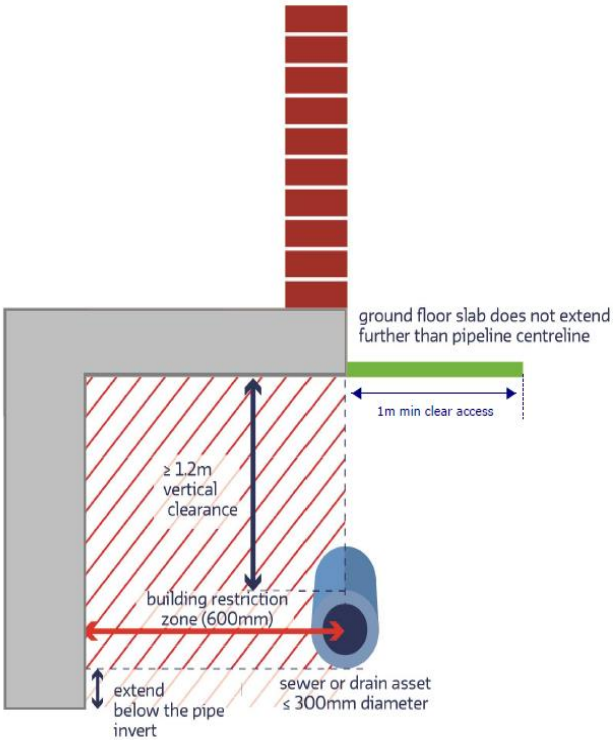


Diagram 5 Ground floor slab

6.3 Above-ground floor slabs

Applications to project above ground floor slabs over sewers and drains (such as to form balconies) may be considered subject to the following requirements:

- The asset has a diameter of 300 mm or smaller.
- At least 2.4 m minimum headroom (clearance between the ground level and the underside of the slab) is maintained at all times above the asset.
- Columns are allowed to be suspended from above ground slabs provided they are for aesthetic purposes only and do not provide structural support to the slab or surrounding structure. The design engineer must provide certification demonstrating the columns are purely decorative.
- The slab is for a single residential dwelling.

Above ground floor slabs not meeting these requirements may be considered in special situations and will require detailed designs by a qualified structural engineer

6.4 Piling

Piles are a type of foundation installed into the ground to provide support to a structure. They are commonly used to transfer loads from buildings to be built within the zone of influence of an asset (refer to Section Zone of influence3.1 for further information on the zone of influence).

Piles must be founded to a depth below the asset's zone of influence or to refusal in stable rock, such as limestone.

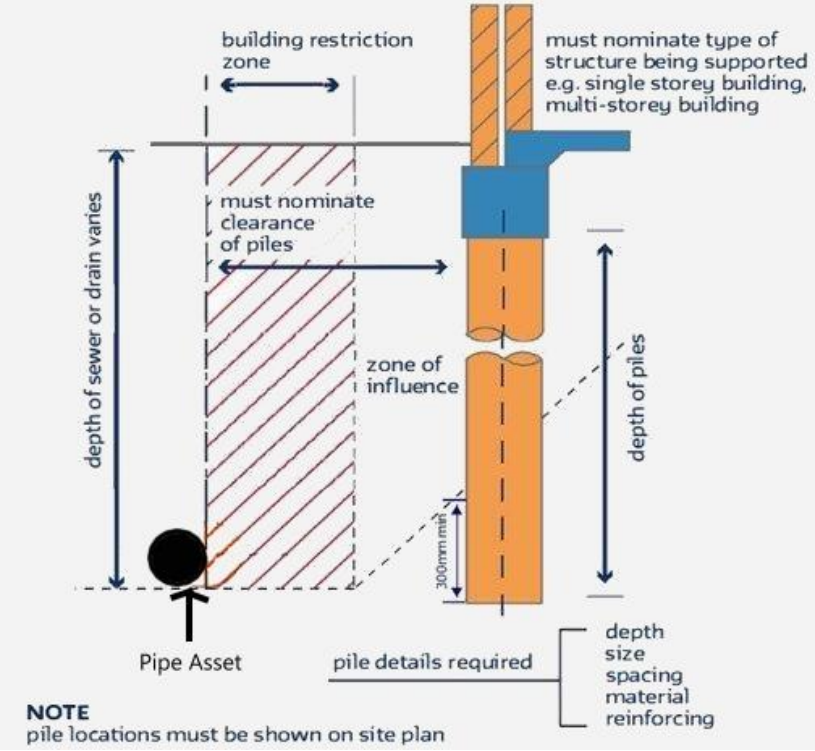
Sufficient minimum horizontal clearance from the asset should be allowed for to prevent influence of the pile installation on the asset from vibration or soil movement – the clearance distance shall be the building restriction zone (see Section 3.2) plus any additional distance required to prevent damage to the asset.

6.4.1 Requirements

Where piling is required, the following information must be provided:

- a pile detail which shows the depth and width of pile (see Diagram 6 below)
- a site plan showing the position and spacing of the piles.

The pile detail and site plan must include both the date and the signature of the structural design engineer, which must be clearly visible.



Piles need to be installed by an experienced piling contractor who is accredited (by an approved Australian authority if required) for the type of piles being installed (e.g Screw, Concrete, Continuous flight auger piles (**CFA**).

Piles must extend a minimum of 300 mm below invert level (or the zone of influence) to ensure the piles remain structurally adequate if the pipe has to be excavated.

Pile engagement to be sufficient to ensure the arrangement is self-supporting should we need to excavate our asset.

Where screw piles are employed, the pile must be angled at two degrees away from the asset.

Diagram 6 Example of CFA pile detail

6.5 Underground structures

Underground structures are permanent structures that include below ground swimming pools and spas, below ground tanks and basements (see Diagram 7).

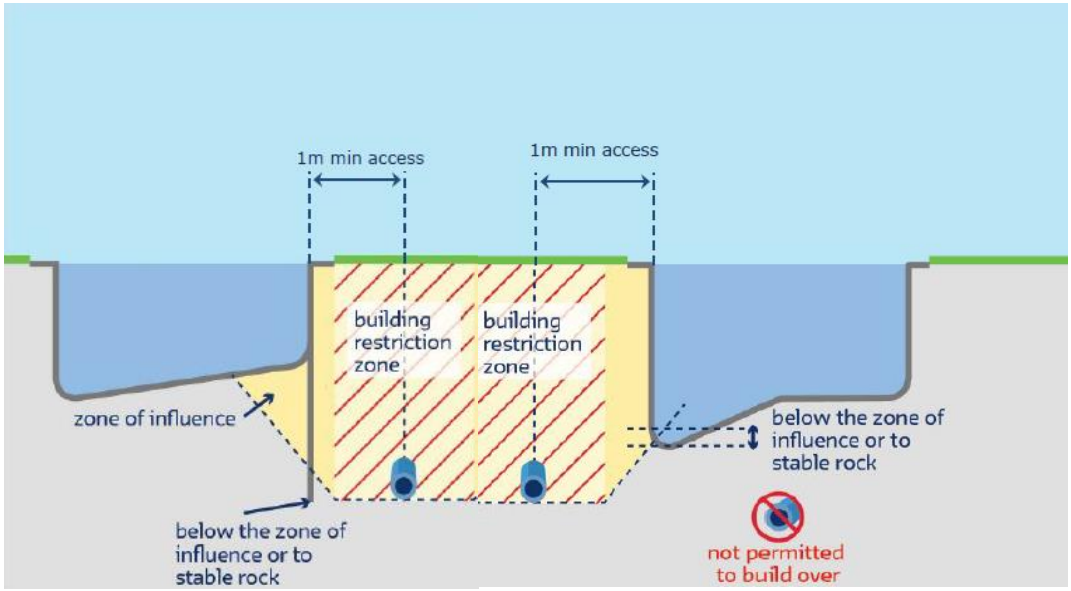


Diagram 7 Underground structures

6.5.1 Requirements

Underground structures are generally not allowed within the prescribed proximities to any of our pressurised pipelines (this includes water supply pipelines, sewer pressure mains and drainage pressure mains). Where you consider there to be no alternative options, please seek special advice from the Protection of Assets Team - POS_enquiries@watercorporation.com.au

Underground structures within the prescribed proximities to sewer reticulation, sewer mains and main drains may be considered subject to the following requirements:

- The structure must be self-supporting within the zone of influence: commonly achieved using foundation supports such as piles which extend to a depth below the zone of influence or to stable rock (refer to Section 6.4 for guidance on pile design).
- The structure must be outside the building restriction zone.
- Unconfined access way of at least 1.0 m wide must be maintained to and around the edge of sewer and drain maintenance structures at all times (see Diagram 4).
- Allowance must be made for excavation of the asset for maintenance and repair without undermining the integrity of the adjacent below ground structure.

Some pools are designed to be supported by the surrounding soil when they are full. Where continued use of a pool is important, such as public swimming pools and hotel developments, you may want to consider designing the pool to allow adjacent assets to be excavated without needing to empty the pool.

6.5.2 Laying sewers in basements

In certain cases, involving major construction activities, applications to lay sewers and drains in basements (e.g. underground car park) may be considered as shown in the example (right). A detailed design is required in all cases, which will have to conform to Water Corporation Design Standards DS50.

6.6 Light weight structures

Light weight structures are structures that are detached from main buildings and be readily dismantled and removed at any time. Some examples include:

- colourbond sheds
- framed patios and carports
- decking
- above ground demountable pools, e.g. spas and tanks
- road signs
- road safety barriers.

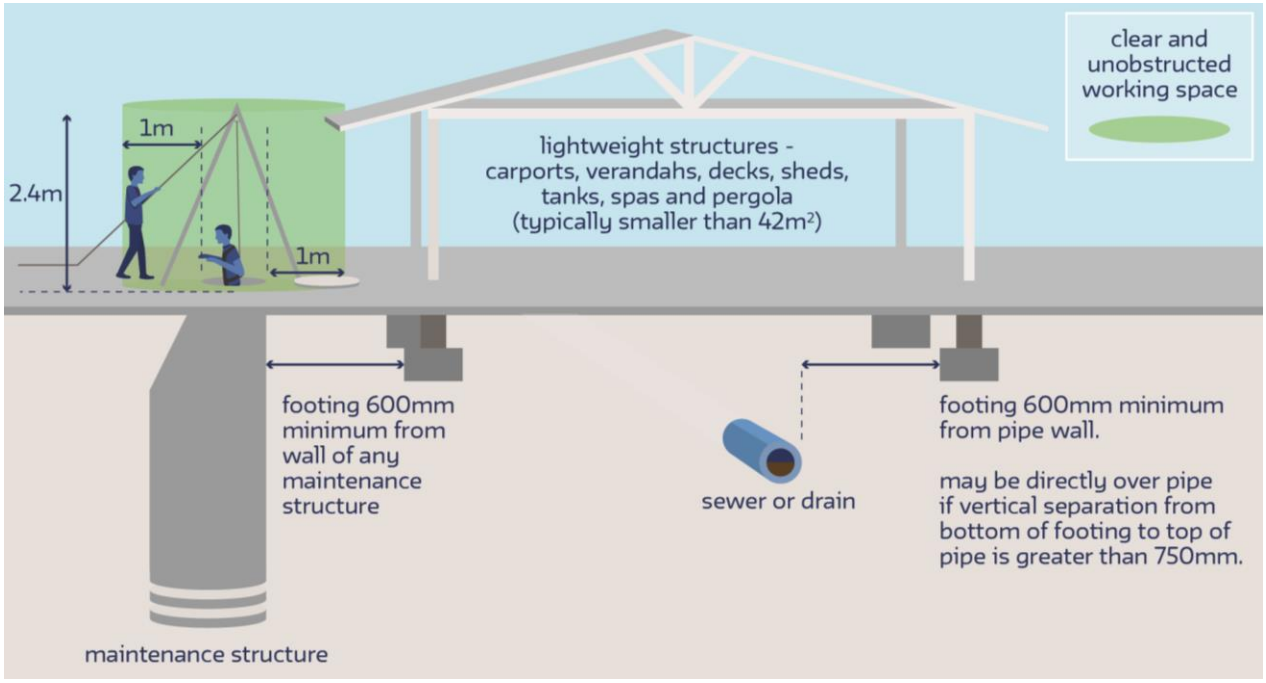


Diagram 8 Light weight structures

6.6.1 Requirements

Light weight structures are exempt from requiring our approval. However, the following requirements still need to be considered before working near our assets:

- **Pressurised pipelines** (water supply pipelines, sewer and drainage pressure mains): lightweight structures are not to be placed within the zone of influence of our pressurised pipelines.
- **Sewers and main drains**: lightweight structures can be placed over sewers and drains provided there is a:
  - vertical clearance between the top of pipe and footing of at least 750 mm
  - horizontal clearance between the pipe wall and footing of at least 600 mm.
- Lightweight structures are not to be built directly over sewer and drain maintenance structures and:
  - an unconfined access way of at least 1.0 m wide must be always maintained around maintenance structures.
  - a horizontal clearance of at least 600 mm must be maintained between maintenance structures and any footings.
- A headroom (distance between the ground level above the asset and underside of the structure) of at least 2.4 m must be maintained at all times.

6.7 Fences and walls

This section covers the requirements for light weight walls and fences that can be readily dismantled and removed at any time. This typically includes:

- timber, metal or concrete fibre fences no greater than 1.8 m high*
- mass walls made from brick, stone or concrete no greater than 1.8 m high*
- noise attenuation walls no greater than 1.8 m high*
- retaining walls no greater than 1.2 m high**.

* Fences and walls greater than 1.8 m high are typically treated in the same manner as single storey structures (refer Section 2.1)

** For requirements of retaining walls greater than 1.2 m and refer Section 6.8.

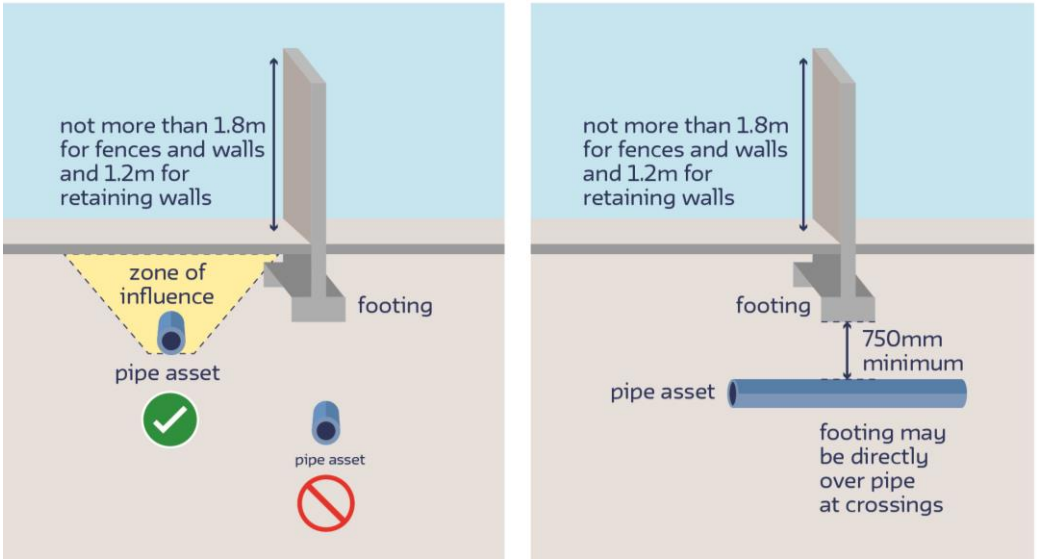


Diagram 9 Fences and walls – along assets (left) and crossing assets (right)

6.7.1 Requirements

Readily dismantled fences and walls near our assets are exempt from requiring our approval however the following requirements still need to be considered before working near our assets:

- Fences and walls parallel to assets are not to be placed within the building restriction zone, and should avoid being placed in the zone of influence where possible.
- Where possible locate the asset centre to provide the greatest clearance from the panel footings.
- Fences and walls crossing assets must:
  - cross at a 90-degree angle to the asset
  - maintain a vertical clearance between the top of asset and any footing of at least 750 mm
  - not be built directly over maintenance structure covers, valve pit covers and covers associated with all other pipe fittings.
- Fences and walls are not to be built directly over sewer and drain maintenance structures and an unconfined access way of at least 1.0 m wide is to be maintained around maintenance structures at all times as per Diagram 4.

