



STANDARD **UNDERGROUND AND** **OVERHEAD SERVICES**

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CONTENTS

1	Purpose	3
2	Objectives	3
3	Scope	3
4	Lifesavers	3
5	Definitions, Acronyms and Abbreviations	4
6	Roles and Responsibilities	6
7	General Requirements	6
7.1	Risk Management General	6
8	Key Elements – Managing the Risks	6
8.1	Underground Assets	6
8.1.1	Process for Managing the Locating and Excavation Around Underground Assets	6
8.1.1.1	Job Planning	6
8.1.1.2	Pre-Task Risk Assessment (PTRA)	7
8.1.1.3	Dial Before You Dig and Service Location	7
8.1.1.4	Safe Approach Distance to Underground Assets	8
8.1.1.5	Supporting Assets	8
8.1.1.6	Work on top of or below an Underground Asset	8
8.1.1.7	Electrical Earthing of Metallic Pipes	8
8.1.1.8	Gas Assets – Gas Strikes	9
8.1.1.9	Sewerage Asset Strike	9
8.1.1.10	Water and Telecommunication Asset Strike	9
8.1.1.11	Electrical Asset Strike	9
8.1.1.12	The Five P's of Safe Excavation	10
8.2	Overhead Power	10
8.2.1.1	Job Planning Construction Projects	10
8.2.1.2	Pre-Task Risk Assessment (PTRA)	11
8.2.1.3	Overhead Services Safe Approach Zones	11
8.2.1.4	Mobile Plant Operation Near Overhead Power Lines	12
8.2.1.5	Operating Equipment near 13200 Vac Power Lines	13
8.2.1.6	Vehicle Clearance Under Overhead Powerlines	13
8.2.1.7	Vegetation Control Near Overhead Power Lines	14
8.2.1.8	Workers in Contact with Plant Operating in Accredited Zones	14
8.2.1.9	Accidental Contact with Overhead Powerlines	15
8.3	Safety Observers	16
8.3.1	The Role of the Safety Observer for Underground and Overhead Work	16
9	Training	17
10	Monitoring and Reviewing	17
11	Related Documents	17
12	Associated Regulations and Standards	18
APPENDIX A: UNDERGROUND SERVICES APPROACH DISTANCES		19



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1 Purpose

This document describes the standards and procedures within Hunter Water Corporation (HWC) to effectively manage Underground and Overhead Service risks. It represents the HWC Workplace Health and Safety (WHS) Management System's commitment to compliance with the NSW WHS Act and WHS Regulation.

2 Objectives

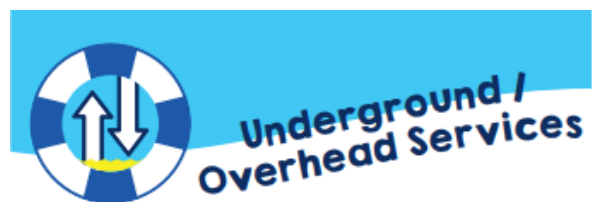
The objectives of this standard are to ensure that all areas, functions, and work processes that may have an Underground and Overhead Services risk are effectively managed to ensure the health and safety of Hunter Water people, contractors, and the general public.

3 Scope

This Standard applies to all Hunter Water Business Units. This standard covers the requirements associated with Underground and Overhead Services within HWC.

4 Lifesavers

The Hunter Water Lifesavers area a set of minimum behaviours related to high-risk activities.



I will always look up and live and only penetrate ground using the 5P's of excavation.

- // Look up and live - maintain safe approach distances from overhead services and use trained spotters where required
- // Demarcate overhead power using visual controls such as Blue Cones, Tiger Tail, Flagging etc
- // Penetrate ground safely ensuring the 5P's are followed:
 - **Plan** Obtain and understand the Dial Before You Dig (DBYD) report
 - **Prepare** Review the DBYD, locate the asset using electronic scanners and mark out
 - **Pothole** Establish the exact location of the asset and verify direction
 - **Protect** Mark the location of exposed infrastructure and protect assets from damage while digging or working within the excavation
 - **Proceed** Only proceed with your excavation when you have implemented the four above P's
- // Always use a spotter when excavating and stop / check if ground conditions change or warning tape is exposed



5 Definitions, Acronyms and Abbreviations

Term	Definition
Accredited Person	A person who has completed a recognised training course relating to work Near Overhead Power Lines that a registered training organisation has conducted.
Approach Distance	The minimum separation in air from an exposed overhead conductor must be maintained by a person or any object held by or in contact with that person.
De-energised	This means separated from all sources of supply but not necessarily isolated, Earthed, discharged or out of commission.
Dial Before You Dig	Dial Before You Dig (DBYD) is a non-profit referral service. DBYD represents most of Australia's underground asset owners
Earthed	This means being directly electrically connected to the general mass of the earth to ensure and maintain the effective dissipation of electrical energy.
Electricity Supply Authority	Means a person or body engaged in the transmission or distribution of electricity to the public or in the generation of electricity for supply, directly or indirectly, to the public. An Electricity Supply Authority may also be known as a network operator, a network service provider or an electricity entity.
Energised	Means connected to a source of electrical supply or subject to hazardous induced or capacitive voltages
Envelope	This means the space encapsulating an item of Plant, including attachments such as rotating or flashing lights or radio aerials, is categorised as: <ul style="list-style-type: none"> ▪ Design: the space encapsulating all possible movements of the Plant and a load attached under maximum reach ▪ Transit: the area encompassing the normal height and width of a vehicle or Plant when travelling to or from a worksite
High Voltage (HV)	A voltage exceeding Low Voltage (i.e. > 1,000 Vac or 1,500 Vdc) (AS/NZS 3000 Wiring Rules).
Hunter Water	Hunter Water Corporation
Hunter Water Worker (Our People)	A worker works at a workplace owned, controlled, or managed by Hunter Water.
Insulated	It is separated from adjacent conducting material by a non-conducting substance or airspace, permanently providing resistance to the passage of current or too disruptive discharges through or over the surface of the substance or space to obviate the danger of shock or injurious leakage of current (AS/NZS 3000 Wiring Rules).
Isolated	This means being separated from all possible sources of electrical energy and rendered incapable of being Energised unintentionally.
Low Voltage (LV)	A voltage exceeding Extra Low Voltage (i.e.> 50 Vac or 120 Vdc ripple-free) but not exceeding 1,000 Vac or 1,500 Vdc (AS/NZS 3000 Wiring Rules).



