

Guidance for working near to Severn Trent assets.

Any planned work near to our assets could result in these assets being damaged. If such work involves any of the activities list below and is within 15m of our asset, the risk becomes even greater. If our assets fail this could also lead to the service to our customers being adversely affected, environmental impact such as flooding, damage to property, and even risk of injury to.

Any of the works listed below can present a significant potential impact on our assets. If any of the works listed below are planned, we need details of what is intended, and clarity as to how close work will take place to our assets. We may apply restrictions as to what work you will be allowed to undertake, and such work may to require a formal agreement.

- Construction of new buildings or alterations of existing
- Installation of underground utilities
- New or Improvements to highways
- Piling
- Significant temporary works
- Crane operation, piling rigs.
- Loading from other plant and machinery
- Deep excavations / Tunnelling
- Demolition
- Significant Dewatering

In general terms we require that your proposed works

- Do not have an adverse effect on the service level of the asset.
- Do not damage or otherwise adversely affect the asset.
- Do render the asset more difficult to maintain or repair.

This guidance applies to the permanent works and any temporary enabling works.

Statutory and Legal Obligations

It is an offence under S174(1) of the Water Industry Act to damage or interfere with a public asset, and this can result in a criminal conviction with fines being imposed.

CHAPTER II

PROTECTION OF UNDERTAKERS' WORKS, APPARATUS ETC.

Protection of apparatus in general

174. Offences of interference with works etc.

174.—(1) Subject to subsection (2) below, if any person without the consent of the water undertaker—

(a) intentionally or recklessly interferes with any resource main, water main or other pipe vested in any water undertaker or with any structure, installation or apparatus belonging to any water undertaker; or

(b) by any act or omission negligently interferes with any such main or other pipe or with any such structure, installation or apparatus so as to damage it or so as to have an effect on its use or operation,

that person shall be guilty of an offence and liable, on summary conviction, to a fine not exceeding level 3 on the standard scale.

Reference should also be made to:

- Health and Safety Guide No.47 (HSG47) which outlines the potential dangers of working near underground assets
- Drainage and Waste Disposal: Approved Document H Building Regulations

Your planned work

If work is planned near one of our assets our preferred option is for the asset to be diverted. If the proposed work involves the construction of a permanent structure, we may ask that its location be revised to accommodate our asset. However, if it is not possible to relocate the structure or divert our asset, we will consider allowing work to proceed. This will be subject to you providing an impact assessment, demonstrating the risk is as low as reasonably practicable (ALARP), and full details of the proposed works.

At our discretion, we may allow work to take place close to or even over a gravity sewer **(but never over a water or pressurised waste water main)**. Any such approval to work close to our asset will be subject to the impact assessment, our technical approval, and may require a formal protection agreement.

Minimum Safe Working Distance from our assets

Small waste and water pipes (less than 300mm)	Minimum 3m
Waste rising mains	Minimum 4m
Large waste pipes (300mm to 1000mm)	4m to 5m (depending on size and depth)
Large water pipes (300mm to 1000mm)	Minimum 6m
All pipes greater than 1000mm	Bespoke widths for pipes greater than 1000mm, or at excessive depths.

Please note – never rely on asset record drawings when planning your work. It is your responsibility to locate and confirm the precise depth and location of any asset within your working area or any location that might be affected by your work

What you will need to do:

- Submit full details of your planned work for our consideration.
- Provide an impact assessment statement as described below.
- Verify the precise location of our asset on site and not rely solely on our asset records.
- Mark the location of the asset on the surface of the site and the required protective strip if necessary.
- Undertake Pre and Post surveys (CCTV, leakage, etc) to confirm no damage has been caused as a result of your works.
- Monitor vibration, ground movement etc, as applicable.
- Adhere to asset specific issues as applicable (to be found below).
- Enter into a Protection Agreement or give an undertaking of having understood and complied with our standard conditions.

Your impact assessment should include an assessment of the risks of your activity and a method statement outlining how the works will be carried out safely with due regard to the general public and our apparatus. It should also include proposals for monitoring vibrations, ground movements, strains etc. as appropriate to the activity and measures to be implemented in the event of damage or another emergency situation.

