



# Trenching and Excavating (High Risk) Procedure

Document ID: SCEE-BS-HS-PRO-0021

## Authority

	Title	Name	Date
<b>Owner</b>	HSEQ Manager	Anthony Gollan	27/07/2023
<b>Reviewer</b>	HSE Superintendent	Anthony Gollan	27/07/2023
<b>Approver</b>	Group Manager – Business Services	Jamie Yeing	27/07/2023

## History

Revision	Date	Amended By (Name)	Details of Amendment
0.0	06/01/2015	Codie Davies	Document renumbered, supersedes WI-OHS-021
1.0	23/06/2017	Anthony Gollan	Document reviewed with minor amendments
2.0	22/05/2019	Anthony Gollan	Procedure reviewed to include lessons learnt and to incorporate best practice.
3.0	07/10/2020	Anthony Gollan	Addition of AS 5488 – 2013 Classification of Subsurface Utility for colour and feature codes chart
4.0	27/07/2023	Vanessa Placheta	SCEE Electrical Branding and Review

## Table of Contents

<b>1</b>	<b>Purpose.....</b>	<b>4</b>
<b>2</b>	<b>Scope .....</b>	<b>4</b>
<b>3</b>	<b>Definitions .....</b>	<b>4</b>
<b>4</b>	<b>Responsibilities .....</b>	<b>4</b>
<b>5</b>	<b>Flowchart.....</b>	<b>4</b>
<b>6</b>	<b>Trenching and Excavating.....</b>	<b>5</b>
	<b>6.1 Permit Process and Management.....</b>	<b>5</b>
	<b>6.2 Design.....</b>	<b>7</b>
	<b>Dial Before You Dig .....</b>	<b>7</b>
	<b>Location of Underground Services .....</b>	<b>8</b>
	<b>Visual Indicators .....</b>	<b>9</b>
	<b>Building Owners/Residents .....</b>	<b>10</b>
	<b>6.2.1 Marking of Identified Underground Services .....</b>	<b>11</b>
	6.2.1.1 Detection-based Mark out .....	12
	6.2.1.2 Plan Based Mark Out .....	13
	<b>6.3 Verification of Underground Services .....</b>	<b>13</b>
	<b>Pot-Holing.....</b>	<b>13</b>
	<b>6.4 Operation of Backhoe or Mini-Excavator.....</b>	<b>15</b>
	<b>Mechanical Excavation.....</b>	<b>15</b>
	6.4.1 Directional Drilling / Bore & Horizontal Bore (Grundomat pneumatic boring)....	16
	6.4.2 Pneumatic Boring (Grundomat) .....	17
	<b>6.5 Environmental Awareness .....</b>	<b>17</b>
	<b>6.6 Trenches .....</b>	<b>18</b>
	<b>6.7 Excavation Work.....</b>	<b>19</b>
	6.7.1 Unloading of Plant.....	20
	6.7.2 Mechanical Excavation .....	20
	<b>6.8 As-Built Drawings .....</b>	<b>22</b>
	<b>6.9 Management of Change.....</b>	<b>22</b>

6.10 Contingency Controls .....	22
7 References .....	23
8 Related Documents.....	23

## 1 Purpose

The purpose of this procedure is to provide Southern Cross Electrical Engineering Limited (SCEE) employees with the necessary guidance and information to ensure that while working on Trenching or Excavating activities they will be done in a safe and efficient manner.

## 2 Scope

This procedure is to apply to all SCEE employees, subcontractors, visitors or members of the public working on or visiting sites under the control of SCEE.

## 3 Definitions

Term	Definition
JHA	Job Hazard Analysis
Hazard	Anything that has the potential to cause injury, illness, damage or harm
Risk	An uncertain event or condition that, if it occurs, will affect the achievement of objectives. It is measured in terms of likelihood and consequence

## 4 Responsibilities

Role	Responsibility
Project Manager	The Project Manager shall be responsible for ensuring resources are available to enable the implementation of this procedure and for the accountability of person's responsibilities as defined.
Site Manager	Ensure full compliance with the requirements of this procedure Ensure the effective implementation of this procedure.
Employee	Employees shall comply at all times with the procedure
HSE Advisor	Audit and monitor compliance with this procedure. Assist in undertaking inspections in accordance with this procedure
Supervisor	Ensure the application of this procedure. Execute the requirements of this procedure.

## 5 Flowchart

N/A

## 6 Trenching and Excavating

Trenching and Excavating have been assessed as a High Risk Work Activity by SCEE.

The statutory requirements regarding duty of care to both SCEE and it's employees remain the first priority at all times.

This procedure shall be accompanied by a Job Hazard Analysis (JHA) and ensures that variables relevant to each task are recorded via risk assessment.

At all times this procedure and associated JHA makes all employees aware of the need to provide safe interactions and clear communications with other workgroups involved or working near the task.

All necessary measures should be taken to ensure that the excavations are in a safe condition at all times, including but not limited to the erection of suitable barricades, barriers, warning signs and hazard lights as applicable.

### 6.1 Permit Process and Management

All excavations and penetrations exceeding 100mm in depth require an excavation permit.