Term	Definition
LV ABS (Aerial Bundled Cable)	An insulated cable system is used for low voltage overhead distribution of electricity manufactured per the Australian Standard, AS/NZS 3560.
Near	A physical proximity situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming closer than the relevant Approach Distances specified in this document.
No Go Zone	The area around overhead power lines into which no part of a person or material or cranes or vehicles or items of mobile Plant may encroach without the approval of the Electricity Supply Authority.
Ordinary Person	A person without sufficient training or experience to enable them to avoid the dangers that overhead power lines and associated electrical apparatus may create.
Overhead Electric Line	Any bare or covered aerial conductors and other associated electrical equipment that make up an aerial line for the distribution and transmission of electrical energy.
Plant	Includes any machinery, equipment, appliance, container, implement, tool, and any component of any of those things, and anything fitted or connected to any of those things. (Work Health and Safety Act 2011).
Safety Observer	<p>This means, concerning work Near overhead or underground electrical lines, a person who shall be specifically assigned the duty of observing the work near live overhead or underground power lines and associated electrical apparatus to:</p> <ul style="list-style-type: none"> Warn personnel or the crane or Plant operator to ensure the Approach Distances are being maintained and Warn of any other unsafe conditions. <p>The Safety Observer must:</p> <ul style="list-style-type: none"> Be positioned at a suitable location to effectively observe both the overhead or underground power lines and Plant Be able to immediately and effectively communicate with the operator of the crane or mobile Plant or other personnel if required Ensure that all personnel stay outside the specified approach distance (unless performing a rescue by approved standards or carrying out a specific task that is described in the safe work method statement, e.g. a crane dogman holding a non-conductive tagline attached to a load suspended from a mobile crane) Not carry out any other work while acting as a Safety Observer, which includes the passing of tools, equipment or materials directly to the personnel performing the work Not observe more than one work activity at a time <p>Continue to monitor the work activity being carried out and have the authority to suspend the work at any time.</p>
SWMS	Safe Work Method Statement
Tiger Tails	Plastic pipe-type cable covers provide a useful visual indication to people working in the vicinity of Overhead Electric Lines or stay wires. Tiger tails do not insulate wires. A tiger tail is also known as a torapoli pipe.



Term	Definition
WI	Work Instruction
Worker	<p>Worker includes:</p> <ul style="list-style-type: none"> ▪ An employee of Hunter Water; or ▪ A contractor or subcontractor to Hunter Water, or ▪ An employee of a contractor or subcontractor to Hunter Water or ▪ An employee of a labour-hire company who has been assigned to work at a Hunter Water workplace or ▪ An outworker of Hunter Water, or ▪ An apprentice Hunter Water, or ▪ A trainee of Hunter Water, or ▪ A student gaining work experience at Hunter Water or ▪ A volunteer at Hunter Water

6 Roles and Responsibilities

Roles and Responsibilities can be located in the [WHSMA Manual](#).

Individual guidance booklets are in the Responsibility, Accountability, and Authority Manual [HW2021-534](#).

7 General Requirements

The general principles are that Hunter Water people will take all reasonable precautions to avoid inadvertent asset strikes or work in the vicinity of assets to create a risk to people.

Work near underground or overhead services is work where there is a reasonable possibility that a worker will, either directly or through a conducting medium (i.e. Plant, material hand tool, air), come within an unsafe distance of energised (live) electric lines, water pipes, sewer pipes, gas pipes, oil or fuel pipes, or telecommunications infrastructure. The term 'near' can be interchanged with other commonly used legislative or industry terms such as 'close proximity', 'unsafe distance' or 'in the vicinity of'.

7.1 Risk Management General

The standard Hunter Water principles and processes for risk management should be adhered to, including hazard identification, risk assessment and control; however, specific precautions and processes must be followed because of the nature of work on or about in-ground and overhead assets. These are prescribed by legislation and guidance material provided by Safe Work NSW and the infrastructure asset owners. The following two major sections describe the processes for Underground and overhead Assets, respectively.

8 Key Elements – Managing the Risks

8.1 Underground Assets

8.1.1 Process for Managing the Locating and Excavation Around Underground Assets

8.1.1.1 Job Planning

Construction projects, including excavation or work near overhead power, should identify these potential hazards in the Chair assessment, completed at three formal stages through the project planning phase. Safe Work Method Statements are required for construction where underground and overhead service hazards and controls should be covered.



