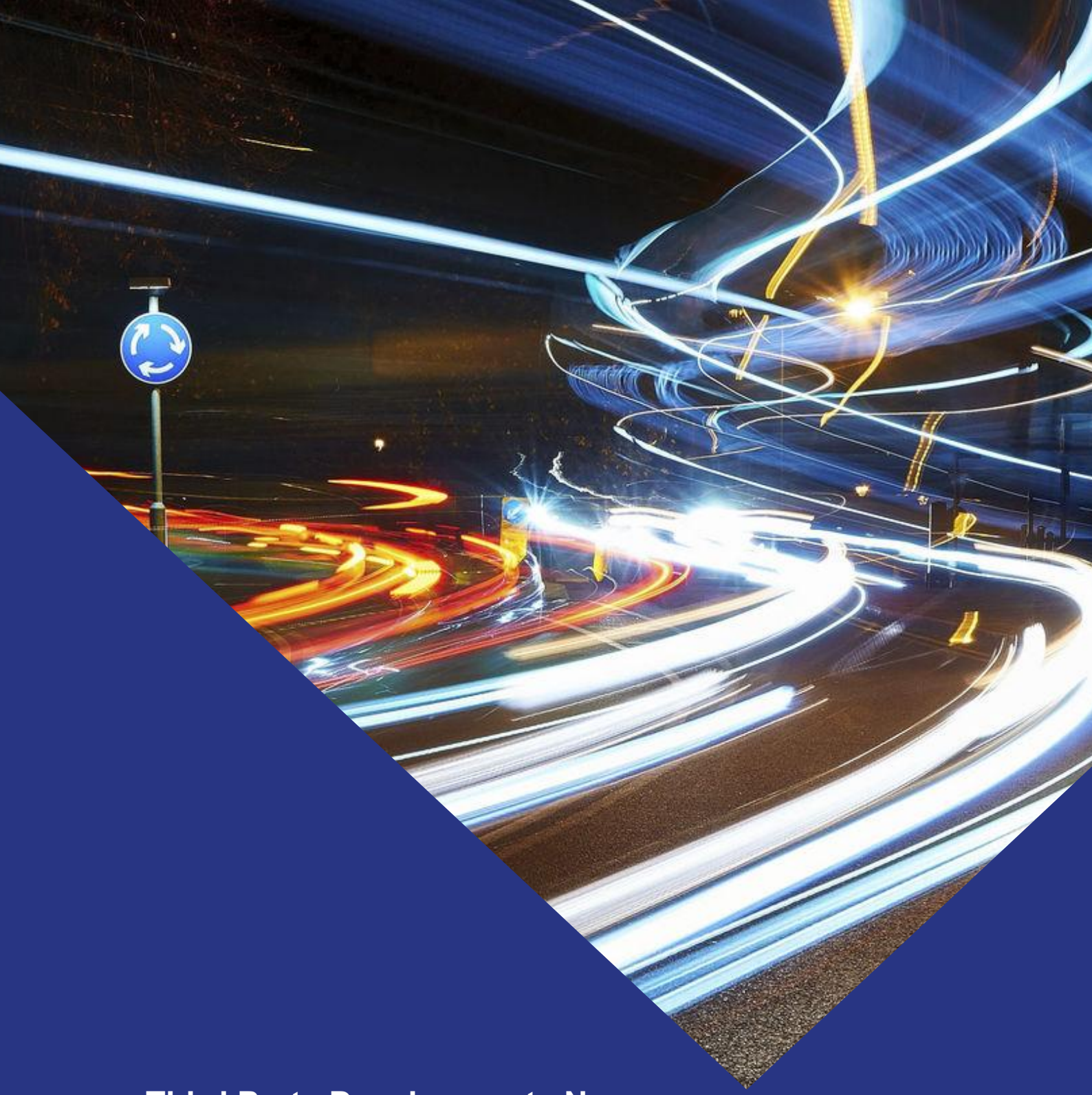


Third Party Developments Near National Grid Electricity Transmission (NGET) Tunnel Assets

