



Guidance on piling, heavy loads, excavations, tunnelling and dewatering

Contents

1 Introduction	3
2 Works That Can Impact Our Assets And Cause Damage	3
3 What Will Be Required Of You	3
3.1 Piling	5
3.2 Loading	5
3.3 Abnormal Load Transport.....	6
3.4 Excavation, Tunnelling, Dewatering Etc	7
3.5 Demolition	7
4 Assessment Criteria Guidance.....	8
5 Risk Assessment & Method Statement.....	10
6 Fees And Charges	10
7 Useful References.....	10
8 Glossary Of Terms	10
9 Attributions.....	10
10 Getting In Touch With Us	11

1 Introduction

Are you planning to pile within 15m of our pipes, position heavy loads, excavate, tunnel or undertake significant dewatering adjacent to or over our assets? Do you know these and other similar activities can actually cause damage to and subsequent failure of the assets, resulting in compromised levels of service to customers, flooding, damage to property, compromised safety of our operatives and third parties and even fatalities?

Where an asset cannot be diverted or relocated either temporarily or permanently to accommodate your works, we will require an impact assessment to be undertaken to ensure that the consequences of your works will have as low as reasonably practicable (ALARP) risk to our assets. Depending on your project, you may require additional approvals from us, such as [build over or close to public sewers](#) which outlines the requirements for building over or within 3m of our sewers. No development or structure should be built within 5m of water transmission (trunk) mains or 3m of water distribution mains.

This guidance is intended to provide preliminary advice to you if you wish to undertake work that may impact our assets. It is strongly recommended that the client for the works or their representatives contact [Thames Water's Developer Services](#) (Customer Led unit) for more specific discussions and guidance.

In general terms we will require that your proposed works:

- i) Do not interfere with the delivery of services to our customers both during and after the completion of activities.
- ii) Do not reduce the whole life value of our apparatus: That is, the apparatus will not suffer

damage, loss of capacity, or be otherwise downgraded.

- iii) Do not inhibit or otherwise prevent maintenance and repair to our apparatus.

2 Works that can impact our assets and cause damage

The following are examples of works that can negatively impact our assets and result in damage. This is not an exhaustive list. If in doubt about the potential impact of your works, please contact us:

- Piling – driven or displacement piles (hammer, sheet) and bored or replacement piles (continuous flight auger, rotary etc.)
- Loading – cranes, piling rigs, self-propelled modular transporters (SPMT), abnormal loads (defined as vehicles with weight more than 44000kg or an axle load of more than 10000kg for a single non-driving axle and 11500 for single driving axle.
- Excavations, tunnelling, dewatering.
- Demolitions

3 What will be required of you

Whilst requirements for different works may differ, the following will be required as a minimum if your scheme is deemed to pose a risk to our assets:

- Engineering Impact Assessment by you and reviewed by us. See the [Assessment Criteria](#) included in this document which is provided for guidance.
- Pre and post work surveys (CCTV surveys, manhole surveys, trial holes, leakage surveys, line & level etc.) to confirm that the assets have not been compromised as a result of your works.

- Results of monitoring (vibration, ground movement, strain etc.) as appropriate during the course of your works.

3.1 Piling



Continuous flight auger method of piling

If your scheme involves any form of piling:

- You will need to request asset records from [Thames Water Property Searches](#) showing the types and number of apparatuses in and around your proposed site. The accuracy of the position or depth of any apparatus on asset record plans cannot be guaranteed.
- The outer surface of the apparatuses that may be affected must be defined at ground level before works commence.
- Driven piles shall be installed no closer than 15 metres from the pipe measured between the outside face of the pile and the outside face of the pipe.
- Bored or augered piles shall be at least three metres or 1.5 times the diameter of the pile, whichever is greater, from the pipe measured between the outside face of the pile and the outside face of the pipe.
- Piles adjacent to a pipe must be founded at a level not less than 1.5 m below the underside of it. Any

frictional resistance of the pile above a line drawn upwards at 45 degrees from the underside of the pipe should be ignored when calculating the load carrying capacity of the pile.