Hunter Water Civil and Maintenance tasks should be planned and programmed wherever possible. Pre-planning provides the opportunity to obtain Dial Before You Dig reports well before the work occurs and enables the necessary locating and marking to be completed.

For planned civil maintenance work, the Level 5 and Ganger leaders should assess the task before the work crew attending to determine and arrange the necessary DBYD reports and identify any overhead services that need to be considered and planned for. Ideally, the Level-5 / ganger can complete ground service locating with a ground scanner and mark out services with survey paint.

8.1.1.2 Pre-Task Risk Assessment (PTRA)

The Hunter Water PTRA includes hazard identification prompts for underground and overhead utilities. The PTRA should be the pre-cursor for DBYD and service location if it is not a pre-planned task described above.

8.1.1.3 Dial Before You Dig and Service Location

Underground Asset Location, as described by the NSW Safe Work Guide – Work Near Underground Assets – 2007, requires the following steps to locate utility services such as Electricity, Communications, Water, Sewerage, Oil and Gas, and others:

- Contract DBYD
 - DBYD is online - www.1100.com.au
 - Phone: Ph.1100 during business hours
 - Mobile device: download the 1100 (Dial Before You Dig) app from iTunes
- Obtain Dial Before You Dig Report – ideally, this is obtained two days before the work occurs. Keep on-site for the direction of the work. Keep a diary record and record the DBYD request number on the PTRA record.
- Print them out in colour / open them up and read them
- Review the DBYD report. DBYD plans to provide network presence only – further investigation is required if services are shown. Recipients may need to contact the utility or service provider for more detailed information.
- An onsite inspection should always be performed to ascertain the existence, location, depth and alignment of assets
- Asset owners of gas infrastructure provide for a fee domestic connection shown on a street diagram. **Note:** A thorough visual inspection of the street and properties is required to ascertain the existence of gas service connections to a household. The street connection diagrams are for each street, it is essential to remember that property boundaries can bound other streets; these plans are accurate only for the street address; the connection and meter may be at the rear of the property in X street but shown on the plans as the address in Y street.
- REMEMBER: No law requires cables or services to be laid at a certain depth
- REMEMBER: Many services have been in the ground for countless years, and subsequent earthworks can alter a cable's 'apparent depth', e.g. footpath and subdivision work, gardening
- Contact the utility provider to determine the location of assets indicated in the vicinity
- Locate assets with a ground location scanner or by other safe methods
- Mark out services on the ground with marker paint. Controls and, if required, a sketch of assets should be detailed in the PTRA Assessment or similar document
- Pot-holing - hand digging with non-conductive hand tools (consider hydro-excavation an option). Pot-holing must be used to locate existing underground assets to ensure adequate clearances are maintained between assets and to locate other asset crossings. Pot-holing at each asset crossing and regular spacing along assets is recommended.
- Mechanical gradual excavation (mud bucket) utilising spotter



Note: Approval and a specific permit to work may need to be obtained for digging property such as the rail corridor or on private lands.

Note: If unsure where the service is located, contact the service provider – service providers such as Energy Australia can attend the site and assist with service location or provide advice on securing exposed services.

If any plan you receive says, “You are working near transmission cables”, it is compulsory to:

- Notify AUSGRID two weeks before work is scheduled to begin
 - Phone the AUSGRID Transmission enquiries line on (02) 49519200 to arrange for an AUSGRID representative in your region
 - Print Ausgrid plans in colour. Know what is located underground. **TREAT ALL CABLES AS LIVE**
- | | | |
|---|---------------------------------|---------------|
| – | Transmission | BROWN |
| – | High Voltage (HV) Cable | ORANGE |
| – | Low Voltage (LV) Cable | BLUE |
| – | Low Voltage (LV) Service | Light BLUE |
| – | Street Light Control (SL) Cable | GREEN |
| – | Auxiliary | MAGENTA |
| – | Earth | Dark GREY |
| – | Abandoned | Light GREY |

8.1.1.4 Safe Approach Distance to Underground Assets

Refer to Appendix A for a safe approach distanced from underground assets.

8.1.1.5 Supporting Assets

When services are uncovered and surrounding excavation material removed, this can weaken, stress or cause movement with the service pipework or conduits and cause damage. Services should be supported so they are secured using suitable materials that will not cause damage.

8.1.1.6 Work on top of or below an Underground Asset

No disturbance of the underground assets, including any mechanical cover (e.g. concrete or polymeric cover slab), should occur without prior notification to the asset owner.

Excavation must not be carried out below an underground asset unless steps are taken to ensure that:

- The asset/s or the integrity of the asset and support material is not damaged
- Under-crossing shall be at right angles whenever possible
- Such excavation below the asset/s should not come within the distance specified in DBYD information. **Note: all transmission cables, pipelines, and petrochemical networks may have separate requirements.** and the asset owners should be contacted before commencing work.
- Steps must be taken in consultation with the asset owners to ensure the asset is adequately supported

8.1.1.7 Electrical Earthing of Metallic Pipes

Before

The following precautions must always be followed:

- Electrical insulated/rated gloves
- Rubber gumboots
- Fit electrical Bridging Straps
- Use the Plumb Guard detection device



- Comply with **Work Instructions 001 – Working on Potable Water Mains and Fittings** and **Work Instruction 004 – Working on Commercial and Domestic Water Services**

If an electrical current is detected, work must immediately stop and remove workers from the hazard. Supervisors must be notified along with the relevant electrical authority.