Each Excavation Permit is valid for the period stated on the permit. An Excavation Permit must be re-validated (or a new Excavation Permit issued) if there is any need or intention to change the size, depth or means of Excavation.

The table below sets out the Permit Process by activity and responsibility;

Permit Activities		Responsibility
1	Define scope of work and complete the excavation permit application.	Supervisor
2	Identify required excavation limits with pegs/paint	Supervisor
3	Submit excavation permit to permit issuer.	Supervisor/Safety Advisor
4	Joint inspection of the proposed work area, if required.	Permit Issuer and Supervisor
5	Request as built drawings of buried services from document controller	Permit Issuer
6	Scan and test area for power cables	Permit Issuer or Delegate
7	Mark location of identified power cables and any other services	Permit Issuer or Delegate
8	Arrange isolation of power cables and other services as required	Permit Issuer or Delegate
9	Witness / lockout and tag isolation	Permit Issuer or Delegate
10	Review all conditions	Permit Issuer or Delegate
11	Final check on drawings and isolations	Permit Issuer or Delegate
12	Validate and issue the excavation permit	Permit Issuer
13	Inspect lockout and tag isolations	Permit Issuer and Supervisor, Work Group
14	Sign and accept the excavation permit	Supervisor
15	Carry out excavation works	Supervisor and Work Group
16	Arrange survey as built installation of services	Supervisor

17	Provide new as built data to the document controller with a copy to Permit Issuer	Supervisor
18	Maintain a copy of revised as built drawing as hard copy and arrange for new data to be drafted as a new drawing revision	Document Controller
19	Authorize commencement of backfill	Superintendent/ Supervisor
20	Inspect completed excavation and sign off permit when satisfied	Superintendent/ Supervisor
21	Enter permit details in excavation permit register	Safety Advisor
22	Return permit to permit issuer	Supervisor
23	Inspect location of completed excavation	Permit Issuer or Delegate
24	Arrange removal of all isolations	Permit Issuer or Delegate
25	Close out permit with permit issuer and date accordingly.	Permit Issuer

All identified energy sources such as power cables must be tested to the point of certainty to confirm their location and status. An excavation permit will not be authorised until this activity has been completed and all power cables that are required to be isolated have been positively isolated to the satisfaction of the Permit Issuer and confirmed by the Permit Acceptor.

Once the limits of the proposed excavation have been confirmed, the location of any known existing buried services will be identified with ground marking paint.

The SCEE Supervisor is responsible for accepting the excavation permit on behalf of the SCEE work party and shall ensure that:

- They are directly involved with the Excavation work;
- Any excavation within 1.5 meters of any known service is to be carried out by manual excavation (i.e. shovel) until the service is exposed (unless contrary site procedures apply);
- A valid excavation permit is in place whenever excavation work is in progress;
- Each excavation permit including all associated relevant data (eg drawings, site plans design drawings etc) is displayed at the workplace at all times while work is in progress;
- The location of any known buried services have been identified in accordance with the excavation permit details;
- The excavation permit is signed, checked and accepted prior to any work commencing;
- All work is carried out in accordance with the excavation permit conditions;
- Any open excavation is surrounded with suitable barricades or barriers at all times;
- In the event of locating or uncovering any unexpected service or unidentified material the excavation work ceases and the supervisor is immediately informed;
- In the event of uncovering any suspected archaeological items or artifacts, the excavation work ceases and the client Construction Manager or delegate is immediately informed;
- If service warning tape is encountered whilst machine digging, mechanical excavation shall cease and hand digging only shall be used to locate the services. Should services be unable to be located after hand digging, the supervisor is to be contacted to decide on the appropriate course of action and notify the work party of further action required. Under no circumstances is mechanical excavation to continue without supervisor approval.

- In the event of any damage to underground services the excavation work shall cease and the client Construction Manager should be informed immediately – the excavation permit is suspended and no further excavation work should take place until the excavation Permit is re issued;
- Any mobile equipment operating in the vicinity of overhead power lines must maintain the minimum clearances specified in site procedures and must raise of a vicinity permit or other permits or approvals if required ; and
- Ensure that the ‘as built’ data has been identified and is recorded and that the Permit Issuer has authorised the commencement of backfill.

### 6.2 Design

Where the design may disturb underground or aboveground assets, a Dial Before You Dig plan shall be reviewed. Distance of proposed work within the design pack must comply with the affected asset owner’s clearance zone. Refer to Appendix B.

#### Dial Before You Dig

Where applicable Dial Before You Dig (DBYD) service must be conducted (Phone 1100 or via [www.1100.com.au](http://www.1100.com.au)) at planning/design stage where any activity likely to disrupt buried services is to occur.



#### The Essential First Step

It is recommended that printed Dial Before You Dig plan be in A3 size for ease of visual understanding. Not all of Australia’s underground asset owners are members of Dial Before You Dig. Therefore you should never assume that the plans you receive from your enquiry represent the only underground assets in your excavation area, especially when work is on private property as these are rarely shown.