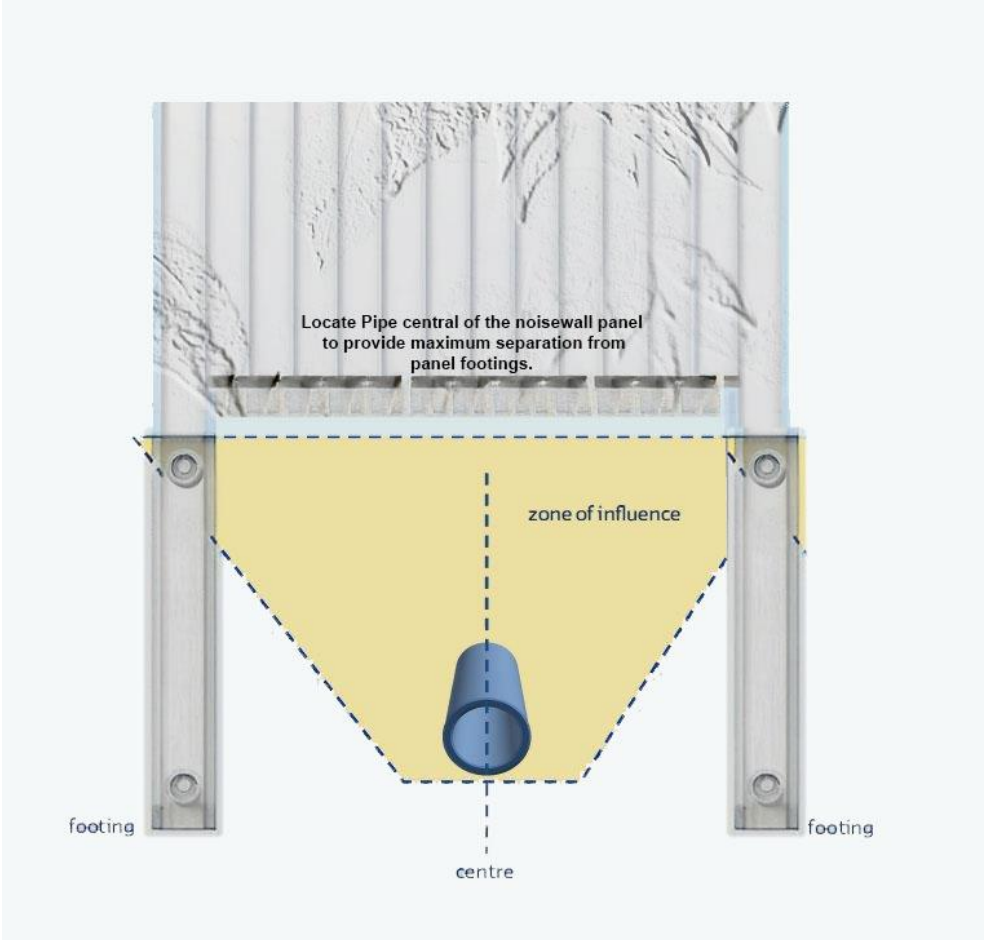


Diagram 10 Fences and walls continued

6.8 Retaining walls

Retaining walls are used where there is a difference in ground levels to prevent ground from subsiding or eroding away.

Retaining walls can be built from many different types of materials including precast interlocking blocks or materials that are built in situ such as stone, poured concrete, treated timber and brick.

This section covers the requirements for retaining walls that are greater than 1.2 m high*.

Retaining walls not greater than 1.2 m are treated in the same way as fences and walls – refer to Section 6.7.

Ground anchors are generally not allowed within the prescribed proximities to any of our pressurised pipelines (this includes water supply pipelines, sewer pressure mains and drainage pressure mains). Where you consider there to be no alternative options, please seek special advice from The Protection Of Assets Team – refer to Section 6.9 for ground anchor requirements.

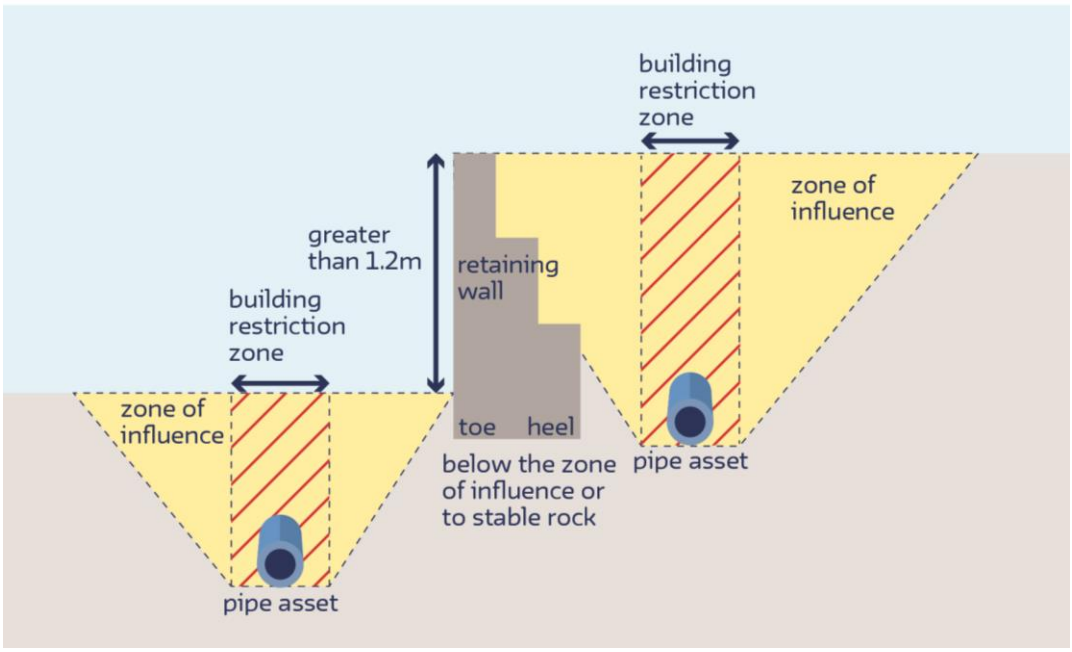


Diagram 11 Retaining walls

6.8.1 Requirements

Retaining walls are generally not allowed within the prescribed proximities to any of our pressurised pipelines (this includes water supply pipelines, sewer pressure mains and drainage pressure mains). Where you consider there to be no alternative options, please seek special advice from us.

Retaining walls within the prescribed proximities to our sewer reticulation, sewer mains and main drains may be considered subject to the following requirements:

- Retaining walls must be self-supporting within the zone of influence – this is commonly achieved by using foundation supports, such as piles, founded to a depth below the zone of influence or to stable rock (refer to Section 6.4 for guidance on pile design).
- Retaining walls are not to be placed within the building restriction zone.
- Where retaining walls are required to cross assets they must cross at a 90-degree angle and there must be a vertical clearance between the top of pipe and wall footing of at least 750 mm.
- An unconfined access way of at least 1.0 m wide must be maintained around the edge of sewer and drain maintenance structures at all times.
- Allowance must be made for excavation within the zone of influence to access the asset without undermining the integrity of the retaining wall.
- Allowance must be made that if the main were to fail it would not affect the integrity of the retaining wall.
- Designs for major retaining walls (such as for bridges) must be completed by a suitably qualified structural design engineer to verify that the asset will not be impacted.

6.9 Ground anchors

Ground anchors are generally not allowed within the prescribed proximities to any of our pressurised pipelines (this includes water supply pipelines, sewer pressure mains and drainage pressure mains). Where you consider there to be no alternative options, please seek special advice from us.

6.10 Supplement 1: Zones around our assets – for buildings and structures

The following graphs have been developed to define the zone of influence and building restriction zone for **sewer reticulation**, **sewer mains** and **main drains** in the context of residential, commercial and industrial buildings and structures (refer to Sections 6.1and 6.4).

For all other types of work, the zone of influence can be determined using Diagram 2 in Section 3 as a guide, except for where we request you to engage a suitably qualified geotechnical design engineer to determine the zone of influence which may be required if your building work presents a high risk.

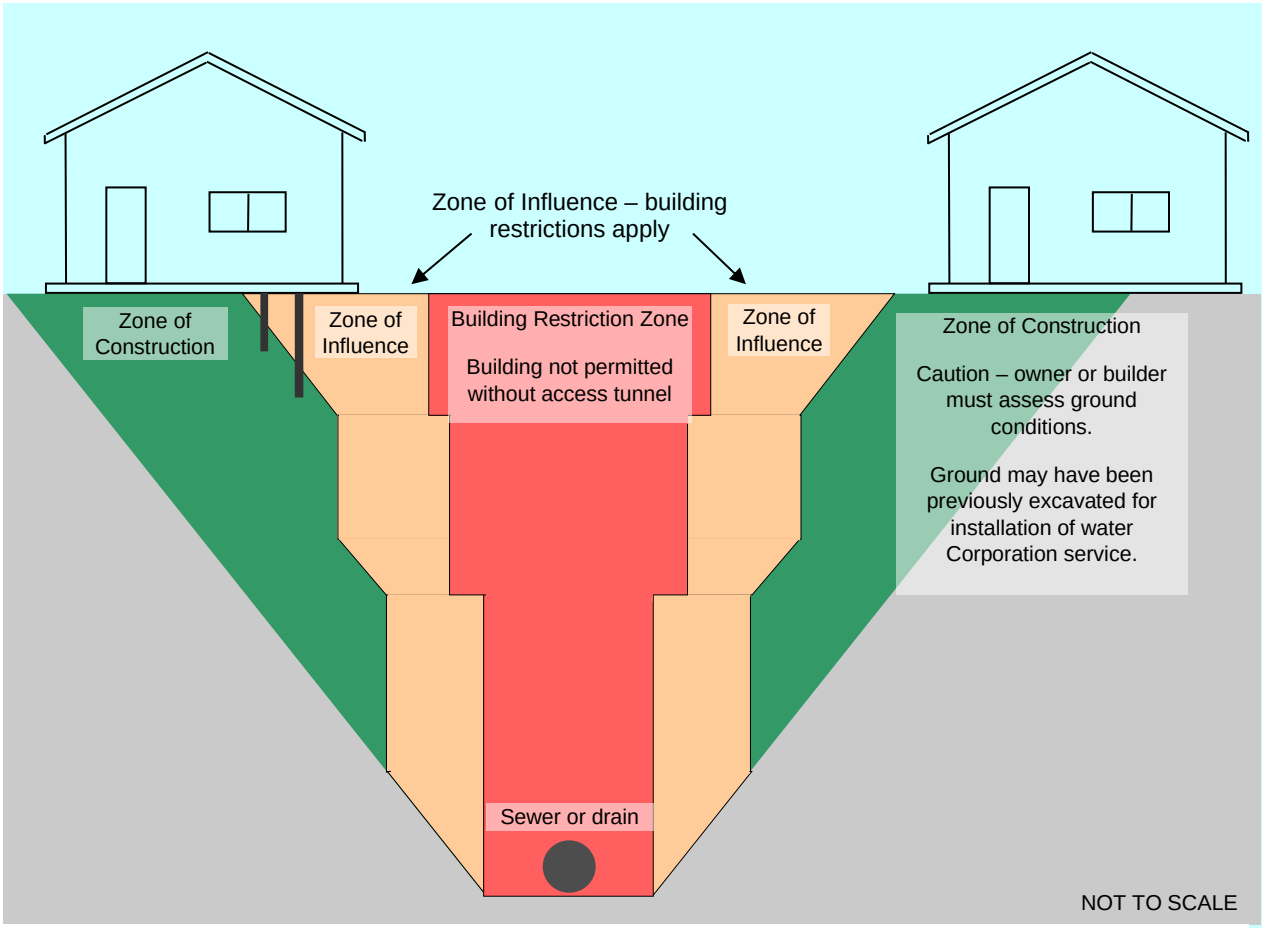
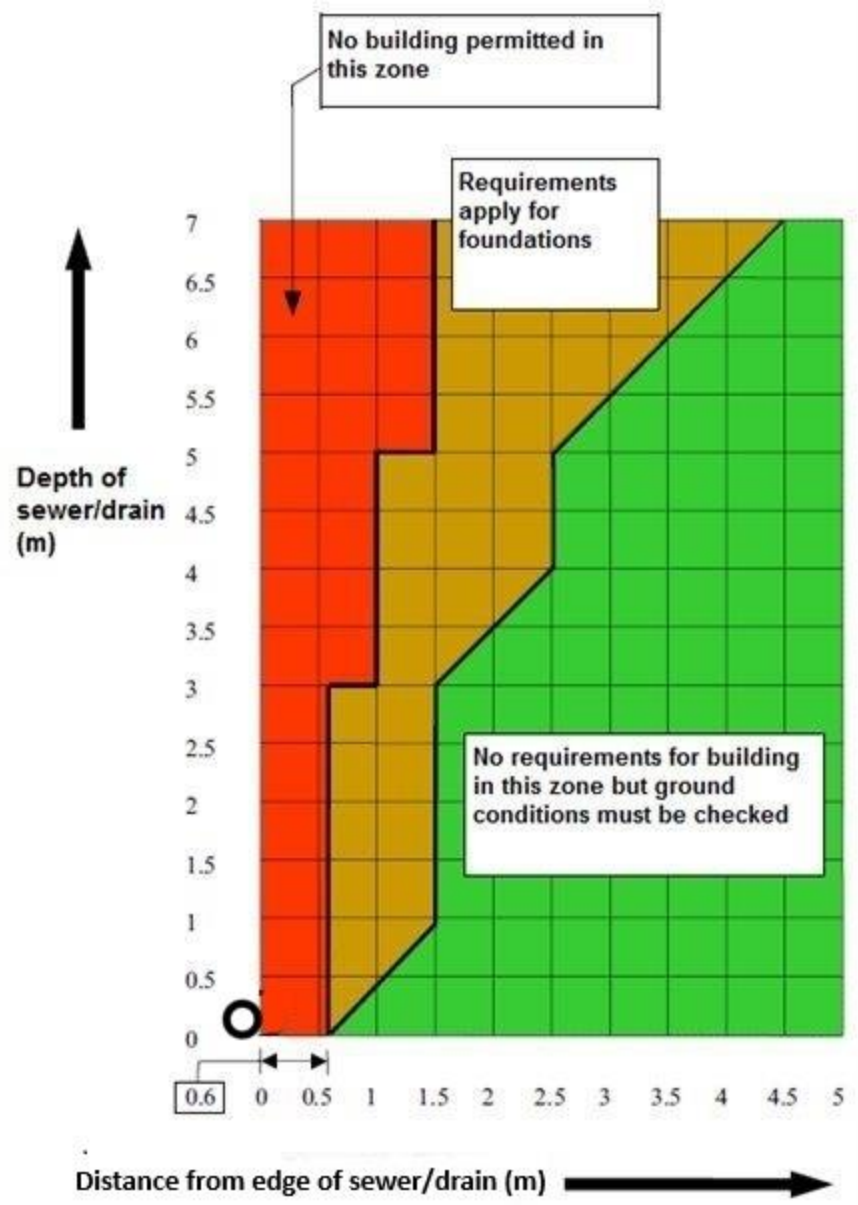