TGN(E)_304

Issue 3 | July 2026

nationalgrid

Contents

Purpose and Scope 2

1. Underground Tunnels in NGET 2
2. Underground Tunnel Exclusion and Safeguard Zones 3
3. 3rd Party Development Review Process 5
4. Key Design and Construction Considerations for 3rd Parties 6
5. Surveying Regime for 3rd Party Works 8
6. Monitoring Regime for 3rd Party Works 8
7. Operational Access to NGET Tunnel Assets 9
8. NGET Asset Protection Agreement and Recovering 'Reasonable Costs' 9
9. AMENDMENTS RECORDS 10

APPENDIX A – NGET Plant Protection Contact 11

APPENDIX B – NGET TGN(E)_304 Process Flowchart 12

Disclaimer
NGET or their agents, servants or contractors do not accept any liability for any losses arising under or in connection with this information. This limit on liability applies to all and any claims in contract, tort (including negligence), misrepresentation (excluding fraudulent misrepresentation), breach of statutory duty or otherwise. This limit on liability does not exclude or restrict liability where prohibited by the law nor does it supersede the express terms of any related agreements.

Purpose and Scope

National Grid Electricity Transmission (NGET) is committed to operating electricity cables in a safe and reliable way with the minimum of inconvenience to our customers and local communities – this also includes any infrastructure that supports our cable network like underground cable tunnels.

Underground cable tunnels are a key component of our electricity network, primarily being located deep underneath heavily urbanised areas, they are used to avoid complex interfaces with existing infrastructure in the UK's major cities, as well as challenging geographical constraints.

This NGET guidance document covers all work by 3rd parties where a proposed development could have an influence on the integrity of NGET underground tunnel assets, including associated assets like headhouses, access shafts and other relevant infrastructure.

Examples of 3rd party works in proximity to underground tunnel assets might include general construction, excavations, demolition, installation of public utilities and other services including underground and overhead pipes and cables, surveys, ground investigation works and general access.

This document also applies to those 3rd parties working on behalf of NGET, where their works are in proximity to NGET tunnel assets.

For works carried out directly on a NGET tunnel (e.g. extensions, repairs or replacement), this document shall be used as guiding good practice and the principles applied as far as practicable. However, some requirements (including the exclusion zone provisions) may not be fully practicable due to the nature of the works and the need to work within the exclusion zone, while still ensuring protection of the existing tunnel asset.

Further information about NGET cable tunnel assets can be obtained by contacting NGET Asset Protection. Further contact information can be found in Appendix A.

1. Underground Tunnels in NGET

1.1. Underground Tunnel Locations

National Grid Electricity Transmission (NGET) has a significant amount of underground tunnels across its electricity transmission network, primarily containing HV cable assets that are owned and operated by NGET.

The latest guidance for working near our assets can be found at:

https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/working-near-our-assets

For accurate locations of the NGET cable network across the UK – please use the following link to obtain the relevant shape file for underground cables*:

https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/network-route-maps

**Please note that a compatible GIS is required to use these files.*

1.1. Typical Underground Tunnel Construction

The majority of NGET underground tunnel assets are bored tunnels, which are constructed either by starting from one entrance and constructing the whole tunnel or by starting at both entrances and meeting in the middle. The tunnel sections for the majority of tunnel routes will have been constructed using a Tunnel Boring Machine (TBM).

With regards to more recent underground tunnel projects (for example London Power Tunnels), the tunnels themselves are typically single bored tunnels running from a primary substation to a receiving substation via a series of intermediary access shafts and headhouses – generally located between 20 and 60 metres below ground level, lined with fibre-reinforced precast concrete segments.

Other tunnel assets within NGET that also contain transmission cables are typically constructed using other standard tunnel construction methods (for example cut and cover), although the range

of tunnel depths below ground level can vary significantly dependent on location, geology and other physical constraints.

Individual underground tunnel asset drawings and other relevant information (material, design specifications) can be provided by NGET (where available).

2. Underground Tunnel Exclusion and Safeguard Zones

2.1 Exclusion Zone

NGET imposes an Exclusion Zone on all 3rd parties, including those working on behalf of NGET. The exclusion zone represents a pre-defined area around the tunnel structure where NGET will not permit any encroachment from any private or utility planned development.

The Exclusion Zone, extending outwards from the exterior of the tunnel perimeter, prohibits any works in the close proximity of any tunnel asset that could have a negative impact on the structural integrity and/or operation of the asset and its ancillary systems.

