PowerWater

ACCESS TO APPARATUS RULES *PROCEDURE*

WORK IN THE VICINITY OF APPARATUS

Approved By:	Prepared By:	Issue Date: 17/06/2011	Status: Approved
Andrew Macrides Managing Director	Access to Apparatus Rules Committee	File No: QDOC2011/71	Version No: 1

CONTENTS

WORK IN THE VICINITY OF APPARATUS

1. PURPOSE

This *procedure* sets out the requirements for work *in the vicinity* of *apparatus* owned, controlled or operated by Power and Water.

2. SCOPE

This *procedure* covers Power and Water *employee*s, *contractors* and members of the general public working *in the vicinity* of *apparatus* owned, controlled or operated by Power and Water.

Words or terms shown in italics are definitions and are listed in section 5 of this *procedure.*

3. REFERENCES

Australian Standard 2550.1	Cranes, hoist and winch – Safe use – General requirements
Australian Standard 4360	Risk management
Electricity Reform Act 2005	
Electricity Reform (Safety and	Technical) Regulations 2005
ENA NENS 04	National Guidelines for Safe Approach Distances to Electrical and Mechanical Apparatus
ENA	Guideline for Management of Tools and Equipment used in the Electricity Supply Industry
ENA	Draft National Guideline for Earthing Potential Rise when Operating Mobile plant near Live Overhead Electrical apparatus
Power and Water	Access to *Apparatus* Rules
Workplace Health & Safety Act 2011	
Workplace Health and Safety Regulations 2010	

4. ROLES AND RESPONSIBILITIES

Nil

5. DEFINITIONS

5.1 ***Apparatus*** - means *electrical apparatus* and *mechanical apparatus.*

5.2 ***Approved*** - means having appropriate organisation endorsement in writing.

5.3 ***Authorised person*** - means a *competent* person with technical knowledge or sufficient experience who has been *approved* to act on behalf of Power and Water to perform the duty concerned.

5.4 ***Authority to work in the vicinity of apparatus*** - means an authority issued to a person when work is required to be performed *in the vicinity* of *apparatus*.

5.5 ***Cable*** - means an insulated *conductor* or two or more such *conductor*s laid together, whether with or without fillings, reinforcements or protective coverings.

5.6 ***Competent*** - means having the skill, knowledge and attributes a person needs to complete a task.

5.7 ***Conductor*** - means a wire, *cable* or form of metal designed for carrying electric current.

5.8 ***Contractor*** - means any person and/or organisation entering into an agreement (whether oral or written) to provide goods or services to Power and Water.

5.9 ***Earthed*** - means directly connected to the general mass of earth to ensure and maintain the effective dissipation of electrical energy.

5.10 ***Electrical apparatus*** - means any electrical equipment, including electrical motors, transformers, switchgear, overhead power lines and underground *cable*s, the *conductor*s of which are *live* or can be made *live*.

5.11 ***Electricity network*** - means transmission and distribution systems consisting of *electrical apparatus* which are used to convey or control the conveyance of electricity between generators' points of connection and customers' points of connection.

5.12 ***Employee*** - means a person employed by Power and Water, a *contractor* or sub*contractor*, and a person employed by a *contractor* or sub*contractor*, who carries out work for Power and Water.

5.13 ***Excavation*** - in relation to work *in the vicinity* of *apparatus*, means:

(a) using hand tools for the removal of earth to a depth greater than 300mm;

(b) using earth moving machinery to a depth greater than150 mm; or

(c) mechanical ploughing for agricultural purposes in rural areas to a depth greater than 250mm.

Note: Excavation conducted solely by vacuum extraction is not considered to be *excavation,* however, vacuum extraction *shall* not used for *pot holing.*

5.14 ***Exposed conductor*** - means a *conductor*, approach to which is not prevented by a barrier of rigid material or by insulation which is adequate under a relevant Australian Standard specification for the voltage concerned.

5.15 ***High voltage (HV)*** - means a nominal voltage exceeding 1000 volts alternating current or exceeding 1500 volts direct current.

5.16 ***Instructed person*** - means a person, with appropriate training or experience to enable them to identify *high voltage* and *low voltage conductor*s and to be aware of the hazards electricity may present.

5.17 ***Insulating mat*** - means a mat of insulating and non-hygroscopic material intended to effectively provide an electrically safe barrier on which the user can stand, kneel or be otherwise supported.