If you need further guidance, or to notify us of planned work please contact:

Asset.protection@severntrent.co.uk

For asset specific guidance please see the following:

Working Near Small Water Mains (<300mm)

We require detailed plans and the construction depths of the proposed works over Severn Trent Water's asset. Prior to work commencing we will require confirmation of the line and level of the water main in the location of the works through hand dug trial holes.

Please be aware of the following precautions, conditions and requirements in consideration of your planned works

- No building temporary or permanent permitted above the water main.
- Main and easement not to be located within the confines of property boundaries.
- 6 metre exclusion zone, 3 metre on either side of the main.
- Main to be located in green public open space or adoptable public highway, subject to review and STW agreement, construction constraints will also apply.
- No machine excavation within 1000mm of the pipe, subject to confirmation of location. Within 1000mm all excavation undertaken by hand.
- No excessive ground is to be removed from the surround of the pipe.
- No excessive ground is to be removed below crown of pipe, angle of repose to remain at 30° any works beyond this are prohibited. Further consultation will be required.
- No ground is to be removed surrounding bends or thrust blocks.
- At no point or time will the pipe be undermined.
- At no point will joints to the pipe be exposed.
- No heavy plant is to cross the main unless there is a designated crossing point.
- Where the pipe passes through the construction site, to be marked by a post and wire fence with hi-vis plastic netting 3 metre on either side of the pipe to prevent accidental movement of equipment near the pipe.
- Point loadings of plant and equipment are to be supplied.
- Details of protection measures to protect the asset to be supplied.
- Details of how the protection measures will be constructed and maintained.
- Detailed design and construction method statement taking into consideration everything detailed herein.
- No directional drilling.
- No piling and drilling within 6000mm of the pipe without approval. Vibration monitoring will be required as a result of any such undertaking.
- Contingency plans in the event that you do damage the pipe.
- Sequence of works.
- No other apparatus is to be laid within 300mm of our apparatus either above or below subject to review of your detailed plans and STW agreement.
- All service crossings to be laid at 90° and to be ducted.
- Storm and foul construction details to be supplied with applicable method of construction.
- No manholes / gullies permitted within 3 metres on either side of the pipe.

- Full details of any demolition proposed.
- Street lighting details to be provided.
- Full information on any earth /noise bunds.

Cautionary notes for your consideration:

- The contractor/company is to ensure he has adequate insurance in the event of consequential damage. STW will look to recover all associated costs thereof in the event of damage and loss.
- The Health and Safety pack for the site must have Severn Trent Water details within in the event of an emergency. 0800 783 4444
- Any designer or Architect designing works in the vicinity should ensure the above is accounted for and detailed accordingly.
- Every possible precaution should be taken to avoid damage to our apparatus. You or your contractor must ensure the safety of our equipment and will be responsible for the cost of repairing any damage caused.

Working Near Large Water Mains (300mm and above)

We require detailed plans and the construction depths of the proposed works over and surrounding Severn Trent Water's asset. Prior to work commencing we will require confirmation of the line and level of the water main in the location of the works through hand dug trial holes.

Please be aware of the following precautions, conditions and requirements in consideration of your planned works:

- No building temporary or permanent permitted above the water main.
- 12 metre exclusion zone 6 metre on either side of the pipe.
- Main and easement not to be located within the confines of property boundaries.
- Main to be located in green public open space or adoptable public highway, subject to review and STW agreement, construction constraints will also apply.
- No machine excavation within 1500mm of the pipe, subject to confirmation of location. Within 1500mm all excavation undertaken by hand.
- No excessive ground is to be removed from the surround of the pipe.
- No excessive ground is to be removed below crown of pipe, angle of repose to remain at 30° any works beyond this are prohibited. Further consultation will be required.
- No ground is to be removed surrounding bends or thrust blocks.
- At no point or time is the pipe to be undermined.
- At no point will joints to the pipe be exposed.
- No heavy plant is to cross the main unless there is a designated crossing point.
- Where the pipe passes through the construction site, to be marked by a post and wire fence with hi-vis plastic netting 6 metre either side of the pipe to prevent accidental movement of equipment near the pipe.
- No plant loadings to be applied unless protection is installed.
- Point loadings of plant and equipment are to be supplied.
- Details of protection measures you will put in place to protect the asset are to be supplied.
- Details of how the protection measures will be constructed and maintained will be required by STW prior to works commencing.
- Detailed design and construction method statement taking into consideration everything detailed herein.
- No directional drilling.
- No piling or drilling within 6000mm of the pipe without approval. Vibration monitoring will be required as a result of any such undertaking.
- Contingency plans in the event that the main is damaged.
- Sequence of works.
- No other apparatus is to be laid within 450mm of our apparatus either above or below - subject to review of your detailed plans and STW agreement.
- All service crossings are to be laid at 90° and ducted.

- Storm and foul construction details to be supplied with applicable method of construction.
- No manholes / gullies permitted within 3 metres on either side of the pipe.
- Details of any proposed demolition to be provided.
- Street lighting details to be provided.
- Full information on any earth /noise bunds.

Cautionary notes for your consideration:

- Approximate daily liability as a consequence of damage is £3 million, excluding any repair requirements and consequential damage to nearby properties and land.
- Flood risk from any damage is extremely high.
- Any contractor/company working in the immediate vicinity must ensure that they have adequate insurance in the event of an incident, minimum therefore of £10 million for one incident.
- The Health and Safety pack for the site must have Severn Trent Water details within in the event of an emergency. 0800 783 4444
- Any designer or Architect designing works in the vicinity should ensure the above is accounted for and detailed accordingly.
- Every possible precaution should be taken to avoid damage to our apparatus. You or your contractor must ensure the safety of our equipment and will be responsible for the cost of repairing any damage caused.

Working Near Aqueducts and other Critical Assets

Due to the highly critical nature such assets the following as a start is provided but may not be exhaustive:

We require detailed plans and the construction depths of the proposed works over and surrounding Severn Trent Water's asset. Prior to work commencing we will require confirmation of the line and level of the Aqueduct in the location of the works through hand dug trial holes.

Please be aware of the following precautions, conditions, and requirements in consideration of your planned works:

- No building temporary or permanent permitted above the Aqueduct.
- 12 metre exclusion zone, 6 metre on either side of the pipe.
- Aqueduct and easement not to be located within the confines of property boundaries.
- Aqueduct to be located in green public open space or adoptable public highway subject to review and STW agreement, construction constraints will also apply.
- No machine excavation within 6 metres of the pipe, subject to confirmation of location. Within 6 metre all excavation undertaken by hand.
- No excessive ground is to be removed from the surround of the pipe.
- No excessive ground is to be removed below crown of pipe, angle of repose to remain at 30° any works beyond this are prohibited. Further consultation will be required.
- At no point or time is the pipe to be undermined.
- At no point will joints to the pipe be exposed.
- No ground is to be removed surrounding bends or thrust blocks.
- No heavy plant is to cross the Aqueduct unless there is a designated crossing point.
- Where the Aqueduct passes through the construction site, the Aqueduct to be marked by a post and wire fence with hi-vis plastic netting 6 metre either side of the pipe to prevent accidental movement of equipment near the Aqueduct.
- No plant loadings to be applied unless protection is installed.
- Point loadings of plant and equipment are to be supplied.
- Details of protection measures you will put in place to protect the asset are to be supplied.
- Details of how the protection measures will be constructed and maintained will be required by STW prior to works commencing.
- Detailed design and construction method statement taking into consideration everything detailed herein.
- No directional drilling.
- No piling or drilling within 20 metre of the pipe without approval - subject to review of detailed plans, vibration monitoring will be required as a result of any such undertaking.