8.1.1.8 Gas Assets – Gas Strikes

Should an incident involving gas assets occur, the following actions should be taken:

- All work should cease immediately
- Operator is to shut down the plant or equipment UNLESS this process may provide an ignition source for any escaping gas
- It is essential to leave the cab or operator station, trench or enclosure and maintain an exclusion perimeter due to the risk of explosion or fire. Do not attempt to use any instrument which may provide an ignition source near the gas escape. This may include mobile phones, two-way radios, etc.
- Warn all other personnel and the public to keep clear from the worksite and equipment. **DO NOT** attempt to approach, re-enter or start the vehicle until the relevant authorities have determined the site is safe.
- Contact the fire brigade on 000 if life and property are threatened
- Facilitate First Aid treatment and seek medical aid as required
- Advise your organisation's emergency contact and request they immediately notify the relevant authorities, including the applicable asset owner
- Initiate the emergency management plan and incident investigation process

8.1.1.9 Sewerage Asset Strike

Should an incident involving sewerage assets occur, the following actions should be taken:

- Cease work, make the site safe and contact the sewerage asset owner as soon as possible. Local circumstances and ownership should be considered.
- If contaminated, shower or wash down with copious amounts of water. Remove any contaminated clothing as soon as practical.
- There is a risk of infection from ingestion or eye contact. If eyes are contaminated, flush with copious amounts of fresh potable water. If ingested, seek medical advice.
- For skin contact, wash with soap and water. For broken skin and abrasions, also seek medical advice.
- Protect the public and watercourses from exposure to raw or untreated sewage.
- If damage to a sewer pipe occurs during construction works, take appropriate steps to prevent surrounding material from entering the pipe.

8.1.1.10 Water and Telecommunication Asset Strike

- Cease work, make the site safe and contact the asset owner.

8.1.1.11 Electrical Asset Strike

- Cease work, make the site safe and contact the asset.

Should

- An attempt should be made to break the machinery's contact with the live power line by moving the machine clear only if it is safe to do so.



- If it is not possible to break the contact with the live power line, the crane or mobile plant operator should remain inside the cabin of the crane or on the plant item. The network operator should be called immediately to isolate power to the live power line. The operator must remain in place until the power has been isolated and the 'all clear' given by the network operator.
- If leaving the cabin or the operator's position due to fire or other life-threatening reasons is essential, jump clear of the equipment. Do not touch the equipment and the ground at the same time. When moving away from the equipment, the operator should hop or shuffle away from the plant item (with both feet together) until at least 8 metres from the nearest part of the crane or plant. Under no circumstances run or walk from the item of plant as voltage gradients passing through the ground may cause electricity to pass through the body, resulting in an electric shock.
- Warn all other personnel and public members to keep 8 metres clear from the plant item. Do not touch or allow persons to touch any part of the plant, and do not allow persons to approach or re-enter the vehicle until the network operator has determined the site safe. Remember, electricity flows through the ground, so an electric shock could be received from walking close to the scene. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site made safe before assisting.
- Untrained, unequipped persons should not attempt to rescue someone receiving an electric shock. All too often, secondary deaths occur because others get electrocuted trying to help earlier victims. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site safe before assisting.

8.1.1.12 The Five P's of Safe Excavation

Plan – Plan ahead by lodging your BYD enquiry at least one business day before your project begins, and ensure you have the correct information required to carry out a safe project

Pothole – Prepare by reviewing the utility plans and contacting the asset owners if you need assistance. Look for onsite asset clues such as pit lids, marker posts and meters. Engage a DBYD skilled locator who can assist you in locating assets electronically before potholing

Protect – Pothole, if permitted, using the asset owner's stated method as specified on the plans and information pack. Some potholing methods include hand digging or hydro vacuum extraction

Proceed - You should only proceed with your excavation work after you have planned, prepared, potholed (unless prohibited) and have protective measures in place

8.2 Overhead Power

8.2.1.1 Job Planning Construction Projects

Construction projects, which include work near overhead power, should identify these potential hazards in the Chair assessment, which is completed at three formal stages through the project planning phase. Service isolations, terminations, re-routing services, and, if required, fitment of warning devices, such as tiger tails, can be organised now.

Hunter Water civil and maintenance tasks should be planned and programmed wherever possible. Pre-planning provides the opportunity to overhead services well before the work occurs and enables the necessary planning and, if required, isolations to be arranged.

For planned civil maintenance work, the Level 5 and Ganger leaders should assess the task before the work crew attending to determine and arrange the necessary DBYD reports and identify any overhead services that need to be considered and planned.

The basic concept when dealing with live overhead electricity is to apply the following hierarchy of control:

1. Arrange with the energy service provider to isolate the supply; or
2. Plan and carry out the work outside of the "Ordinary Person Safe Approach distance" or
3. Plan and carry out work up to and within the "Accredited Person Safe Approach Distance."



