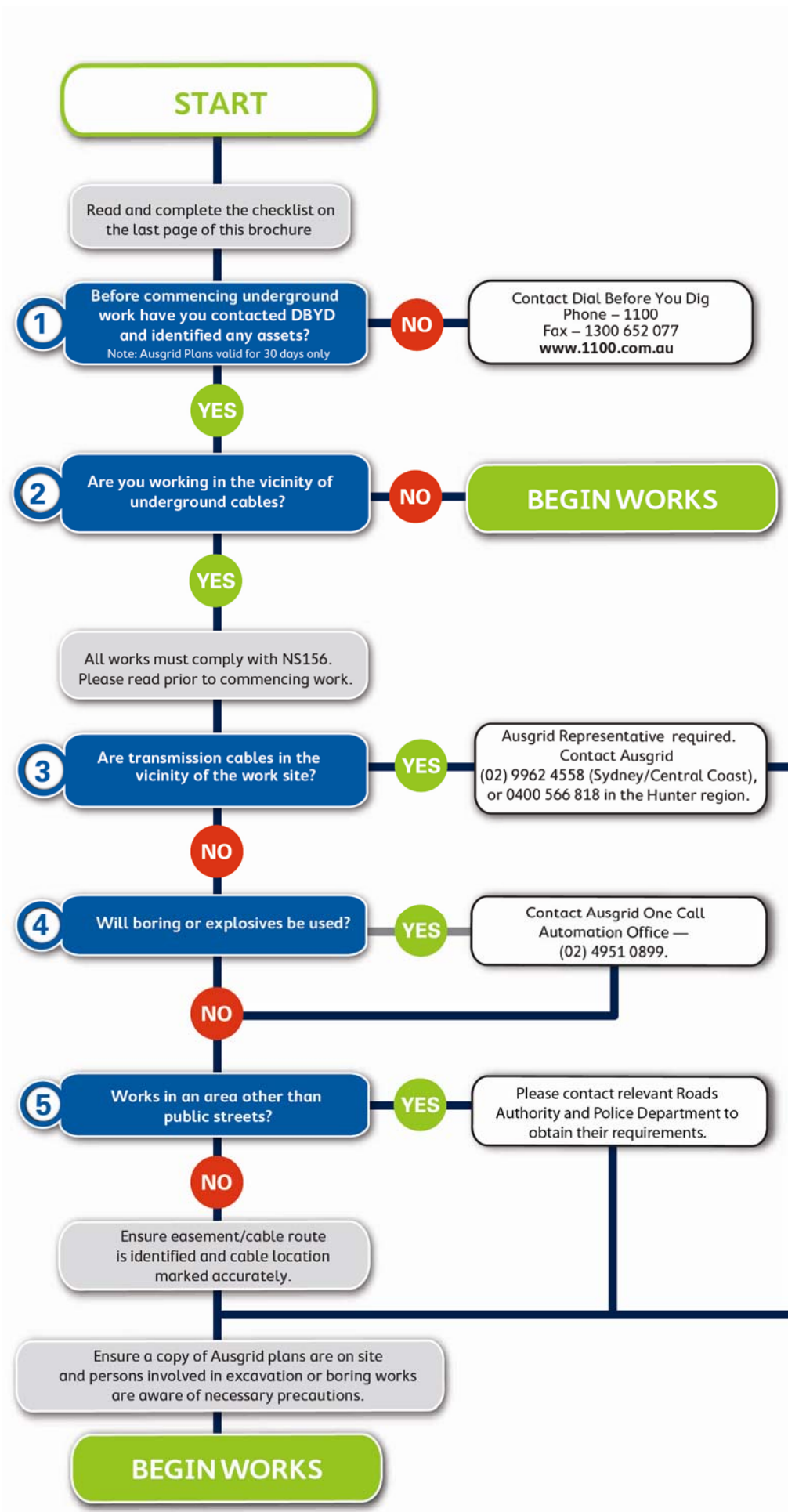


**NS 156**  
Working Near or around  
Underground Cables

August 2010







## Ausgrid Checklist for Work Near or around Underground Cables

It is the responsibility of the Constructor to ensure that underground pits, ducts and cables are not damaged as a result of construction work. It is also your duty to protect your workers from harm or injury. This Checklist is intended to be used as a guide to what Constructors should do to make sure they have satisfied the minimum requirements to minimise damage to underground networks.