The dimensions of the Exclusion Zone are identified in Figure 1. The exclusion zone extends 6m vertically from the outer face of the tunnel wall (plus a 500mm construction tolerance) and 3m horizontally from the outer face of the tunnel wall (plus a 500mm construction tolerance).

For vertical shafts, the Exclusion Zone shall extend 3 m horizontally in all directions (plus a 500mm construction tolerance) from the external perimeter of the shaft structure, at all levels where the shaft is present.

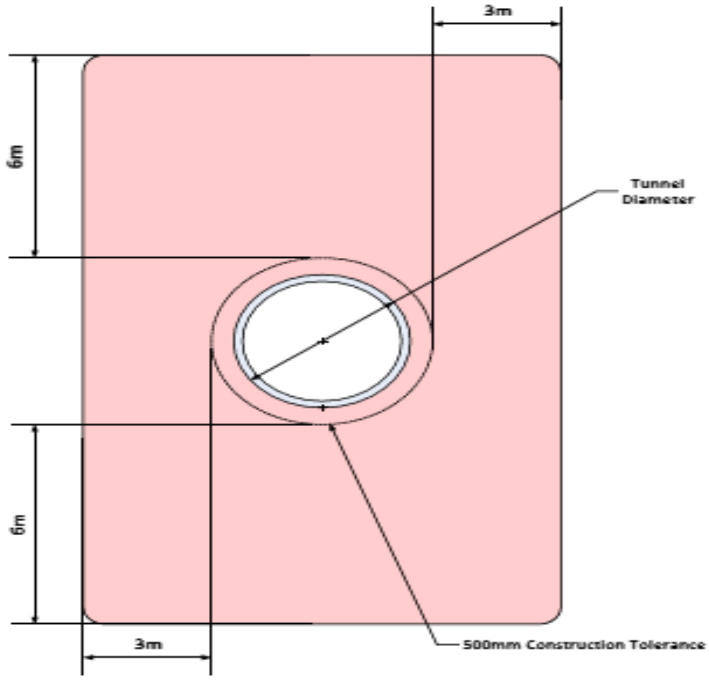


Figure 1 – Exclusion Zone Definition

2.2 Safeguard Zone

NGET also imposes a Safeguard Zone on all 3rd parties, including those working on behalf of NGET. This aims to promote an interface between the 3rd party and NGET with regards to any major works that have the potential to have an impact on the structural integrity and/or operation of the asset and its ancillary systems.

The Safeguard Zone considers whether any proposed structure falling within a line 45° from the tunnel invert could load the tunnel lining. This ensures that any 3rd party works that is planned to infringe on this zone, seeks appraisal and ultimately acceptance from NGET, prior to any works taking place.

There is also a notional horizontal boundary for the Safeguard Zone which is set at 35m either side of the tunnel centreline.

The dimensions of the Safeguard Zone are identified below in Figure 2.