5.18 ***In the vicinity*** - means either a situation where:

(a) a person is in close proximity to and there is a risk of either directly, or through any conducting medium, of unintentionally coming within relevant *safe approach distance to live conductors*; or

(b) there is a likelihood of unintentional contact with *apparatus* or services that could cause personal injury or damage.

5.19 ***Live*** - means energised or subject to hazardous induced or capacitive voltages.

5.20 ***Low voltage (LV)*** - means nominal voltage exceeding 50 volts alternating current or 120 volts direct current but not exceeding 1000 volts alternating current or 1500 volts direct current.

5.21 ***Mobile plant*** - means a crane, elevating platform, tip-truck or similar plant, any equipment fitted with a jib or boom and any device capable of raising or lowering a load.

5.22 ***Non instructed person*** - means a person, without appropriate training or experience to enable them to identify *high voltage* and *low voltage conductor*s and to be aware of the hazards electricity may present.

5.23 ***Person in charge*** - means the person who has the responsibility of ensuring the safe conduct of work under their control.

5.24 ***Pot holing*** - means the digging of a small hole, approximately 0.5m x 0.5m, using hand tools, to locate buried services or to determine underground conditions.

5.25 ***Temporary earth*** - means a removable uninsulated *conductor* installed in contact with the earth (or an intermediate material) intended for the conduction and dissipation of current.

5.26 ***Toothless bucket*** - means the *excavation* bucket of backhoe or similar machine that does not have exposed teeth or cutting blade to help break up the earth.

5.27 ***Permanent network earth*** - means a permanent connection point to a earthing system consisting of an arrangement of earth *conductor*s, typically including an earth grid, earth electrodes and additional earth *conductor*s such as overhead earth wires *cable* sheaths, earth continuity *conductor*s and parallel earthing *conductor*s.

5.28 ***Procedure*** - means the documentation of a systematic series of actions (or activities) directed to achieve a desired result.

5.29 ***Safe approach distance to live conductors*** - means the minimum separation in air from a *live exposed conductor* that *shall* be maintained by a person, or any object (other than insulated objects designed for contact with *live conductors*) held by or in contact with that person.

5.30 ***Safety observer*** - means a *competent* person assigned the solitary duty of observing and/or monitoring the safety of persons in potentially hazards situations and providing warnings, where necessary.

5.31 ***Shall*** - means mandatory.

5.32 ***Should*** - means advisory or discretionary.

5.33 ***Substation*** - means a *switchyard*, terminal station or place at which *high voltage supply* is converted or transformed.

5.34 ***Switchyard*** - an area identified by an *approved* sign(s) and surrounded by fences or walls that prevent unauthorised access inside which *high voltage exposed conductors* maintain *standard safety clearances*.

6. RECORDS

Nil

7. ATTACHMENTS

Attachment 1 – Work *in the vicinity* of overhead and underground infrastructure

Attachment 2 - Earthing of *mobile plant in the vicinity* of *electrical apparatus*

Attachment 3 - Before You Dig (DBYD) *procedure*

Attachment 4 - Underground infrastructure location advice

Attachment 5 - *Excavation in the vicinity* of underground *cables*

Attachment 6 - Responsibilities under an *authority to work in the vicinity of apparatus*

Attachment 7 - Power, water and sewerage infrastructure location flow diagram

8. *PROCEDURES*

8.1 Work *in the vicinity* of overhead power lines

8.1.1 Where work *in the vicinity* of overhead power lines may bring, or is likely to bring, a person, or any object (other than insulated objects designed for contact with *live conductors*) held by or in contact with that person within the distances set out in Attachment 1 – "Work *in the vicinity* of overhead and underground infrastructure", then the *person in charge* of the work *shall* apply to Power and Water on 1800 245 092 for written authority to commence work.

8.1.2 Following a request for authorisation to work *in the vicinity* of overhead power lines a risk assessment will be undertaken by a Power and Water representative.

8.1.3 Where the risk assessment determines, an *authority to work in the vicinity of apparatus shall* be issued.

8.1.4 Persons, including members of the general public, who are required to work *in the vicinity* of overhead power lines, *shall* be instructed on their responsibilities in receiving an *authority to work in the vicinity of apparatus,* as shown in Attachment 6 – "Responsibilities under an *authority to work in the vicinity of apparatus"* (see LEVEL 1 INSTRUCTION), by a person authorised to issue an *authority to work in the vicinity of apparatus.*

8.1.5 Where persons or *mobile plant* are capable of coming within the *safe approach distance to live conductors* a *safety observer shall* be assigned prior to the commencement, and for the duration, of the work.