<b>PLANS, LOCATION and NOTIFICATIONS</b>	<b>Completed</b>
All relevant utilities plans obtained from Dial Before You Dig? (call 1100 - allow at least 5 working days for plans).	
Examined plans and assessed all possible impacts on Ausgrid's network?	
Do you have both Underground Distribution & Transmission Plans (if applicable), on site at all times?	
All cables and conduits shown on the Ausgrid plans been located and marked on the ground?	
If you are planning to use a bore, have you ensured that the equipment is calibrated?	
Have you read and understood the requirements of NS 156? (for copies of NS 156 phone Ausgrid One Call Automation Office at the number on the response to your DBYD enquiry or visit Ausgrid's website at: <a href="http://www.ausgrid.com.au/">http://www.ausgrid.com.au/</a>	
Have you notified Ausgrid as specified by NS 0156 and complied with requirements? Contact numbers: for transmission cables in Sydney and Central Coast areas (02) 9962 4558, 0400 566 818 in Newcastle and the Hunter and for all other cases. Ausgrid One Call Automation Office (02) 4951 0899	
<b>INSPECTION OF WORK BY AUSGRID'S REPRESENTATIVE</b>	<b>Completed</b>
Is the Ausgrid representative on site for any work near or around* any transmission cable before you start? (*Refer to NS 156.)	
For proposed work near or around* cables other than transmission and/or conduits, are any requirements specified by Ausgrid's representative clearly understood and ready to be applied before you start the work? (*Refer to NS 156.)	
<b>PROTECTION</b>	<b>Completed</b>
Check that all people on-site have been made aware of the presence & location of ALL Ausgrid underground cables and/or conduits; especially boring, drilling and trenching machine operators?	
Is there any asbestos or asbestos containing material in Ausgrid's underground network assets?	
Have you checked for the presence of any Organo-Chloride Pesticides (OCP) in transmission trenches?	
Is the site supervisor monitoring all machine operators working near or around Ausgrid's underground cables and/or conduits?	
Are the requirements specified by Ausgrid's representative being followed?	
Are Ausgrid's requirements in place for any exposed cables and/or conduits to be supported and protected?	
Have you marked all exposed underground cables and/or conduits with flags that are clearly visible from within all machinery used on-site?	
Have safety barriers, fencing or para-webbing been erected to protect staff and the public as well underground cables and/or conduits in areas that are at risk?	

**In the event of DAMAGE to Ausgrid's cables or conduits, call 13 13 88 immediately.**

### **PROCEED with CAUTION**

It is your responsibility to protect Ausgrid's cables and conduits from damage and your Duty of Care to protect your workers from harm or injury.

Signed: \_\_\_\_\_  
Responsible person on site

Date: \_\_\_ / \_\_\_ / \_\_\_

Network Standard  
NS156  
Working Near or Around Underground Cables  
August 2010

## Contents

1	THINGS YOU MUST KNOW ABOUT WORK NEAR AUSGRID'S CABLES.....	1
2	INTRODUCTION .....	2
3	SCOPE .....	2
4	DEFINITION OF WORK NEAR UNDERGROUND CABLES .....	3
4.1	Other Definitions .....	4
5	PLANNING YOUR PROJECT.....	5
5.1	Consequences of Damaging Ausgrid Cables and Equipment.....	5
5.2	Obtaining Plans.....	5
5.3	Work on Private land or in Parks and Reserves .....	5
5.4	Reading and Interpreting Ausgrid Plans .....	6
5.5	Contacting Ausgrid.....	6
5.6	Other Documents you need to Read .....	7
5.7	Plan For Safe Work – Keep Clear, Pot Hole, Arrange OH Outages.....	7
5.8	Include Information in Work Methods and Plans .....	7
6	CONSTRUCTION WORKS.....	8
6.1	Before Starting Work.....	8
6.2	Precautions .....	8
6.3	Excavation Works .....	9
6.3.1	Damage to Ausgrid Cables During Excavation Works.....	9
6.3.2	Excavation and Removal of Sub-Surface Material.....	9
6.3.3	Heavy Machinery Operating Over Cables and/or Conduits .....	10
6.3.4	Boring or Drilling Near Cables.....	10
6.3.5	Use of Explosives .....	10
6.4	After Work Completion.....	10
6.4.1	Bedding and Covering of Cables.....	10
6.4.2	Backfilling of Excavations.....	11
6.4.3	Reinstatement of Excavations.....	12
7	EMERGENCIES .....	13
7.1	Emergencies Arising From Damage Caused to Ausgrid Assets .....	13
7.1.1	Make Safe .....	13
7.1.2	Contact Ausgrid and Emergency Services.....	13
7.2	Others Dealing With Emergencies Which May be Close to Ausgrid Assets.....	14
8	WARNING NOTICE ON AUSGRID CABLE PLANS .....	14
9	INDICATIONS THAT CABLES MAY BE NEARBY .....	15
10	UNMARKED CABLES .....	17
11	AERO/HYDRO VACUUM EXCAVATION FOR LOCATING CABLES (POTHOLING) AND FOR EXCAVATIONS .....	18
12	UNDER BORING AND DIRECTIONAL DRILLING .....	19
13	ENVIRONMENTAL ISSUES.....	20
13.1	Asbestos.....	20
13.2	Organo-chloride Pesticides.....	21
14	TYPICAL TRENCH CONFIGURATIONS.....	22



# 1 Things You Must Know About Work Near Ausgrid's Cables

- **Not all** cables are recorded on Ausgrid's plans. Some are missed due to errors while some cables may not belong to Ausgrid.
- Ausgrid does not guarantee the accuracy of the plans. Errors may arise as roads are moved or levels change. You must take appropriate precautions described in this standard when undertaking excavating works.
- If your work involves underbores or explosives, you **MUST contact Ausgrid before commencing work.**
- A single line drawn on the pavement by service locators does not reflect the width or depth of the utilities it is marking – it's a centreline only. See Section 5.4 on Reading Plans and Section 14 for typical trench configurations.
- If plans sent to you by Ausgrid say you are working near *Transmission cables*, you **MUST contact Ausgrid before commencing work.**
- See Section 5.5 for contact details.