Diagram 12 Zone of Influence example

Graph 1 – Single storey structures and multi-storey structures

Shading denotes the situation that applies

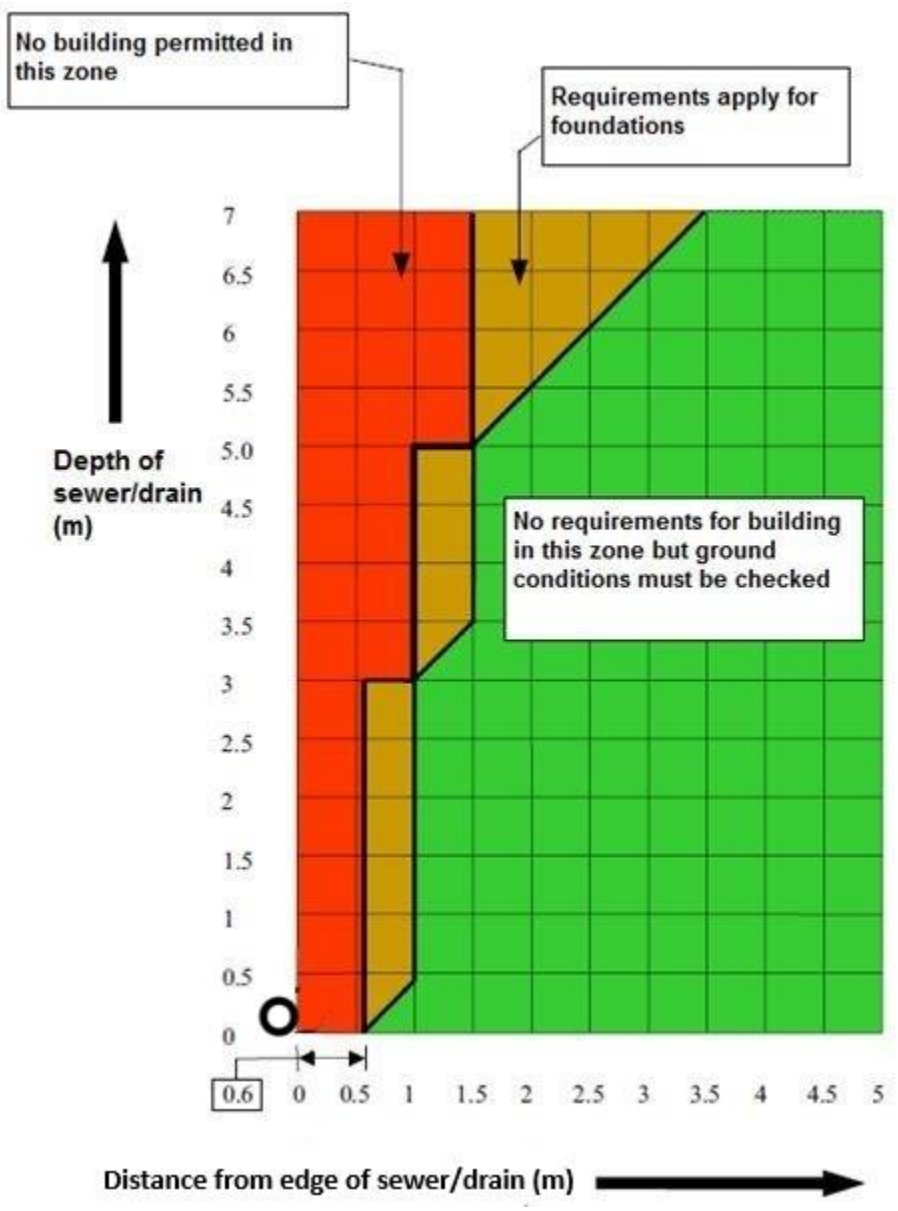
Proposed Structure Type	Sewer/Drain Concrete Encased		Sewer/Drain Diameter (mm)			Sewer/Drainpipe Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Single storey									
Multi-storey									



Graph 2 – Single storey structures and multi-storey structures

Shading denotes the situation that applies

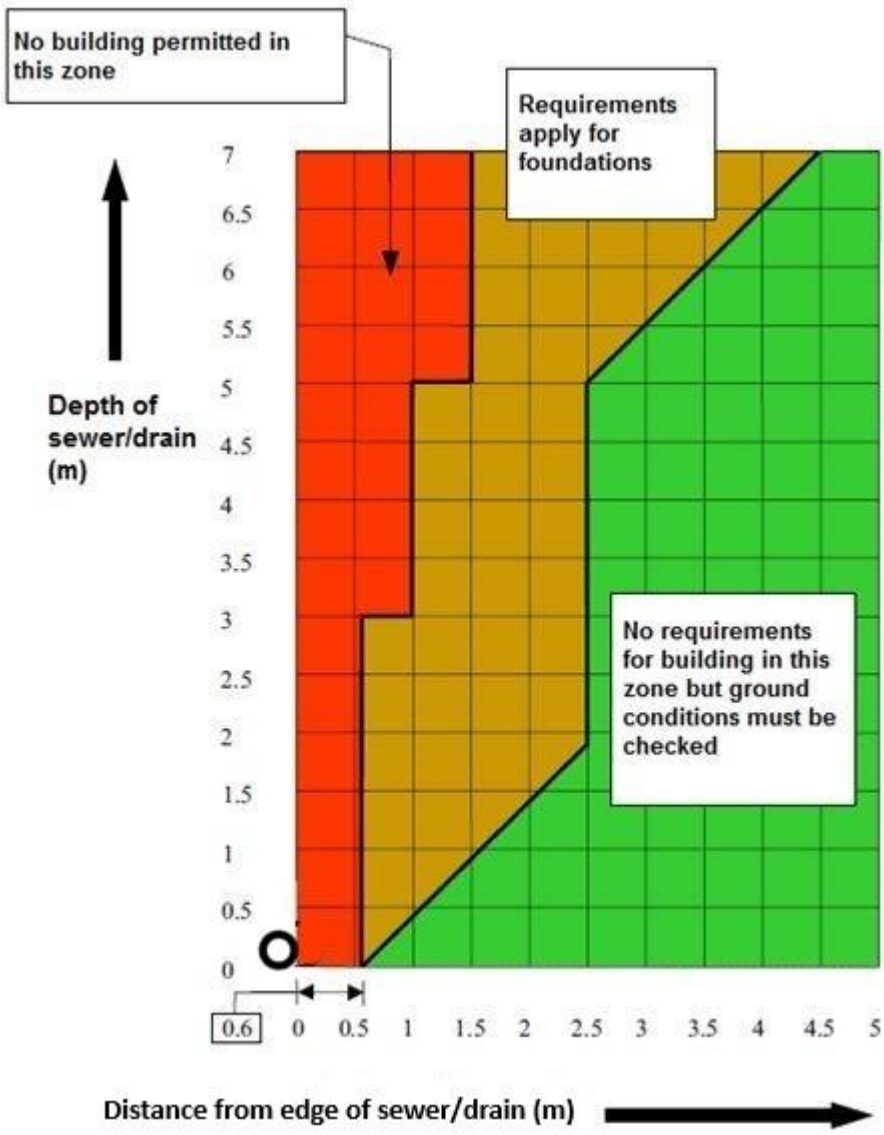
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Single storey									



Graph 3 – Single storey structures and multi-storey structures

Shading denotes the situation that applies

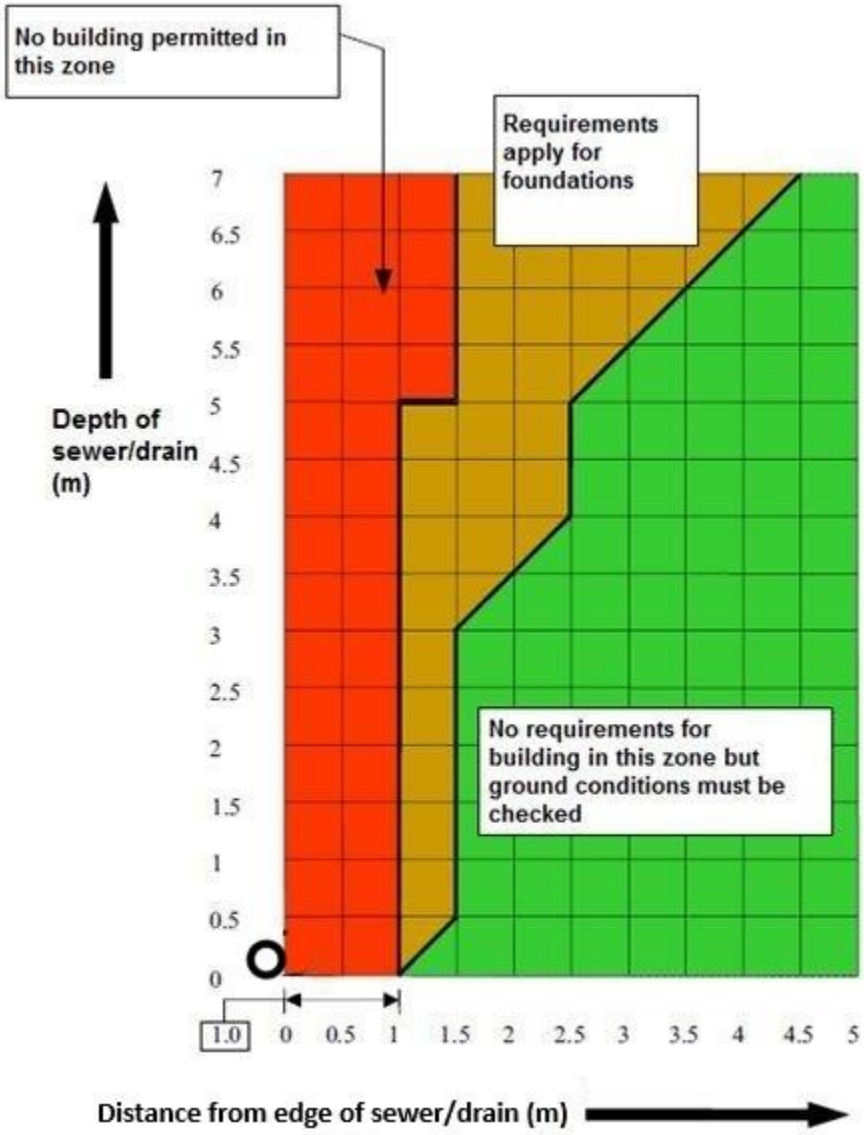
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Single storey									
Multi-storey									



Graph 4 – Single storey structures and multi-storey structures

Shading denotes the situation that applies

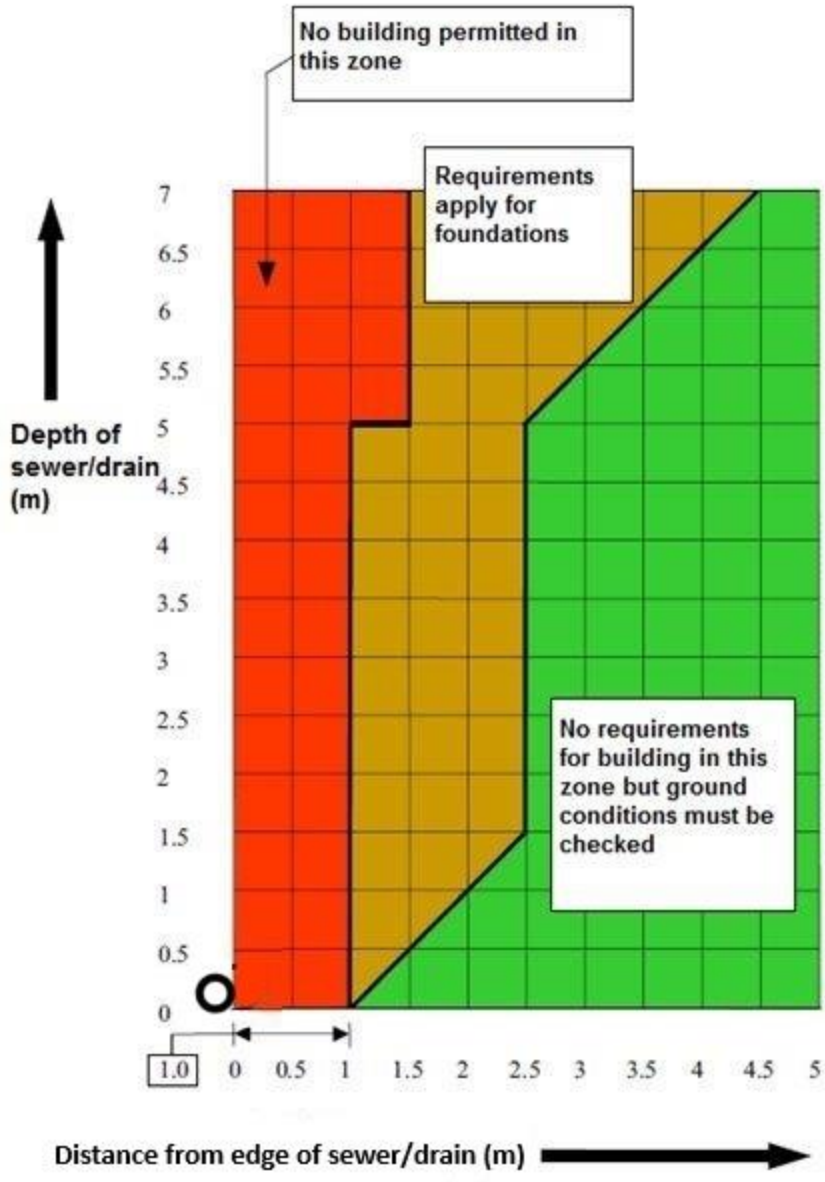
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Pipe Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Single storey									



Graph 5 – Single storey structures and multi-storey structures

Shading denotes the situation that applies

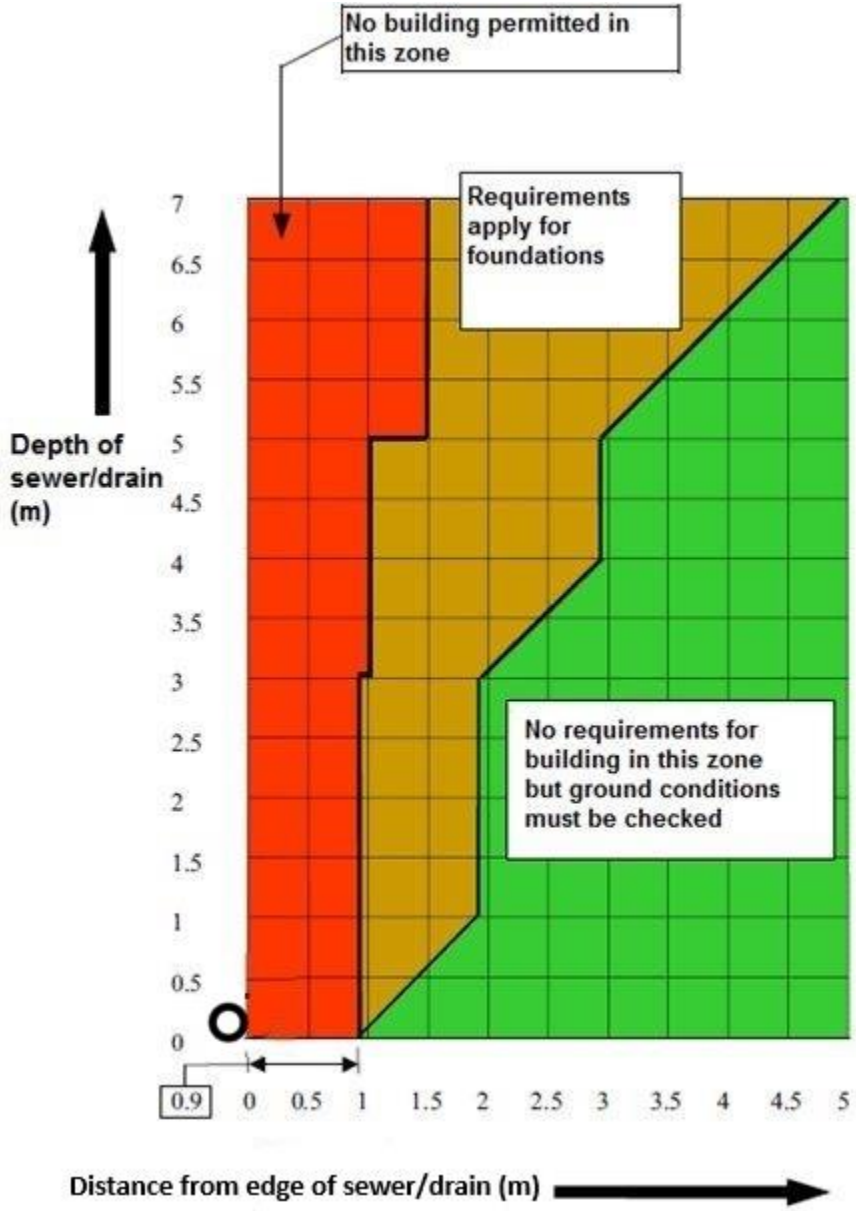
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Single storey									
Multi-storey									