8.1.6 Where operating *mobile plant* is capable of coming within the *safe approach distance to live conductors* it *shall* be *earthed* in accordance with Attachment 2 – "Earthing of *mobile plant in the vicinity* of *electrical apparatus*".

8.2 Work *in the vicinity* of underground infrastructure

8.2.1 A person *shall* not place or maintain a corrosive, abrasive, heavy or deleterious material or substance above an underground power *cable* or make an opening in the ground surface that may endanger an underground power line or remove, tamper with or cover any underground line marker without the written authority of Power and Water.

8.2.2 If excavating within 3 metres of underground power or communication *cable*s or within 1.5 metres of underground water or sewerage services a "Dial before You Dig" (DBYD) enquiry *shall* be submitted in accordance with Attachment 3 – "Dial before You Dig (DBYD) *procedure*".

Note 1: Work *in the vicinity* of an underground gas pipeline *shall* only be undertaken with the consent of the asset owner.

8.2.3 Persons, including major *contractor*s, period order *contractor*s and persons required to regularly conduct *excavation* near *high voltage* or *low voltage* underground *cable*s *shall* attend an instruction course conducted by Power and Water on safe working and *excavation in the vicinity* of *electrical apparatus*. Additionally, they *shall* be instructed on their responsibilities in receiving the *authority to work in the vicinity of apparatus* by a person authorised to issue an *authority to work in the vicinity of apparatus,* as shown in Attachment 6 – "Responsibilities under an *authority to work in the vicinity of apparatus"* (see LEVEL 2 INSTRUCTION).

8.2.4 All *excavation* work *shall* comply with Power and Water requirements and relevant environmental Acts and Regulations.

8.2.5 Operators of *mobile plant* and machinery *shall* possess appropriate qualifications/licenses.

8.2.6 Where *excavation* is being undertaken *in the vicinity* of underground communication or power *cable*s the requirements of Attachment 5 – "*Excavation in the vicinity* of underground *cable*s" *shall* be observed.

8.2.7 Where operating *mobile plant* under an *authority to work in the vicinity of apparatus* is capable of coming within the *safe approach distance to live conductors* it *shall* be *earthed* in accordance with Attachment 2 – "*Earthing* of *mobile plant in the vicinity* of *electrical apparatus*".

8.2.8 Persons *shall* not make contact with *earthed mobile plant* and *shall* observe the *safe approach distance to live conductors* in Attachment 1 – "Work *in the vicinity* of overhead and underground infrastructure".

8.2.9 Where persons or *mobile plant* are capable of coming within the *safe approach distance to live conductors* a *safety observer shall* be assigned prior to the commencement, and for the duration, of the work.

Attachment 1 – Work *in the vicinity* of overhead and underground infrastructure

A1-1 *SAFE APPROACH DISTANCE TO LIVE CONDUCTORS*

The *safe approach distance to live conductors* covered in this section A1-1 apply to all work by *non instructed*, instructed and *authorised person*s *in the vicinity* of *electricity network*s owned or managed by Power and Water.

(a) *Non instructed persons* include members of the general public and *employees* who do not have sufficient knowledge, training or experience to be able to identify *high voltage* and *low voltage conductors*.

(b) *Instructed persons* have appropriate training or experience to enable them to identify *high voltage* and *low voltage conductor*s and to be aware of the hazards electricity may present. *Instructed persons* are given appropriate training by Power and Water or are deemed to have the appropriate experience required to identify *HV* and *LV conductors* and to be aware of the hazards present.

(c) *Authorised persons* have technical knowledge or sufficient experience and are *approved* to act on behalf of Power and Water to perform the duty concerned.

Note 1: Table 1 provides the *safe approach distance to live conductors* that *non instructed person*s, *instructed person*s and *authorised person*s *shall* maintain to *live conductor*s, for the voltage concerned.

Note 2: Table 2 provides the *safe approach distance to live conductors* that *mobile plant* operated by *non instructed person*s, *instructed person*s and *authorised persons* without a *safety observer* and *instructed persons* and *authorised person*s with a *safety observer, shall* maintain to *live conductor*s.

Note 3: The *safe approach distance to live conductors* shown in Tables 1 and 2 are from *exposed*, covered and insulated *conductors* and do not apply to *earthed* metallic *screened cables* or *totally enclosed electrical apparatus*.