*Photo of typical joint bay*



## 2 Introduction

**NS 156 provides information on steps you must take to ensure that work near Ausgrid's network does not reduce the reliability of the electrical network or create safety hazards for Ausgrid's staff, the public and your workers.**

Ausgrid cables operate at voltages up to 132,000 volts. Before commencing any work near Ausgrid assets, it is essential that you read this document and incorporate the safety measures into your work documentation.

This Standard is to be read in conjunction with other documents including:

- Occupational Health and Safety Act and OH&S Regulation;
- WorkCover Guidelines and Codes of Practice.



## 3 Scope

This Network Standard applies to:

- underground electrical supply network cables and other equipment throughout Ausgrid's network franchise;
- all persons performing works in the vicinity of underground equipment owned by Ausgrid.

## 4 Definition of Work Near Underground Cables

The following requirements are the minimum to be applied when working in the vicinity of underground electrical cable systems.

“Work Near Underground Cables” includes any of the following:

- Any work which lowers or raises the surface level above cables or conduits or places a structure above cables or conduits.
- Any work below the surface level and within 2 metres either side of any *transmission cable* or associated pilot cable. See Figure 1 below.
- Any work below the surface level and within 0.3 metres either side of any *distribution cable*.
- Road boring work not already covered above, where the bore may pass within 2 metres of any cable or conduit. See Section 12 for more information.
- Any other work, whether by hand or involving machinery or plant, which has caused, or may cause any of the following:



- (a) Hazards to persons from contact with cables
- (b) Damage to cables or conduits
- (c) Cables or cable protective covers or warning tapes or conduits or earthing conductors becoming exposed
- (d) Washout or removal of cable or conduit bedding material or backfill or replacement with different material
- (e) Collapse of cable trench
- (f) Cables or conduits being undermined or unsupported.

Refer also to Table B (Section 5.2) of WorkCover Guide - Work Near Underground Assets.

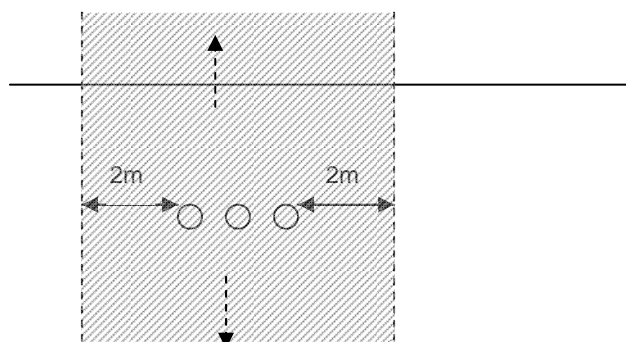


Figure 1 –  
Transmission cables  
Any work inside  
shaded area is “Near  
UG cables”

## 4.1 Other Definitions

Distribution mains/cables	Cables operating at voltages lower than transmission mains
Hand Excavation	The use of shovels, picks, mattocks crow bars and similar tools with no independent source of power, that have a limited capacity to penetrate soil
High voltage cable	A distribution cable operating at 11,000 volts or higher, or a Transmission cable.
Low voltage (LV) Cable	A distribution cable operating at 240/415 volts
Transmission mains/cables	Cables and other equipment operating at 33,000 volts or higher
vacuum/hydro excavation	Excavation using equipment designed to use water or air pressure to loosen soil and other materials and a vacuum to remove it – see Section 11

## 5 Planning Your Project

### 5.1 Consequences of Damaging Ausgrid Cables and Equipment

Underground cables can exist anywhere – see Section 10 for information on **unrecorded cables**. Even if poles and overhead wires are in the street, underground cables may also be present.

**All sites where excavation work is proposed to be carried out should be treated with caution and thoroughly checked for the presence of underground cables.**

Damage to underground electric cables may result in:

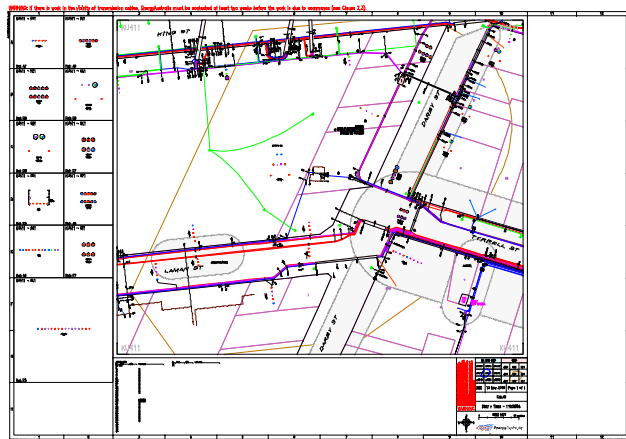
- Injury from electric shock or severe burns, with the possibility of death;
- Interruption of the electricity supply to wide areas of the city;
- Damage to your excavating plant;
- Responsibility for the cost of repairs.

### 5.2 Obtaining Plans

During the planning phase of a project, it is essential to check on the presence of any underground cables in the vicinity.