Graph 6 – Below ground pools, spas, tanks and basements

Shading denotes the situation that applies

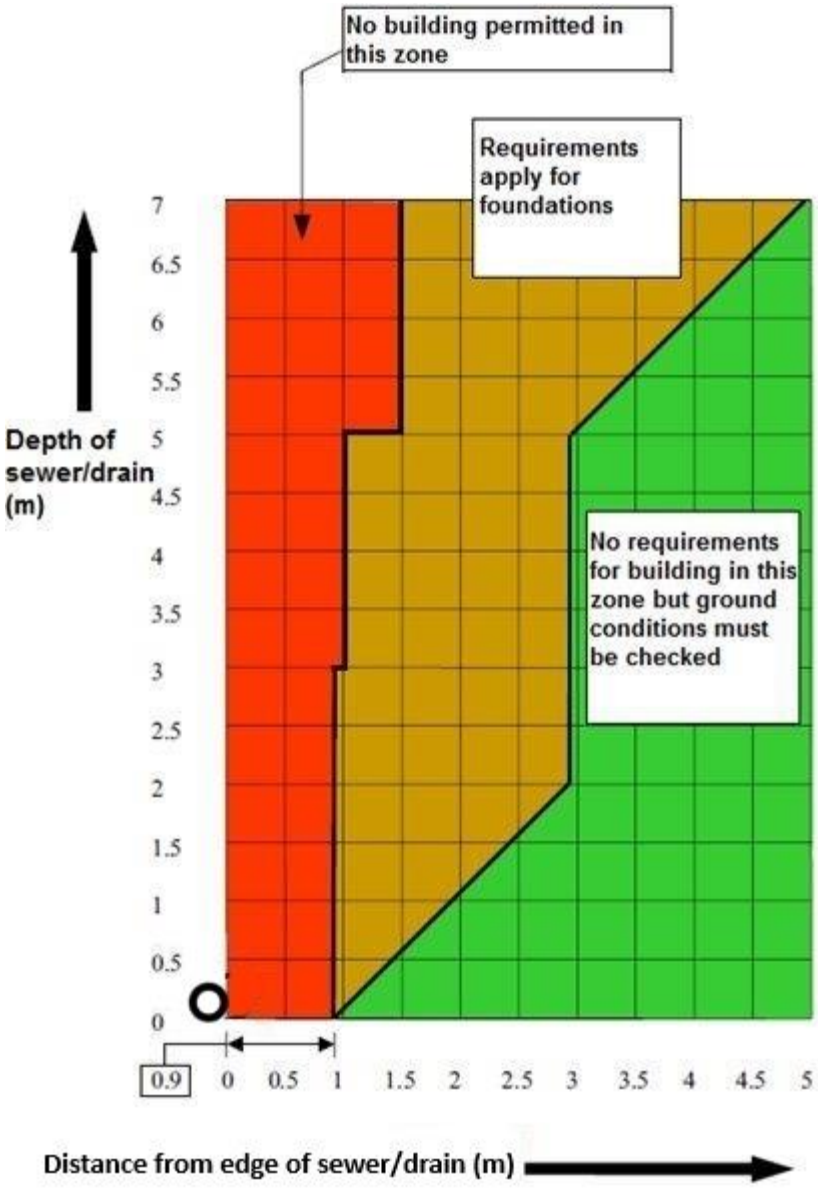
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Pools, Spas, Tanks and Basements									



Graph 7 – Below ground pools, spas, tanks and basements

Shading denotes the situation that applies

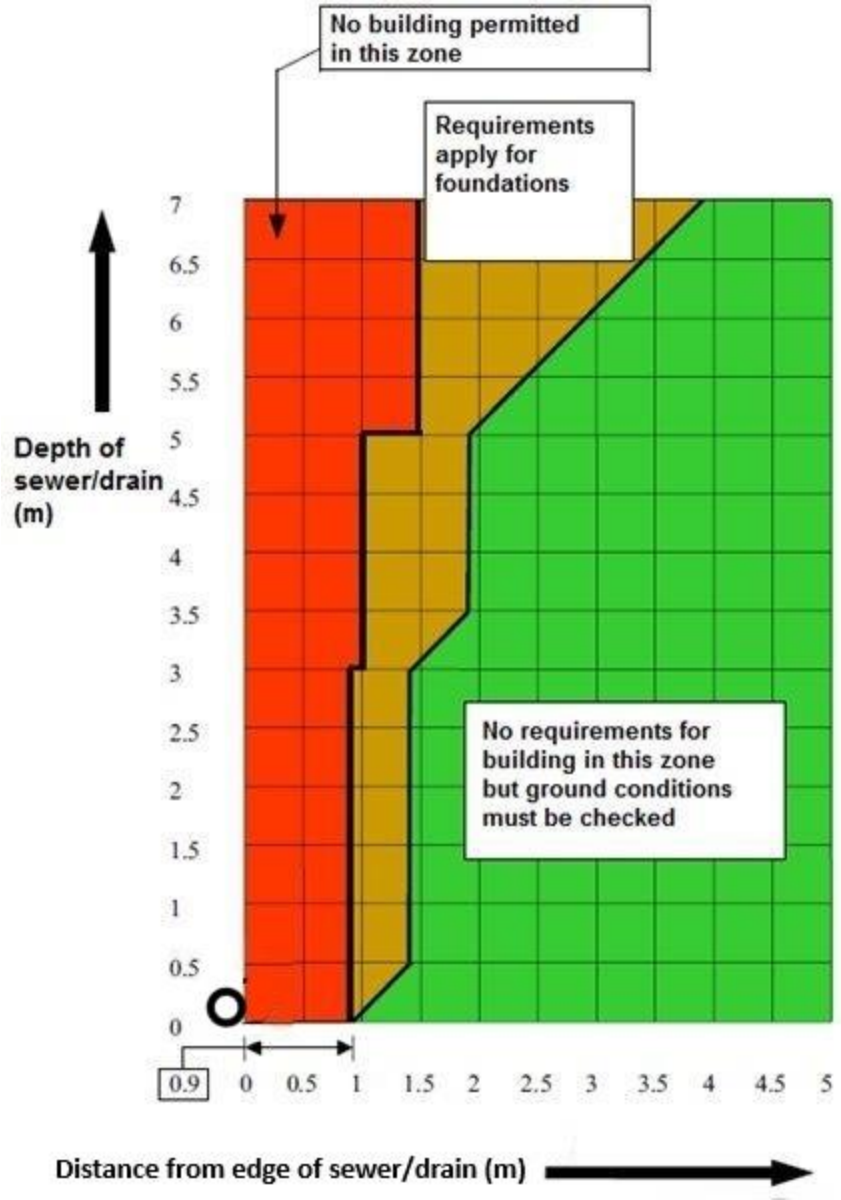
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Pools, Spas, Tanks and Basements									



Graph 8 – Below ground pools, spas, tanks and basements

Shading denotes the situation that applies

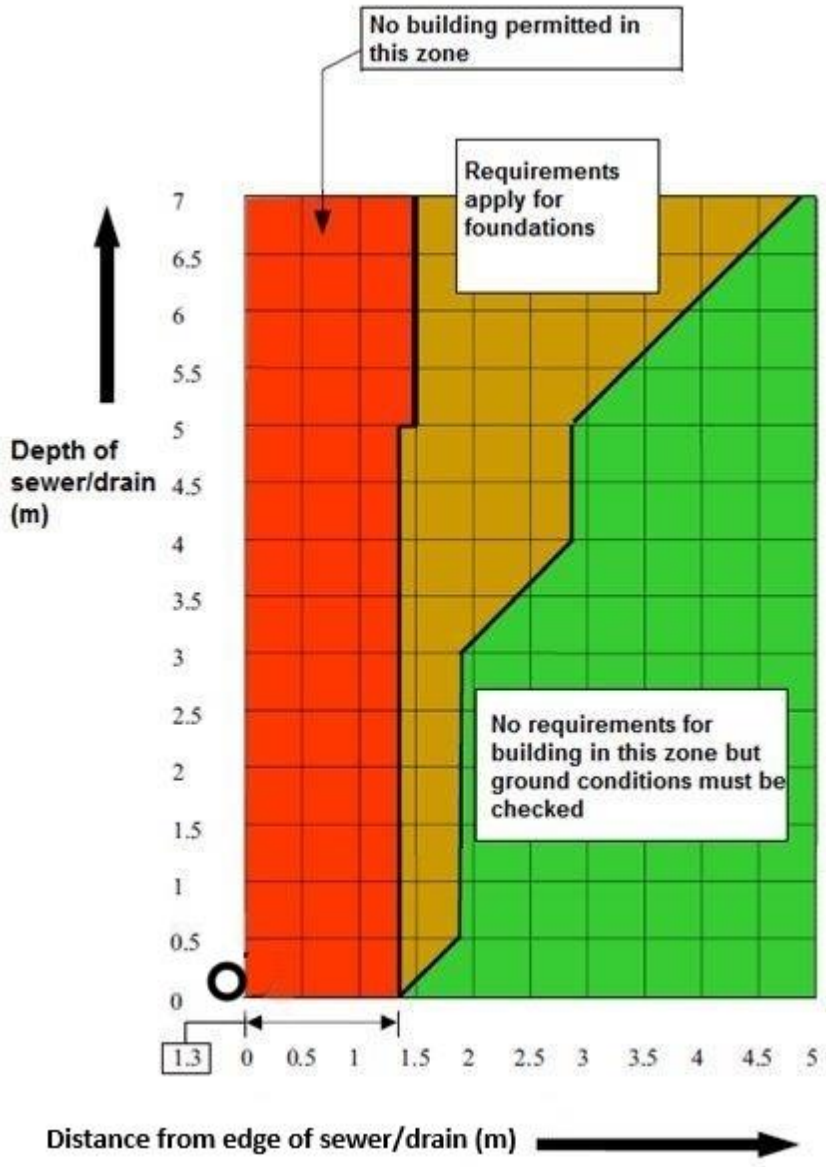
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Pools, Spas, Tanks and Basements									



Graph 9 – Below ground pools, spas, tanks and basements

Shading denotes the situation that applies

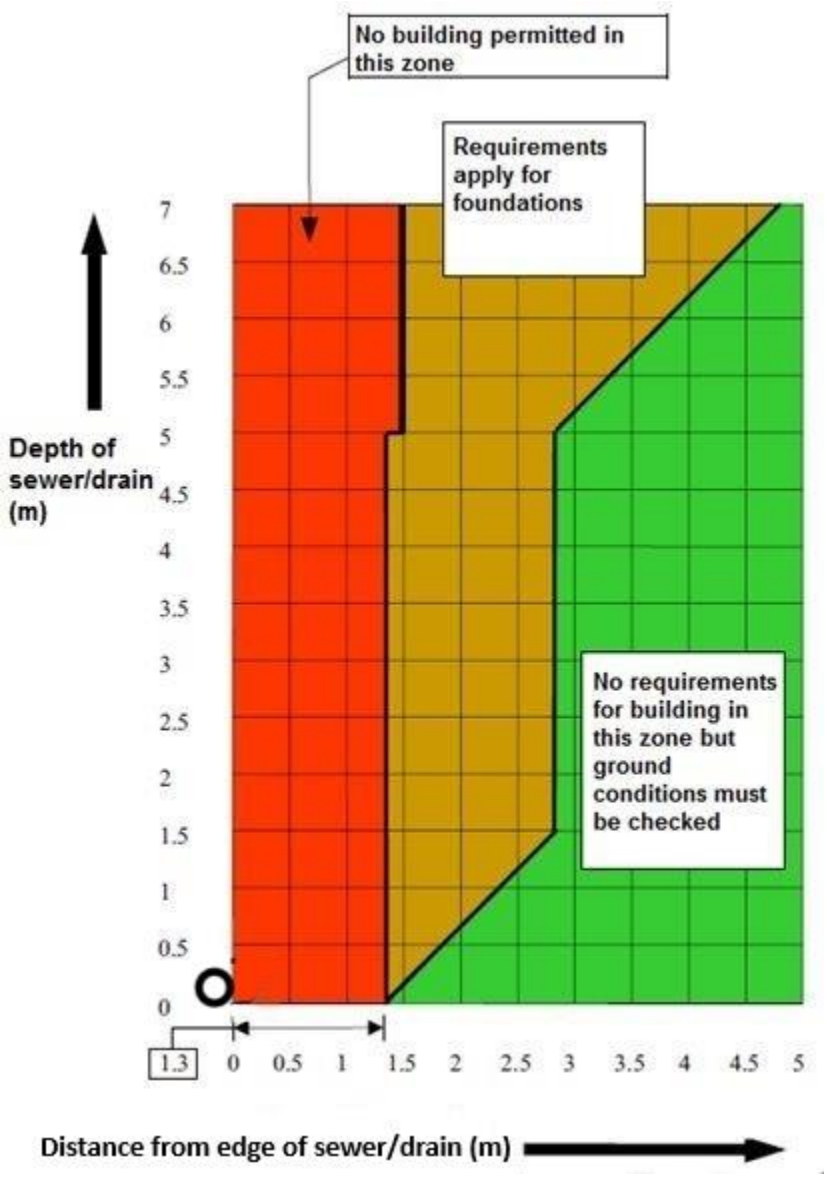
Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Pools, Spas, Tanks and Basements									



Graph 10 – Below ground pools, spas, tanks and basements

Shading denotes the situation that applies

Proposed Structure Type	Sewer/Drain Details								
	Concrete Encased		Diameter (mm)			Material			
	No	Yes	150	225	300 - 600	PVC	VC	AC	All
Pools, Spas, Tanks and Basements									



7 Technical requirements for protecting our assets – Streets and verges

7.1 Earthworks and cover

The ground cover (depth from ground level to top of asset) over buried assets provides support and protection from excessive loads and damage.

Earthworks and alteration of surfaces, including removal or placement of soil, gravel, concrete, bitumen, and paving, may expose assets to excessive loading.

Reduced cover in ground conditions where the water table is higher than the asset also has the potential to cause flotation. Flotation occurs where there is not enough cover over the pipe to balance the upward force created by the water table.

Diagram 13 Example of ground level changes

Requirements

Earthworks and alteration of surfaces within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) may be considered subject to certain requirements.

7.1.1 Cover

Our minimum cover requirements must be achieved at all times.

Table 5 below provides a guide to our minimum cover requirements for different types of assets depending on their location.

The location of the asset determines the type of loading that the asset will be exposed to. This is normally categorised by two main conditions;

- trafficable
- non-trafficable.

Refer to our design standards for full details of our cover requirements.