- Contingency plans in the event that the Aqueduct is damaged.
- Details on the proposed access route.
- Sequence of works.
- No other apparatus is to be laid within 600mm of our apparatus either above or below - subject to review of your detailed plans and STW agreement.
- All service crossings are to be laid at 90° and ducted.
- Storm and foul construction details to be supplied with applicable method of construction.
- No manholes / gullies permitted within minimum 3 metre on either side of the pipe.
- Details of any proposed demolition to be provided.
- Street lighting details to be provided.
- Information on any proposed noise or earth bunds required.

Cautionary notes for your consideration:

- Approximate daily liability as a consequence of damage is £3 million, excluding any repair requirements and consequential damage to nearby properties and land.
- Flood risk from any damage is extremely high.
- Any contractor/company working in the immediate vicinity must ensure that they have adequate insurance in the event of an incident, minimum therefore of £10 million for one incident.
- The Health and Safety pack for the site must have Severn Trent Water details within in the event of an emergency. 0800 783 4444
- Any designer or Architect designing works in the vicinity should ensure the above is accounted for and detailed accordingly.
- Every possible precaution should be taken to avoid damage to our apparatus. You or your contractor must ensure the safety of our equipment and will be responsible for the cost of repairing any damage caused.

On completion:

- Maintained access and egress to enable suitable plant and equipment to repair, renew or maintain the asset.
- Consideration given to height and width access.
- Consideration given to the working environment in the event of repair and maintenance.
- Handover and inspection.

Working Near Waste and Water Asset (general)

These general conditions and precautions apply to the public sewerage, water distribution and telemetry systems. The conditions include sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the Agreement for the self-construction of water mains. Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

In order to achieve safe working conditions adjacent to any apparatus the following should be observed:

1. All STW apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to our apparatus. You or your contractor must ensure the safety of our equipment and will be responsible for the cost of repairing any damage caused.
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated
4. During construction work, where heavy plant will cross the line of STW apparatus, specific crossing points must be agreed with the Company and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW apparatus, STW should be consulted to enable any affected STW apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW apparatus affects its support, the STW apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW apparatus. In special cases, it may be necessary to provide permanent support to STW apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW apparatus.
8. No apparatus should be laid along the line of STW apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW apparatus for smaller sized pipes and 6 metres either side for larger

sized pipes without prior approval. No manhole or chamber shall be built over or around any STW apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant being installed and existing STW apparatus. - We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable.

Minor reduction in existing levels may result in conflict with apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such apparatus in order to determine any necessary alterations in advance of the works. 3 Guidance for working near our assets May 2014 [public] 12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that Severn Trent Water Limited will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW apparatus without prior consultation with STW.

You must not enter the public sewerage system without prior approval.

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your Contractor on site. If any damage is caused to STW apparatus, the person, Contractor or Subcontractor responsible must inform STW immediately on:

0800 783 4444 (24 hours)

These general conditions and precautions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the Agreement for the self-construction of water mains)(STW Apparatus) of Severn Trent Water (STW) and are not to be taken as exhaustive.

Piling and Drilling

- No piling and drilling within 6000mm of the pipe without approval.
- To prevent any damage, levels of ppv must be kept below 15 mm/s
- Any peak above 15 mm/s works must cease and STW will need to be informed.
- Personnel on the ground must be aware of these figures.
- Equipment will need to be constantly monitored by personnel.
- **Vibration levels that cause damage** depend upon the peak particle velocity and the frequency at which it occurs. Damage to the main is likely where peak particle velocity is high when its frequency is low.
- Assuming a vibrographs sensor is being used, it is crucial that this is fixed (or coupled) properly to the structure being monitored. A suitable method of fixing we would accept would be bolting, gluing (using epoxy resin), or sandbagging.
- Site the equipment on or at the structure nearest to the vibration source (the piling rig, for example).
- The equipment must be level (within 10 degrees).
- If a sandbag is used it must be loosely filled and placed so that its sides touch the ground around the geophone pack, whilst ensuring that the geophone pack remains level.
- Never site the equipment on a paving slab, as this may independently move giving rise to higher readings than the adjacent structure is being subjected to.
- Prevent the monitoring equipment from being knocked or disturbed by objects, people or animals and thus giving false readings.

