



AUSTRALIAN
CONSTRUCTORS
ASSOCIATION

Construction & Building Industry Safety Guideline

Underground Services



Disclaimer

This Guideline contains information regarding work health and safety. It includes some of your obligations under the work health and safety and electrical safety legislation that jurisdictional regulators administer. To ensure you comply with your legal obligations you must refer to the appropriate Acts and Regulations that apply in the jurisdiction where you are conducting your work.

This publication may refer to legislation that has been amended or repealed. When reading this Guideline you should always refer to the latest jurisdictional laws. It is the responsibility of the businesses and the individuals involved to ensure that a safe system of work is employed and that statutory requirements are met.

Australian Constructors Association disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Guideline.

Construction & Building Industry Safety Guideline Underground Services

Intent

To manage the risk of striking underground services resulting in harm to persons and damage to property, plant and equipment by providing guidance to individuals undertaking work near underground services, which may impact both proposed and existing works.

Scope

This guideline applies to all construction, excavation or maintenance activities, which may impact underground services.

Underground services can include Power Cables, Telecommunication Cables, Gas Lines/mains, Sewer Pipes/mains, Water Pipes/Mains, Drainage Pipes and Soakwells, Fuel Lines and Storage Tanks.

Safety Imperatives

- a. A “Services/Utilities Manager/Coordinator should be appointed for all projects involving extensive underground services and should be independent of the construction team. They should be responsible for the overall management of underground services from planning to handover of the infrastructure and ensure so far as reasonably practicable that construction and excavation work is carried out in accordance with the WHS Regulations or equivalent jurisdictional legislation.
- b. A Safety in Design Process and accurate ‘service’ analysis shall be undertaken, to identify services and owners. Stakeholder ‘As built’ drawings should be reviewed during this process.
- c. A risk management process shall be undertaken for all activities involving - Trenching/Excavation, Ground Penetration, Vertical/ Directional Boring, Pilling Operations, road, track and footpath repair works and positioning of outriggers, plant and equipment, which could impact underground services.
- d. A Dial before You Dig (DBYD) and any other network asset owner or operator’s specific service location guidance and as built drawings shall always be obtained and reviewed to inform the risk management process prior to excavation or in-ground works at any site.
- e. The location of any proposed excavation or in-ground works should be examined using service locating equipment including Ground Penetrating Radar (GPR), Metal Detectors, Electrical Sensors, Non-destructive potholing, and other measures as required to ensure all services are accurately and positively identified.
- f. All Services/Utilities on the project should be recorded on a Register and kept up to date.
- g. Mechanical excavating plant or equipment should not be used to locate services unless deemed appropriate by a formal risk assessment. Hydro jetting and vacuum excavation can be used as an alternative to mechanical excavation.
- h. At all times underground services shall be assumed energised until isolated and proven de-energised.
- i. During excavation, underground services should be physically supported to prevent displacement or breakage of the service and an appropriate shoring system installed as required.

- j. When an excavation is more than 1.5m deep heavy equipment should not be driven over or material stockpiled around so as to impact the excavation zone and its zone of influence.
- k. During excavation maintain the nominated exclusion zones of all services. Upon completion and/or repair and handover of the underground services all warning media should be reinstated and the updated DBYD /as built drawings of the underground services passed onto the DBYD provider/ network owners or operators in each State or Territory.

Australian Contractors Association Construction & Building Industry Safety Guideline