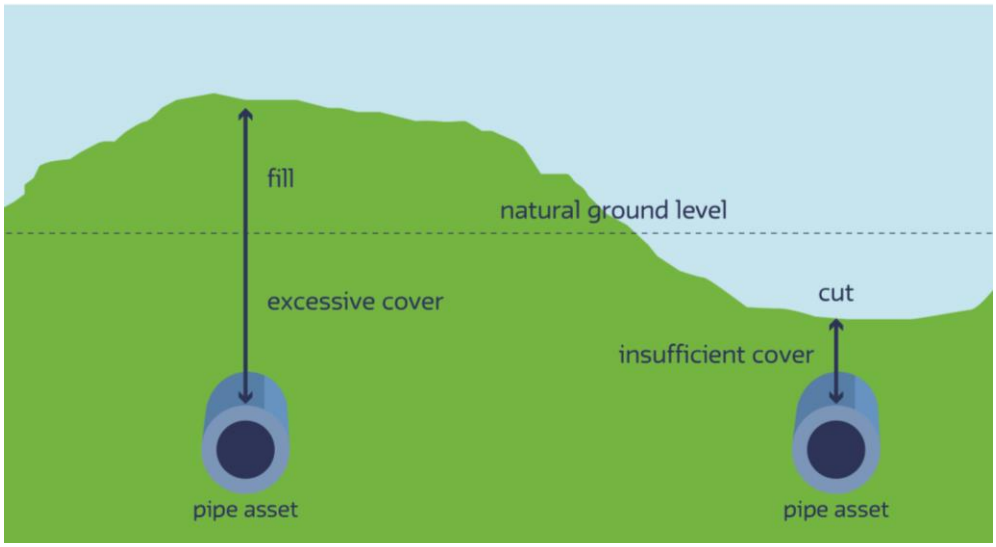


Diagram 14 Earthworks and alteration of surfaces

Table 5 Guidance information on minimum cover requirements for buried assets

Type of asset	Location	Minimum cover
Trunk and distribution water mains	Freeways and other primary distributor roads	1,500 mm
	Road reserves, car parks and other trafficable areas	750 mm
	Parklands and other non-trafficable areas	600 mm
Water reticulation	Road reserves, car parks and other trafficable areas	600 mm
	Parklands and other non-trafficable areas	600 mm
Sewer reticulation and sewer mains	Road reserves, car parks and other trafficable areas	900 mm
	Parklands and other non-trafficable areas	750 mm
Sewer and drainage pressure mains	Freeways and other primary distributor roads	1,500 mm
	Other trafficable areas as well as parklands and non-trafficable areas	900 mm
Main drains	Road reserves, car parks and other trafficable areas	900 mm
	Parklands and other non-trafficable areas	750 mm
Residential service connections	Road reserves, car parks and other trafficable areas	450 mm
	Parklands and other non-trafficable areas	450 mm

Minimum depth of cover may be required to be locally increased to accommodate the effective heights of the stop valves/gate valves plus the required clearances for the spindle caps below the finished surface level (FSL).

- Box out depths: cover can be reduced temporarily to levels where 600mm is maintained over the existing pipe for boxing out purposes in road reserves, car parks and other trafficable areas.
- Maximum cover requirements: pressurised pipelines generally must not be buried deeper than 2.0 m. Pipelines may need to be raised where maximum cover cannot be achieved.

If you are unable to comply with our cover requirements, you may be required to provide an engineering assessment demonstrating that there will be no excessive loadings on our assets otherwise you may be required to raise, lower or relocate the asset. The assessment should take into consideration the condition of our asset. This can be progressed in discussion with the Protection of Assets Team.

7.1.2 Pipeline fittings and structures

All maintenance structure covers, valve pit covers and covers associated with all other pipe fittings must be brought to the new finished ground level.

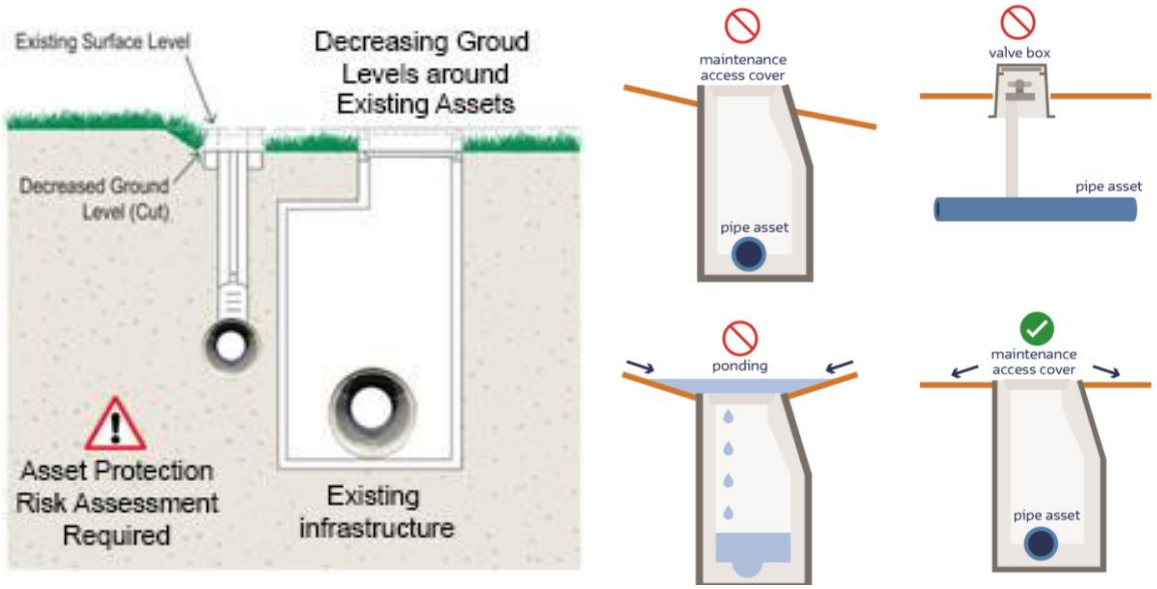


Diagram 15 Alteration of surfaces around covers and lids

7.1.3 Other

If a surface is changing from non-trafficable to trafficable, we may require you to replace the backfill and embedment material in the trench zone of the asset and replace fitting covers with trafficable covers. Refer to Section 7.7.1for more information on road development requirements and relevant Water Corporation Design Standards.

Proposed changes to surface levels must not interfere with overland flow paths or the drainage capacity of existing pipeline scour facilities.

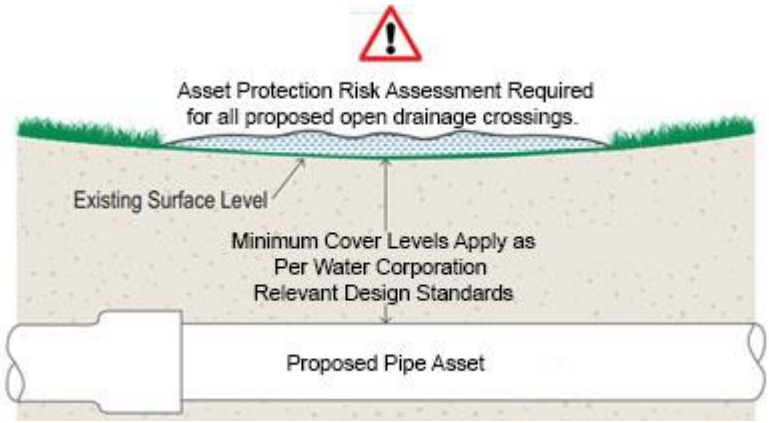


Diagram 16 Open drain example of cover requirements

7.2 Permanent protection methods

7.2.1 Sleeves

Sleeves are used to provide protection for nearby infrastructure against potential pipeline leaks and bursts and enable pipelines to be removed and replaced with minimal impact to the surrounding environment and infrastructure.

Sleeves can:

- be made from various materials like STEEL, RC and GRP
- have the internal annulus grouted or ungrouted
- have electrical isolation requirements depending on their application.

In all cases, sleeves require a detailed design in accordance with the relevant Water Corporation design standards.

Water Corporation generally does not sleeve a pipeline unless:

- It is requested of another major infrastructure operator such as Public Transport Authority (PTA), Arc Infrastructure (for pipelines under railways) or Main Roads WA (for under major roads).
- It is in a location where we could not reasonably expect to access the pipe by open excavation to repair AND the pipe is essential for customer service.
- Where a burst pipe may result in unacceptable damage to another utility asset, our own infrastructure, a nearby building, or structure.

NOTE: alternative protection measures (rather than sleeving) may be appropriate such as pipe encasement or deep foundations for the other structures. Examples of situations may include:

- Major road where a road shutdown is not practical
- Environmental significant land prohibits earthworks
- Under buildings or retaining / walls
- Under embankments or similar locations where there is a short length of very deep pipe, that is otherwise accessible at the ends
- Railway lines

7.2.2 Banding and jointing

When new works impact joints on existing steel, several measures may be implemented to maintain or enhance joint integrity:

- External bands may be required where modifications make the pipe difficult to access, particularly if the joints are not already double welded and internally corrosion protected.
- Joints can also be rewrapped either as part of a banding program or as a measure in this own right. This measure is often required due to the breakdown of the original petroleum based wrapping systems over time.

As a general practice, new installations and relocations are designed to avoid placing joints beneath roadways or in areas with restricted access.

For modern Sintakote or Sintalock pipes, their propriety brand joints are of such a standard, making additional joint protection unnecessary. However, any conventionally welded joints may need attention as outlined above.

Any banding or jointing work must adhere to the relevant Water Corporation design standard.

7.2.3 Tunnels

The use of tunnels to protect assets against additional loading from roadworks must only be used as a last resort.

Similar to sleeves, tunnels offer protection and access to pipelines that cannot be excavated for maintenance and repair.

Unlike sleeves, tunnels also allow full access to pipelines without requiring their removal. A common application of a tunnel is under key transport infrastructure, such as a large water main under a freeway, where sleeves are not suitable.

Tunnels are not acceptable in high groundwater locations.

Tunnel requirements can be discussed with the Protection of Assets Team.

7.2.4 Bridging slabs

Bridging slabs as a method of protection will only be allowed in exceptional circumstances as it permanently impedes access to the pipeline for maintenance and repair.

This must only be used as a last resort and requires Water Corporation’s permission.

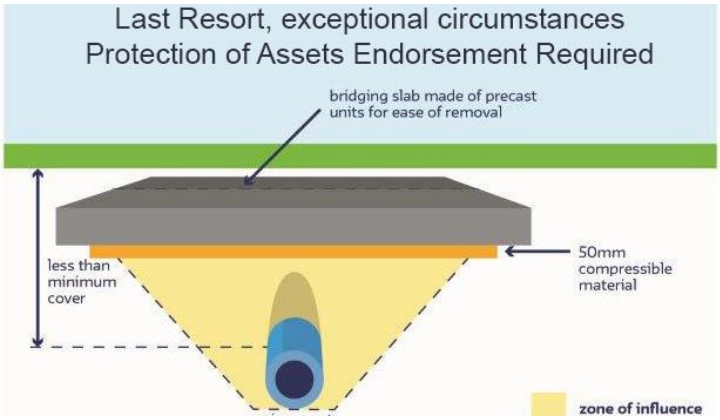


Diagram 17 Bridging slab

7.2.5 Concrete encasement

Similar to bridging slabs, concrete encasement will only be allowed in exceptional circumstances as it permanently impedes access to the pipeline for maintenance and repair.

This must only be used as a last resort and requires Water Corporation’s permission.

7.3 Excavations

An excavation is any activity that involves moving, removing, or displacing earth, rock or other material in the ground using tools, machinery or explosives. Excavations can be open or trenchless.

All types of excavations pose a risk of damaging our assets, either from direct contact with exaction equipment or compromising the stability of assets bedding and support material around our assets.

The risk of damage increases with:

- more extensive excavations and larger machinery
- for excavations near brittle pipe materials (AC, VC, RC and CI) or pipework that is ageing can be more easily damaged.

Pipelines made from AC, RC, and VC are typically constructed from short pipe sections. Differential soil movement can stress these joints, potentially leading to leaks or bursts.

Even minor knocks or scratches on buried steel pipes can damage their corrosion protection coatings and must be reported.

All excavation works must adhere to the Worksafe WA Excavation Code of Practice (see Section 7.3).

7.3.1 Open excavations requirements

Open excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity using tools, machinery, or explosives.

Open excavations within the prescribed proximities of our assets must comply with the requirements below.

- Any deep excavation (i.e. deeper than the asset or 1200 mm, whichever is the lesser) where its zone of influence passes under the asset, is required to have ground support system such as shoring in use. Serious consideration should also be given to having the asset temporarily isolated during the works to prevent any possible inundation. Water Corporation shall be contacted to assess and may be required to temporarily isolate the asset during the planned works.

  When shoring is installed, it must be in accordance with the relevant standards and codes of practice to ensure that no ground movement or subsidence occurs on removal particularly in proximity of AC, RC and VC mains.

If the main is to be taken offline the following applies:

- For pressure pipes:
  - Water Corporation will assist where the main may be required to be depressurised for the duration of the works, by isolation or temporarily cutting and capping the main on either side of the excavation, in an area outside of the zone of influence of the excavation. Water Corporation may complete isolations for the relevant area. Apply through Water Corporation's website (see Section 5.2). Fees for isolation works apply.
  - Depending on the specific location, a temporary bypass main and temporary services may be required

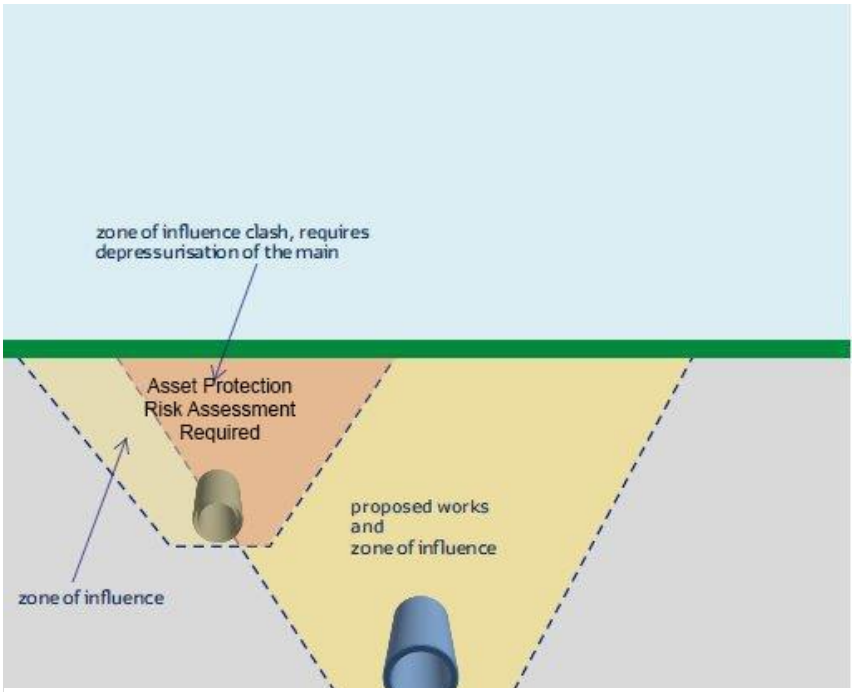


Diagram 18 Open excavations – circumstances for depressurisation

- For gravity pipe:
  - An approved form of isolation must be installed upstream of the excavation in an area outside of the zone of influence of the excavation.
- Depending on the specific location, tankering and temporary services may be required.
- Working in the proximity of Anchor Blocks (generally related to Water Main extensions):
  - An approved form of isolation must be installed upstream of the excavation in an area outside of the zone of influence of the excavation (generally an upstream valve located upstream of a flushing point).
  - Water Corporation may complete isolations for the relevant area. Apply through Water Corporation's website (see Section 5.2). Fees for isolation works apply.
  - Excavations must not be within 4 m of the anchor block or restraint until the water main has been confirmed as isolated by a Water Corporation representative and an endorsed Asset Protection Risk Assessment provided by Water Corporation has been obtained.
  - The surrounding soil behind the anchor block acts as a ground support system, not the thrust block itself. In the event that the soil is disturbed without adequate isolation in place, there is a risk of ground movement and restraints failing
  - Depending on the specific location, temporary services may be required.