To determine if cables or conduits (or other services) exist in a particular location, contact the **Dial Before You Dig** Service on

- telephone 1100,
- facsimile 1300 652 077, or
- [www.dialbeforeyoudig.com.au](http://www.dialbeforeyoudig.com.au)



This is a free service, providing information on which utilities have an interest in a particular location and the relevant contact details.

Ausgrid will respond to the enquiry, advising you of whether our records indicate that Ausgrid underground cables and/or conduits are present or are not present in the vicinity of the location you forwarded to us. If cables are within your defined location, the advice will be accompanied by Ausgrid's underground cable plans.

### 5.3 Work on Private land or in Parks and Reserves

For work on land other than public roads, if cable locations are not clearly marked on site or easily traceable from measurements to permanent marks, call EAOCCAS to arrange an Ausgrid representative to assist in positively locating cables before commencing excavations, or planning the position of any significant structures.

## 5.4 Reading and Interpreting Ausgrid Plans

If your job site is in the Sydney or Central Coast areas, you may receive separate plans for *transmission* and *distribution cables*. *Transmission cables* operate at voltages between 33,000 and 132,000 volts. For work in the Newcastle and Hunter areas, both *transmission* and *distribution cables* are shown on the same plan, but additional warnings and marking indicate if *transmission mains* are on the plans.

**Work close to transmission mains requires special precautions which are described in this standard.**

For information on reading Ausgrid plans, refer to the document COMN0119 *How To Read Ausgrid Plans* supplied with the response to your Dial Before You Dig request, or available on Ausgrid's website, at the Dial Before You Dig information page:

<http://www.ausgrid.com.au/> .

**At least one person trained in reading Ausgrid plans should be on site during excavation works.**

See also Section 8 *Using Cable Plans* for information on the warnings on Ausgrid plans.

## 5.5 Contacting Ausgrid

Once you have received Ausgrid plans, take them and physically check the work site to determine whether the work will be in the vicinity of cables and/or conduits<sup>1</sup>. If it is, proceed as follows:

**For work near *transmission cables* it is compulsory to arrange for an Ausgrid representative to attend the worksite. In the Sydney and Central Coast areas, contact the transmission on-call contact on pager (02) 9962 4558 to arrange for an Ausgrid representative. For *transmission cables* in the Newcastle and Hunter areas, the correct number is 0400 566 818. Wherever possible, Ausgrid's representative should be booked two weeks before work commences.**

This is to ensure the work is undertaken safely and so as not to endanger the cables or workers. The relevant details should be provided and the representative's attendance arranged. **A regulated charge will be made for this service.**

For *distribution cables*, it is not necessary to contact Ausgrid (unless you are using explosives or boring machinery). However, if you have questions or need additional information about Ausgrid's underground construction, contact the Ausgrid One Call Automation service (EAOCAS) on (02) 4951 0899.

EAOCAS may then provide the relevant contact details for the Field Services branch which manages the area in which the work is being undertaken.

**Note:** Ausgrid's representative is not supervising the work, nor providing safe work methods for undertaking the work – these are the responsibility of the person in charge of the works.

However, work in the vicinity of underground cables must incorporate any requirements indicated by Ausgrid's representative and be in accordance with this Network Standard.

<sup>1</sup> Cable locating services can be found under *Underground Service Locators* in the yellow pages phone book.

## 5.6 Other Documents you need to Read

Where Ausgrid cables are located near to your proposed work, several other documents will be important in helping you understand your obligations and plan your work:

- WorkCover Guide - Work Near Underground Assets ([www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au));
- Guide to Code of Practices for Street Opening (NSW Street Opening Conference) ([www.ipwea.org.au/streets](http://www.ipwea.org.au/streets));
- How to Read Ausgrid Plans (Supplied with Ausgrid plans or from our website).

## 5.7 Plan For Safe Work – Keep Clear, Pot Hole, Arrange OH Outages

If your work involves boring close to or across Ausgrid cables or equipment, you need to undertake pot holing to positively locate the cables and to locate the drilling head as it approaches the cables. Refer to Section 12 on Underboring and Directional Drilling for details.



## 5.8 Include Information in Work Methods and Plans

When preparing your work method statements and plans, ensure that the warnings and precautions listed in this standard, including the need to arrange Ausgrid representative when necessary, are included in your work methods or plans issued to any persons involved in work near underground cables.

**If work is going to be contracted out, you should include a requirement in the conditions that the contractor must contact Ausgrid if this is required by any part of this Network Standard (e.g. work near *transmission cables*).**

## 6 Construction Works

### 6.1 Before Starting Work

**Complete the check sheet at the front of NS156 and run through its requirements with all staff on site. Keep a copy on site at all times.**

- Check the date on your Ausgrid plans – plans are normally only valid for 30 days and you may need to place a new request to ensure nothing has changed.
- Ensure at least one person on site is trained in first aid and that a first aid kit is on site at all times.
- Take notice of all warning signs and instructions from authorised persons.
- Ensure a phone is on site or nearby, that it is working correctly and that staff are aware of the emergency numbers they may require (Ausgrid emergencies – 13 13 88).
- Check that any cable location work, including use of utility locators, pot holes and plans or other information provided by Ausgrid is available to site staff before they begin work.
- Ensure all requirements of this standard that apply to your job have been completed or included in your work method statements and all persons working on the site when you are excavating near cables are aware of the hazards and necessary precautions.