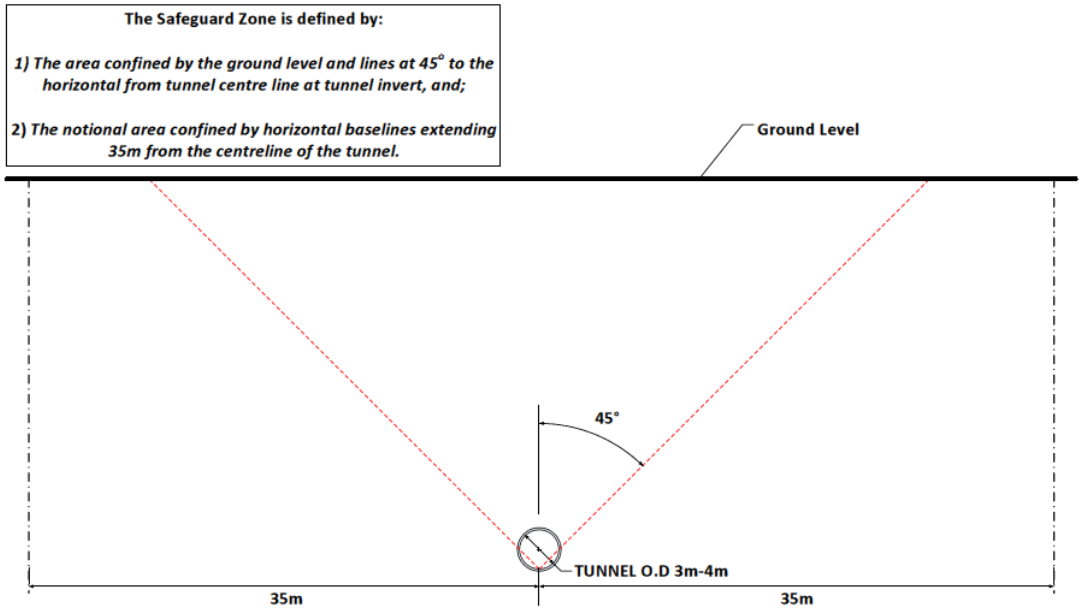


Figure 2 – Safeguard Zone Definition

2.3 Excavation Zone

There is also an Excavation Zone that needs to be considered during any 3rd party works, including those working on behalf of NGET.

The Excavation Zone is a 2.5m strip below ground level constrained by the horizontal baseline of the Safeguard Zone, where any excavation works in this area is unlikely to require any additional engineering assessment but due to the potential effects of heave on clay soils, any excavation that exceeds the 2.5m depth below ground level will require an Engineering Assessment to show that heave will not have an effect on the integrity of the cable tunnel.

Where the tunnel is shallow such that the exclusion zone overlaps the excavation zone, the exclusion zone shall take precedence. Such cases shall be assessed on a case-by-case basis and assessed as part of the AiP process for any planned excavations in the overlapping Exclusion Zone and Excavation Zone.

2.4 Definition of Works

The definition of ‘works’ with regards to these zones could include, but are not limited to:

- **a)** Ground Investigation Works,
- **b)** Existing Utility Asset Maintenance or Replacement,
- **c)** 3rd Party Building Developments,
- **d)** Development and Construction of Underground Public Transport Infrastructure,
- **e)** Development and Construction of Utility Infrastructure,
- **f)** Any Development with the potential to impact the integrity and operation of the cable tunnel asset.

The designated zones shall also apply to any decommissioning, demolition or maintenance works that could affect the integrity and operation of any of the cable tunnel assets.

The combined guidance drawing for the zones identified can be found in Figure 3:

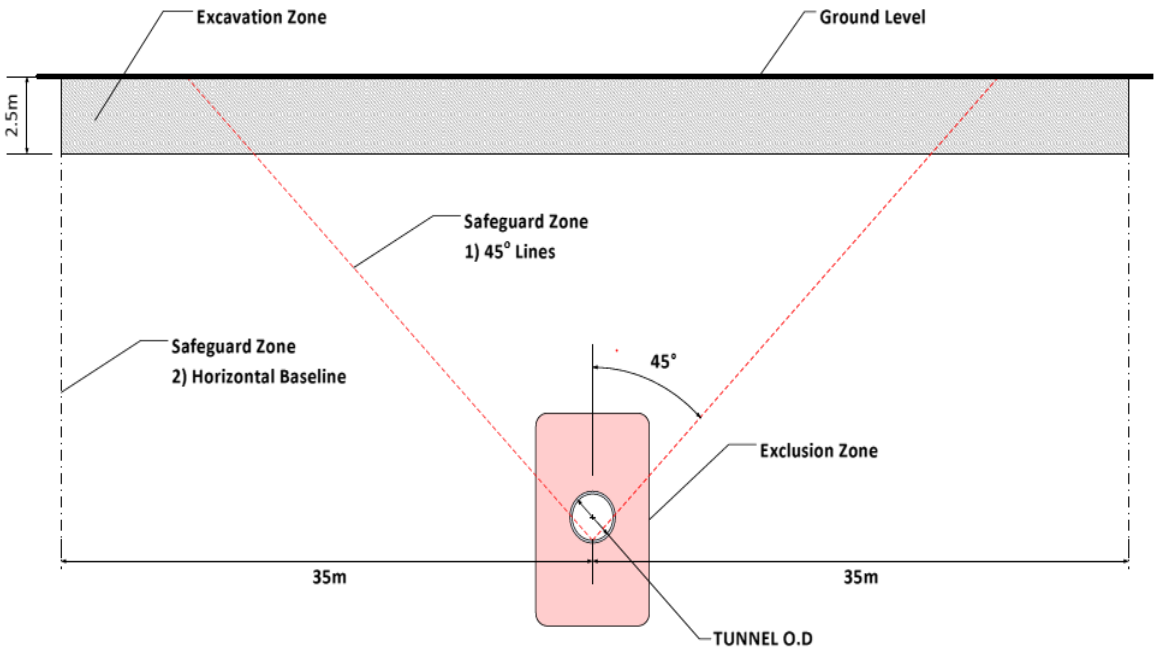


Figure 3 – NGET Cable Tunnel Exclusion and Safeguard Zones

3. 3rd Party Development Review Process

3.1 3rd Party Development Submission Requirements

The basic requirement to be met by the 3rd party nominated design teams, on any structural designs, which could potentially impose loads or other actions on a NGET underground tunnel asset within 35m horizontally of the centreline of the tunnel is to provide the following:

a) Information on the design method which the design team intend to use to ascertain the effects of the new structure foundation on the existing tunnel.

b) A Ground Movement Assessment to establish the effect from 'greenfield' ground movements

c) As part of initial discussion between the 3rd Party and NGET, an Engineering Assessment may be required to ensure that the tunnel can withstand the increased loading, through comparison of the effects of the actual loading with those caused by the design surcharge (see Section 4).

d) A Category I, II or III Design Check Certificate (as appropriate), provided by an independent checker, is to be issued to NGET to assure the loads on the foundations and to appraise the ground movement assessment analysis. Note: There is no requirement for the independent checker to be a Contractor Design Approval Engineer (CDAE), as defined in NG/ET/BP_188 and NG/ET/SR_188.

e) An Approval in Principle (AiP) document containing all the information identified above to be submitted to NGET for review and comment.

Note that for 3rd party developments linked to smaller utilities infrastructure (so pipework, cables etc.) an AiP will also be required but may not require an as rigorous assessment when compared to larger developments (high rise buildings, underground tunnels, highways etc.).

3.1.1 Approval in Principal (AiP) Document

The AiP is a document to be produced and submitted by the 3rd party to NGET to identify and explain the following:

a) what is proposed with regards to the 3rd party development

b) where the proposed development is in relation to NGET asset(s)

c) whether there will be any interaction with NGET asset(s)

d) where there is interaction, initial proposals for mitigation measures and design intentions

e) any available drawings, reports or other important information relating to the proposed development

f) the impact from the Ground Movement Assessment

g) any Engineering Assessment(s) (if required)

h) the justification behind not proposing an Engineering Assessment (if required)

There is no pro-forma or template for the AiP so it is expected that the 3rd party will use a sensible format and document structure.

3.1.2 Engineering Assessment

For any potential interaction with a NGET underground tunnel asset, where it has been determined by the third party that it could have an effect on the structural integrity and operation of the cable tunnel – then an Engineering Assessment will be required as part of the AiP submission from the 3rd party to justify that the engineering effects from the development are not 'significant' on the overall integrity of the tunnel asset.

The content of the Engineering Assessment section of the AiP will depend on the type of interaction with the tunnel asset and this can be discussed and agreed with a technical specialist from NGET. Due to the complex nature of tunnel design and analysis, there is an expectation that there will be non-linear dynamic analysis to demonstrate compliance.

The Engineering Assessment should also ensure that a separate 3rd party Design Check Certificate (level of design check to be agreed between 3rd party and NGET) is provided and the record of the check is included as part of the overall submission to NGET.

4. Key Design and Construction Considerations for 3rd Parties

4.1 Surcharge Loading Constraints

4.1.1 Definition of Acceptable Surcharge Loadings

NGET will want to discuss loading or unloading from any development that could potentially load or deform the tunnel linings, and have any negative impact on the structural integrity of the tunnel asset.

The design of more recently constructed tunnels (post 2000) allows for surcharge loadings from existing buildings or, where there were no existing buildings, assumes a uniformly distributed load of 75kN/m² at ground level, based on the ground level at the time the design was undertaken.

Resultant surcharge loading on the connecting tunnel and shaft forming the head house shall not exceed 75kN/m².

For all other existing tunnel assets, assume a uniformly distributed load of 50kN/m² at ground level, based on the ground level at the time the tunnel as was installed.

It shall be assumed for any 3rd party proposing development above NGET tunnels, that point loading of a tunnel is not acceptable in any case.