Table 1 *Safe approach distance to live conductors* for *non instructed person*s, *instructed person*s and *authorised persons*

Nominal phase to phase voltage (alternating current)	***Safe approach distance to live conductors* (mm)**		
	For *non instructed person*s	**For *instructed person*s**	**For *authorised person*s**
Above 50 volts but not exceeding 1kV	3000	300	Insulated contact only
Above 1kV & up to & including 33kV	3000	1200	600
Above 33kV & up to & including 66kV	4000	2000	1000
Above 66kV & up to & including 132kV	5000	3600	1800

Table 2 *Safe approach distance to live conductors* for *mobile plant* operated by *non instructed, instructed* and *authorised persons*

Nominal phase to phase voltage (alternating current)	***Safe approach distance to live conductors* (mm)**			
	For *mobile plant* operated by *non instructed persons*	**For *mobile plant* operated by *instructed persons* or *authorised persons* without a *safety observer***	**For *mobile plant* operated by *instructed persons* or *authorised persons* with a *safety observer***	
			Un-insulated portions of *mobile plant*	**Insulated portions of *mobile plant***
Above 50 volts but not exceeding 1kV	3000	1000	600	Contact allowed
Above 1kV & up to & including 33kV	3000	1500	1200	700
Above 33kV & up to & including 66kV	4000	3000	2000	1000
Above 66kV & up to & including 132kV	5000	3600	3000	1800

A1-2 SAFE APPROACH DISTANCE TO UNDERGROUND INFRASTRUCTURE

The safe approach distance to underground infrastructure covered in this section A1-2 apply to all work by *non instructed* or *instructed persons in the vicinity* of underground infrastructure owned or managed by Power and Water.

(a) In relation to underground infrastructure *non instructed persons* include members of the general public and *employees* who do not have sufficient knowledge, training or experience to be able to locate and/or identify underground power, water and sewerage or gas infrastructure.

(b) In relation to underground infrastructure *instructed persons* have been instructed by Power and Water on the safe working, identification of, and *excavation in the vicinity* of power, water and sewerage infrastructure. Additionally, when required, they *shall* be instructed on their responsibilities in receiving an *authority to work in the vicinity of apparatus*.

Table 3 Safe approach distance to underground infrastructure

<table>
<tr><th rowspan="2">Safe approach distance (mm) to underground power cables for *non instructed persons</th><th colspan="3">Safe approach distance (mm) to underground water & sewerage infrastructure</th></tr>
<tr><th>*Non instructed persons</th><th>*Instructed persons</th><th>Mobile plant operated by *instructed persons</th></tr>
<tr><td rowspan="2">3000</td><td rowspan="2">1500</td><td rowspan="2">250</td><td>250</td></tr>
<tr><td>Excavation less than 250mm shall be by hand excavation only.</td></tr>
<tr><td colspan="4">* See clause A1-2 (a) and (b).</td></tr>
<tr><td colspan="4">NOTE: Work in the vicinity of an underground gas pipeline shall only be undertaken with the consent of the asset owner.</td></tr>
</table>

Attachment 2 – Earthing of *mobile plant in the vicinity* of *electrical apparatus*

A2-1 EARTHING *MOBILE PLANT*

(a) The earthing of *mobile plant* to the general mass of earth *should* be via *approved* earthing equipment using covered flexible trailing *cable* having appropriate fault ratings for the prospective fault levels and *shall* comply with relevant standards including "ENA - National Guideline for Management of Tools & Equipment used in the Electricity Supply Industry".

(b) The following hierarchy *should* be considered in establishing an effective and safe earthing system for *mobile plant*:

(i) *Permanent network earth*

The earth connection *should* preferably be made to a *permanent network earth*.

(ii) Stay or pole stake

Stay and pole stakes are considered a better earth than *temporary earth* electrodes due to the depth of embedment and the surface area contact to the general mass of earth.

(iii) *Temporary earth*s

Where a *permanent network earth* is not available then *mobile plant should* be *earthed* with at least a 20mm diameter *temporary earth* electrode driven to a depth of 500mm. The location of the *temporary earth* electrode *should* be away from trafficked areas and inaccessible to the general public.

Note 1: The suitability of any driven electrode system proposed *should* be reviewed by reference to the resistance of earth electrode used to earth *mobile plant* (see Construction Vehicle Earthing Chart below) using relevant soil resistivity values for the network.

(c) Where *mobile plant* does not have a designated earth point installed, the connection of the trailing earth lead *should* be to bare metal, preferably the chassis of the *mobile plant*.

(d) *Mobile plant shall* be *earthed* by the use of a short as practi*cable* trailing earth lead. The trailing earth lead *shall* first be attached to the *permanent network earth* or *temporary earth* and then attached to the *mobile plant*.