P = Primary responsibility S = Support role / Involved

Electrical Safety Guideline

Imperative Item	Safety Imperative	Element Guidance	Element Timing	Electrical Supervisor	Engineer	Workplace Manager	Installing Electrician	General Manager	Managing director/CEO	Expected Outcome	Regulation / COP Reference
a	A Services/Utilities Manager/Co-ordinator should be appointed for all projects involving extensive underground services and should be independent of the construction team. They should be responsible for the overall management of underground services from planning to handover of the infrastructure and ensure so far as reasonably practicable that construction and excavation work is carried out in accordance with the WHS Regulations or equivalent jurisdictional legislation.	<ul style="list-style-type: none"> The Services/Utilities Co-ordinator where appointed shall be competent in this field and be responsible for the planning of all related works, interface with stakeholders and the implementation of and verification of control measures to prevent impacting underground services. The Services Co-ordinator should be appointed by the principal/head contractor 	In the design phase of the project	S	P	P	P	S	S	Project appointed Services/Utilities Co-ordinator	WHS Regulations or jurisdictional equivalent (Vic & WA). Refer to Table 1.
b	A Safety in Design Process and accurate 'service' analysis shall be undertaken, to identify services and owners. Stakeholder 'As built' drawings should be reviewed during this process.	<ul style="list-style-type: none"> The Safety in Design Process should identify any existing underground service constraints and the potential safety and constructability impact of all proposed underground services. 	In the design phase of the project	S	P	P	S	S	S	Underground services addressed and recorded in the Safety in Design - Risk Register	WHS Regulations or jurisdictional equivalent (Vic & WA). Refer to Table 1. AS/NZS 31000:2009 Risk Management Principles. Guidance on The Principles of safe Design For Work.

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c	A risk assessment shall be undertaken for all construction work activities involving trenching, excavation, ground penetration, vertical/ directional boring, piling operations, road, track and footpath repair works and positioning of outriggers plant and equipment, which could impact underground services. Note: Excavation work at a depth greater than 1.5 metres is classified as ‘high risk construction work’ and special requirements apply for the work as required by the WHS Regulations.	<ul style="list-style-type: none"> The principal/head contractor in conjunction with any design consultants and asset owners shall undertake a risk assessment for all activities that may impact underground services The risk assessment shall identify control measures based upon the Hierarchy of Control to minimise impacts on underground services Control measures in the field should be as identified in the risk assessment and have a responsible person nominated for implementing the control measures Check with all asset owners, the location of underground services 	In the design and construction planning phase of the project	S	P	P	S	S	S	Underground services addressed and recorded in the Safety in Design and Construction WHS project Risk Registers	WHS Regulations or jurisdictional equivalent (Vic & WA). Refer to Table 1. AS/NZS 31000:2009 Risk Management Principles. Guidance on The Principles of safe Design For Work.
d	A Dial before You Dig (DBYD) and any other network asset operator’s specific service location guidance and as built services shall always be obtained and reviewed as part of the risk assessment process prior to excavation of any site. Note: The location of underground services that have been provided by a service / network operator may not be accurate for many reasons.	<ul style="list-style-type: none"> The DBYD or other network operator’s assets guidance should show the <i>approximate</i> location, type, voltage, pressure, contents and nominal depth of underground services <p>How the DBYD service works:</p> <ul style="list-style-type: none"> Lodge a request for information through the web or by calling the enquiry service if you are trying to identify the owners and locations of underground infrastructure/services before undertaking excavation works. Dial Before You Dig will then send a referral on your behalf to members who have underground assets in the area you are planning to excavate. 	In the construction planning phase of the project - Prior to excavation	S	P	P	S	S	S	DBYD and as built drawings identifies <i>approximate</i> location and nature of known electrical services.	WHS Regulations or jurisdictional equivalent (Vic & WA). Refer to Table 1. NSW - Guide Work Near Underground Assets WorkSafe Victoria Guide - Undertaking Work Near Underground Assets Designated