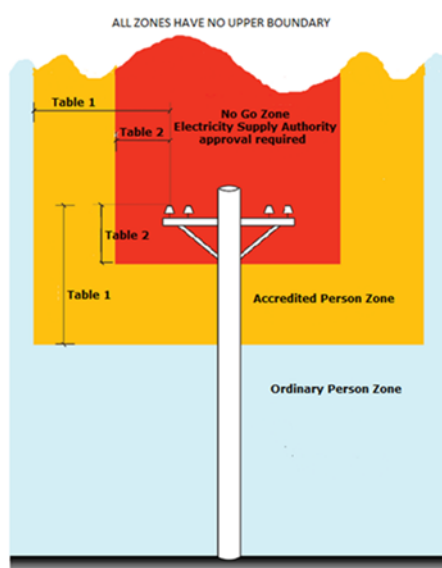
Note: If any work needs to occur closer than the “Accredited Person Safe Approach Distance” or the work includes earthing or bonding leads, then a safe work system must be developed for the principal Electrical Engineer’s approval before work is permitted to occur.

8.2.1.2 Pre-Task Risk Assessment (PTRA)

The PTRA tool includes hazard identification prompts for underground and overhead utilities. The PTRA, if not a pre-planned task described above, should be the precursor for controls relating to safely managing overhead power.

8.2.1.3 Overhead Services Safe Approach Zones

The following table shows the safe clearance and competencies to be considered when working near overhead power.



Nominal phase to phase ac voltage (Volts)	Approach distance (m)
Up to and including 132,000	3.0
Above 132,000 up to and including 330,000	6.0
Above 330,000	8.0
Nominal pole to earth dc voltage (Volts)	Approach distance (m)
Up to and including +/- 1500 Volts	3.0

ORDINARY PERSONS

Nominal phase to phase ac voltage (Volts)	Approach distance (m)
Insulated low voltage cables up to 1000, including LV ABC	0.5
Un-insulated low voltage conductors up to 1000	1.0
Above 1000 up to and including 33,000	1.2
Above 33,000 up to and including 66,000	1.4
Above 66,000 up to and including 132,000	1.8
Above 132,000 up to and including 220,000	2.4
330,000	3.7
500,000	4.6
Nominal pole to earth dc voltage (Volts)	Approach distance (m)
Up to +/- 1,500	1.0

ACCREDITED PERSONS

Work by Ordinary Persons

A risk assessment must be completed, and a spotter must be used if determined by the risk assessment, even if working within the Ordinary person zone.

Consultation for work near Overhead Electric Lines by Ordinary Persons outside of but up to the Approach Distances specified must not be carried out until the following parties have been consulted concerning the proposed work:

- For Electricity Supply Authority Overhead Electric Lines on public property – No consultation required
- For any Overhead Electric Lines on private property – Consultation with the person in control of the property
- For any Overhead Electric Lines on Hunter Water Property – No consultation required

Work Carried Out by Accredited Persons

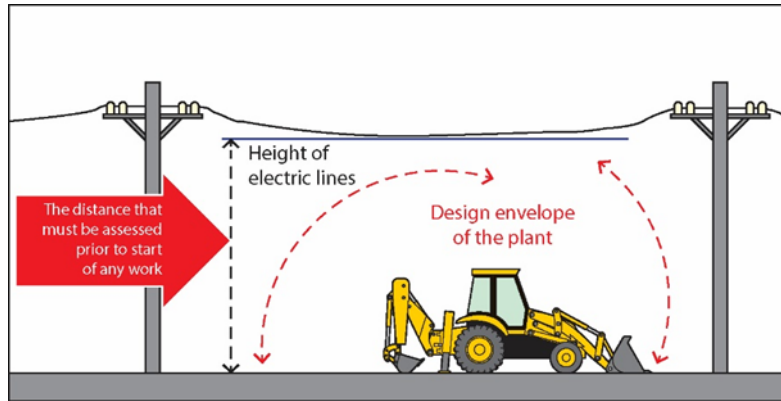
Accredited Persons, with a Safety Observer who are performing work Near overhead power lines (including Plant, hand tools, equipment or any other material held by a person), cranes (and their loads) and items of mobile Plant operated by an Accredited Person with a Safety Observer Near overhead power lines. The



Approach Distances in the above are table based on the following conditions:

- Completion of a job-specific written risk assessment before the commencement of work;
- Application of a safe system of work, which includes the use of a Safety Observer; and
- Compliance with any conditions imposed by the Electricity Supply Authority with control of the Overhead Electric Lines impacting the work.

8.2.1.4 Mobile Plant Operation Near Overhead Power Lines



When the Plant is operated Near (including under) Overhead Electric Lines, the full working Envelope of the mobile Plant must be considered when assessing the job risks so that the Approach Distance of the mobile Plant relevant to the operator's competency is not at risk of being breached.

This may require the limiting of raising/hoisting and slewing motions of the mobile Plant with:

- Mechanical stops or interlocking of the motion of the crane or mobile Plant to prevent it from being moved within the approach distance
- Mechanical constraints on the jib, boom, or other part of the crane or mobile Plant likely to contact Energised Overhead Electric Lines or associated electrical equipment as a result of surge or backlash of hydraulic operation
- Using cranes or mobile Plant fitted with programmable zone limiting devices. If a zone-limiting device is used, the interlocking and warning system should be designed with a safety integrity commensurate with the risks of contacting the electric lines

Hunter Water requires Blue Traffic cones to be placed in a suitable location beneath overhead power lines to highlight, warn and remind people, particularly plant operators and spotters, of the presence of overhead power. The blue cones should be placed as a control after the pre-task risk assessment, and their purpose should be discussed in the induction toolbox via the PTRAs before work commences. They should only be removed at the end of the job after mobile equipment movements have ceased.





