WORK PROCEDURE FOR CARRYING OUT MECHANICALLY ASSISTED EXCAVATIONS NEAR TO HIGH PRESSURE PIPELINES

In this document:

Shall: indicates a mandatory requirement.

Should: indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment shall be completed to show that the alternative method delivers the same, or better, level of protection.

1. PURPOSE

This work procedure describes the requirements for carrying out mechanically assisted excavations near to High Pressure pipelines or buried pipework, as described in T/PM/SSW/2 and T/SP/SSW/22, within a pipeline easement, National Grid AGI or the public highway. This work procedure includes all excavations within 3 metres either side or within 600 mm above a high pressure pipeline or any associated fitting attachments and is intended for use by National Grid approved, competent, personnel supervising excavation activities. This procedure shall be supplemented with site specific instructions.

Mechanically assisted excavations shall only be undertaken after the pipeline position has been confirmed from hand dug trial holes and the pipeline has been marked out with an adequate number of pegs.

The principles of this work procedure should also be applied when carrying out mechanically assisted excavations near to Intermediate Pressure steel pipelines (pipelines operating between 2 and 7 barg), for which reference should also be made to T/PM/DP/1.

2. RESPONSIBILITIES

All National Grid approved, competent, personnel involved in monitoring and supervising mechanically assisted excavations shall follow the requirements of this Work Procedure and be trained in utilities plant location. He/she shall be competent in the interpretation of plans and be experienced in general excavation work.

The mechanical excavator driver should be trained and certificated for operation of the specific mechanical plant.

3. RELATED DOCUMENTS

T/PM/DP/1	Work procedure for inspection and prevention of damage to National Grid gas plant operating at pressures up to 7 bar.
T/PM/EM/71	Management procedures for dealing with gas escapes and other emergencies.
T/PM/MAINT/5 Part 1	Management Procedure for Maintenance of pipelines operating above 7 barg – Part 1 Control of Maintenance Activities
T/PM/MAINT/5 Part 2	Management Procedure for Maintenance of Pipelines Operating Above 7 Barg – Part 2 Control of Third Party Activities
T/PM/OLI/1	Management Procedure for carrying out on-line inspection of steel pipeline systems.
T/PM/SCO/1-5	Management procedures for safe control of operations.

T/PM/SSW/2	Management Procedure for safe working in the vicinity of National Grid Gas high pressure pipelines and associated installations – Requirements for National Grid Gas.
T/PM/SSW/8	Management Procedure for working on un-odorised gas installations.
T/PM/P/18	Management procedure for working on pipelines containing defective girth welds or girth welds of unknown quality.
T/SP/SSW/22	Specification for safe working in the vicinity of National Grid Gas high pressure gas pipelines and associated installations - Requirements for third parties.
T/SP/SSW/222	Pipeline Safety Advice for Farmers, Landowners, Occupiers and Contractors
T/SP/TE/B1.	Specification for Pipeline Locator Bars
T/PR/SW/1	Work Procedure for Excavations
HSG47	Avoiding danger from underground services (HSE).
NRSWA	New Roads and Street Works Act.
CI508	Safety in excavations (HSE).
GS6	Avoidance of danger from overhead electrical lines (HSE).

4. SPECIAL TOOLS AND EQUIPMENT

Appropriate plans.

Strip Plans, to identify drainage close to the pipeline.

Third party/utility plans

Any other relevant records, such as special drawings, pipeline inspection tallies (from T/PM/OLI/1 where available) to assist in identifying the presence of fittings, attachments and bends.

An approved pipeline and cable locator.

Appropriate pegs, marker flags and spray marker paint

A National Grid approved 600 mm D Handle searcher bar conforming to National Grid specification T/SP/TE/B1.

5. BEFORE STARTING WORK

Planning offsite

5.1 This activity **MAY** be suitable for lone working subject to an appropriate assessment being completed in accordance with Lone Working Procedures.