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		<ul style="list-style-type: none"> Within two working days you should receive plans or other information sent to you by the asset owners. <p>Find DBYD at www.1100.com.au Or call 1100 in business hours.</p> <ul style="list-style-type: none"> The use of photographic records of site conditions prior to excavation is recommended. In this way a defence can be established in the event of unfounded accusations of causing damage. 								<p>Information Provider</p> <p>Network Operator Assets Guidance</p>
e	The location of any proposed excavation should be examined using service locating equipment including Ground Penetrating Radar (GPR), metal detectors, electrical sensors, non-destructive potholing, and measures taken to ensure so far as reasonably practicable that all services are then accurately and positively identified.	<ul style="list-style-type: none"> The use of service location equipment is to positively identify the existence of any underground service that may have not been noted on the DBYD or the network operator assets guidance documents Potholing or other defined methodology will prove where and at what depth underground services are located Be alert for marker tape in trenches above conduits, and for covers or bricks placed above cables. Note that some cables are oil-filled, and contact with the cable casing could allow oil to leak. Report any damage immediately. Do not apply any force to electrical conduits or cables. Report any faults, damage or defects immediately. Do not backfill over faults or damaged sections 	In the construction planning phase of the project - Prior to excavation	S	P	S	S	S S	Service locating equipment survey identifies the approximate location and depth of unknown electrical services Potholing positively identifies underground services type, location and depth and is particularly important in identifying the physical location of the services.	

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		unless ordered by the asset owner / authority.									
f	All Services/Utilities on a project should be recorded on a Register and kept up to date.	<ul style="list-style-type: none"> A register of all underground services should be maintained by the Principal/Head Contractor and communicated to all subcontractors and field crews that may impact the underground service 	In the construction planning phase of the project.	S	S	P	S	S	S	All Services/Utilities in the work area positively identified and recorded on a Register and kept up to date.	
g	Mechanical excavating plant or equipment should not be used to locate services unless deemed appropriate by a formal risk assessment. Hydro jetting and vacuum excavation may be used as an alternative to mechanical excavation.	<ul style="list-style-type: none"> The use of mechanical plant and equipment increases the risk of damage to underground services 	In the construction planning phase of the project - Prior to excavation	S	P	S	S	S	S	All Services/Utilities positively identified without impacting the asset using non-destructive asset location techniques.	
h	At all times underground services shall be assumed energised until isolated and proven de-energised.	<ul style="list-style-type: none"> All services shall be considered energised until proven otherwise Subject matter experts may be required to be consulted (electrical, gas, telecommunications, Water/ Sewage, etc.) 	In the construction planning phase of the project - Prior to excavation	S	S	P	S	S	S	All underground services shall positively identified, isolated and proven de-energised.	
i	During excavation, services should be	<ul style="list-style-type: none"> To prevent displacement or breakage of 	During	S	S	P	S	S	S	Protecting and or separating/supporting the service	

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	physically protected, separated or supported to prevent inadvertent contact	<p>the underground service and to maintain the integrity of both the service and the excavation an appropriate shoring system should be installed as required based on depth, soil and service type.</p> <ul style="list-style-type: none"> Physical protection, support and separation systems should be installed in consideration of the voltage/pressure/contents of underground services and any other conditions such as water charged ground in the location of the works. Where the risk of contact with services exists, excavation should be initially by the use of toothless buckets and completed by hand (i.e. potholing). Backfill around services with clean sand to prevent damage. 	excavation work						and excavation minimises the potential for damage to the underground service or harmful contact with the underground service	
j	When an excavation is more than 1.5m deep heavy equipment should not be driven over or material stockpiled around so as to impact the excavation or its zone of influence.	<ul style="list-style-type: none"> Clear zones for heavy traffic and storage of material are to be established to prevent potential damage to all identified underground services. The zone of influence must be considered based on the ground conditions and soil type. 	During excavation work	S	P	S	S	S S	Keeping heavy vehicles and the imposed load of excavated spoil away from the excavation minimises the potential for damage to the service	
k.	During excavation maintain the nominated distances away from underground services.	<ul style="list-style-type: none"> Maintaining safe working distances from underground services may require the use of timber versus steel shoring systems in the case of high voltage electrical services and may also require the work to be undertaken under the 	During excavation work	S	P	S	S	S S	Maintaining the nominated clearances will minimize the potential for arc/ flashover /explosion to occur from the service	