(e) The maximum trailing earth lead length needs to be defined to suit each work situation. A maximum distance of 10 metres or less is desirable.

(f) When *mobile plant* is used in overhead power line situations outside a *substation* or *switchyard* the trailing earth lead *shall* be terminated onto a *temporary earth* or to the main earth connection of the worksite.

(g) If more than one *mobile plant* is involved and within a distance of 5 metres of each other, then they *should* be connected (bonded) to a common earth point. If they are separated by more than 5 metres, then each *mobile plant should* be independently connected to earth.

(h) *Temporary earth* electrodes *should* be barricaded for a radius of 1 metre minimum to guard against step and touch potentials.

(i) Special caution *should* be exercised when personnel need to access or alight from *mobile plant*. Consideration *should* be given to the use of *insulating mat*s at access and egress points to and from the *mobile plant*.

A2-2 MOVEMENT OF *MOBILE PLANT*

(a) Where it is necessary to move *mobile plant* around a worksite and it is possible that the *mobile plant* could come within *safe approach distance to live conductors*, then the *mobile plant shall* be *earthed* at all times during the movement.

Note: Normal vehicular movement is not included in this category, i.e. cars entering site.

A2-3 RESISTANCE OF *TEMPORARY EARTH* ELECTRODE USED TO EARTH *MOBILE PLANT*

The value of the resistance to earth of a single *temporary earth* electrode depends on its dimensions and the resistivity of the soil it is embedded in. As soil resistivities may vary widely a minimum value could be as low as 10 Ω metres for wet saline soil up to a high value of say 10,000 Ω metres, for dry rocky terrain.

A 20mm diameter earth electrode driven up to 500 mm into the soil is recommended as typically about the best that can be expected for a *temporary earth*.

Where 500mm depth, or a required resistance value cannot be achieved, then consideration can be given to using multiple *temporary earth* electrodes connected in parallel to lower the effective resistance to earth.

There will be a practical maximum number of *temporary earth* electrodes that can be used at a work site. If the *temporary earth* electrodes are spaced well apart compared with their penetration depth then the mutual coupling effects between the electrodes will be small, and good reductions in resistance to earth can be achieved. As depths of 500mm or less are being considered, *temporary earth* electrode spacings of 3 to 4 metres will have very little mutual effects, and are practical for a typical worksite involving one or more vehicles.

For a single *temporary earth* electrode 20mm diameter, driven 200mm or 500 mm into the soil, the calculated resistance is tabled below for various soil resistivities.

	Soil Resistivity in Ωmetres			
	10	100	1000	10,000
Resistance to earth of a single 20x200mm earth stake	27 Ω	269 Ω	2691 Ω	26,913 Ω
Resistance to earth of a single 20x500mm earth stake	14 Ω	137 Ω	1368 Ω	13,682 Ω

From the table above a *temporary earth* electrode will have a reasonably high resistance unless the soil resistivity is very low. Note that the usual figure taken for “average” or “normal” soil resistivity is 100 Ωmetres. This means that typical *temporary earth* electrodes for normal soil conditions at the worksite will be in the order of 130 to 270 Ω. However many worksites will be in areas where the soil resistivity is higher than this and resistance values of thousands of ohms could be expected.

Where two or more *temporary earth* electrodes are used and they can be well spaced apart, the effective resistance will be simply given by dividing the figures in the table above by the number of electrodes. For example, for two *temporary earth* electrodes, connected to each end of a vehicle in 100 Ωmetre soil the resistance values will be in the range of say 68 to 135 Ω.

CONSTRUCTION VEHICLE EARTHING

CALCULATION OF EARTHING ELECTRODE RESISTANCE - 1: ROD ELECTRODES

This table gives values of resistance to earth of a single rod electrode for various soil resistivities and rod lengths. Rod diameter is fixed at 20mm.