**If you fail to adhere to the safety requirements of this publication and relevant legislation the consequences could include:**

- **Injury or death**
- **Fines or prison terms under the Electricity Supply Act or the Occupational Health and Safety Act**
- **Penalties under Occupational Health and Safety Regulation, e.g. Liability for the cost of repairs, plus contingent costs**
- **All work being stopped and any construction dismantled on direction of Ausgrid or WorkCover.**

### 6.2 Precautions

A hazard assessment must be carried out by the work crew prior to commencement of work to ensure that:

- All hazards have been identified and assessed.
- The appropriate controls have been put in place to mitigate the hazards.
- All members of the work crew are aware of the hazards.
- The safety of the public and other workers has been ensured.
- Ausgrid has been notified of any proposed work in the vicinity of underground cables, where required and described in Section 5.5.

The following precautions must be taken whilst working on or near underground cables:

- Ensure you *hand excavate* or *vacuum excavate* to locate Ausgrid's assets before machinery is used – refer to Section 11.
  - No personnel shall physically handle a *distribution cable* of any type, if its condition is suspect or doubtful unless the cable is proved to be de-energised.

- No personnel shall physically handle a high-voltage cable while it is live unless it is completely surrounded by an earthed sheath or screen, or both, and precautions are taken, where necessary, to avoid danger from induced voltages and transferred earth potentials.  
**Contact EAOCAS for assistance if you believe you may need to move a cable.**
- A high-voltage cable shall be isolated, earthed and proved to be de-energised on site prior to commencing work on the cable.

You should also refer to the precautions listed in Section 6 of NUS 199 *Safe Electrical Working on Low Voltage Assets* for other hazards associated with some LV cables.

Some transmission trenches contain Organo-Chloride Pesticides (OCP) which are harmful to human health. Refer to Section 13.2 for more information.

**All individuals on the work site must also comply with any safety instructions given by an Ausgrid representative.**

The site manager or supervisor is responsible for ensuring that all construction staff are fully conversant with the necessary clearances from exposed live overhead conductors.

## 6.3 Excavation Works

### 6.3.1 Damage to Ausgrid Cables During Excavation Works

Any damage no matter how small or large, even though not immediately causing failure, should be reported to Ausgrid's EAOCAS or if outside normal working hours, Ausgrid's Emergency contact number (13 13 88). Refer also to Section 7 for information on dealing with emergencies.

### 6.3.2 Excavation and Removal of Sub-Surface Material



Excavators must also comply with the requirements of environmental legislation and WorkCover. Refer to the WorkCover Guide - Work Near Underground Assets and the WorkCover Codes of Practice: Excavation Work for all works, and Work Near Overhead Powerlines if OH lines are nearby.

If excavating where cables may be nearby, *hand excavation* or *vacuum/hydro excavation* must be used to establish the depth of all existing services and Ausgrid cables. Even where *hand excavation* is used, care must be exercised not to damage the outer sheath of cables. See Section 11 for information on *vacuum/hydro excavation*. These excavations shall be close enough to ensure that any cables and services between the *hand/vacuum excavated* locations are at the same depth. Once the exact location of the cable is known, mechanical excavators may then be utilised.

**Note:** Mechanical excavation shall only be permitted for excavation down to 150mm above the top of the cable cover, marker tape, bricks or tiles. All excavations closer than 150mm must be carried out by hand or vacuum/hydro.

All cables, once exposed, should be treated with caution. Exposed cables will operate safely if undisturbed. However slight impacts to unsupported lengths of cable can lead to failures.

**If any unrecorded underground cables, conduits or bare earth wires are exposed, EAOCAS must be notified immediately. See Section 5.5 for more information on contacting EAOCAS.**

### 6.3.3 Heavy Machinery Operating Over Cables and/or Conduits

Where heavy "Crawler" or "Vibration" type machinery is to operate over the top of cables and/or conduits, the following minimum cover requirements must be maintained whilst the machinery is in operation:

- For *transmission cables*, requirements will be indicated by Ausgrid's representative when notified of the work.
- For other cables and/or conduits, minimum cover must be maintained as follows:
  - 300mm to cable cover slabs or marker tapes or if there is no cable cover slabs or marker tapes;
  - 450mm to low voltage cables or conduits;
  - 600mm to high voltage cables.

If you find it difficult to achieve these minimum covers, contact EAOCAS who will direct you to the appropriate section for assistance.

### 6.3.4 Boring or Drilling Near Cables

Refer to Section 12.

### 6.3.5 Use of Explosives

The proposed use of explosives within five metres of underground cables and/or conduits must be notified to EAOCAS before use. Refer to Section 5.5 for contact numbers depending on whether the cables are for *transmission* or *distribution*. Requirements will be notified by Ausgrid's representative.

## 6.4 After Work Completion

### 6.4.1 Bedding and Covering of Cables

Cables are normally bedded into soft, stone-free soil and sand. Where this bedding has been disturbed and cables exposed, the bedding material must be re-instated. Cables must lie on a layer of bedding having a minimum depth of 75mm. The same bedding material must also cover the cables by at least 75mm. Particular care shall be taken when backfilling around cables to ensure that broken pavers and other sharp objects are not mixed with the bedding material.