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		supervision of the asset owner/operator. Refer to Appendix C for further guidance									
I.	Upon completion and/or repair and handover of the underground services all warning media should be reinstated and the updated DBYD /as built drawings of the underground services in each work location passed onto the DBYD provider/ network owners or operators in each State or Territory.	<ul style="list-style-type: none"> Providing the revised or new as built drawings of underground services to the DBYD provider/network owners/operators allows them to be in a position to distribute accurate information on the location, depth and type of underground service to future potential users. Inspections on the implementation of this guideline shall be conducted on a regular basis. Audit and inspection, findings and corrective actions shall be recorded and referenced in any review process. The review process shall be documented.	On completion and handover of the works	S	P	S	S	S	S	Notify - Network Operator or Assets owner of works as executed (As Built) Any systems failures or process breaches are identified and managed in a manner to assure continual improvement with this guideline and work practices.	WHS Regulations 2011 Regulations 32 - 38 AS/NZS –ISO 31000 AS/NZS 9001

Key references applicable to this Safety Guideline are:

Safe Work Australia – Codes of practice & Guidelines

Code of practice – Excavation Work

Code of practice – Construction Work

Code of practice: How to manage work health and safety risks

Code of practice: Work health and safety consultation, Co-operation and Co-ordination

Code of Practice: First Aid in the Workplace

Guidance on the Principles of Safe Design For Work.

Jurisdictional Codes and Guidelines

WorkCover NSW

Guide – Work Near Underground Assets

WorkSafe Victoria

Guide – Framework for undertaking work near overhead and underground assets

Department of Commerce – Western Australia

Code of practice – Excavation - 2005

Standards

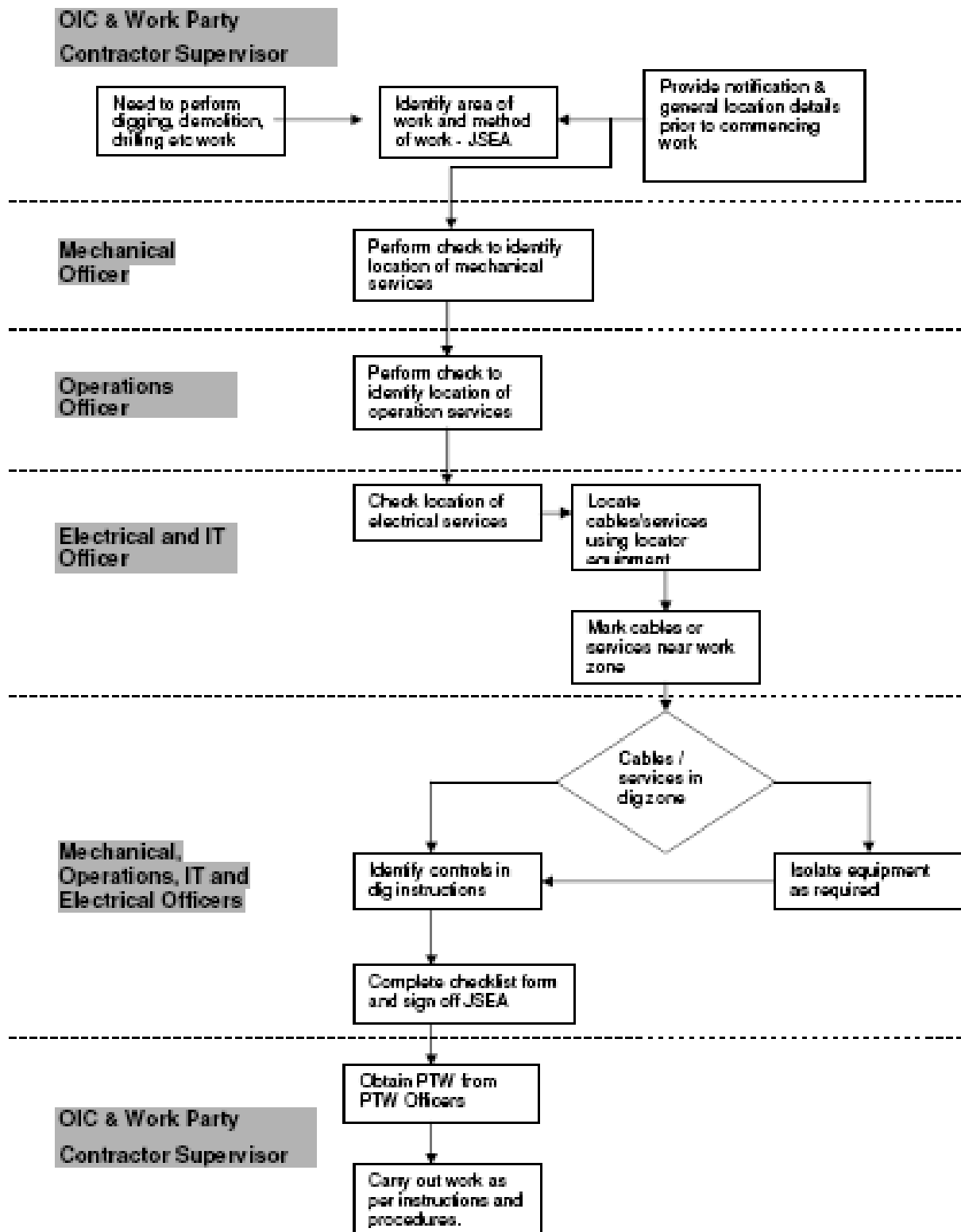
AS/NZS 31000:2009 Risk Management Principles