Consideration to contacting other asset owners when planning the work should include but are not limited to;

- Main Roads Authorities;
- Rail Asset Owners;
- Councils
- Indigenous Groups/tribe

Plans are to be reviewed thoroughly. Ensure the plan relates to the area that has been requested, and ensure they are understood by the work crew. If anyone is unclear about what the symbols mean on the plan or how to proceed, contact the relevant asset owner.

From time to time plans may show “proposed” work on the asset owner’s plans. Contact with the asset owner shall be undertaken to verify the “proposed” work as it may have been completed and have not been updated on their plans.

When working in the vicinity of underground or at ground level assets, it is important to observe any instructions stated on the plans provided by the asset owner. Underground assets may be as little as a few millimetres below the surface.

**Note:** Underground location plans provide information about network presence only; they do not pinpoint the exact location; as such positive identification through profiling / potholing must still occur.

**Note:** You must place the same importance of a Dial Before You Dig plan to that of your Construction Plan or Drawings.

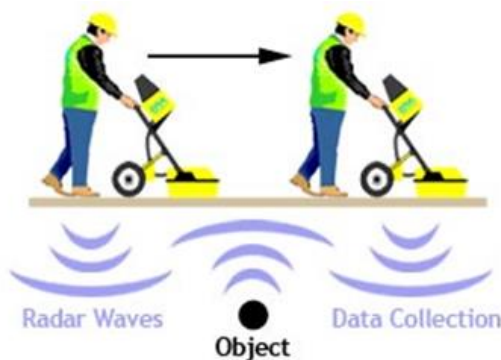
**Recommendation:** Contact each asset owner on the Dial Before You Dig plan and check if they have any specific requirements not listed.

### Location of Underground Services

Where possible all underground services within the work zone must be verified at the surveillance stage of the project and in accordance with AS5488:2013 Classification of Subsurface Utility Information. DO NOT assume information in the Dial Before You Dig plan are 100% accurate, especially as it relates to the depth of services.

The use of an electronic pipe or cable locator, in conjunction with potholing, is recommended to accurately identify the location of underground assets – as asset owners’ plans may not be 100% accurate and will not provide exact locations.

Ground Penetrating Radar (GPR) is a tool that is emerging within the civil construction industry as an excellent tool for identifying underground assets and mapping assets on a wider scale. Image below shows how a GPR works in locating underground services.





Asset to be detected	Devices		
	Electromagnetic Detector	Ground Penetrating Radar (GPR)	Probe, Beacon Sonde, or TracWire
Metal UST	Suitable	Suitable	
Fiberglass UST		Suitable	
Sewer/water Line (Metallic)	Suitable	Suitable	Suitable
Sewer/Water Line (non-metallic)		Suitable	Suitable
Power Line (Non energised)	Suitable	Suitable	
Product Line (w/ trace wire)	Suitable	Suitable	
Product Line (w/out trace wire), non-metallic		Suitable	
Product Line (Metallic)	Suitable		
Metallic/Non-metallic Line (w Tracer Wire)	Suitable	Suitable	
Instrument/Telecomm Lines (non-energised)		Suitable	
Natural gas line (Pipeline)	Suitable	Suitable	
Metallic/Non-metallic Line (w/o Tracer Wire)		Suitable	
Power/Instrument Line (Energised/Signalled)	Suitable	Suitable	

Where electronic devices are used to locate underground services, the Quality Level should be read in conjunction with AS 5488:2013 – Classification of Subsurface Utility Information.

Once identified using such electronic devices, care should be taken to mark the location of the underground asset on the ground's surface.

### Visual Indicators

Prior to electronic locating and potholing a visual inspection of the work site must be carried out. Most underground services will have physical markers within the work zone or close by, which will help identify the assets that may impact on your area. Private properties, Single or Multi Dwelling Units are areas that need extra attention as they are most likely not on the Dial Before You Dig Plans. Images overleaf are examples of some asset markings you may see around the work area.

			
<p>Power Cable Hub on side of roads or property</p>	<p>Cut road ways may provide or indicate underground assets.</p>	<p>Fire Hydrant markers indicate mains water for emergency services</p>	<p>Gas Supply Main indicates assets within the area. This is not always an indication that asset is directly beneath the sign.</p>
			
<p>Gas meters on private property</p>	<p>Water meters on private property</p>	<p>High pressure mains in parks and public areas</p>	<p>Telstra Junction Box on side of properties.</p>

### Building Owners/Residents

Utilising the knowledge of the land owner or the residents that resides on the work site is highly recommended. They usually have a good idea of what assets have been installed in the past or recently and may be able to point out these assets. This is particularly important on rural or semi-rural areas.

Consider the various assets that may exist inside the boundary of properties. The example below shows the potential assets that may exist even in a small space and the visual indicators.



## 6.2.1 Marking of Identified Underground Services

Marking of underground assets allow the excavation crew or driller to visually see where underground assets may be located. There are 2 ways of marking underground assets that SCEE approves of;

- Detection-base Mark Out
- Plan-base Mark Out

When marking at work site, follow AS 5488 – 2013 Classification of Subsurface Utility for colour and feature codes to use.