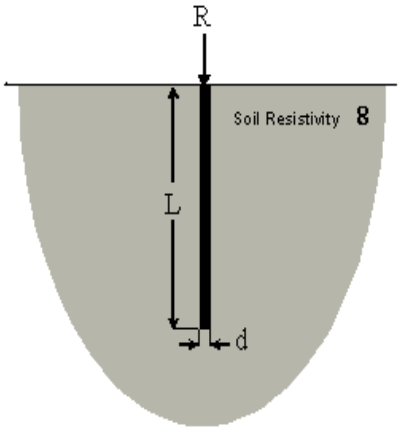
R = Electrode resistance to remote earth in Ohms

L = Electrode length in metres

ρ = Soil Resistivity in Ohm-metres

d = Electrode diameter in metres (0.02 metres)

$$R = \frac{\rho}{2\Pi L}\left[\mathrm{Log_e}\left(\frac{8L}{d}\right) - 1\right]\Omega$$



SOIL RESISTIVITY	ELECTRODE LENGTH - metres					
	0.2	0.5	1.0	1.5	2.0	3.0
10	27	14	8	6	5	3
50	135	68	40	29	23	16
100	269	137	79	57	45	32
200	538	274	159	115	90	65
500	1,346	684	397	286	226	162
1,000	2,691	1,368	794	573	452	323
2,000	5,383	2,736	1,589	1,145	905	646
5,000	13,457	6,841	3,972	2,863	2,262	1,615
10,000	26,913	13,682	7,944	5,726	4,524	3,231

Attachment 3 – Dial Before You Dig (DBYD) program

A person (customer) before they commence *excavation* near Power and Water underground infrastructure *should* Dial Before You Dig. DBYD is a national program that provides information on the location of Power and Water's underground sewerage, water and power infrastructure (See attachment 7 - Power, water and sewerage infrastructure location flow diagram).

(a) Prior to commencing *excavation* the *customer shall* contact DBYD by:

  (i) Lodging an online enquiry at www.1100.com.au; or

  (ii) dialing 1100, Monday to Friday (except public holidays) ,during normal business hours.

(b) DBYD forwards a request to Power and Water, with site address details and a customer sequence number assigned, for underground infrastructure location advice and maps.

(c) DBYD requests to Power and Water *shall* be logged by Power and Water call centre and up-loaded to FIS which generates infrastructure location advice and maps. Request details *shall* be e-mailed to the generic e-mail address at Network Performance, Water Services and Remote Operations.

(d) A Power and Water representative *shall* compile and forward infrastructure location advice to the customer.

(e) The customer is obligated to contact Power and Water on 1800 245 092 where their activities are within 3 metres of power infrastructure or 1.5 metres of water or sewerage infrastructure to obtain written approval prior to commencing work.

(f) The customer upon contacting Power and Water on 1800 245 092 will be directed to a Power and Water "services locator". The "services locator" in discussion with the customer may inform the customer that a site infrastructure location is required and *shall* arrange a mutually acceptable date and time for the site infrastructure location.

(g) When the location of underground infrastructure has been carried out and service routes are clearly marked, the services locator *shall* record the details on an underground infrastructure Checklist, sign, date and time the checklist and have the customer sign and date the checklist to signify that they understand the directions given and their responsibilities under the Infrastructure Location Advice provided. See Attachment 4 – "Underground infrastructure Location Advice";

(h) Where, during *excavation*, the customer finds unlocated *cables* the *excavation shall* cease and the *person in charge shall* contact Power and Water on 1800 245 092.

(i) If the services locator determines the work requires an *authority to work in the vicinity of apparatus* it will be issued by Power and Water.

(j) A Power and Water representative who is authorised to issue an *authority to work in the vicinity of apparatus*, will undertake a risk assessment to assess the scope of work and to identify the location and extent of activities permitted;

(k) Where an *authority to work in the vicinity of apparatus* is issued the responsibilities for the issue, receipt and to work, as set out in Attachment 6 – "Responsibilities of persons under an *authority to work in the vicinity of apparatus" shall* be observed.

Attachment 4 – Underground infrastructure location advice

PowerWater

UNDERGROUND INFRASTRUCTURE LOCATION ADVICE

DBYD SEQUENCE NUMBER	
WORKSITE LOCATION (Street name, cross street, landmark)	
SCOPE OF WORKS	

UNDERGROUND INFRASTRUCTURE	Plans received as per DBYD / asset Owner	Plans indicate assets in vicinity	Assets located	Asset marking complete	Machine digging permitted	*Pot holing* required	*Safety observer* required	Exposed *cable*/service protection required	*Mobile plant* / equipment to be *earthed*	Authority to work in vicinity issued	Plans attached
	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
COMMUNICATIONS											
ELECTRICAL											
WATER										N/A	
SEWERAGE										N/A	
OTHER										N/A	

ADDITIONAL COMMENTS

PERSON LOCATING UNDERGROUND INFRASTRUCTURE			
NAME:	SIGNATURE:	DATE:	TIME:
	This Advice is valid until:	DATE:	TIME:
Contact details:			

CUSTOMER			
I understand the directions given and my responsibilities under this Underground Infrastructure Location Advice. **NOTE:** If during excavation unlocated cables are found cease excavation & contact Power & Water - 1800 245 092			
NAME:	SIGNATURE:	DATE:	TIME:
Contact details:			

Attachment 5 – *Excavation in the vicinity* of underground *cables*

(a) An *approved* electronic detection device, operated by a *competent* person, *should* be used to accurately identify the location of underground *cables*.