Jurisdiction	Legislation
Commonwealth	Work Health and Safety Act, 2011 Work Health and Safety Regulations, 2011
Australian Capital Territory	Work Health and Safety Act, 2011 Work Health and Safety Regulations, 2011
New South Wales	Work Health and Safety Act, 2011 Work Health and Safety Regulation, 2011 Note: Special excavation provisions apply for the protection of underground electricity and gas assets in NSW, these are covered in the following regulations: Electricity Supply (General) Regulation 2001 – Part 11 Gas Supply (Safety & Network Management) Regulation – Part 5
Northern Territory	Work Health and Safety (National Uniform Legislation) Act, 2011 Work Health and Safety (National Uniform Legislation) Regulations, 2011
Queensland	Work Health and Safety Act, 2011 Work Health and Safety Regulations, 2011

	Electrical Safety Regulation, 2013
South Australia	Work Health and Safety Act, 2012 Work Health and Safety Regulations, 2012
Tasmania	Work Health and Safety Act, 2012 Work Health and Safety Regulations, 2012
Victoria	Occupational Health and Safety Act 2004 Occupational Health and Safety Regulation, 2007 Note: WHS Act and Regulations not yet introduced in this jurisdiction.
Western Australia	Occupational Health and Safety Act 1984 Occupational Health and Safety Regulation, 1996 Note: WHS Act and Regulations not yet introduced in this jurisdiction.

Table 2: Regulatory Guide – Particular requirements that may be relevant to underground services work. Note: This is not a complete list of all regulations that may be applicable for the work. Reference must be made to the relevant Work Health and Safety Regulation or jurisdictional equivalent OHS Regulation for a complete list of regulatory requirements.	
Work Health and Safety Regulation	Subject area
Regulation 32	Application of Part 3.1
Regulation 33	Specific requirements must be complied with
Regulation 34	Duty to identify hazards
Regulation 35	Managing risks to health and safety
Regulation 36	Hierarchy of control measures
Regulation 37	Maintenance of control measures
Regulation 38	Review of control measures
Regulation 39	Provision of information, training and instruction
Regulation 43	Duty to prepare, maintain and implement emergency plan
Regulation 166	Overhead and underground electric lines - Duty of PCBU
Regulation 291	Meaning of “high risk construction work”
Regulation 299	Safe work method statements required for “high risk construction work”
Regulation 304	Excavation work – underground essential services information
Regulation 305	Management of risks to health and safety associated with excavation work