- All boring operations must be controlled to ensure that the minimum of vibration is transmitted to the apparatus. A peak particle velocity (PPV) of 10mm/s is the maximum that should be recorded at the face of the apparatus.
- Requirements for other types of piles such as impact hammer or vibrating hammer need to be considered on an individual basis, dependant on the nature and condition of the pipe.
- Piles forced or otherwise jacked into place can cause abnormal loadings on pipes below and should be subject specific assessment.

3.2 Loading



Crane positioned on riggers, transferring loading to the ground

If your scheme involves the placing or siting of loads such as cranes/outrigger, piling rigs and other heavy equipment in the vicinity of our apparatuses:

- You will need to request asset records from [Thames Water Property Searches](#) showing the

types and number of apparatuses in and around your proposed site. You may need to physically identify the location and depth of the apparatuses. The accuracy of the position or depth of any apparatus on asset record plans cannot be guaranteed.

- The proposed load shall be superimposed to enable visualisation of the position in relation to our pipes and other apparatuses.
- The ALARP risk approach for this type of work is to position the loads so that they do not bear upon our apparatus. This might be achieved by keeping the load-bearing supports outside an area defined by drawing 45 degree lines upward and away from the pipe. For buildings, and in some circumstances crane outriggers, this may also be achieved by bridging or piling thereby carrying the loads on ground beneath or to the side of the apparatus. Where it is not possible to keep loads outside the zone of influence then other methods to calculate the impact will be required (e.g. Boussinesq pressures beneath loaded areas). A complete impact assessment covering the following calculations will be required:-
- Determine the longitudinal ground movement profile cause by the application of the proposed loads. From this, derive the worst case tensile stresses in the pipe and joint rotation
- Consider the crushing effects of the proposed loads on the pipes. Where loads may be higher than a basic HGV axle load (11.5 tonnes), an assessment should be made. This may follow the methods given in 'A guide to design loadings for buried rigid pipes by Young and O'Reilly, Transport & Road Research Laboratory, HMSO 1987.
- Calculate the increase in strain on brick sewers cause by the application of the proposed loads.

3.3 Abnormal Load Transport



Abnormal load being transported on a road

If your scheme involves the movement of very heavy loads or [abnormal loads](#) which are likely to traverse our apparatuses:

- You will need to request asset records from [Thames Water Property Searches](#) showing the types and number of apparatuses along the route of the load transport. The accuracy of the position or depth of any apparatus on asset record plans cannot be guaranteed.
- A scaled/dimensioned drawing showing all axles and the anticipated loads they will carry will need to be submitted.
- If the loads are to pass over our assets, a risk assessment would be required outlining the protective measures in place to reduce or alleviate the risk of damage.
- If the axle loads are greater than the maximum allowable HGV load (11.5 tonnes), an impact assessment is likely to be necessary.
- We would need a confirmation of the route and date of the load transport.

3.4 Excavation, Tunnelling, Dewatering etc.



Deep excavation using heavy machinery

If your scheme involves excavation, tunnelling, dewatering etc. near or over our apparatuses:

- You will need to request asset records from [Thames Water Property Searches](#) showing the types and number of apparatuses in the vicinity of your proposed excavation site.
- You will need to physically identify the location and depth of the assets. The accuracy of the position or depth of any apparatus on asset record plans cannot be guaranteed.
- Ground movement analysis shall be undertaken to determine the potential ground movement to occur and the resulting strains, joint rotations and joint pull-out. The analysis should include profiles of the pipe movements, strains and joint rotations within the zone of influence of the construction works.
- The impact assessment should include a clear and specific section and plan drawings showing the proposed excavation depth and the relative vertical and horizontal positions of our apparatus.
- For excavations over our assets including water tunnels and sewers subject to surcharge, you will

need to establish the impacts of unloading of the ground over the apparatus. Please consult with us at an early stage of your design process.

3.5 Demolition



Demolition using explosives

If your scheme involves demolition in the vicinity of our apparatuses:

- You will need to request asset records from [Thames Water Property Searches](#) showing the types and number of apparatuses in the vicinity of your proposed demolition site.
- You may need to physically identify the location and depth of the apparatuses. The accuracy of the position or depth of any apparatus on asset record plans cannot be guaranteed.
- All demolition operation must be controlled to ensure that the minimum of vibration is transmitted to the pipe. A peak particle velocity (PPV) of 10mm/s is the maximum that should be recorded at the face of the apparatus.
- Ground movement analysis shall be undertaken to determine the potential ground movement to occur and the resulting strains, joint rotations and joint pull-out. The analysis should include profiles of the pipe movements, strains and joint rotations

within the zone of influence of the demolition works.