5.2 The proposed work should be carefully planned in advance. The depth and size of the proposed excavation should take account of the reason for the excavation, i.e. whether the excavation is for a localised coating repair, for a full encirclement pipeline repair, to investigate external interference damage, for a connection etc.

The excavation should take account of the soil type, depth and pipeline parameters (e.g. diameter, pressure etc). The algorithm shown in APPENDIX B should be used to assist in the planning. Excavating a trench parallel to and adjacent to the pipeline should be considered for some planned excavations, as this minimises the manual effort of hand digging of the earth directly above the pipeline. For planned excavations with a length greater than 5m, a further assessment is required to ensure the pipeline is adequately supported.

5.3 Where it is known that the pipeline contains defective girth welds or welds of unknown quality, work should be carried out in accordance with T/PM/P/18 alongside this work procedure

5.4 A method statement and site specific risk assessment for the work to be carried out shall be prepared in advance and agreed with the National Grid approved representative. Where overhead plant is present on site, the requirements of the HSE document GS6, Avoidance of danger from overhead electrical lines, shall be followed.

5.5 Where applicable, ensure that the necessary arrangements have been made with any relevant third parties prior to the work being carried out.

5.6 For sites within the boundaries of un-odorised gas sites, the additional requirements of T/PM/SSW/8 shall be followed.

5.7 Check appropriate plans, strip maps and other records, such as the OLI tally, to ensure that the area to be excavated is not in the vicinity of a nitrogen sleeve or other stabbings, such as pressure/drain points and offtakes on the pipeline.

Planning on site

5.8 Establish good communications with your manager or supervisor ensuring that your whereabouts are known.

5.9 Check all portable equipment is adequate for safe operation, correctly calibrated and certified.

5.10 Review site conditions and ensure all hazards have been identified and are controlled. Consider personal and others safety. If at any time you are unsure of the precautions to be taken, STOP WORK AND CONTACT YOUR MANAGER. If your manager is not available, then contact the duty manager via either the DNCC or GNCC, as appropriate.

5.11 Fire extinguishers shall be deployed as appropriate to the risk but are mandatory when undertaking intrusive maintenance.

5.12 National Grid Safe Control of Operations (SCO) procedures, where applicable, shall be adhered to at all times.

5.13 Safe digging practices, in accordance with HSE publication HSG47, shall be followed.

5.14 Equipment that is not certified shall only be used in hazardous areas with the approval of the Authorising Engineer.

5.15 As a minimum, the operative shall undertake the following checks each time the searcher bar is to be used to ensure it is adequate for safe operation:

- Ensure that the tool is labelled to confirm that it has been electrically tested and the date of the required retest.
- Ensure that the tool is only used within the stipulated retest date.
- Check that the insulated covering is sound and free from cuts and indentations.

- Check that the spike is not bent or damaged.

If the searcher bar fails any of the above checks it shall not be used and a suitable replacement shall be obtained. Any faulty or defective impact tools shall be returned to the person responsible for tool maintenance.

5.16 Only National Grid approved personnel may trace the pipeline for the purposes of the machine assisted dig. Ensure that the National Grid personnel are trained and competent in using the pipeline locator, and the pipeline locator has a current calibration certificate. A search across and along the side of the pipeline, using the pipeline locator, should be undertaken to identify the presence of any offtakes on the pipeline.

5.17 Confirm that the contractor has all the utilities drawings and issue a copy of T/SP/SSW/22 together with a completed copy of the Site Document Control Form to the contractor's team leader. The contractor at the start of the excavation shall be requested to sign APPENDIX A of this Work Procedure sheet to say that he/she has read and understands the work that is permitted and will comply with its content. If the contractor is a National Grid appointed contractor working under a Permit to Work with an approved method statement and risk assessment, then this will suffice. Where utility plans indicate the presence of other underground apparatus, the owner of other plant shall be consulted by the contractor to agree a safe working method or to arrange a site visit.