8.2.1.5 Operating Equipment near 13200 Vac Power Lines

Voltages induced by Electric Fields

When working near overhead electric lines energised at voltages exceeding 132,000 Vac, dangerous voltages can be induced in the metallic parts of mobile Plant or metallic construction materials exceptionally long lengths of metallic construction materials.

Before any mobile plant is operated or metallic construction materials are handled near overhead electric lines Energized at greater than 132,000 Vac, the principal electrical engineer or their delegate must be advised of the work in writing and consulted for risk management advice.

8.2.1.6 Vehicle Clearance Under Overhead Powerlines

Approach Distances for vehicles, mobile Plant stowed for transit or with a design Envelope up to an including 4.6 metres in height, which are driven by or operated by persons under Overhead Electric Lines are explained below.

When assessing the Approach Distance for a vehicle driven under overhead power lines, several factors should be considered, including:

- The Approach Distances specified are based on the fact that the design or transit Envelope of the vehicle does not allow any part of the vehicle to come closer than the Approach Distances specified. This includes the load, exhaust pipe and attachments such as rotating/flashing lights or radio aerials. Refer to the illustration below.



- Where a work activity involves a person working from, standing on or walking across the top of a vehicle, the relevant approach distance specified in either Table 1 or Table 2 must be maintained. This may include a person accessing a load on a vehicle during loading/unloading.
- Where, as a result of the work being performed, the distance between the conductors and the ground may decrease (for example, when constructing work or backfilling causes the ground level to be raised), then the distance between the vehicle must be continually re-assessed to ensure that the relevant Approach Distances are being maintained.

Table 1: Approach distances for road transport vehicles passing under electric lines

Nominal Phase-to-Phase AC Voltage (Volts)	Approach to Distance (m)
Low Voltage conductors up to 1000	0.6
Above LV, up to and including 33,000	0.9
Above 33,000 up to and including 132,000	2.1
Above 132,000 up to and including 220,000	2.9
330,000	3.4
500,000	4.4
Nominal pole-to-earth dc voltage (Volts)	Approach to Distance (m)
Up to +/- 1,500	0.9



Scaffolding Erected Near Overhead Power Lines

The erection, dismantling and use of fixed scaffolding Near Overhead Electric Lines and associated electrical apparatus with an operating voltage up to and including 33 kVac must maintain an Approach Distance of at least 4 m. For scaffolding work above 33 kVac, the Electricity Supply Authority must be consulted, and any special conditions imposed by the Electricity Supply Authority must be complied with.

Table 2: Approach distances for scaffolding

Nominal phase to phase AC voltage (Volts)	Approach Distance (m)
Up to and including 33 kV	4.0
Greater than 33 kV	Consultation with the Electricity Supply Authority Required

Suppose the need to erect scaffolding Near Overhead Electric Lines arises at a Hunter Water workplace. In that case, the work must be risk managed in accordance with Safe Work Australia, Working in the Vicinity of Overhead & Underground Electric.

8.2.1.7 Vegetation Control Near Overhead Power Lines

Vegetation control near overhead electric lines must only be carried out by workers with the competency UET20312 - Certificate II in ESI - Powerline Vegetation Control, who have been authorised by the Hunter Water Principal Electrical Engineer or their delegate.

Whenever practicable, vegetation control near overhead electric lines must be carried out with the lines de-energised or isolated.

Vegetation control near overhead electric lines must only be carried out using fit-for-purpose plant and equipment.

The Hunter Water Principal Engineer or his/her delegate shall maintain competency and authorisation records relating to workers authorised to carry out vegetation control near overhead electric lines.

8.2.1.8 Workers in Contact with Plant Operating in Accredited Zones

When cranes, loads or mobile plant are operating within the Accredited Person Zone, no one should remain in or make contact with any part of the crane, load or mobile plant and the ground or another earthed situation unless extra risk controls are in place to prevent electric shock.

If the Plant operating within the Accredited Person Zone is of the type where the Worker operating the Plant stands on the ground to operate the Plant, the **Worker operating the Plant must only handle the controls if:**

- The OEM's documentation states that the controls are effectively Insulated to protect the operator; or
- The controls are of the wireless remote type; or
- The Energised electrical equipment is Low Voltage; **AND**
- The Worker is wearing Low Voltage insulating gloves; or
- The Worker is standing on a clean and dry rubber insulating mat at least 900 mm x 900 mm x 6 mm thick and compliant with AS/NZS 2978 Insulating mats for electrical purposes; or
- The operator stands on an equipotential conductive mat, which is electrically connected to all metalwork associated with the controls



All other Workers must keep clear of the Plant and load unless they are essential to the operation and competent to work in the Accredited Person Zone, e.g. dogman, people helping to set up the Plant or the Plant operator. If a Worker must contact the Plant or load while standing on the ground or in an earthed situation, at least one of the following risk controls must be utilised:

- The Energised electrical equipment is Low Voltage, **AND** the Worker is wearing Low Voltage insulating gloves; or
- Effective insulation is provided on the Overhead Electric Lines or electrical equipment, or the crane, load or mobile Plant or its parts to ensure that even if it contacts the Overhead Electric Lines or electrical apparatus, no-one would receive an electric shock; or
- The load is controlled by non-conductive tail ropes, with insulating properties appropriate to the maximum electric line voltage, whenever uncontrolled motion could allow the load to come within the No Go Zone; or
- The Worker is positioning or removing lifting gear from a crane hook or the load while it is stationary; or
- The Worker is adjusting outriggers, jacks, packing, chocks or similar, **AND** the crane, load, or mobile Plant is not being moved at that time.