4 Assessment Criteria Guidance

The criteria given below are suggested to facilitate the preparation of impact assessment documents in respect of our existing apparatuses. They are for guidance only and represent levels of change in strain and joint rotation below which the risk of significant damage may be considered negligible. It should be noted that it is the Designer's responsibility to select appropriate values for specific assessments.

Values lower than those detailed in the tables below are likely to be acceptable to us. However, higher values would require justification that the risk of damage remains negligible. We do not guarantee that even lower values will not result in damage. If alternative criteria values are considered to be appropriate by Designers, it is suggested that we are consulted as early as possible in the assessment process.

Table 1 - Assessment Criteria for Existing Thames Water Pipeline and Sewer Assets

PIPE TYPE	Diameter (mm)	Allowable Increase in Strain (‰)		Rotation (deg.)
		Tension	Compression	
Brick Sewer (red / yellow / blue brick)	N/A	500	25% of the allowable stress	N/A
Cast Iron Lead-yarn joints	N/A	100	1200	0.1
Ductile Iron (Lead-yarn gasket joints)	N/A	500	700	0.5
Ductile Iron (Rubber gasket joints)	N/A	500	700	2.0
Steel	N/A	450	450	1.5
Vitrified Clay	<125	80	400	0.5
	>125	80	400	See Table 2
Concrete (unreinforced)	<225	20	400	0.5
	225 – 750	40	400	See Table 2
	>750	60	400	

Table 2 - Maximum Rotation for Vitrified Clay and Concrete Pipes

Diameter (mm)	Rotation (deg.)
< 375	2.0
375 – 750	1.0
750 – 1400	0.5
> 1400	0.3

5 Risk Assessment & Method Statement

Your impact assessment should include an assessment of the risks of your activity and a method statement outlining how the works will be carried safely with due regard to the general public and our apparatuses. 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 other emergency situation.

6 Fees and Charges

A fee will be charged to cover our input in reviewing your impact assessment, monitoring your works and providing resource and/or operational assistance during your works. The fee will be determined after we establish the scope of your works and the expected input required. Please note that the fee could be less or more than initially advised as the final cost to you will be based on actual time spent.

7 Useful References

- Building over or close to a public sewer (available on Thames Water website).
- Build Regulations 2010, Drainage and Waste Disposal: H4 Building over sewers
- Thames Water Operational Asset Management Standard - Water Networks - Developments Affecting Water Assets.
- A guide to design loadings for buried rigid pipes by Young and O'Reilly, Transport & Road Research Laboratory, HMSO 1987.
- Construction Design & Management Regulations (CDM) 2007.
- Water Industry Act 1991 (Section 174).
- BS 7385-2:1993 - Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

- BS 5228-2:2009 Code of practice for noise and vibration control on construction and open sites.
- The Road Vehicles (Authorised Weight) Regulations 1998.

8 Glossary of Terms

ALARP – As low as reasonably practicable

Apparatus – All structures and equipment that form part of our sewerage and clean water transmission and distribution networks (pipes, valves, washouts, manholes, pump stations etc.)

Build over/close to public sewer – Any structure that is intended to be built over or within 3m of our sewer.

Build over is not allowed in the case of clean water pipes, pumping/rising mains and strategic sewers.

HGV – Heavy goods vehicle

Microstrain – used to denote the change in length or deformation per unit length of an object when force is applied.

Third party – Anyone wishing to undertake works in the vicinity of our assets.

9 Attributions

Image of water pipe burst by [Ideal Group](#)

Image of CFA piling by [Rock & Alluvium Ltd](#)

Image of crane by [Trac Ltd](#)

Image of abnormal load transport by [Kings Haulage](#)

Image of deep excavation by [Crossrail](#)

Image of explosive demolition by [Keltbray](#)

10 Getting in touch with us

For enquiries regarding your works or any other questions relating to the potential impact of your works, please contact us on;



[Thameswater.co.uk/developerservices](https://thameswater.co.uk/developerservices)



developer.services@thameswater.co.uk



0800 009 3921 (Monday – Friday 8.00am – 5.00pm)



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