(b) When the underground *cable*s have been identified *pot holing* techniques *should* be used to exactly locate the underground *cable*s.

(c) Once the exact location of any *cable* is known mechanical *excavation,* using *toothless bucket*s, may be used to a depth of 150mm above the *cable* covers, marker tape, bricks or tiles. All *excavation* closer than 150mm *shall* be carried out by hand or vacuum extraction.

(d) Prior to carrying out directional boring across the line of underground *cable*s the location of the *cable*s *shall* be positively identified by *pot holing* or by another *approved* method.

(e) Any hand held equipment or tool using an external energy supply is to be considered a powered tool and when used for *excavation* is **NOT** considered as hand *excavation*.

(f) All *cable*s, once exposed, *should* be treated with caution as slight movements or impacts to unsupported lengths of *cable* can lead to failures.

(g) Any damage, no matter how small or large, even though not immediately causing failure, *shall* be reported to Power and Water.

(h) During the course of removing sub-surface earth and materials, the person carrying out the work *should* exercise care to safeguard existing services and other structures within and around the *excavation* site.

(i) Sand or a similar material *shall* be used when re-bedding a *cable*.

(j) Where it is necessary to erect temporary bridges, viaducts or other support structures over or around an *excavation*, regular inspections at periods nominated by Power and Water *shall* be carried out to ensure the safety and integrity of *cable*s or services.

(k) If any underground *cable*s, conduits or bare earth wires are exposed that are not identified on the DBYD information, then all work *shall* cease and the person carrying out the work *shall* notified Power and Water immediately, or if after hours notification is to be made on 1800 245 092.

(l) Where heavy “crawler” or “vibration” type machinery is to operate over the top of *cable*s and/or conduits, the following requirements *shall* be observed whilst the machinery is in operation:

  (i) for *cable*s above 33,000 volts a Power and Water representative *shall* be notified of the work and *shall* indicate any precautions required; and

  (ii) for *cable*s below 33,000 volts the minimum depth of earth cover to be maintained *shall* be:

    - 300mm to *cable*s with cover slabs or marker tapes;
    - 450mm where there is no *cable* cover slabs or marker tapes over *low voltage cable*s; or
    - 600mm where there is no *cable* cover slabs or marker tapes over *high voltage cable*s.

    Note: If there are any reservations as to the operation of *mobile plant in the vicinity* of underground *cables*, the *authorised person* carrying out the risk assessment *shall* seek further assistance.

Attachment 6 – Responsibilities under an *authority to work in the vicinity of apparatus*

A6-1 *INSTRUCTED PERSON*S

(a) All persons who are to receive an "*Authority to work in the vicinity of apparatus*" (referred to hereafter as the "Authority") *shall* be instructed to one of the following levels:

(i) **LEVEL 1 INSTRUCTION** – Persons, including members of the general public, who are required to work *in the vicinity* of overhead power lines, *shall* be instructed on their responsibilities in receiving the Authority by a person authorised to issue an *authority to work in the vicinity of apparatus*, an as shown below.

(ii) **LEVEL 2 INSTRUCTION** – Persons, including major *contractor*s, period order *contractor*s and persons required to conduct *excavation* near *high voltage* or *low voltage* underground *cable*s *shall* attend an instruction course conducted by Power and Water on safe working and *excavation in the vicinity* of *electrical apparatus*. Additionally, they *shall* be instructed on their responsibilities in receiving the Authority by a person authorised to issue an *authority to work in the vicinity of apparatus,* as shown below.