4.1.2 Exceeding Surcharge Loadings

The surcharge allowances in Section 4.1.1 can only be exceeded if an engineering assessment of the tunnel load and deformation is produced and is acceptable to NGET.

As part of this the 3rd party shall provide the following technical information as part of the Ground Movement Assessment and Engineering Assessment:

a) predicted soil movements/settlement and therefore tunnel lining movement at stages of construction, loading and consolidation, including unloading for example during demolition or basement construction

b) tunnel lining hoop stress, joint stress and bending moment changes, allowing for any segment joint lips in that location

c) combination of hoop stress and bending moment with respect to the M-N interaction diagram

d) maximum Radius of Curvature due to impact from development

e) assessment of maximum cross-section distortion (presented as a %)

f) structural assessment of bolted connections (where applicable)

g) dimensional assessment of opening up of joints for both bolted and non-bolted lining joints

h) verification where appropriate using semi-empirical methods

The 3rd party shall also consider and respond to the following issues with construction:

a) stress relief and deformation of NGET tunnel assets from the boring process

b) potential for outflow of soil into pile bore, reducing support to tunnel lining

c) potential for concrete or support fluid flow from pile bore to NGET tunnel assets

4.2 Foundation and Borehole Constraints

Where piled foundations are required, bored piles are preferred.

Where possible, piles should be founded below the tunnel invert so that end bearing loads are transmitted below the tunnel.

The pile should be sleeved throughout to prevent load transfer via skin friction to the ground above the tunnel. Where this is not possible, any subsequent analysis will need to consider the combined effects of end bearing and skin friction (dependent on geotechnical information).

Excessive vibration near to NGET tunnel assets is unlikely to be acceptable, normally ruling out driven piling, as well as vibro-compaction and stone columns.

The precise location, depth and loading of piled foundations should be carefully specified. As part of the consultation process NGET may request advance notification of scheduled piling, and that the pile logs and test pile results be made available for review.

If NGET believes that continuing piling will or is reasonably likely to have an adverse impact on NGET tunnel assets, then NGET reserve the right to suspend the piling works until the 3rd party can demonstrate otherwise through further analysis and/or supplementary monitoring.

Those proposing boreholes should have regard to the extent of the Safeguard Zone and where necessary liaise with NGET to establish any constraints and/or monitoring requirements.

As a minimum the drilling method, diameter, proposed depth, inclination and OS coordinates of the foundation/borehole will be required before acceptance is given.

Where drilling support fluid is proposed, the fluid shall be selected to avoid any potential ingress of fluid into the nearby NGET tunnel assets, for instance from transmission of the fluid through fissures in the ground.

A representative from NGET may wish to attend site to verify site controls on location and depth – typically, notice of 24 hours will be given prior to a site visit and all effort should be made by the 3rd party to accommodate these types of requests.

4.3 Ground Movements, Vibration, Distortion and Settlement Constraints

4.3.1 Vibration

Vibration can present a risk to operation through disruption of equipment or through movement of ground or structures (ground displacement, settlement or heave).

There is an ultimate vibration limit of 30mm/sec peak particle velocity for all aspects of work in proximity to NGET underground assets (tunnels and shafts).

If the piling methods, identified earlier in this section, are specified and the developer cannot demonstrate that the vibration does not exceed a peak particle velocity of 7mm/s at the intrados of the tunnel structure or associated auxiliary structures then a settlement and vibration monitoring regime will be required.

4.3.2 Distortion

Cross sectional distortion of the shaft/tunnel shall not exceed 0.2% of the theoretical diameter.

Maximum permissible radius of curvature of 10km.

4.3.3 Ground Movement and Settlement

Minor settlement will have occurred during the tunnelling operations associated with the installation of the majority of NGET tunnel assets, but this will have been calculated with a high level of accuracy.

The absolute deflection of any point of head house from its as built position in any direction shall not exceed 10mm and is typically anticipated to plateau after a few years.

As per Figure 3, for any large-scale excavations (car parks, basement areas etc.) that remove a depth of soil greater than 2.5m, the 3rd party must liaise with NGET to establish whether there is a requirement to provide calculations for review and acceptance by NGET.

The calculations should quantify any ground movements that may occur across the excavated area - as well as satisfying NGET that the integrity of the tunnel asset is maintained.

NGET would mainly be concerned about the potential for heave, certainly in the various clay strata in Southeast England but will also require information regarding settlement during and post construction works.