6. METHOD OF WORKING

General

6.1 All work is to be carried out in the presence of a competent National Grid approved representative. The algorithm shown in APPENDIX B should be used in conjunction with the instructions presented below.

6.2 The instructions issued by the National Grid approved representative on site shall be adhered to at all times to ensure the safety of the pipeline.

6.3 Due to the potential for toothed excavator buckets to damage pipelines, toothless buckets shall be used whenever a mechanical excavator is used. This should reduce, but does not eliminate, the potential for damage.

6.4 Third parties and contractors may excavate, unsupervised, with a powered mechanical excavator no closer than 3 metres to the edge of the National Grid located pipeline. Any fitting, attachment or connecting pipework on the pipeline shall be exposed by hand. All other excavation should be by hand.

6.5 Consideration may be given to a relaxation of these limits by agreement with the National Grid approved representative on site and only whilst he/she remains on site to supervise this work – note this National Grid approved representative is in addition to the competent person on site.

Relaxation of the limits shall be based on the real position of the pipeline as confirmed by trial hole. In this case, a powered mechanical excavator shall not be allowed to excavate closer than 600 mm to the nearest part of the pipeline.

6.6 If at any time the National Grid approved representative has any doubt with regard to the excavation by machine at this location, then permission to use the machine will be withdrawn and the excavation shall be completed by hand digging.

6.7 Prior to using the searcher bar, a plant location survey shall be undertaken to determine the position of underground mains and services within the area to be excavated. Mark out the position of underground plant located during the survey.

The searcher bar should not be used within 230 mm of the located line of electricity cables or gas services (this does not include the pipeline being excavated). If the position of the plant does not allow this, the maximum possible distance shall be maintained between the searcher bar and the located plant, as determined by a site specific risk assessment. However, in circumstances where the 230 mm clearance is reduced care shall be taken to ensure that the searcher bar is not used directly above the line of the located plant.

Trial holes and marking out

6.8 The use of trial holes for establishing the position, depth and direction of the pipeline shall be undertaken prior to any mechanically assisted excavations. The number of trial holes should be sufficient to be able to confirm the pipeline location, direction and depth.

- For standard depths of cover (<1.2 m), trial holes shall be hand dug to confirm the pipeline location, depth and direction.
- For depths of cover >1.2 m, mechanical excavators may be used to assist in digging trial holes, until the remaining depth of cover is 1.2m, after which the trial holes shall be hand dug to confirm the pipeline location, depth and direction.

6.9 When the pipeline location has been confirmed by the trial holes, ensure the pipeline position is clearly marked out with an adequate number of pegs to define the location of the pipeline with an HP gas pipeline indicator/sign attached to each peg. Pegs should be firmly planted and checked at the start and end of each day's work (if applicable) and also if conditions change (e.g. heavy rain).

6.10 When the pipeline has been located and marked out, a mechanically assisted excavation may be carried out in accordance with this work procedure, in conjunction with a site specific risk assessment, method statement and any permit requirements.

Removal of topsoil or top surface layer and storage

6.11 Check depth of pipeline using the approved pipeline locator. A connection to the pipeline with the location equipment transmitter, via a cathodic test post, or similar, will normally provide a more accurate signal.
Note; Depending on the approved type of pipeline locating tool to be used it may either measure the depth of the pipeline from the centre of the pipeline or to the top of the pipeline.

6.12 Using the approved searcher bar, probe the length and width of the top layer surface at 100 mm intervals to a depth of 600 mm.

6.13 If at any time the searcher bar touches an object, excavate by hand to identify the object.

6.14 Remove topsoil or top surface layer from the 3 metre strip either side of the pipeline using a mechanical excavator.