8.2.1.9 Accidental Contract with Overhead Powerlines

Should contact be made with a live underground or overhead power line or a flash-over occur between a live overhead power line and a crane or an item of mobile plant, the following actions shall be taken:

An attempt should be made to break the machinery's contact with the live power line by moving the jib or driving the machine clear only if it is safe to do so

If it is not possible to break the contact with the live power line, the crane or mobile plant operator should remain inside the cabin of the crane or on the plant item. The network operator should be called immediately to isolate power to the live power line. The operator must remain in place until the power has been isolated and the 'all clear' given by the network operator. Caution: When a crane or item of the plant inadvertently contacts overhead powerlines, circuit protective devices may operate to turn the power off automatically. However, some protection devices are designed to automatically reclose, re-energising the powerlines after a short period, typically 1 – 4 seconds.

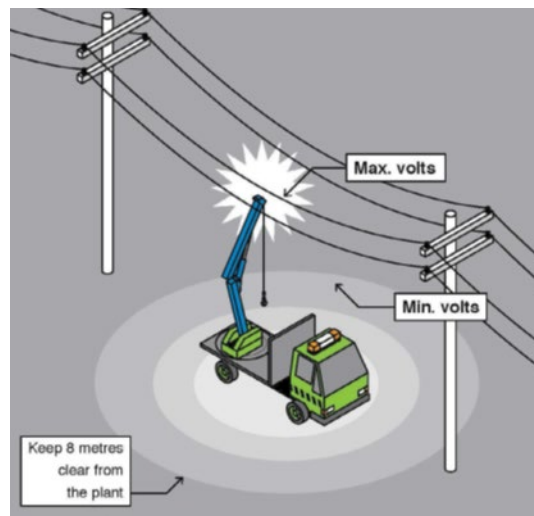
If leaving the cabin or the operator's position due to fire or other life-threatening reasons is essential, jump clear of the equipment. Do not touch the equipment and the ground at the same time. When moving away from the equipment, the operator should hop or shuffle away from the plant item (with both feet together) until at least 8 metres from the nearest part of the crane or plant. Under no circumstances run or walk from the crane or item of the plant as voltage gradients passing through the ground may cause electricity to pass through the body, resulting in an electric shock.

Warn all other personnel and members of the public to keep 8 metres clear from the crane or item of the plant. Do not touch or allow persons to touch any part of the crane or plant item, and do not allow persons to approach or re-enter the vehicle until the network operator has determined the site safe. Remember, electricity flows through the ground, so an electric shock could be received from walking close to the scene. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site made safe before assisting.

Untrained, unequipped persons should not attempt to rescue someone receiving an electric shock. All too often, secondary deaths occur because others get electrocuted trying to help earlier victims. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site has been made safe before assisting.



Figure 1: Affected area surrounding mobile plant when in contact with energised overhead electric line



8.3 Safety Observers

8.3.1 The Role of the Safety Observer for Underground and Overhead Work

The safety observer is a person specifically assigned to observe the work activities in the vicinity of underground and overhead services. This person should have completed specific training to keep the work and implement control measures in an emergency. They should alert workers, crane operators, or plant operators when approach distances may be about to be breached or if other unsafe conditions arise.

When excavating near or adjacent to underground assets, it is essential to be aware of overhead hazards such as overhead powerlines. Risk assessment may require more than one safety observer for such activity, e.g. one observer to mitigate inadvertent contact with underground hazards and the other to mitigate inadvertent contact with overhead hazards.

A safety observer should:

- Be whenever the work activity is likely to be done closer than the distances outlined in the DBYD information
- Be positioned at a safe location to observe both overhead electric lines and plant operations effectively
- Be able to immediately and effectively communicate with the crane or mobile plant operator or other people if required
- Ensure all people stay outside the specified approach distance unless they are performing a rescue by approved standards
- Carrying out a specific task described in the SWMS, e.g. a crane dogger holding a non-conductive tagline attached to a load suspended from a mobile crane
- Not do other work while acting as a safety observer, e.g. passing tools, equipment or materials to workers
- Not observe more than one work activity at a time
- Monitor the work activity being done and have the authority to stop the work at any time



9 Training

Hunter Water must provide training in Confined Spaces. Competent Person.

This training should include the following topics:

- Excavation Awareness
- Dial Before You Dig
- Earth Bridging Straps / Plumb Guards
- Overhead Power approach – Accredited Person

10 Monitoring and Reviewing

Monitoring processes for this topic include:

- High Risk Audits
- Safe Behaviour Observations
- Field Interactions

Review processes for this topic include:

- Review of applicable injury and incident reports
- Review of hazard reports in Protecht
- Review of this standard and associated documents, Risk Register, Bow Tie diagrams following a high potential incident
- Engagement with the Field Safety Committee and any relevant sub-committees.