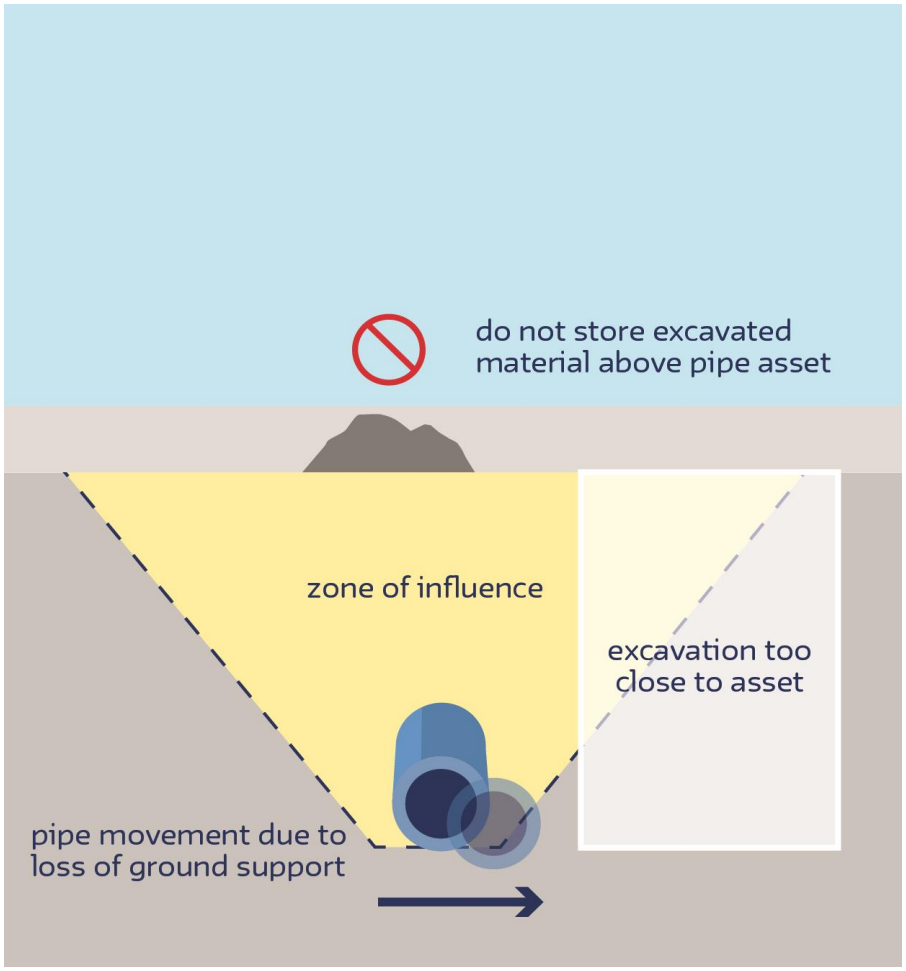


Diagram 19 Open excavations – not acceptable

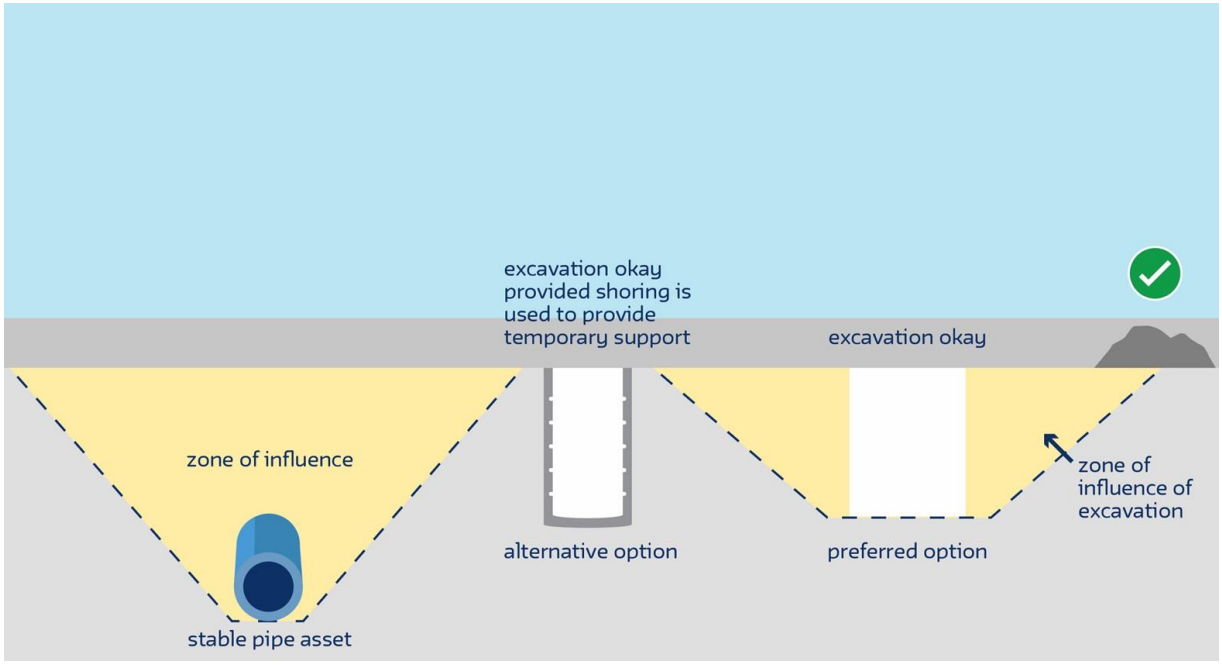


Diagram 20 Open excavations – acceptable

- Buried assets must not be exposed; at least 600 mm cover is maintained at all times including during road box-out – though a minimal exposure is acceptable, such as for service crossings and if only the top of the pipeline is exposed or where actual cover has to be established.

  Establishment of actual cover is to be carried out prior to the works commencing via potholing, preferably by vacuum excavation techniques.
- Thrust blocks restrain thrust forces in pressurised pipelines and are commonly found at pipeline fittings and changes in pipeline size and direction – thrust blocks and the ground supporting them should never be disturbed as this could cause sudden failure of the asset. A minimum separation will need to be maintained.
- Excavation of acid sulphate soils can cause damage to assets through corrosion, in particular steel pipelines – we may require you to address the risks and management controls to our assets in your acid sulphate soils management plan.

Diagram 21 Example of ground level change

- Details of proposed work methods (including excavation equipment, shoring methodology – including trench stops) and details of any assets that need to be exposed (such as length of pipeline and duration of time pipeline will be exposed for) must be provided.
- Backfilling and reinstatement – our pipelines are installed in compacted bedding, selected fill and support material which is part of the pipeline design. Where pipelines are exposed, we require you to backfill and reinstate the pipeline to our standards:
  - Unsaturated soil:
    - The first 200 mm cover above the pipe shall be clean sand. This shall be compacted by tamping to ensure no voids exist around the pipe. The remaining volume can be filled with the existing soil, free of any road base, rocks greater than 50 mm or other foreign matter. This shall be filled using a backfill methodology to be approved by Water Corporation before each lift.
  - Saturated soil:
    - When pipelines in saturated soils are exposed, it is preferred that the excavation is dewatered so that backfilling and compaction can be done using unsaturated soil. Where dewatering is not feasible, cement stabilisation may be permitted. In this instance cement stabilised sand (sand: cement ratio no stronger than 20:1 by volume) must be used 200 mm above the pipe. This is to be compacted by tamping to ensure there are no voids around the pipe. The remaining volume is to be filled using a backfill methodology to be approved by Water Corporation prior to commencement on each lift.
  - Surfaces shall be reinstated as required by the local authority – refer to Restoration and Reinstatement Specification for Local Governments which is available from the Main Roads Western Australia website.
- We may require an inspection by one of our representatives before back filling takes place and may require compaction test results.

7.3.2 Trenchless excavations requirements

Trenchless excavation is becoming increasingly used for laying and renovating underground services, particularly where there is a need to avoid surface disruption. Trenchless excavations cause minimal disturbance to soil and surface infrastructure such as to road surfaces and pavements compared to open excavations. These types of excavations however pose a great risk to underground services. Care should be taken when using trenchless methods to avoid colliding with our assets.

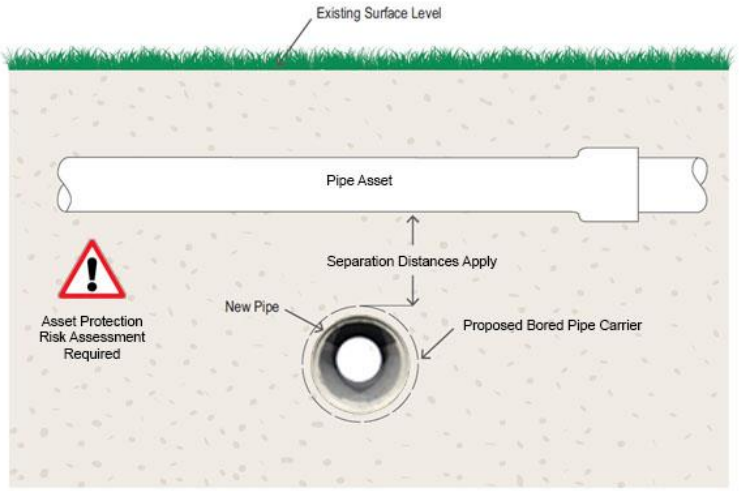


Diagram 22 Example of sleeved new pipe below existing asset

Trenchless excavations within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) will be considered subject to the following requirements:

- Details of proposed work methods must be provided, including:
  - type of trenchless installation equipment
  - bore diameter
  - ground conditions
  - the accuracy and reliability of the technique or equipment being used
  - proposed drill site and drill path
  - details of the affected assets (including **clearance between drill path and asset).**

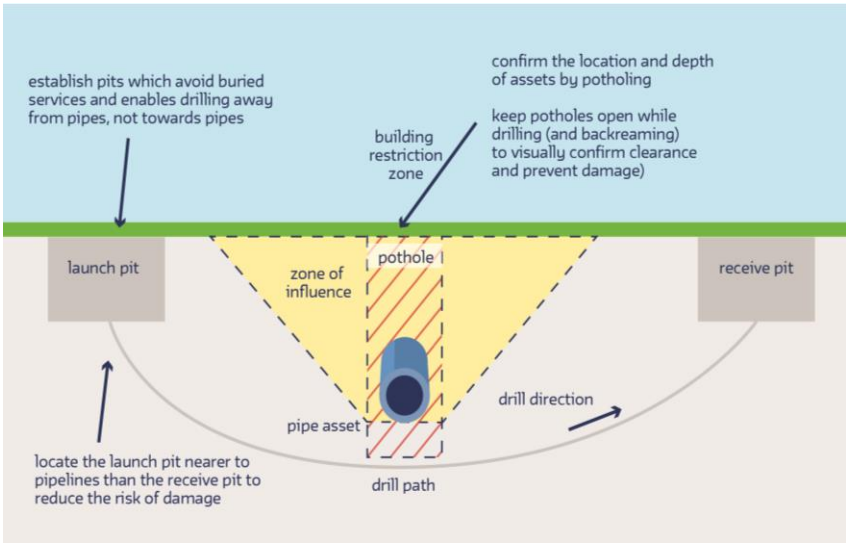
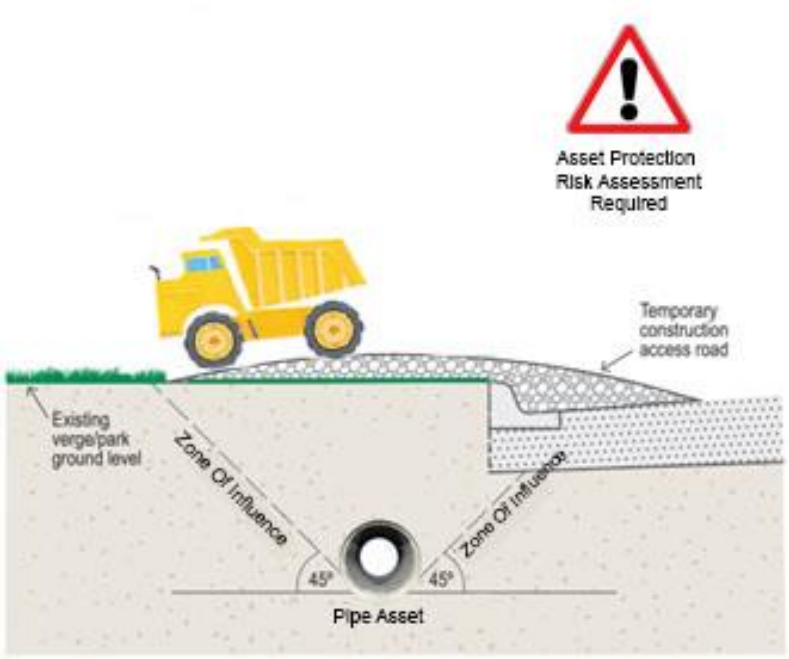


Diagram 23 Trenchless excavations

- Potholing must be used to positively locate all underground assets to ensure adequate clearances are maintained between assets (refer Section 7.6 for clearances).
  Potholing at each asset crossing and at regular spacing along parallel assets is recommended. All buried assets that are cross or parallel within 1 meter of the drill path should be exposed.
- Where trenchless excavations cross pipelines, the launch pit (rather than the receive pit), should be located nearest to the most significant pipeline if possible.
- The depth of the installed utility must be proven at all pipeline crossing points.
- Continuously monitor the path and depth of the drill head, including during back reaming where the path of the drill head may deviate from the original path. Potholes are to be kept open to monitor progress of the drill head near assets and to ensure clearance distances are maintained.
- An asset condition assessment may need to be undertaken upon completion of the work.

7.4 Movement of heavy vehicles



Heavy vehicles, such as construction equipment or other heavy transport, crossing buried assets can cause damage due to heavy loads and vibration. Even relatively light loads can crack assets if the asset is brittle or ageing or with shallow cover RC, AC, VC and CI pipelines are particularly susceptible to damage from the movement of heavy vehicles.

Diagram 24 Example of vehicle movement with temporary fill support for traffic

7.4.1 Requirements

Movement of heavy vehicles (other than on permanent roads) within the prescribed proximities of our assets (as defined in Table 4 Summary of prescribed proximities) may be considered subject to the following requirements:

- You must confirm the depth of cover above an asset with potholing – while assets are installed to meet minimum cover requirements to protect them from damage, the cover may have altered since the time of installation due to excavation activities, erosion, ground level changes or ground subsidence.
- Subject to having minimum cover for trafficable conditions (refer Table 5), vehicles that are legally permitted on public roads are allowed within the prescribed proximities.
- For heavy construction plant or vehicles that exceed maximum legal load limits (such as piling rigs, cranes and rollers), you may need to provide an engineering assessment demonstrating that there will be no excessive loadings or vibrations on our assets. The assessment should take into consideration the condition of our asset which you may choose to confirm via an asset condition assessment.
- The use of protective measures such as increased ground cover above the asset or steel road plates may be permitted where no other viable options are available. Additional requirements apply if the vehicle loading is to permanently change from non-trafficable to trafficable conditions, refer to Section 9.1.

7.5 Vibrations

Excessive vibrations can cause direct damage to our assets, such as damage of pipe joints or cracking of brittle pipes (AC, RC, VC and CI), or can cause soil subsidence resulting in collapse of our assets. The internal cement mortar lining of metallic pipes can also be damaged.

Common types of work that generate excessive vibrations include:

- vibratory ground compaction
- blasting
- demolition works
- pile driving and boring.

The risk of vibration at the asset will vary depending on several factors including the size of the vibrations, asset condition, ground conditions, and distance from the source of vibration.

7.5.1 Requirements

Work that creates excessive vibrations within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) may be considered subject to the following requirements:

- Where possible use low vibration work methods and control vibration at the source – consider substituting equipment that creates large amounts of vibrations for equipment that generates lesser vibrations, including:
  - Vibratory ground compaction equipment
    - The use of light rollers, plate compactors and tampers over the use of heavy vibratory rollers is preferred – light rollers, plate compacters and tampers, working in layers of 300 mm, are generally permitted within the prescribed proximities supported by an Asset Protection Risk Assessment endorsed by Water Corporation.
    - The use of static compaction equipment over vibratory compaction equipment. Static compaction uses the weight of a machine, like a roller, to compress soil without relying on vibration or dynamic impact.
    - Working in shallower layers.
  - Piling
    - The use of bored piles or CFA piles over the use of driven or screw piles.
  - Blasting
    - Blasting near our assets is to be avoided whenever possible; non-explosive methods or rock breaking is preferred.
    - Where explosive methods cannot be avoided you must provide us with a blast plan that includes an engineering assessment of the impact of the blast on nearby assets and proposed risk mitigation actions.