- Pipeline Easements: - Where sufficient depth of cover exists, light tracked vehicles may be permitted to strip topsoil to a depth of 250 mm, using a toothless bucket.
- Pipeline in the Highway: - Removal of the bituminous or concrete highway surface layer by mechanical means is permitted to a depth of 300 mm. Note the use of a chain trencher to do this should not be permitted within 3 metres of the edge of the pipeline. No mechanical

excavation shall be undertaken until the position of any other utilities apparatus has been established and the relevant plant owner contacted for their requirements. Where the surface layer exceeds 300mm, contact your manager

6.15 Store the top soil separately from, and avoid contamination with, other excavated materials.

Excavations

6.16 Where the remaining depth of cover is greater than 600 mm, the use of a mechanical excavator, under close supervision, may be used to assist with excavations, until a remaining depth of cover of 600 mm has been reached – the use of a mechanical excavator shall be closely supervised by the National Grid approved representative with regular checks using the approved pipeline locator and searcher bar, as described below.

6.17 When the remaining depth of cover is less than 600 mm, the rest of the excavation should be hand dug under supervision. Regularly check the position of the pipeline with the approved pipeline locator and probe the excavation with the approved searcher bar, as described below.

6.18 The excavation should be carried out to ensure there is no risk of collapse or removal of support to the pipeline. This will require careful consideration of trench support systems, or adequate benching / sloping angles to control the risk of excavation collapse. Suitable access and egress provisions should also be considered. Under no circumstances should any personnel enter the excavation until a risk assessment by a competent person determines these risks have been suitably controlled.

6.19 Regularly check the depth of the pipeline using the approved pipeline locator. A useful guide to the accuracy of the indicated depths of the pipeline locator is to see whether the indicated depth decreases by the same amount of the excavated depth.
Note; Depending on the approved type of pipeline locating tool to be used it may either measure the depth of the pipeline from the centre of the pipeline or to the top of the pipeline.

6.20 Using the approved searcher bar, probe the length and width of the excavation at 100 mm intervals to a depth of 600 mm.

6.21 If at any time the searcher bar touches an object, excavate by hand to identify the object. If the object is found not to be the pipeline, continue searching the excavation as above.

6.22 If nothing is found within the excavation by the searcher bar, then the earth can be removed up to a further depth of 150 mm at a time before repeating the pipeline locator and searcher bar checks. Continue to check the remaining depth of cover using the approved pipeline locator.
Note; Depending on the approved type of pipeline locating tool to be used it may either measure the depth of the pipeline from the centre of the pipeline or to the top of the pipeline.

Reinstatement

6.23 When the works are completed, the excavation should be reinstated, taking care to replace the topsoil or top surface layer. The reinstatement should be undertaken in accordance with the appropriate reinstatement specification, such as the NRSWA. When the reinstatement involves the use of powered mechanical plant, this shall be undertaken in accordance with T/PM/SSW/2, T/SP/SSW/22 or T/SP/SSW/222. The National Grid approved representative should consider supervision of this activity.

7 WHEN WORK IS COMPLETE

7.1 Complete all necessary documentation and return as soon as possible.

7.2 The records shall be maintained in accordance with the requirements of T/PL/RE/1.

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APPENDIX A

CONTRACTOR SIGN OFF

A.1 THE CONTRACTOR SHALL SIGN BELOW PRIOR TO STARTING WORK

3rd. Party's Company Name _____

3rd. Party's Representative on site _____

I have received a copy of T/SP/SSW/22 and understand the work that I can undertake.