AS5488-2013 Classification of Subsurface Utility Information		
Primary Code and Line Colour		
Subsurface Utility Type	Primary Code	Line Colour
Communications (white)	C	
Drainage (Stormwater/raw water) (green)	D	Green
Electricity (orange)	E	Orange
Fire service (red)	F	Red
Gas (yellow)	G	Yellow
Petroleum products (including oils), flammable and combustible materials (brown)	P	Brown
Recycled water (purple)	R	Purple
Sewer (cream)	S	Cream
Unidentified services (pink)	U	Pink
Water (potable) (blue)	W	Blue

Markings should take into account the area being marked and the specific location of the excavation to avoid excessive paint marks, especially in urban and public areas. Be particularly aware of paved public footpaths, other decorative paved areas, private driveways etc. and minimise the amount of paint applied (use dots instead of lines). In some instances marking with chalk or crayon is more appropriate.

It is not recommended that surveyors / locators indicate depths when marking as inaccuracies can lead to accidents; visual confirmation via potholing is always required. It is also recommended that the surveyor/locator is on site with the person responsible for the excavation work at the time the survey is conducted so that consultation on the work type and a clear understanding of the marks left by the surveyor / locator can be made.

Table B2 of AS5488 Classification of Subsurface Utility Information (SUI) indicates the recommended primary code and line colour for each subsurface utility type. Utility codes and colours facilitate the identification of different subsurface utilities on plans, electronic models and in the field. However, the colour codes do not reflect or indicate the colour of conduits, pipes or cables. The following codes and colours are recommended for adoption.

Please refer to Appendix A for Table B2.

The colour codes and feature codes (Table B3 within Annex A) should be used to mark out underground utility lines. Unless otherwise noted; marks should be placed as closely over the utility line as possible.

Markings should be adequate for its intended purpose and not be excessive or oversized. The marker types that are most suitable to the terrain and site conditions should be used. Examples: Chalk on decorative paving areas.

Utilizing Table B2 & B3(Appendix A); and example of making is shown below;

EHV 

This marking indicates Electricity High Voltage underground.

GLP 

This making indicates Gas Main – low pressure

### 6.2.1.1 Detection-based Mark out

In order to provide for more accurate location, one or more of the following electronic location processes are available to assess the location of existing underground services:

- Scanning with Cable Avoiding Tools (CAT)
- Scanning with High-frequency Generators (Genny)
- Scanning with Ground Penetrating Radar(GPR)- only where suitable to the environmental conditions (i.e. soil type and water tables)
- Trace wire detection



Once the locations are identified, markings can be carried out in line with the above devices prior to potholing.

### 6.2.1.2 Plan Based Mark Out

In the event none of the detection methods are successful, or those detection methods are not practical or available, mark-outs based solely on plans and above-ground surveys are to be used to establish the scope of pot-holing.

As plans are indicative only, reliance on them without verification from detection methods will lead to more extensive pot-holing.

## 6.3 Verification of Underground Services

### Pot-Holing

Pot-holing is an excavation technique to locally expose a subsurface utility at a point. The technique is non-destructive using hand digging or sensitive vacuum/water blasting techniques so that the utility service or its protective covering are not destroyed or damaged.



Pot-Holing Activity



Exposed Services in Pot-Hole

For the use of water blasting techniques to physically locate underground networks, it is recommended that:

- The non-destructive water blasting plant can be used with a maximum operating pressure of 2000psi or 138bars to locate the network in question. Pressure greater than this may cause damage to the outer layer of cables and sometimes the inner core, which may cause disruption to services.
- It is highly recommended that only a rotary nozzle head be used as the radius is minimised and creating less damage.
- Vacuum hose is positioned in the pothole being extracted to ensure the removal of all fines slurry. This is to give a clear visual sight of the excavation bottom and the distance to the networks
- Never drive the lance into any substance in order to dislodge stiff stratum.
- The nozzle head (lance) should never be used to probe for a network

- The nozzle head should be at least 100mm above the asset when operating at 2000psi.

Manual Pot-holing using hand equipment is commonly used to verify the depth and alignment of services.

- Steel crowbars can be used to break a hard surface but non-conductive fibreglass crowbar must be used to dig further. Ensure adequate penetration protection gloves are worn with the fibreglass bar as splinters may cause an injury.
- Where a risk assessment has identified a risk of electricity; shovels, spades or equipment selected for the task should be non-conductive along with non-conductive gloves and boots when hand digging where practicable.
- Place the shovel blade parallel to the asset line and dig a hole with a shovel directly above the asset location until the asset is exposed. Take care not to damage the line or coating. This method of digging parallel to the asset line is a good preventative measure.
- Mechanical excavation equipment **MUST NOT** be used to widen or deepen the hole before exposing the asset.

Pot-holing should be undertaken along the length of the marked location at intervals in Appendix C Pot-holing.

Scope and/or at each asset crossing to identify the path of underground assets and their depth.