On steep inclines and other locations where the scouring of backfill material is likely to occur, it is Ausgrid's practice to place bulkheads consisting of packed sand/cement bags (20:1 mixture) at regular intervals. Hence if applicable the party responsible for the excavation work should follow a similar practice.

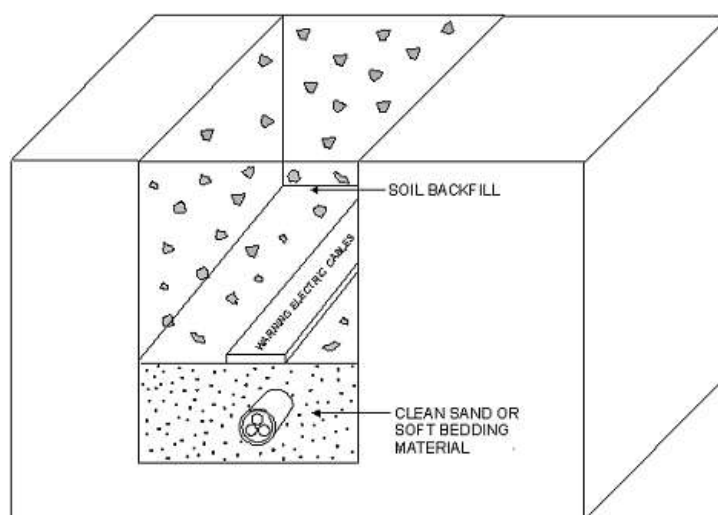
Orange polymeric cable covers must be laid to completely cover all conduits and any direct-laid *distribution cables* which have been disturbed. The polymeric cable covers are used to provide a warning of the presence of cables. Only cable covers approved by Ausgrid shall be used. Where

*transmission cables* are involved, Ausgrid's representative will provide details of the backfill and cover required.

Ausgrid uses two sizes of cable covers:

- 150mm wide cable covers for single-cable or single conduit installations;
- 300mm wide cable covers for two cables side-by-side, or two conduits side-by-side, or a cable and a conduit side-by-side.

Following the installation of the cover strip, the trench may then be backfilled using backfill materials approved by Ausgrid.



**Backfilled Trench**

In the situation that the polymeric cable covers are damaged during the excavation process, they shall be replaced by the party that carried out the work before any backfilling can take place. The polymeric cable covers should be centrally positioned over the cable and/or conduit.

Cable covers can be obtained from Ausgrid's Procurement Branch or through Ausgrid's representative.

#### 6.4.2 Backfilling of Excavations

Unless otherwise stated, backfilling of trenches and other excavations shall be carried out in accordance with Ausgrid's Network Standard NS 130. Any excess spoil is to be removed from the work site, and the area to be restored to at least its original cleanliness.

Refer to Section 6.3.3 for information on using heavy machinery over buried cables and conduits.

### 6.4.3 Reinstatement of Excavations

#### **Temporary Reinstatement**

Temporary reinstatement of trenches shall be carried out in accordance with the requirements of the appropriate road controlling Authorities.

Responsibility for the maintenance of the temporary reinstatement will rest with the party responsible for the excavation work until permanent reinstatement is effected.

#### **Permanent Reinstatement**

The party carrying out the work shall arrange permanent reinstatement with the appropriate road controlling authority.



## 7 Emergencies

### 7.1 Emergencies Arising From Damage Caused to Ausgrid Assets

#### 7.1.1 Make Safe

Machinery (including hand operated plant such as jack hammers) can become alive if it contacts or damages electrical cables or equipment. In the event that a cable or electrical equipment is damaged, all people should be warned to keep away from machinery as well as the work site in general.

If anyone is working on a machine that damages electrical equipment they should stay on the machine unless there is a risk of fire or explosion. If the person needs to get off, they must endeavour to leave the plant without making contact with the ground while still touching the machine. For example, try to jump clear of the machine, and then “bunny hop” (both feet together) away from the machine until they are at least 5 metres away.

#### 7.1.2 Contact Ausgrid and Emergency Services

Contact Ausgrid Emergency Service on telephone **13 13 88** and provide information on the location of the damage and any information on the extent of damage and the contact details of the person in charge of the worksite.

Contact other emergency services according to the nature of the incident and your company work practices.



## 7.2 Others Dealing With Emergencies Which May be Close to Ausgrid Assets

If emergency work is being carried out and it is believed that Ausgrid assets may be located in the vicinity of excavation works required to deal with the emergency, the manager of the incident should contact Ausgrid's emergency contact number – 13 13 88 – in order to arrange for an Ausgrid representative to attend the site or provide any necessary assistance as soon as practicable.