NGET does not offer the right of support nor does it accept liability for any settlement, damage, noise or vibration emanating from the normal operation or maintenance of any tunnel asset.

5. Surveying Regime for 3rd Party Works

5.1 Tunnel Line and Level Survey

Prior to any detailed planning and design works commencing in relation to a 3rd party development, NGET can provide indicative tunnel locations from the as-built drawing records for tunnel assets and any associated structures (shaft, adits, access points etc.) but these should not be relied upon for 3rd party planning/design development – particularly in relation to development of foundation and structural layouts.

Positive identification via a specific tunnel survey shall be carried out by the 3rd party, this should be scoped to ensure an accurate determination of the line and level of the affected tunnel asset. This can then inform accurate locations of the Exclusion, Safeguard and Excavation Zone(s).

5.2 Baseline and Post-Construction Condition Surveys

Prior to any construction works in proximity to a NGET tunnel asset, an internal baseline condition survey of the tunnel shall be carried out. The scope of the survey should be agreed between the 3rd party and NGET – this will include the agreed chainage to be affected by the proposed development – but ultimately the baseline condition survey will inform future comparisons as a result of subsequent condition surveys.

A post-construction condition survey shall also be carried out – and where there are any either new or worsening defects identified as part of the survey and these can be directly attributed to impact from any construction works associated with the 3rd party development, these should be rectified by the 3rd party at their expense.

The scope of the surveys shall be focused around a visual examination, covering the affected tunnel chainage length – identifying defects by exception and providing a record of the overall condition of the tunnel for review by NGET.

Interim condition surveys may be required subject to the requirements of the overall asset protection strategy.

6. Monitoring Regime for 3rd Party Works

It may be necessary for a 3rd party to implement a monitoring strategy for a NGET tunnel asset during certain works.

For developments above, below or near to tunnels the developer will agree with NGET whether tunnel monitoring is required and, if so, to agree a monitoring regime.

An Asset Monitoring Plan shall be submitted by the 3rd party to NGET for review and acceptance prior to commencing any works in proximity to the NGET tunnel asset.

A suitable RAG (Red/Amber/Green) trigger level status should be proposed as part of the Asset Monitoring Plan with corresponding action plans – including provision for emergency response, should settlement/vibration exceed the red trigger level(s).

Frequency of monitoring readings and the method of data provision to NGET shall be agreed prior to commencing any monitoring works and included as part of the Asset Monitoring Plan.

Monitoring measures will depend upon the predicted settlement, increase in tunnel stresses and construction methodology and may include:

a) a review and subsequent monitoring of cable support structures (including fixtures) including vertical and horizontal alignment

b) vibration monitoring for foundation/tunnelling works in close proximity to the NGET tunnel asset

c) pre-construction and post-construction three-dimensional survey using laser or fixed targets (also during the works if for an extended period) to identify the radial and longitudinal deformation profile changes of the NGET tunnels during the works

d) monitoring equipment recording movement of tunnel lining in real time. This will need to be in place well before loading (to allow a stable set of readings to be taken) and continue until soil movement is largely complete or until it is clear that the settlement has matched the predictions

e) monitoring of adjacent structures such as retaining walls forming basements close to the NGET tunnels so that displacements of the wall are monitored at source and may be able to be correlated with displacements of the nearby NGET tunnels

7. Operational Access to NGET Tunnel Assets

Where a 3rd party or one of their nominated suppliers may require access to a NGET asset for either survey or monitoring-related activities - requests for access should be directed through NGET Plant Protection in the first instance, with ongoing involvement from NGET technical and operational staff as required.

Access to NGET tunnels may require considerable input and support from NGET Operations staff to ensure safety from the system is maintained for all parties involved therefore the timeline for access for monitoring activities cannot be advised in general – and will be discussed on a case-by-case basis.

The 3rd party will also have to provide a safe system of work for review and acceptance by NGET Grid Operations before access to the underground tunnel can be granted – as well as detailed information about any equipment that will be used for monitoring activities.

8. NGET Asset Protection Agreement and Recovering ‘Reasonable Costs’

There may be a requirement for the 3rd party to enter in a legal undertaking with NGET that covers the protection of the NGET asset(s) in relation to the 3rd party’s proposed development – this is in the format of a legally binding Asset Protection Agreement (APA).