Where the recommended scope of potholing below table cannot be applied, or it is not reasonably practicable to do so,

- Examples where the scope of potholing may not be able or need to be applied
  - High volume of concrete re-instatement
  - Narrow or inaccessible verges
  - Safety risks
  - Moderate risk assets that have been sufficiently verified to ensure they are protected from damage.
  - Where assets are electronically located outside of 1m of the drill/grundomat path and the absence is confirmed in the entry or exit hole, additional potholing may not be required.
  - When using a pneumatic bore, if any assets are electronically located within 1m but greater than 500mm below the drill path, it may be practicable to only pothole to confirm the absence of the asset to the depth of the drill path (strip trench).

Additional locating or controls measures should be implemented to ensure that services have been confidently located and protected, applying:

- An established risk based methodology to permit deviating from the current industry recognized code of practice;

- Additional controls for the location and identification of underground assets (e.g., contacting the asset owner, ground penetrating radar, rodding and tracking through conduits, re-design and/or change alignment.)

To apply best practice or where high risk services are involved, pot-holes should remain open or be reopened during the drilling/boring to ensure the tracker can visually confirm the drill head clearing the asset when drilling across the asset.

In any instance where electronic detection tools fail to clearly detect the location of services, that existing service must be assumed to be within 0.5 metres of the proposed excavation and the associated scope of potholing undertaken until the true clearance distance from the excavation can be established with confidence.

Where the asset owner stipulates more frequent pot holing or greater distances is required; the asset owner requirement must be met.

## 6.4 Operation of Backhoe or Mini-Excavator

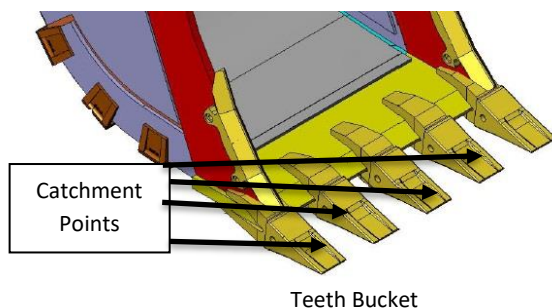
Backhoes and mini-excavators shall always be used in accordance with the manufactures operating instructions. Spotters shall be used as required and determined under risk assessment. The spotter shall be identified on the JHA.

Delineation of the working area of the backhoe or mini-excavator should be made clear by either witches hats, flagging or hard barricade. Particular attention needs to be given to the slewing radius of the excavator when delineating the work area.

All operators must be competent to operate the machine, and require a Verification of Competency for the machine they are operating.

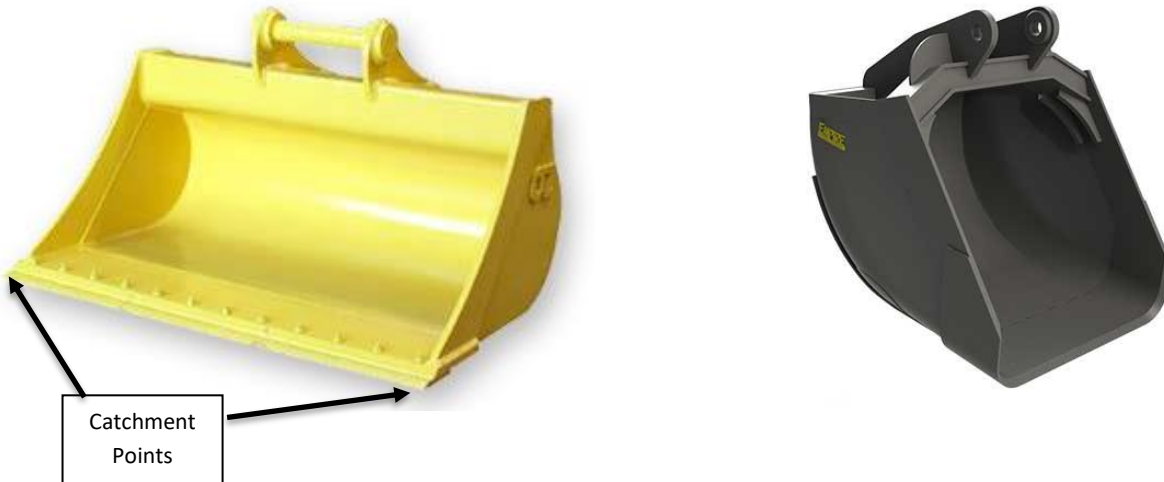
### Mechanical Excavation

Planning the selection of excavation plant is just as important as locating the underground services. The wrong equipment or attachment could undo all your planning work and lead to an asset strike or damage. Although not always practicable, teeth buckets or bucket rakes (similar to that pictured below) on an excavator are not recommended for use near existing underground or at ground level assets as each tooth edge increases the risk of a snag and damage to assets.



Each tooth on a bucket presents 2 catchment points each; as above.

Flat blade buckets (as pictured below) are highly recommended for working near underground or at ground level assets as they have fewer catch points and minimises damage. As illustrated below; a flat blade bucket has 2 catchment points and minimises the likelihood of damage to assets.