APPENDIX A: EXAMPLE EXCAVATION PROCESS FLOW CHART



APPENDIX B EXAMPLE PERMIT TO EXCAVATE

PERMIT No.:	VALID FROM:	VALID TO:
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SECTION 1: Description of Work (To be completed by Supervisor in charge of works)

Location:	Chainage:	
Description of Works (Specific & Precise Scope):		
Name of Supervisor in charge of works:	Company: <i>(inc Subcontractors)</i>	Date:

SECTION 2: Services Identified within 5.0 metres of proposed works (To be completed by Permit Controller)

Services Drawing No's.:

Service Description	Present?		Buried Marked?		Overhead Marked?		Drawings Attached?		Service Isolation Requirements <small>(provide details)</small>	Detail of Services (describe depth & direction etc. service ran)
	Y	N	Y	N	Y	N	Y	N		
Electricity										
Gas										
Water										
Sewer										
Storm Water										
Telecommunication										
Other										

Permit Controller Comments (Review of service drawings; specify condition / sensitivity of service, precautions, and / or No Go Zones):

All known assets / services have been identified, all drawings attached & listed on this permit	Permit Name:	Controller	Signature:	Date
<ul style="list-style-type: none"> • Review of services drawings completed • Acknowledgement of conditions to positively identify services before excavation starts. 		Supervisors Name:	Signature:	Date
<ul style="list-style-type: none"> • Any specific conditions for positively identifying services have been detailed. 	Permit Name:	Controller	Signature:	Date:

Hand dig (potholing) shall be performed where excavation is within 5.0 metre of services to positively identify their exact location. Acceptance of this permit requires each party to take all actions necessary to protect area services. All services are to be considered **live** unless specifically noted and proved otherwise.

NOTE: If work is to be done within NO GO Zones, Service Authorised Rep. and / or Asset Owner must be present during excavation.

SECTION 3: Environmental Check (Aboriginal Heritage, Contamination, Sediment etc.) (To be completed by Environmental Department)

1. Are there any identified Heritage sites in the area? Y/N
 2. Have heritage surveys been done by the client? Y/N or N/A
 3. Are there any species in the area which are protected under state or federal legislation? Y/N
 4. Have Flora and Fauna Surveys been done by the client? Y/N or N/A
 5. Has a copy of any required vegetation Clearing Permit been obtained? Y/N or N/A
 6. Is the excavation planned for a known or suspected contaminated site? Y/N
 7. Will groundwater be intercepted? Y/N
 8. Will surface water or the bed/banks of any water course be disturbed? Y/N
 9. Is there a plan in place to manage impacts of cleared vegetation/top soil/ overburden? Y/N Provide details:
 10. Have weeds been identified in the areas to be excavated? Y/N
 11. Is there a weed hygiene procedure in place? Y/N Provide Details:
- Other Considerations: Erosion control, dust deposition/ suppression, fauna egress from excavation, dewatering of excavation after rain, etc

Specify Environmental controls to be implemented:

Reviewed scope of work & control measures listed are adequate

Environment Dept Name:

Signature:

Date:

SECTION 4: Safe Systems of Work (To be completed by Competent Person)

Risk Assessment Developed and Reviewed: Yes No		Risk Assessment No.:	
Excavation Collapse & Entry Controls		Tick	
Will workers be required to enter the excavation(s)?		YES	} Proceed to Item A
		NO	} Proceed to Item C
A:	Will the excavation(s) be greater than 1.5m deep?	YES	} Proceed to Item B
		NO	} Proceed to Item C
B:	A safe means of entry/exit shall be achieved	The use of secured ladders – at least one per 10m section of trench	
	Prevention of collapse shall be achieved via: (must identify at least one)	The use of shoring	
		The use of battering to all sides required	
		The use of benching to all sides required	
		A written and signed authority (e.g. geotechnical engineer)	
	General safe entry in the excavation shall be achieved via: (both items mandatory)	More than one person being present at the excavation during entry	
		A competent person to supervise work, inspect excavation(s) and maintain an excavation log daily prior to entry } Proceed to Item C	
C:	Clarifying details as applicable (type of shoring, method of placement/removal, batter/bench dimensions, access details etc):		