This is required should there be potential for the development to cause significant impact on the tunnel asset – this could be a combination of excessive settlement, increase in stress of the tunnel lining and/or impacts from construction works associated with the development that could impact the operation of the tunnel and equipment contained within.

NGET is likely to require at least ‘in principle’ agreement on the undertaking of the APA before engagement with the 3rd party in consideration of their proposed works and the agreement to reimburse ‘reasonable costs’ associated with providing advisory/technical/operational services to the 3rd party.

NGET use a standard template for Asset Protection Agreements which can be reviewed and discussed once an ‘in principle’ agreement has been reached between the 3rd party and NGET.

9. AMENDMENTS RECORDS

Issue	Date	Summary of Changes	Author(s)
1	April 2018	New Document	Lee Warren Asset Policy
2	September 2020	Various sections updated (survey requirements, design constraints) and references updated.	Lee Warren Asset Lifecycle
3	July 2026	Appendix A and B added. Exclusion zone for shafts added. Minor clarifications to scope and exclusion zone sections.	Tom Steel Asset Engineering

APPENDIX A – NGET Plant Protection Contact

If you have any questions or need more information about working near our network assets, please contact the National Grid Asset Protection team or submit an enquiry via the Linesearch website: https://lsbud.co.uk/

Linesearch before you dig (LSBUD) is a free, online, and nationwide safe digging service designed to protect people and underground infrastructure by providing immediate location information on utility assets (pipes, cables, etc.) to anyone planning to perform excavation work.

Linesearch provides search facilities for our assets so you can:

- check if your works will affect our transmission network
- find out if it's safe to dig before you start works
- find out where NGET's buried electricity cables are located
- identify where NGET's overhead lines are located and request line profile drawings and safety guidance.

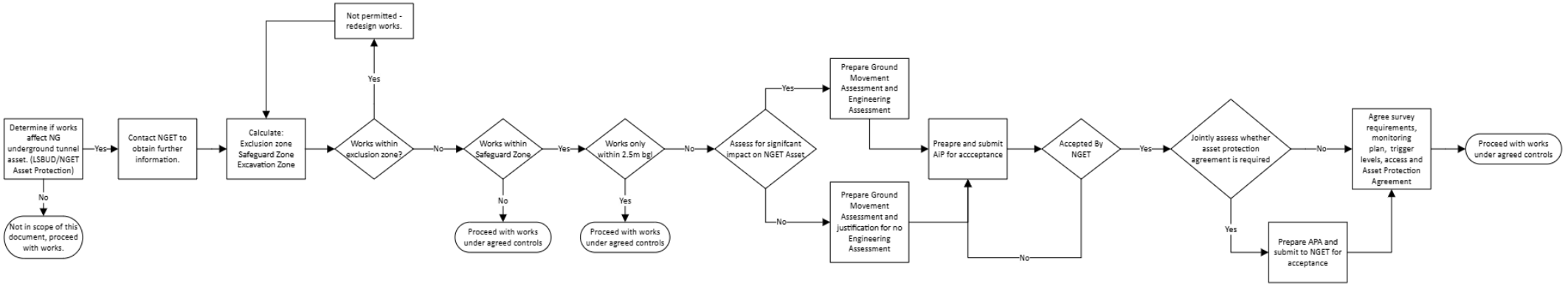
Phone: 0800 001 4282 (Asset Protection)

Email: assetprotection@nationalgrid.com

The Asset Protection phone line is available Monday to Friday, 08:00-16:00 (excluding bank holidays). We aim to return missed calls and voicemails within one hour during normal working hours.

For domestic enquiries, such as metering or power cuts, please contact your local electricity distribution operator, which can be found on the ENA website.

APPENDIX B – NGET TGN(E)_304 Process Flowchart



Copyright © National Grid plc 2026, all rights reserved All copyright and other intellectual property rights arising in any information contained within this document are, unless otherwise stated, owned by National Grid plc or other companies in the National Grid group of companies. No part of this publication may be reproduced in any material form (including photocopying and restoring in any medium or electronic means and whether or not transiently or incidentally) without the written permission of National Grid plc Registered Office:

1 – 3 Strand

London

WC2N 5EH

Registered in England and Wales No. 2366977

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom
Registered in England and Wales
No. 4031152

nationalgrid.com

nationalgrid