### 6.4.1 Directional Drilling / Bore & Horizontal Bore (Grundomat pneumatic boring)

Directional/Horizontal Drilling comes in different shapes and sizes like the excavator. Contact with electrical hazards is a major hazard when operating a directional bore – as such pre-start checks to ensure that the plant is correctly earthed and that all safety devices are operational is essential. Personal Protective Equipment (PPE) and/or clothing are extremely critical with the operation of this plant.

The operator of the plant and any other worker working within the manufactures recommended exclusion zone where underground electrical asset exist; must have appropriate PPE as per manufacture's manual.

Both Directional Borer & Grundomat normally requires 2 workers (1 operator & 1 tracker) so 2-way communication devices are vital to ensure safety messages are maintained at all times during operation.

Other considerations for directional bore are;

- Ensure electrical strike alert units are in place as per manufacturer's instructions.
- When boring/reaming back, consider the soil and ground type and ensure additional clearance is allowed where appropriate. Include clearance to allow for pull up of the line and shackle size.
- Ensure bore logs are recorded and kept for all drill shots.
- Maintain fluid circulation that does not exceed rate capabilities.
- Ensure bore head is tracked along each bore path, including re-bores.
- Ensure risk assessments are completed as part of the pre-start process to assess hazards associated with ground conditions and asset behaviour and implement appropriate controls.



All transmission pipelines involving gas, oil and petrochemicals have separate requirements and the asset owners should be contacted to determine if any specific requirements they may have which affects the work.

### 6.4.2 Pneumatic Boring (Grundomat)

A pneumatic boring tool is a cylindrical air-hammer which is driven through the ground by compressed air.

Unlike a HDD, the pneumatic bore cannot be steered so the aligning of the bore path is very important. The path must be aligned exactly to target.

Other considerations for pneumatic bore include:

- Always operate in accordance with the Operator's manual.
- Use of a level and sighting stick is required to ensure a level and correctly aligned bore path.
- Always plan the bore path allowing minimum asset clearance or 10 times the tool diameter, whichever is greater.
- When crossing power, pothole and leave exposed at the crossing point and watch the bore pass the asset.
- Use non-conductive hoses or joiners.
- Soil conditions, rocks, underground footings and other obstructions and insufficient depth can affect the direction of the bore, sending it off target. This is a common cause of asset strikes. Use countermeasures outlined in the Operator's manual.
- Check pneumatic connections for wear and tear and make sure connections are interlocked and seated correctly. Ensure any safety rings are tightened and/or safety pins are inserted and fit for purpose. Never over-pressurise and use a hose sock or wire to secure the hose in case of disconnection.
- Wear appropriate PPE at all times as per the Operator's manual and Downer requirements.

## 6.5 Environmental Awareness

Contamination of soil and waterways, damage to ecosystems, and compromised ability to engage in sustainable development can be caused by erosion of soil and sediment during excavation and earth moving activities

Consideration to the below control should be planned into the project or activity;

- All spoil and material stockpiles should be located on flat ground away from drainage lines or sensitive environments. If not backfilled in a day or left overnight, spoil and material stockpiles should be covered (tarp or similar) or have sediment controls installed on the downslope
- Control drainage through/from areas of construction to minimise surface flow velocities and minimise pollution of watercourses or water bodies with silt or other loose material
- Silt bags filled with gravel or sand should be installed within the gutter at a 45 degree angle (e.g. one to two silt bags downstream of the works) and as required around drill rigs to contain slurry leaks

- Geo-fabric or similar should be installed over storm water drains (only required when working over or around the inlet)
- Sediment controls should be regularly inspected (at least weekly and after rainfall) and maintained to ensure effectiveness
- Public roads should be cleaned of dirt resulting from construction work daily and/or as required
- The work should be progressively stabilised / restored to prevent large sections of exposed areas being vulnerable to erosion. Additionally, trenches should be kept to the minimum width and length to prevent unnecessary disturbance.
- Return topsoil (e.g. from bore, trench or pit excavation) by backfilling and/or scattering the excavated topsoil around the area to promote revegetation as soon as reasonably possible after construction operations have been completed
- Import acceptable topsoil material to complete the works where the condition of excavated material is not suitable for use as backfill or scatter (e.g. asbestos, chemically or weed contaminated or of such poor condition containing mainly rocks, sand etc.). Make sure that backfill is obtained from a source that is free of contamination potential.
- If suspected heritage sites or aboriginal artefacts (e.g. shell middens, stone tools) are found during the course of works, immediately cease work in the area, barricade the area, implement the Datatel Incident Reporting and Investigation Procedure and await further instructions before recommencing works.
- If a frack-out occurs, work must cease until a SCEE representative approves the resumption of the task. SCEE HSE must be advised to ensure relevant EPA reporting occurs where required.

### 6.6 Trenches

Excavated or other material is not to be placed within 1 metre of the edge of an open excavation or for deep excavations should not fall within a 1:1 ratio (relevant to depth) away from the open edge of the excavation or as specified by the permit issuer following consultation with an engineer.