- During significant vibratory works we may require you to:
  - perform an asset condition assessment to confirm the condition of our asset prior to you starting work
  - undertake prior testing of vibrations to establish safe limits for the specific conditions of the work
  - undertake continuous monitoring of vibrations and asset condition during the work
  - adhere to safe vibrations limits (peak particle velocities) which we may specify for a particular asset – in general, the maximum vibrations at the asset shall not exceed the limits provided in Table 6 below.

Table 6 Safe vibration limits (PPV), refer to British Standard 5228-2:2009 Code of Practice for noise and vibration control on construction and open sites, part 2 Vibration

Vibration type	Safe PPV limit for brittle pipelines (AC, RC, VC, CI)	Safe PPV limit for other pipelines
Continuous vibration	2 mm/s maximum	15 mm/s maximum
Intermittent or transient	5 mm/s maximum	30 mm/s maximum

7.6 Clearances and separations

Maintaining adequate clearances to other underground services is essential to reducing the risks of service installation on our assets. This includes installation of underground services as well as overhead services.

7.6.1 Requirements

Applications for service installations within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) may be considered subject to the following requirements:

- Services crossing our assets
  - Crossings should be made at, or close to, right angles to our assets, with the exception of minor private water and storm water drainage pipes.
  - Each crossing point must be potholed to confirm the location of our asset – for trenchless excavations the pothole must extend deep enough to visually see the installation equipment just prior to it going over or underneath our asset.

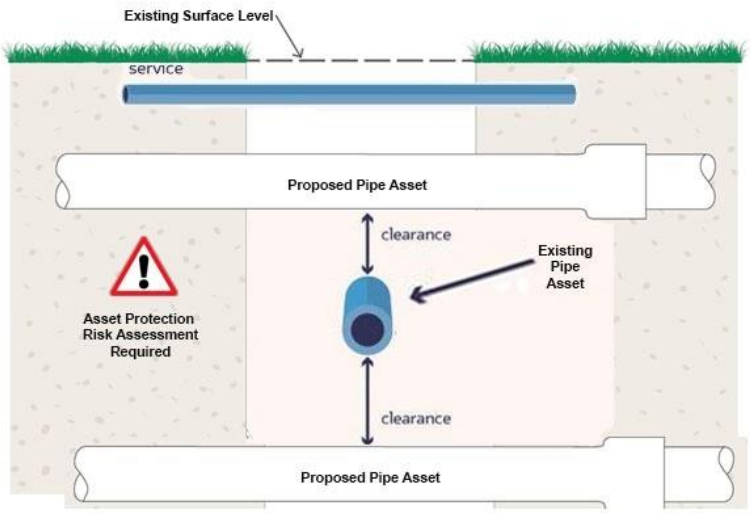


Diagram 25 Underground service installations

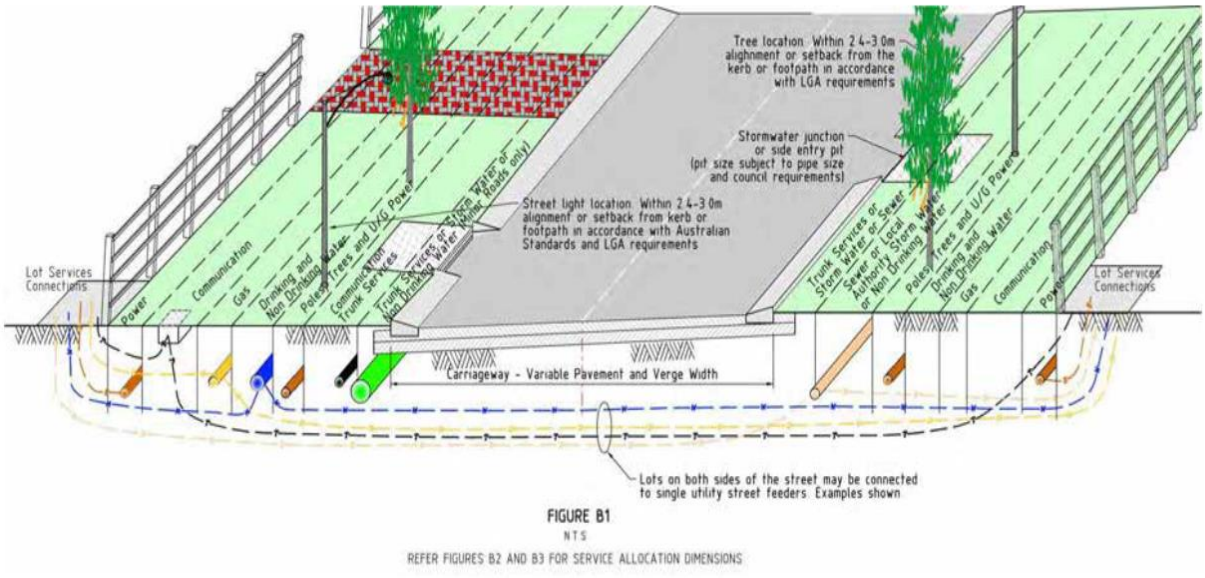
- The following minimum vertical clearances shall be observed:

Table 7a Minimum clearance requirements for service crossings

Diameter of our asset	Minimum clearance for service crossings installed by open excavation	Minimum clearance for service crossings installed by trenchless excavation*
Less than 300mm	At least 150 mm	At least 150 mm plus equipment accuracy (mm)
300 mm to 525 mm	At least 300 mm	At least 300 mm plus equipment accuracy (mm)
600 mm and above	At least 300 mm	At least 300 mm plus equipment accuracy (mm)

*NOTE: For greater than minimum separation distances, drill must stop at 1.0 m prior to Water Corporation's asset and a confirmation of levels undertaken. If levels are as expected, then you may proceed past Water Corporation's asset. For minimum separation distances, a visual inspection of the drill head passing under or over Water Corporation's asset must be undertaken.

- Services parallel to our assets
  - Services in road reserves should be installed on their standard alignments specified in the Utility Providers Code of Practice



Example - standard alignments specified in the Utility Providers Code of Practice

- The following minimum horizontal clearances shall be observed:

Table 7b Minimum clearance requirements for services alongside our assets

Diameter of our pipe asset	Minimum clearance for service parallel to our pipelines
Up to 300mm	At least 600 mm
Greater than 300mm	At least 1000 mm

- Electrical, gas and telecommunication
  - Electrical, gas and telecommunication services installed near our assets may present a risk to our maintenance personnel – these services are to be clearly marked and where required provided with suitable protection – this may include concrete slabs laid 200 mm above the services and buried labelled marker tape above the slabs and along the service.
  - High voltage power lines in the vicinity of metallic pipelines must be assessed for AC interference hazards in accordance with requirements of Water Corporation design standard DS23 Pipeline AC Interference and Substation Earthing.

7.7 Roadworks

7.7.1 Road development

Road development includes any proposed creation or alteration of public and private roads.

Road development applications within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) may be considered subject to the following requirements:

- The location for pipelines is in the road verge on the standard alignments specified in the Utility Providers Code of Practice.
- Pressurised pipelines (this includes water supply pipelines, sewer and drainage pressure mains) are not to be placed beneath the road pavements except for at road crossings and any relocations are to be placed, if possible, on the current Water Corporation relevant alignment corridor.
- Sewer reticulation, sewer mains and main drains may be allowed beneath road pavements provided all maintenance structure covers are located outside vehicle wheel alignments and are fitted with trafficable covers.

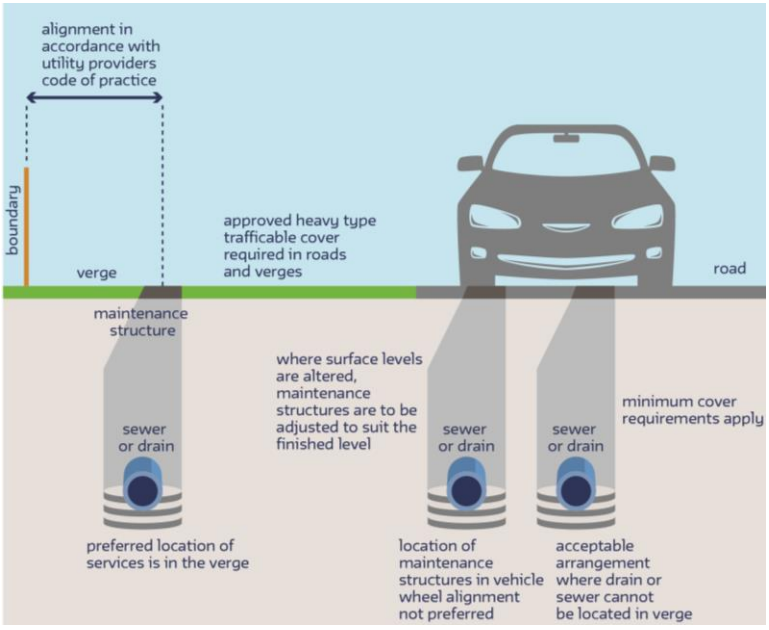


Diagram 26 Road development

7.7.2 Road crossings

- Road crossings must be made at 90-degree angles to the road.
- Road crossings must achieve our minimum ground cover requirements for trafficable conditions (see Section 7.1 for details).

- Levels achieved during boxing out operations are to conform to minimum cover requirements as per Section 7.1.1.
- Depending on the criticality of our asset and classification of the road it may be required pipelines to be placed in sleeves or tunnels – (usually mandated by Main Roads Western Australia).
- Prior to the development of roads or installation of sleeves, pipe joints for existing steel pipelines may need additional protection (e.g. Banding) as per the relevant Design Standard.

7.8 Planting and removing trees

- Care must be taken when planting and removing trees.
- Trees and shrubs rely on their roots to find moisture and nutrients and our assets are an attractive moisture source. Tree roots can penetrate into assets through joints, damaged sections of pipes or maintenance structures, causing blockages and subsequent overflows.
- Trees can also cause damage to assets as a result of movement such as during a storm or when a tree is removed.
- The risk of damage depends on the type and size of tree, and the type of asset affected. Some assets are more susceptible to damage by trees than others, such as AC, RC and VC pipelines or ageing Water Corporation assets.
- Some tree species have large and expansive root systems which can still cause damage even if the tree is not located near to underground assets.

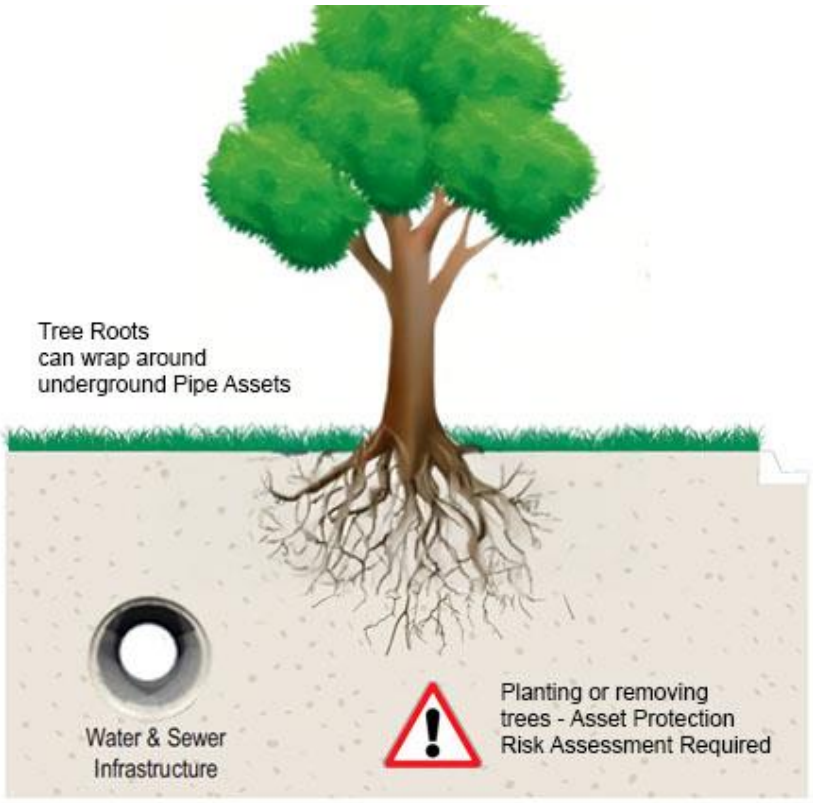


Diagram 27 Example of tree root spread underground

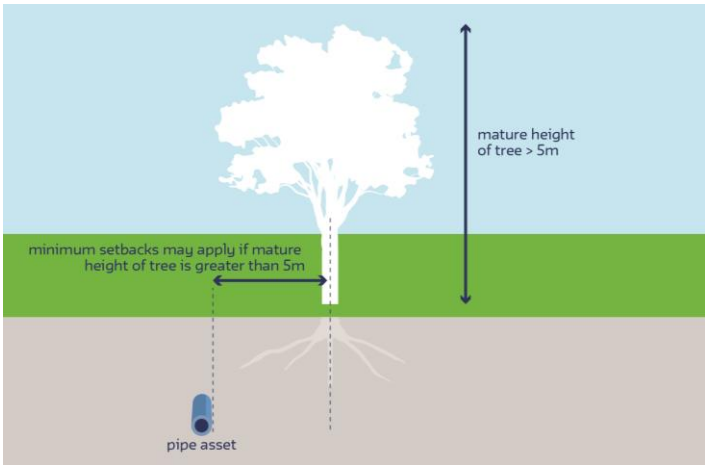


Diagram 28 Tree planting

7.8.1 Requirements

Planting and removal of trees (other than by cutting down and stump grinding) with a mature height of greater than 5 m within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities) require our approval.

Planting and removal of trees smaller than 5 m require careful consideration, especially in the case where they are over critical assets.

In all situations consideration should be given to the following requirements:

- Before planting or removing a tree consider the tree height, expanse of the root system and related risk of damaging assets.
- For any trees or shrubs planted near an asset we recommend using a root barrier to restrict root growth in the direction of the asset.
- Refer to Select the Right Tree for information on common plants and information about their mature height ranges and recommended minimum planting distances from assets.
- Minimum setbacks may apply for trees with a mature height of greater than 5 m.

7.9 Installing equipment on our assets

Common requests to install equipment on our assets include installation of telecommunications antennas on our water tanks or towers to avoid building other structures.

Installation of equipment on our assets always requires approval. Applications may be considered subject to the following requirements:

- The equipment must:
  - not compromise the integrity of our asset – for example, welding brackets to a tank may risk damaging the interior coating of the tank.
  - not present potential safety hazards – for example, equipment cables draped across walkways may present a trip hazard.
  - be adequately supported to withstand dead loading (loading from the equipment itself) as well as live loading (such as from the wind) – for example, improperly designed brackets can buckle the tank during high winds.
  - not prevent future maintenance of the asset – for example, poor positioning of equipment may prevent access to vents and manholes.
- You may be required to obtain approval via an Authority To Work Permit which will can be discussed further with us.

7.10 Key infrastructure

Key infrastructure includes freeways, highways, main roads, bridges, tunnels, railways as well as major building developments.

7.10.1 Requirements

Key infrastructure activities within the prescribed proximities to our assets (as defined in Table 4 Summary of prescribed proximities on page 17) are assessed case by case.

We recommend consulting us early about the development of key transport infrastructure. This allows the design and safety issues to be identified and incorporated at an early stage, reducing the need for ongoing iterations, costs and delays to your project. Early consultation will also allow you to determine what expert advice and input might be needed in the development of your design, such as geotechnical investigations.