11 Related Documents

Document ID	Document Title
Assessment	Pre-Task Risk Assessment PTR
Standard	Consultation, Cooperation, Participation and Coordination
Booklet	Hunter Water Lifesavers – Underground and Overhead Services and Trenching
SWMS	Hunter Water SWMS – Underground and Overhead Services
SWMS	Hunter Water SWMS – Working with Mobile Plant
SWMS	Hunter Water SWMS – Confined Space
SWMS	Hunter Water SWMS - Excavation
Standard	Confined Space
Standard	Underground and Overhead Services
Standard	Excavation
Work Instruction	WI 001 – Working on potable water mains and fittings
Work Instruction	WI 002 – Working on gravity sewer mains and gravity fittings
Work Instruction	WI 003 – Working on rising sewer mains and recycled sewer mains

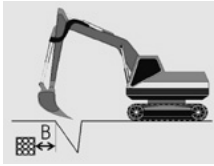


12 Associated Regulations and Standards

Document ID	Document Title
Act	WHS Act 2011 (NSW)
Regulation	WHS Regulations 2017
Code of Practice	Code of Practice – Work Health and Safety Consultation, Cooperation and Coordination
Code of Practice	Code of Practice – How to manage work health and safety risks
Code of Practice	Code of Practice – Underground and Overhead Services Work
Code of Practice	Code of Practice – Confined Space
Code of Practice	Code of Practice - Excavation
Code of Practice	Code of Practice – Managing the risks of Plant in the workplace
Guide	SafeWork NSW Guide – Work Near Underground Assets



APPENDIX A: UNDERGROUND SERVICES APPROACH DISTANCES

Assets	Clearances	No-go zone for powered excavation	Controls	Typical Depths
Types of Underground Assets (Note: The owners of assets registered with the Dial Before You Dig service and covered by this Guideline require an enquiry through this free service and compliance with any directive issued with information regarding the asset)	The minimum approach distance for individuals carrying out work near underground assets	<p>Distance 'B' is the minimum approach distance for powered excavating machines.</p>  <p>A minimum clearance of 300 mm from the asset shall be maintained for directional boring across the line of an asset.</p> <p>For directional boring parallel to the asset and at the level of the asset, a clearance of 500 mm shall be maintained from the edge of the nearest asset. It may be necessary to dig trial holes to prove the location of the nearest asset at points along the route.</p>	<p>Two safety observers will be required if the risk assessment identifies a potential risk of contacting underground and overhead assets. One observer ensures the machinery maintains a safe distance from underground assets, while the other ensures a safe distance from the overhead powerlines.</p> <p>An appropriate fire extinguishing system must be at the worksite for gas or electricity assets.</p> <p>If the width and depth of the excavation will expose the asset, the asset owner must be contacted before commencing work.</p>	
Low and Medium-pressure services and Low-pressure mains	N/A	300 mm	Pot-hole to confirm the location of service. The position of the asset will not appear on the maps.	300 – 450 mm
Medium Pressure mains	N/A	300 mm	<p>Pot-hole to confirm the location of the asset</p> <p>The code of practice for shafts, tunnels and trenches, and the guide to dangers of poorly ventilated workplaces</p>	450 – 750 mm



Assets	Clearances	No-go zone for powered excavation	Controls	Typical Depths
			<p>Only one individual at a time should be excavating if hand excavation is being undertaken in a confined space. Another should act as an observer and be able to operate any breathing, escape or fire equipment required</p> <p>The elimination of an ignition source in the event of an escape</p> <p>Excavation below underground assets should not be undertaken within a distance of 300 mm below the asset located at the lowest level</p> <p>Note: All transmission pipelines involving gas, oil and petrochemicals have separate requirements, and the asset owners should be contacted.</p>	
High-pressure services, mains and pipelines	300 mm with hand tools and supervision from Network Authority	1000 mm	<p>Powered excavation within 300 – 1000 mm is only permitted under the supervision and with a Permit to Work from the Asset Owner</p> <p>Also, see Controls for medium pressure mains immediately above</p>	750 – 1200 mm
Low Voltage Electricity cables – voltages less than or equal to 1000 V (1kV)	Close proximity with the use of hand tools	300 mm	Must contact asset owner for specific conditions	450 – 750 mm



Assets	Clearances	No-go zone for powered excavation	Controls	Typical Depths
Electricity conductors from 11,000V (11kV) up to 33000 V (33kV)	Close proximity with the use of hand tools	600 mm	Must contact asset owner for specific conditions	900 mm
Underground sub-transmission cables 33,000V up to 132,000V (132kV)	Must contact asset owner	Must contact asset owner	Must be carried out under the supervision of the asset owner	900 mm
High Voltage Electricity cables – voltages from 1000V (1kV) up to 33kV	Close proximity with the use of hand tools	Must contact asset owner	Must contact asset owner for specific conditions	600 – 1000 mm
Extra High Voltage Electricity Transmission cables – voltages above (132kV) and 330,000V (330kV)	Must contact asset owner	Must contact asset owner	Work must be carried out under the supervision of the asset owner	800 – 1200 mm
Telecommunications cables	Contact asset owner for specific conditions	Contact asset owner for particular conditions	Must contact the asset owner for special conditions	Typically, 450 –600 mm, other assets to 1200 mm
Water pipelines	N/A	300 mm (if the pipeline is 200 mm or greater in diameter)	Pothole to confirm the location of the asset	Min 450 mm
Sewer pipelines	N/A	300 mm (if the pipeline is 200 mm or greater in diameter)	Pothole to confirm the location of the asset	Between 600 mm to 10 metres