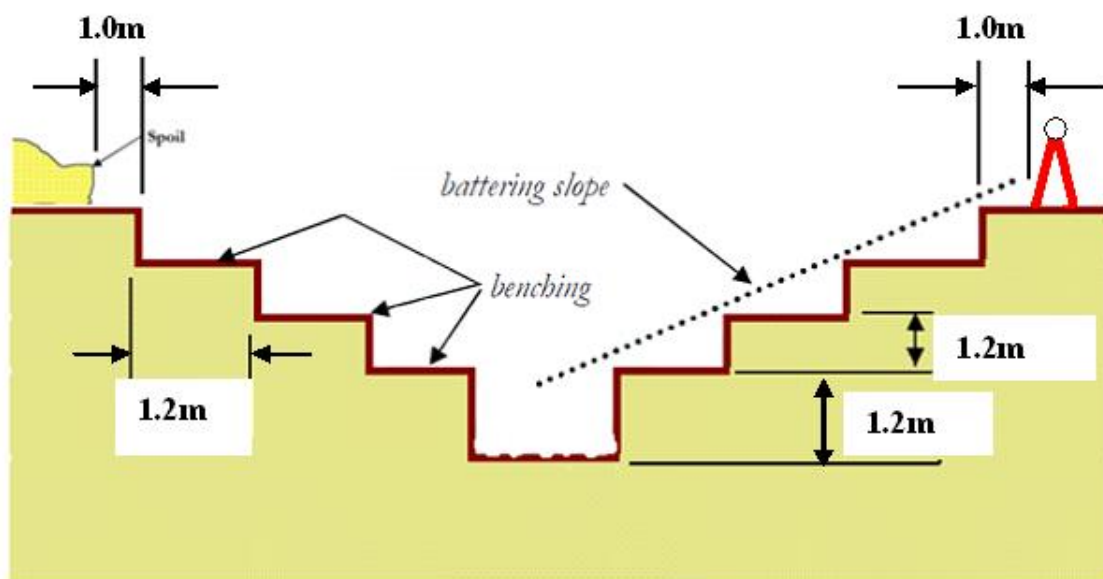
Any person required to enter an excavation exceeding a depth of 1.5 metres should ensure the sides of the excavation are shored, laid back to stable slope, benched, or have some other means of protection provided in accordance with the instructions of an engineer to ensure access that is approved. As a general rule, the bottom vertical height of a trench excavation should not exceed 1.2 metres for the bench. Subsequent benches should also be 1.2 metres vertical height. An excavation of this depth may fall into the category of a confined space, personnel shall follow confined space procedures as appropriate.

For trench excavations exceeding a depth of one metre, ladders, ramps or other forms of access or egress should be provided at intervals of not more than 30 metres to limit the travel distance of a worker to 15 metres from the nearest means of exit and to allow trapped fauna to escape.

Unless otherwise approved by the client Construction Manager, the length of trench excavated ahead of laid service at any one time should be limited to a maximum of 50 meters within the general proximity of plant and 100 meters elsewhere. The bottom width of the excavated trenches should be kept to a minimum but be consistent with the bed width requirements.

A barrier or barricade should be erected at least 1 metre from the edge (Refer Figure 1) of any open excavation or trench and be maintained at all times when work is in progress and removed as soon as it is no longer required. Excavated material may be used as hard barricading such that its height represents half the height of the largest wheel onsite. Barriers or barricades should incorporate reflective tape and/or illuminated warning lights if erected adjacent to roads and are required to remain in place during darkness.

Only hard barricading is allowed. No danger tape or parawebbing is to be used. Information tags are to be used to identify the nature of the hazard and the supervisor in charge of the work.



**Figure 1**

## 6.7 Excavation Work

Pre-Start meeting must be conducted at the start of each day of construction to enable consultation of hazard and risk matters to be discussed. No plant or equipment should be unloaded, moved or operated until all these issues are discussed and all crews understand the day's job/task.

Construction zone must be clearly identified with appropriate traffic and/or pedestrian management in place and monitored regularly. Appropriate signage and markings should also be established around the excavation areas and plant.

Take before photos; especially if there are pre-existing damage to paths, walls, driveways, asbestos etc. what are found during the site set up.

### 6.7.1 Unloading of Plant

All vehicles carrying excavating plant or digger should always be parked on an even and level ground. Do not unload plant if truck tray and ramp are wet and slippery as the plant may slide and roll/tip over.

Where vehicles are parked on sloped roads (i.e. hills and drives) of obvious slope/gradient, the operator should ensure:

- The vehicle is parked so as to face its front wheels into the curb,
- The handbrake is fully applied at all times when parked.
- The vehicle is placed into the appropriate gear.

All vehicles as identified should be chocked where required. Chocks should be of appropriate nature and design to the vehicle size and capacity to assist in the prevention of inadvertent roll back and movement.

Regular site inspections to be undertaken to ensure the safe practices as highlighted above are in practice.

A spotter shall be utilised at all times and remains outside the “NO GO ZONE” or “Line of Fire” when unloading any plant or heavy machinery.

Do not unload plant on public roads unless appropriate Traffic Management is in place.

### 6.7.2 Mechanical Excavation

All mechanical excavation near underground services must maintain the clearance distances as defined in Annex B.