A6-2 RESPONSIBILITIES OF *AUTHORISED PERSONS* ISSUING AN *AUTHORITY TO WORK IN THE VICINITY OF APPARATUS*

(a) An *authorised person* issuing an *authority to work in the vicinity of apparatus shall*:

(i) instruct the person to receive the *authority to work in the vicinity of apparatus*;

- on their responsibilities under the *authority to work in the vicinity of apparatus*;
- where the risk assessment identifies the need, a *safety observer* is assigned for the duration of the work;
- the requirement of any barriers and their location;
- the need to advise Power and Water of any unforseen or changes to the description of work;

(ii) ensure all persons required to work *in the vicinity* are assembled and briefed on the following:

- Identification of *apparatus*;
- the description of work;
- any limitations on access to the *apparatus*;
- voltage level of any *electrical apparatus* and the *safe approach distance to live conductors* that are to be maintained;
- ensure any relevant documentation is attached to the *authority to work in the vicinity of apparatus*; and
- all relevant warnings, precautions and information;

(iii) endorse the *authority to work in the vicinity of apparatus* as issued; and

(iv) notify the *controller* of the issue of the *authority to work in the vicinity of apparatus* at the time of issue and the contact details of the person in receipt of the *authority to work in the vicinity of apparatus*.

A6-3 RESPONSIBILITIES OF A PERSON RECEIVING AN AUTHORITY TO WORK *IN THE VICINITY* OF *ELECTRICAL APPARATUS*

(a) A person receiving an *authority to work in the vicinity of apparatus* (referred to hereafter as the "Authority") *shall*:

(i) sign the Authority as recognition that they are authorised to carry out work as requested and that they understand:

- the location and description of *apparatus* and description of work;
- limitations on the use of plant and equipment, including earthing of *mobile plant* and machinery;
- any *safe approach distance to live conductors* required to be maintained;
- all relevant warnings, precautions and information;
- be the *person in charge* of the work;
- where the risk assessment identifies the need, assign a *safety observer* for the duration of the work and specifically instruct them on their duties (see A6-4 below);
- ensure the Authority and any documented information or instructions provided to carrying out the work is safeguarded and readily available for inspection at the work area for the duration of the work;
- permit other persons to sign on provided they give a briefing at the work area to such persons;
- establish any barriers as requested and, where appli*cable*, safe work practices and work method statements are implemented for the work involved;
- where it is necessary for the *safety observer* to leave the work area, cease all work until they return or another *safety observer* is assigned;
- when they are surrendering the Authority they ensure all persons signed on have signed off and are aware that their permission to work *in the vicinity* is surrendered and they *shall* notify Power and Water that the Authority has been surrendered and the location of the Authority;
- where they are absent from the work area:
    - the work *shall* cease and all persons signed on the Authority *shall* sign off: or
    - the Authority may be transferred to a person who has previously attended a briefing at the work area by an *authorised person* and previously signed on the Authority; and
    - the person to whom the Authority was transferred *shall* notify the person who issued the authority of the transfer.

A6-4 DUTIES AND RESPONSIBILITIES OF A *SAFETY OBSERVER*

(a) A *safety observer shall*:

(i) sign on to the Authority as the nominated *safety observer*;

(ii) have the **solitary duty** of observing and/or monitoring the safety of persons in potentially hazards situations and providing warnings, where necessary, and not observe more than one work activity or plant at any time;

(iii) alert the work team to immediately cease work where they observe any unsafe conditions, actions or non-conformance with approved work practices;

(iv) where it is necessary for them to leave the work area, they inform the *person in charge* of the work and not leave the work area until the work has ceased or another nominated *safety observer* is assigned;

(v) position self at ground level in a suitable location that enables them to effectively observe the work being performed;

(vi) not be positioned in the work basket of an EWP unless:

- a second *safety observer* has been appointed, who is positioned at ground level, or
- otherwise permitted by the approved work practice for the work being carried out; and

(vii) suspend works, where required:

- to significantly relocate to another position that provides greater viewing benefit of the worksite;
- for any other event that may distract their ability to carry out the role of a *safety observer*.

(viii) ensure that all personnel, plant, tools and equipment remain outside the specified minimum safe approach distance.;

(ix) observe personnel carrying out the identified works;

(x) maintain effective and immediate communication with the work team at all times.

Note: Specialist equipment may be necessary where there is a barrier to communication;

(xi) not use communication devices, such as mobile phones and portable radios, unless the use of such is directly related to establishing and maintaining effective and immediate communication with the work team being observed;

(xii) hold a current qualification for first aid and CPR and be able to provide assistance in an emergency;

(xiii) ensure there is no unauthorised access to the worksite whilst work is being carried out;

(xiv) observe the weather conditions at all times and suspend or stop the works if conditions become unsuitable; and

(xv) the *safety observer's* role may be rotated between members of the work team. When this occurs the rotation *shall* be formally carried out to ensure that all members of the work team are aware at all times who is performing the role of the *safety observer*(s). The JSEA form *shall* be updated to record this change.

Attachment 7 - Power, water and sewerage infrastructure location flow diagram