# 8 Warning Notice on Ausgrid Cable Plans

Attention is drawn to the warning notice printed on copies of cable plans:

### **WARNING**

**Ausgrid's plans show the position of assets at the time of installation and may not account for subsequent changes to road alignments, fences or buildings. The plans show no more than the presence or absence of Ausgrid assets in the street.**

**Persons working near electricity networks must exercise care and will be held responsible for any damage caused.**

**You must excavate by hand or use vacuum excavation to establish the location of Ausgrid underground cables and associated assets.**

**Underground: Working near a cable may result in electric shock even if no contact is made. Any work in the vicinity of any cable should only be performed using safe work methods developed in accordance with the recommendations included in WorkCover Code of Practice for Excavation and WorkCover Guide - Work Near Underground Assets as well as recommendations of Ausgrid's Network Standard NS156.**

**Overhead: Do not excavate near poles or towers until the stability of the foundation has been assessed by Ausgrid. Cables or earth conductors may be present close to substations, poles or towers.**

**Workers must maintain safe approach distances and follow applicable WorkCover Codes of Practice.**

**NOTE: You must keep this plan on site during excavation works and have on site a person trained to read this plan.**

**Note:** Care and caution should always be in mind when carrying out excavation work.

## 9 Indications that Cables may be Nearby

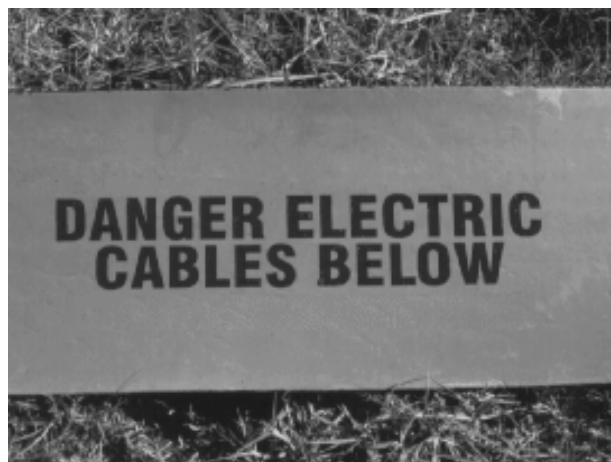
Above ground indications of underground cables include the presence of steel or concrete street lighting standards with no overhead lines attached, pits and pillars in the footpath, or cables running down the side of poles into the ground.

Careful observation of the spoil while excavating or boring can alert the individual to the presence of underground cables. A noticeable change in soil may indicate backfill material which could have been used in a cable trench.

Various forms of cover are used over Ausgrid's cables. These may include:

- 'electric' bricks
- concrete or PVC cover slabs
- PVC or asbestos cement (AC) conduit, earthenware, galvanised or iron pipe
- concrete encased PVC or AC pipe
- polymeric cable covers
- thin plastic marker tape
- wooden troughing
- steel plate.

**Note:** Underground electric cables are not necessarily covered with slabs, marker tapes, or other indicators of their presence, and are frequently not enclosed in conduits. Some underground electricity cables may have been encased in bitumen (refer to photos below).



Particular attention should be paid to areas surrounding pole-mounted substations and high voltage switches, as there are often unrecorded bare or covered earth wires buried in the vicinity.

Underground earthing conductors may also have been installed adjacent to certain other poles and structures. These conductors are not recorded on Ausgrid's network plans.

Refer also to Table A (Section 4.9) of WorkCover Guide - Work Near Underground Assets.

Care and caution must be taken when carrying out any excavation work.



*Bitumen encased cable with Polymeric Cable Cover*



*Bitumen encased cable*

**IMPORTANT:** All excavation sites should be examined thoroughly for indications of underground cables and/or conduits, by careful hand excavation or use of hydro/vacuum excavation (as described in Section 11). Cable covers, such as cover slabs or marker tapes if present must not be disturbed, except where permission is given by Ausgrid's representative for cable covers etc. to be carefully removed by hand to enable the exact locations of cables to be ascertained. Ausgrid must be notified (via EAOAS number – see Section 5.5) and any conditions included in Ausgrid's permission must be strictly observed.

## 10 Unmarked Cables

Electricity cables have been installed underground for over 100 years. Because of this, not all cables may still be recorded. If you are opening or boring beneath the ground, it is wise to always work carefully and be prepared for the unexpected.

Note also that there may be certain instances where there are underground cables buried which are not marked on the cable plans. This applies to all locations, but in particular to underground service lines on customers' premises. It is now a requirement of the NSW Service and Installation Rules for a sketch showing the route of underground service lines to be placed in the main switchboard enclosure of the premises. Installations completed prior to this requirement may not be recorded. In these cases the service line route should be determined by other means, such as by cable locating equipment, before work commences in the vicinity of underground cables.

All reasonable care is taken to ensure that the location and level of cables and conduits shown on Ausgrid's plans is correct at the time of installation; however, reference points may change and road works may be carried out that change ground levels. Therefore proving the location of the cables and conduits is essential when working in close proximity to them.

If you discover unmarked cables while excavating, please contact EAOCAS office on (02) 4951 0899 and forward relevant information so that details may be captured and our plans brought up to date.

### **Work Near Poles**

Accredited Service Providers carrying out pre-climbing pole checks or pole inspection and treatment must comply with the requirements of Network Standards NS 145 and NS 146. In this case, the presence of any cables in the work area at a pole will normally be able to be visually determined. All work and all excavations around poles must be carried out with caution, as cables may not follow expected routes or may not be attached.