For Directional Drilling, clearance distance must take into consideration the reamer head diameter, not just the drill head as the reamer is usually larger than the drill head.



Mechanical Excavation within 500mm of a known underground service shall be carefully carried out by hand.

Mechanical excavating equipment shall not be used, unless a permit is issued and a spotter is used in accordance with the relevant SWMS

When operating earthmoving machinery adjacent to excavations an assessment of the stability of the excavation shall be carried out by a competent person at appropriate intervals, taking into consideration the activities around the excavation and the type and weight of the mobile plant used.

Where trucks with tipper trays are used, arrangements shall be in place to ensure personnel are not present at the hazard zone (i.e. under a raised tipper tray). If it is necessary for personnel to be in the hazard zone (e.g. for maintenance or repair) the following precautions shall be taken:

- the hydraulics shall incorporate a safety back-up system; and
- adequate safety prop(s) shall be in place.

All trenches shall be surrounded by safety barriers to prevent personnel from falling in. Such barriers shall be maintained in good condition, including the following arrangements:

- All components of the safety barrier shall be regularly checked to ensure they are in a serviceable condition and provide an effective barrier and visual warning;
- Multiple star pickets shall be used to ensure webbing is maintained in a secured condition;
- Use non-conductive star pickets if power is identified within the vicinity.
- Star pickets shall not be placed at the immediate edge of the excavation; (at least 900mm high) and shall be at least 2m from the excavation edge.
- Where star pickets or non-conductive star pickets are used it needs to be fitted with protective caps to prevent injury as a result of inadvertent contact;
- If work is planned or progressing for an extended period of time, a more permanent and substantial type of safety barrier/ fencing should be provided.
- Materials, other than spoil, should be stored away from the excavation to prevent materials inadvertently falling into the excavation.
- Where practicable the excavation shall be backfilled progressively. If there is not enough light, excavations shall be illuminated so the barricades and warning signs can be seen.
- Ladders, ramps or other forms of entry and exit shall be provided at intervals according to the length and height of the trench for safe means of access / egress. Where crossing a trench or excavation greater than 1.8m deep, walkways shall be supplied and fitted with toe-boards, handrails and be at least 600mm wide.
- If adjacent structures or buildings may be affected by excavation work, advice shall be sought from an appropriately qualified engineer.

Where required (i.e. where the trench may collapse), trenches shall be shored. The risk of ground collapse should be considered in all excavations; however when the excavation is greater than 1.5m deep then it is a requirement that all sides of the excavation are protected by shoring or shielding (e.g. boxing), benching or battering (Refer to section 6.6).

Unless unavoidable, trenches shall not be left unfilled overnight. Warning signs and wooden boards shall be used to cover all open trenches. Open excavations must be secured to ensure that other workers are not at risk of falling into, or accessing the excavation, and also to ensure that unauthorised access to the site is prevented. When deciding on how this will be achieved you must take into account the risk and likelihood of someone trying to get into the excavation area (for example how close it is to members of the public, camps, parks, shops of other public areas).

### 6.8 As-Built Drawings

Detailed “as built” drawings are accessed and referenced to determine the location and nature of any known buried services, and copies of the data shall be attached to the Permit. As built’s shall be provided by the Permit Issuer.

Prior to backfilling any excavation, an “as built” survey that accurately records the depth and location of all new, temporary or permanent underground services and/or existing services exposed during the excavation, must be completed and submitted for approval. As built drawings showing new underground services or installation should be immediately forwarded to the client.

### 6.9 Management of Change

In the event that as built drawings are not available or unsatisfactory, SCEE shall request that they be made available, be legible and relate to the area of intended excavation. In the event that the client is unable to provide satisfactory as built drawings a cable locator shall be requested for use to identify underground services as per the aforementioned permit activities.

Where a cable locator cannot be used to identify underground services (i.e. PVC conduits), discussion between the supervisor, client and work group will be required to assess the risk of proceeding, discuss what hazards have been identified and the method of controlling those hazards. When there is uncertainty as to the location of services preference must be given to manually excavating (i.e. using a shovel) the location.

If conflict exists as to the method of proceeding with the work then the matter will be discussed between the SCEE Site Manager and the client Construction Manager and resolution sought. In all instances excavation permits must be re-validated (or a new excavation permit issued) if there is any need or intention to change the size, depth or means of excavation.

### 6.10 Contingency Controls

The Emergency Response Plan incorporated into the JHA shall list relevant contact details of site Paramedics. The JHA should also indicate the team member who is First Aid Qualified.



## 7 References

Documents, both internal and external, that are referenced within the content of this procedure, including Australian and International Standards and legislation.

Document ID	Document Title
SCEE-BS-HS-TEM-0042	Trenching and Excavation Permit

## 8 Related Documents

Related documents are those that have a relationship with this document, for example if this was the Operational Risk Management procedure related documents would include the work instruction to complete a JHA, the JHA template, Take 5 work instruction and booklet, etc.

Document ID	Document Title
SCEE-BS-HS-PRO-0001	Job Hazard Analysis
SCEE-BS-HS-TEM-0008	JHA Template
SCEE-BS-HS-TEM-0009	JHA Register