Additional Considerations			
Tick as appropriate		Confined space provisions may apply to certain excavations e.g., foul or contaminated ground or opening a live sewer or trench adjacent or nearby to live traffic flow. Control measures will be required to limit operating areas of earthmoving plant Close-by exhaust fumes could make the excavation atmosphere unsafe for entry Controls are required to prevent undermining of nearby structures The area is likely to contain contaminated soil/old process materials/chemicals/hazardous material Geotech report required / should be obtained New services will need to be marked/identified and/or service plans updated	Include relevant controls details within Section 4 – Risk Assessment or an attached Safe Work Method Statement.
Comments:			
Safe Systems of Work have been verified and reviewed	Competent Person Name:	Signature:	Date:
SECTION 5: Approval (To be completed by Permit Controller)			
Summary of specific actions:			

This Excavation Permit has been specifically issued for the works described above to the Supervisor in charge of the works and will expire on the date stated. The Excavation Permit shall be valid for a period stated from its date of issue and any works outside of those works described will require a Permit to be issued.

Note: It is the responsibility of the Supervisor in charge of the works to inspect the site prior to commencing excavation activities, make this permit & related documentation available on-site to the work crew performing the work and perform ongoing inspections on a daily basis of the excavation to ensure all associated hazards are identified & appropriate control measures put in place.

All services within 5 metres of work zone have been positively identified. Services that require isolation have been checked to ensure that no residual energy sources remain.	Permit Controller Name:	Signature:	Date:
I hereby issue this permit to excavate:	Permit Controller Name:	Signature:	Date:
	Permit Validity:	Valid From:	Valid To:

SECTION 6: Re-Validation (To be completed by Permit Controller & Workplace Manager)

I hereby re-validate this permit and have verified that a re-confirmation of services has been conducted through relevant Authorities.	Permit Controller Name:	Signature:	Date:
	Permit Validity:	Valid From:	Valid To:

SECTION 7: Relinquishment (To be completed by Supervisor in charge of works)

I confirm that the works have been completed and that the area has been left in a safe condition.	Name:	Signature:	Date:
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TYPES OF UNDERGROUND ASSETS & LIMITS OF APPROACH		
ASSET	CLEARANCES	CONTROLS
Types of underground assets		
(Note: The owners of assets registered with the Dial Before You Dig service and covered by the WorkSafe Victoria Guide For Undertaking Work Near Underground Assets require an enquiry through this free service and compliance with any directive issued with information regarding the asset).	Minimum approach distance for individuals [A] and the working envelope of plant and equipment [B] for the guideline provisions.	Safety Controls required for the Deemed to Comply guideline provisions to take effect unless specifically undertaking careful excavation to underground assets or where specific permission has been granted.
1. Assets listed under the Pipelines Act.	3000 mm	Must contact the Asset Owner for specific conditions
2. All electricity conductors greater than 66kV	3000 mm	Must contact the Asset Owner for specific conditions.
3. All electrical conductors up to and including 66kV	300 mm [A], 500 mm [B]	See specific requirements in the WorkSafe Guide For Undertaking Work Near Underground Assets.
4. Telecommunications Cables.	300 mm [A], 500 mm [B]	Must contact the Asset Owner for specific conditions.
5. All Gas pipelines other than those covered under 1.	300 mm [A], 500 mm [B]	See specific requirements in the WorkSafe Guide For Undertaking Work Near Underground Assets.
6. Water, Drainage & Sewerage pipelines	300 mm [A], 500 mm [B]	Must contact the Asset Owner for specific conditions.