We appreciate that these are simple daily checks but:

If possible, remove the paper record or download the instrument after each day's monitoring session and ensure that it is safely stored or given to the relevant person (STW included). Ensure that levels have not been exceeded.

Ensure that the instrument is clean and dry before use and check the battery and charge if necessary.

Calibration

Please provide evidence of the equipment's calibration. **Until this is received works are not to proceed.**

PEAK PARTICLE VELOCITY - WHY DO WE MONITOR IT?

With increasing activities in and around our cities the importance of vibration has become a prominent feature. You might have heard of PPV, but what exactly is it and how does that affect us and our projects?

VIBRATION (PPV) – ALL THE ANSWERS!

What is vibration and where does it come from?

Ground vibrations are associated with different types of elastic waves propagating through the ground. These are surface waves, and bulk longitudinal waves and transverse waves (or shear waves) propagating into the ground depth. Typical frequency range for environmental ground vibrations is 1 – 200 Hz. Waves of lower frequencies (below 1 Hz) are usually called microseisms, and they are normally associated with natural phenomena, e.g., water waves in the oceans.

Ground vibration is measured in terms of Peak Particle Velocity (PPV) with units in mm/s or mm/s⁻¹. It should be noted that the PPV refers to the movement within the ground of molecular particles and not surface movement. The displacement value in mm refers to the movement of particles at the surface (surface movement).

Environmental ground vibrations generated by rail and road traffic may cause annoyance to residents of nearby buildings both directly and via generated structure-borne interior noise. Very strong ground vibrations, e.g. generated by heavy lorries on bumped roads, may even cause structural damage to very close buildings. Typical values of ground vibration particle velocity associated with vehicles passing over traffic calming road humps are in the range of 0.1 – 2 mm/s.

The main sources of ground vibrations at construction are pile driving, dynamic compaction, blasting, and operation of heavy construction equipment. These vibrations may harmfully affect surrounding buildings, and their effect ranges from disturbance of residents to visible structural damage.

Why do we monitor and what are the limits?

Ground vibration can cause serious structural damage but can also be a nuisance to local residents. There are clear limits mentioned for vibration due to construction/demolition in BS 5228-2. In table B.1 - page 36 of BS 5228-2 you will find the guidance on effects of vibration levels. These levels set out the human response to vibration, as in nuisance. When we look at potential damage to buildings table B.2 comes into place. Depending on the type of building there are different limits which are generally higher than the nuisance limits. In general, magnitudes of ground vibrations that are considered to be able to cause structural damage to buildings are above 15 mm/s.

Every ground vibration can be recorded and measured automatically. Since it is simple for everyone to protect people, buildings, infrastructure, soil, air and watercourses from negative environmental impact these days we see more and more demand for continuous automated monitoring so construction & demolition can move forward and communities can be developed with minimal disturbance.

To minimize the impact of vibration caused by construction & demolition works governing bodies often set limits that are aimed to protect individuals from levels likely to cause nuisance and potential cosmetic damage to buildings. You will often see limits of 10 mm/s which is a level likely to cause complaints and is close to the level of potential cosmetic damage in lightweight structures. Amber alerts can also be sent at lower levels to give warning that vibration levels are getting closer to the limits.

It is also useful to store a waveform (very detailed data) when high vibration levels are recorded. This enables you to investigate the actual frequency content of the vibration event. BS 5228-2, table B.2 gives separate limits by frequency which can therefore be accurately assessed.

The standard gives guidance for underground services of 15mm/s for transient and 30 mm/s for continuous vibrations.

Please note that the levels in the tables below are for guidance. You will see separate guidance/ limits on vibration close to historic buildings, utilities infrastructure and sensitive measurement equipment found in universities and hospitals.

Table B.1 Guidance on effects of vibration levels

Vibration level	Effect
0.14 mm·s ⁻¹	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s ⁻¹	Vibration might be just perceptible in residential environments.
1.0 mm·s ⁻¹	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm·s ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level.