Consideration should always be given to the following when developing your design:

- How to ensure adequate access of our assets for future maintenance, repairs or replacements without presenting a risk to key transport infrastructure or our assets.
- Depending on the criticality of our asset we may require pipelines to be placed in sleeves or tunnels – this is usually mandated where critical assets cross major transport infrastructure (refer to Section Permanent protection methods for further guidance).
- How to reduce the risk of our assets being impacted by your work, for example protecting assets from vibrations generated by heavy vehicle.
- How to ensure the impacts and consequences of assets bursts or failure on key transport infrastructure are minimised.
- Also refer to *AS4799-2000 Installation of underground utility services and pipelines within railway boundaries.*

All designs which affect our assets must be in submitted in accordance with relevant Water Corporation Standards (DS80 – WCX CAD Standard) and be submitted in accordance with the process outlined in the Developer's Manual.

Water Corporation also has a list of prequalified Engineering Consultants, who are aware of all Water Corporation's design requirements and can assist in your design.

Please note that freeway crossings need prior approval by MRD-WA and rail crossings by Perth Transport Authority (PTA) and Arc Infrastructure, and it is the responsibility of the Design Engineer to organise for agreements between the parties to be signed prior to approved designs being accepted by Water Corporation.

7.11 Above ground pipelines

Above ground pipelines generally exist in remote areas and may consist of:

- High pressure steel pipelines with internal cement lining.
- Concrete pipe supports.
- Steel trestle pipe supports (for gully or Salt Lake crossings).
- Concrete overhead / anchor blocks.
- Concrete supports, anchor blocks and thrust blocks are usually mass concrete blocks, buried deeper and wider than what is visible above ground.
- Isolation valves and valve pits (buried and above ground).
- Scour valves and scour chambers normally exist in low sections, creeks and drains.
- Air valves, normally on high sections of pipelines.
- Branch distribution main offtakes which feed other adjoining pipelines.
- Special agreement service lines for transfer of water, sewer or drainage.

Above ground pipelines must follow the requirements below.

7.11.1 Service crossings under pipe

- Must not be close to or directly under a pipe support, valve, scour or other fittings.
- Should run in between pipe supports centrally where possible.
- Should stay clear of a pipe joint or other pipeline infrastructure (valves etc).

7.11.2 Drainage

- Engineered drainage channels must not be directed at pipe supports.
- Drainage flows must not undermine any adjacent pipe supports.

7.11.3 Pipeline access / maintenance tracks

- Generally, exist along one or both sides of an above ground pipeline.
- Must always be kept clear at all times and not be obstructed, modified, diverted or closed.

7.11.4 Vehicle crossings

- Underlays, short, buried sections of pipe designated for vehicles to cross over the pipeline between an above ground pipeline.
- Ramps, a structure constructed for vehicles to cross over top of an above ground pipe section
- Public road reserves, are usually an underlay designated for most vehicle crossings
- Many underlays and ramps exist in remote locations for use by adjacent landowners, agricultural, mining, industrial or emergency service access
- Some crossings may have signage to indicate maximum load ratings
- Not all crossings are load rated or authorised for use
- Vehicle crossings with shallow pipe cover are not authorised for use by any vehicle.
- Vehicle crossings which are not designated for Water Corporation operations are not maintained by Water Corporation who have no maintenance responsibility for these crossings.
- Water Corporation has authority to remove an unauthorised or deficient crossing which risks safety to personnel, encumbers access for operational purposes or presents a risk to the pipeline.

8 Understanding our assets

8.1 Types of pipelines

We operate an extensive network of water, wastewater and drainage assets throughout Western Australia.

There are many different types of assets in use but those that are at greatest risk of damage are our buried pipelines. With increasing population densities, more pipelines are being installed underground. This is creating an increasing competition for space and an increasing risk that your work may cause damage to our assets, or that our assets may cause damage to your work.

Our pipelines have different functions, criticalities, sizes, depths and materials. Many pipes operate at high pressures and flow rates, and some may contain hazardous gases. Pressurised pipelines present greater risks than pipelines that flow by gravity.

8.1.1 Main types of pipelines

Water supply pipelines

- Trunk mains
- Distribution mains
- Reticulation mains

All water supply pipelines operate under pressure.

Drainage pipelines

- Main drains
- Drainage pressure mains

Wastewater pipelines

- Main sewers
- Reticulation sewers
- Sewerage pressure mains

8.1.2 Pipeline locations

Many of our pipelines are located in road reserves and public open space but pipelines can also be found in private property. Sewers are the most common type of pipeline located in private property however occasionally sewer pressure mains, water pipelines and main drains can also be found.

8.1.3 Pipeline condition

Our pipelines vary in age and condition; they can be brand new and in as-new condition to over well 50 years old or in poor condition.

8.1.4 Pipeline material

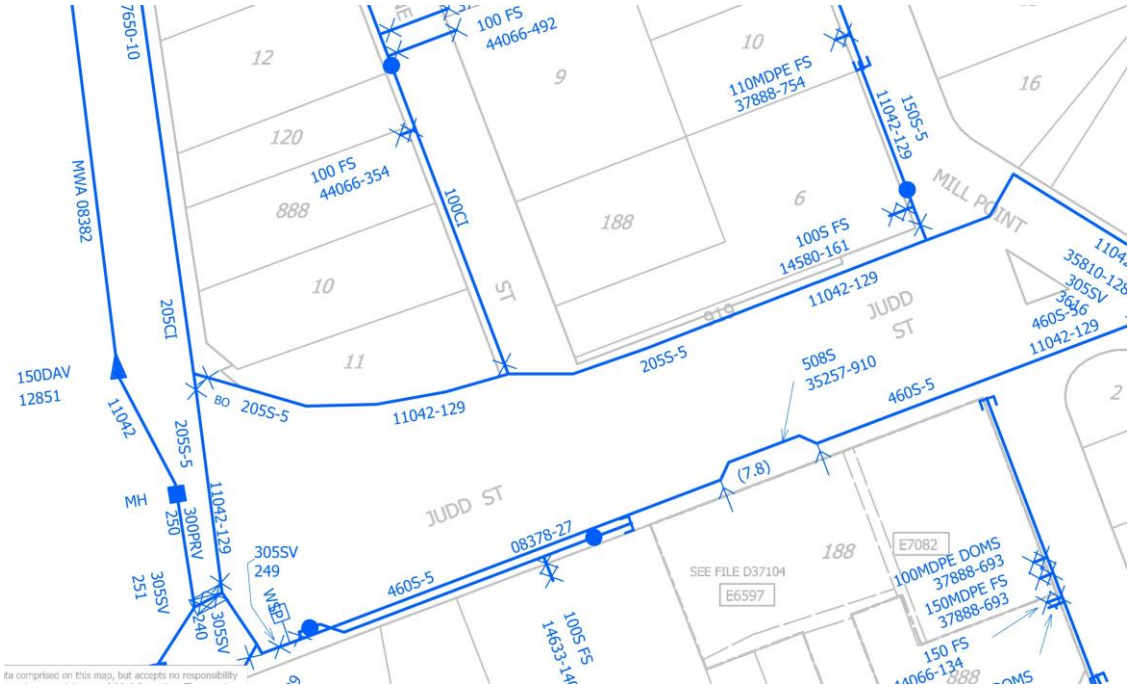
Our older pipelines are typically constructed but not limited to the following materials:

- AC asbestos cement
- CI cast iron
- VC vitreous clay
- S steel
- RC reinforced concrete.

Common materials for newer pipelines include:

- PVC polyvinyl chloride
- PE polyethylene
- GRP glass reinforced plastic
- DI ductile iron
- S steel with inner cement lining
- RC reinforced concrete.

Newer pipeline materials are considered to be more robust than older pipe materials which are typically more brittle or more likely to be in poorer condition, therefore more easily damaged.



Example drawing of our water network

8.1.5 Pipeline fittings and structures

There are many different fittings and structures associated with our pipelines. These fittings and structures are essential for pipeline operation and delivery of services to the community.

Common fittings and structures include:

- thrust and anchor blocks
- cathodic protection test points
- flushing, injection and sampling points
- maintenance structures (such as access chambers, manholes, maintenance shafts)
- valves
- water hydrants
- flow measurement devices (such as water meters).

Some of these fittings will be identifiable by indicators on the surface, such as covers and lids, while other fittings will be below ground and will not be visible. Example of pipe marker posts shown on the right.

Example of pipe marker post

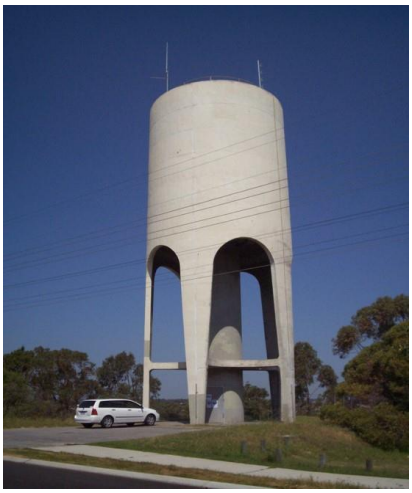
Buried fittings may be located at different depths than the pipeline or may be offset from the centre of the pipeline and therefore do not always accurately indicate the pipeline location. For example, air valves extend from the top of a pipeline, while scour valves extend from the bottom and are usually offset to the side. Similarly, maintenance structures can also be offset from the centreline of the pipe.

Examples of some of the fittings and structures that are visible on the surface are shown below.

Cathodic protection test point (left); valve cover (right)

8.1.6 Water tanks and towers

Water tanks and towers are also sometimes affected by third party works. Since they are located at elevation they are commonly used for mounting telecommunications equipment to avoid building other structures

Examples of a water storage tank (left) and tower (right)

8.1.7 Other assets

Other Water Corporation assets include pumping stations, emergency storage facilities, reservoirs and treatment plants. These assets are usually in dedicated reserves or landholdings, but this isn't always the case.


Examples of a treatment plant (left) and pumping station (right)

9 Reducing risk

If you considering working near our assets, we recommend you consider the following options to reduce the risk of potential damage (in order of preference):

Redesign your work	The preferred option is for you to redesign your work to be outside the prescribed proximities to our asset.
Relocate our asset	Where you are not able to redesign, our assets may be able to be relocated, raised or reconfigured.
Protect our asset	Where redesign and relocating are not possible, we may allow you to work within our prescribed proximities if you adequately protect our asset.

9.1 Redesign your work

In all instances, the preferred option is for you to redesign your work to be outside the prescribed proximities to our assets.

9.2 Relocate our asset

Where you are not able to redesign your work, relocation of the affected asset away from your work may be considered.

Our requirements for relocation works are as follows:

- Proposed relocations of **water reticulation** and **sewer reticulation** assets shall be designed by a design engineer who is a suitably qualified practicing professional engineer with appropriate engineering experience, and is a holder of our current design standards.
- For all **other assets**, relocation designs must be completed by one of the design engineers from our prequalified engineering consultants list.
- All proposed relocations shall be in accordance with current editions of applicable Water Corporation and Australian Standards. Some of our most common design standards relating to sewer, water and drainage assets are listed below.

Table 8 Water Corporation design standards

Asset type or process	Design standard or manual
Water reticulation	Design Standard 63
Sewer reticulation and mains	Design Standard 50
Sewer pressure mains	Design Standard 51
Water distribution mains and trunk mains	Design Standard 60
Main drainage	Design Standard 66
Drawing standards	Design Standard 80
Pipe fittings drawings	Design Standard 65
Protective coatings	Design Standard 95
Products	Strategic Product Registers

We also have additional standards for work that may include SCADA, mechanical, electrical, cathodic protection and other specialised work.

Costs associated with relocating

We will not be responsible for any costs associated with asset relocation that is necessary to offset the effects of your work. This includes the cost of any necessary isolations, connections and inspections that may need to be performed by our personnel.

Asset relocations will normally be like-for-like replacements (material, size and pressure rating) except for AC, CI, RC and VC pipelines which should be replaced with an approved pipe material (as per our current design standards) of equal internal diameter.

We will assess proposed relocations with consideration to future demand requirements in which case we may request pipelines to be increased in size or strength. We will bear the cost of replacements above and beyond like-for-like replacements required to meet future demands.

To enquire about our design standards or request access to our standards please email engineering.standardsenquiries@watercorporation.com.au

9.3 Protect our asset

Where redesigning your work and relocating our assets is not practicable, we may allow you to work within the prescribed proximities.

We will only consider this option if you:

- demonstrate that redesigning your work and relocating our asset are not feasible options
- demonstrate that you have a safe system of work in regard to any hazards associated with working on or near our asset.
- adhere to our technical requirements for protecting our assets
- where necessary, employ methods that protect our asset and your work from potential damage.

9.3.1 Temporary protection

Temporary protection is typically used for temporary works that will only remain in position for a short time, and can include:

- Adapting your work methods - such as supporting an excavation with shoring to prevent loss of ground support around an asset.
- Selecting alternative construction equipment - such as using ground compaction equipment that generates smaller vibrations.

9.3.2 Permanent protection

Permanent protection is typically used for permanent works that will remain in position for a long time such as buildings and structures.

Costs associated protecting our assets

We will not be responsible for any costs associated with protection works that is necessary to offset the effects of your work.

Proposed protection works for water reticulation and sewer reticulation assets shall be designed by a design engineer who is a suitably qualified practicing professional engineer with appropriate engineering experience and is a holder of our current design standards.

For all other assets, protection works must be designed by one of the design engineers from our prequalified engineering consultants list. All permanent protection works shall be designed with a 100-year design life and shall be in accordance with current editions of applicable Water Corporation and Australian Standards.

Drawings for all permanent protection works must be certified by the design engineer and submitted to us for approval. It is the designer's responsibility to ensure that the selected protection method is suitable for the particular application, including confirming that the ground conditions are acceptable for the final design.

9.4 Excavation awareness

Excavation can be dangerous, especially if you're digging without knowing what's below. If you're excavating, it's your responsibility to locate Water Corporation assets and prevent contact to keep you, your team and the community safe.

This information is important if you're a planner, construction worker, supervisor, or in similar roles.

9.5 Duty of care

The safety of your workers and the public remains your responsibility, as per Work Health and Safety Regulations 2022 - Regulations 34, 35 and 36.

Make sure you positively locate all assets before excavating and have a safe system of work.

All work must be in accordance with the relevant acts, regulations, standards and codes of practice.

9.6 Risk of working near our assets

Water Corporation has a vast network with different risks depending on the asset and location:

- Energy release: sudden release of high pressure or high flowing water, which can result in collapse of excavations, buildings and impact to people. The sudden release of large volumes of water under
- Pressure is dangerous and can lead to drowning, significant structural damage, community or supply disruption and traffic hazards.
- Electricity: electric shock exposure due to asset age, electrical assets located close to our pipelines, electric faults, equipment failure and lightning.
- Falls: pits and access chambers, which create fall and drowning risks.
- Hazardous materials: biohazards from the release of wastewater with infectious agents and toxic or flammable gases.
- Pipelines may contain or be coated with hazardous materials.

Secondary hazards may result from damage or disruption to Water Corporation infrastructure.

It's important to assess the risks associated with your work.

9.7 Before you dig – remember the 5 Ps:

1. Plan

- Plan ahead by lodging your BYDA enquiry, and ensure you have the correct information to carry out work safely.
- Plan ahead by applying for an APRA on our website. Search Working Near Our Assets.

2. Prepare

- Prepare by reviewing the utility plans and contact the asset owners if you need help.
- Perform a site inspection-identify any surface indicators of underground asset clues such as pit lids, marker posts and meters.
- Engage a skilled locator to locate assets electronically before potholing

3. Pothole

- Pothole, using the asset owner's stated method as specified on the plans and information pack.
- Pothole methods include hand digging and hydro vacuum extraction
- Backfill potholes on completion

4. Protect

- Protect any exposed utility assets, ensure to contact the utility providers and seek direction

5. Proceed

- Proceed with care -once all checks have been completed and all relevant permits and authorisations are granted.

Never rely on BYDA plans on as the sole means of locating assets; follow all five steps.

Never use an excavator to identify the underground asset.

10 Revisions

This guideline has been revised on the dates shown.

Revision number	Issue date	Reason for change
1.0	June 2017	Initial Issue
2.0	June 2019	Revision and general update
3.0	July 2022	Technical change update
4.0	September 2025	Technical revision and general format update