Name _____ Title _____

Signed _____ Date _____

National Grid Gas Personnel Name _____

Signed _____ Date _____

Date of completion of The Machine Assisted Excavation _____

Work Order Number_____

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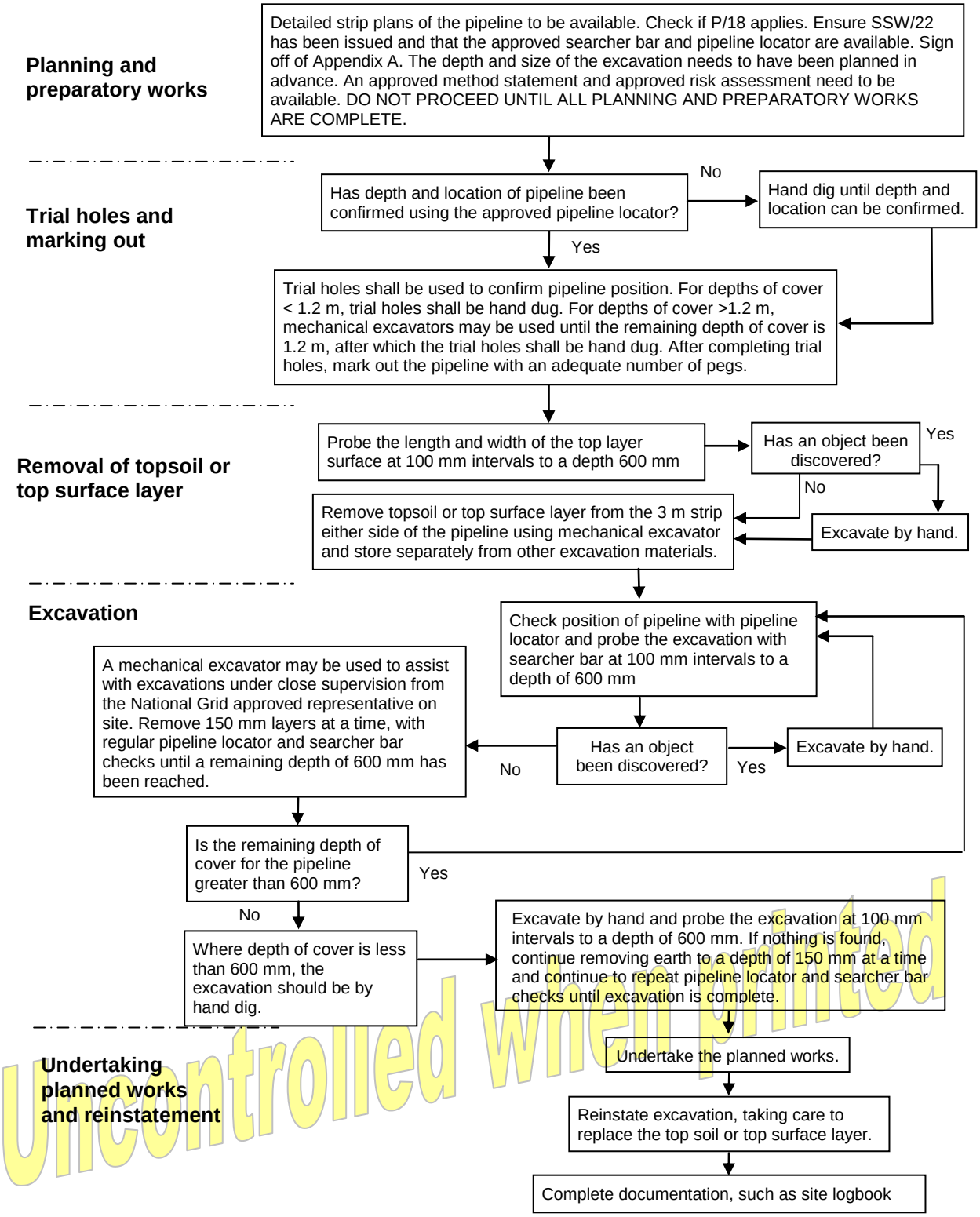
APPENDIX B

METHOD OF WORKING ALGORITHM



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BRIEF HISTORY

First published as T/PR/MAINT/5028	October 2004	EPSG/T04/1315
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Fifth Update published	July 2015	

KEY CHANGES (Identifies changes from the previous version of this document)

Section	Amendments
Section 5 - Before Starting Work	Minor amendments to align with current requirements for this section
Section 3 – Inclusion of references	Update list to include new documents relating to third party activities
Section 6 – Method Of Working	Reference to the type of pipeline locator, and how they measure the depth of the pipeline.