## 11 Aero/Hydro Vacuum Excavation for Locating Cables (Potholing) and for Excavations



Aero/Hydro vacuum excavators use high-pressure air or water to excavate holes without damaging underground cables. The air is used to disaggregate porous substances such as sand, while the water is used in all other cases. The disaggregated material is then vacuumed and stored in a tank for transportation. Air excavated material can generally be used to backfill the excavation; whilst water excavated material must be disposed of at an approved landfill or liquid waste site.

Ausgrid permits the use of this equipment to physically locate its underground assets under the following conditions:

- The device should not be used to dig below cover strips/tiles. If it happens to expose Ausgrid's cables where cover strips do not exist, the cable bedding must be reinstated using sand or a similar product, in accordance with the requirements of the NS 130, to ensure that the cables are not damaged when the hole is backfilled.
- The maximum working pressure for the water excavator is 2,000 pounds per square inch (psi) (13,790 kilopascals), as at higher pressures it is possible to damage fibre optic cables. When potholing in the presence of gas mains, this pressure may be required to be reduced. It is necessary to contact the local gas supplier to find out what pressure is acceptable. The air excavator is to be used at a maximum pressure of 175 psi (1207 kilopascals).
- The device must not be used when locating cable faults. (Apart from any safety issues, this is to prevent further damage to the cable insulation from high-pressure water or air entering through the damaged sheath).
- The device must not be used where asbestos-containing material is known or suspected to be present.

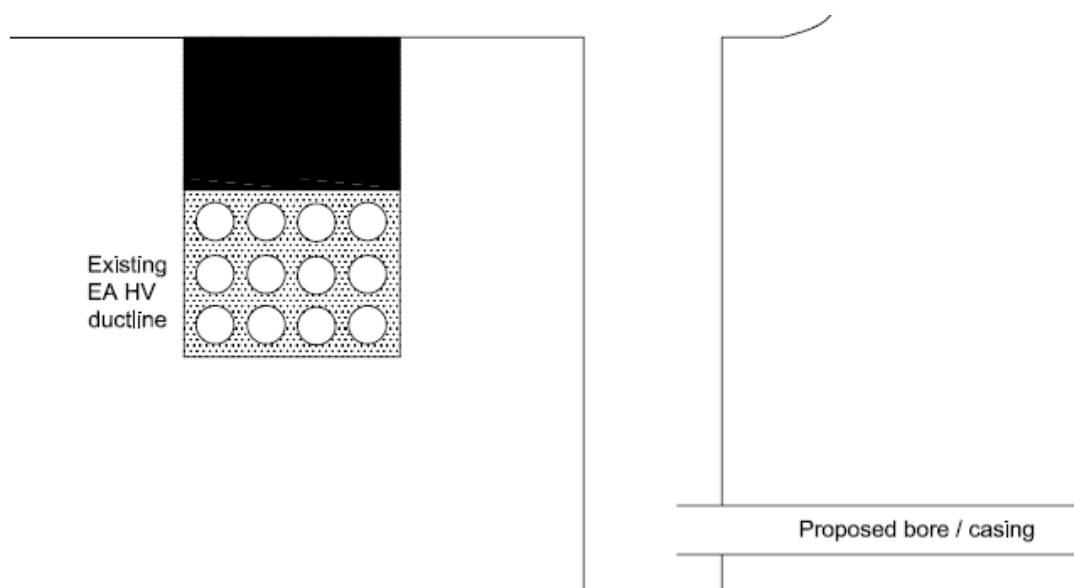
## 12 Under Boring and Directional Drilling

Road boring work, where the bore may pass within 2 metres of any cable or conduit, must be notified to Ausgrid - refer to Section 5.5 for contact details.

Where it is required to bore across a line of cables and/or conduits, the actual location of the cables and/or conduits must be first proven by hand digging or vacuum excavation as described in Section 11.

An observation trench must be hand dug on the approach side, between two and three metres from the cables and/or conduits. This trench is to expose the drilling head before it is within two metres of the cables and/or conduits. Before the bore continues, the clearance requirements between the auger and the cables and/or conduits, and any other site specific requirements, must be obtained from Ausgrid's representative. **This work must not proceed except in accordance with these requirements.**

Where a parallel bore will be within 2 metres of cables and/or conduits, the actual location of the cables and/or conduits must first be proven by hand digging at the commencement of the bore, and at further locations along the bore, where specified by Ausgrid's representative.



## 13 Environmental Issues

### 13.1 Asbestos

**Any persons performing excavation in the vicinity of Ausgrid's underground network assets should have received asbestos awareness training. Any persons removing, repairing or disturbing asbestos (whether bonded or friable) must have been appropriately training and must comply with the requirements of the Occupational Health and Safety Act and Regulation.**

Asbestos or asbestos-containing material was used and may still be present in Ausgrid's underground network assets. Materials containing asbestos have been identified in some conduits/ducts, troughing used to house cable joints both in the ground and in pits, cable bandage/tape in pits and substations, and 'NC' cable duct caulking compound.

Conduits known to contain asbestos are identified by the symbol 'AC' on cross-section details in Ausgrid's cable plans.

Asbestos poses a negligible risk when it is in bonded form, is still in good condition and is not disturbed or broken (e.g. AC conduits). Friable asbestos material (i.e. any material that contains asbestos and is in the form of a powder or can be crumbled, pulverised or reduced to powder by hand pressure when dry) poses significant health risks if it is inhaled.

Asbestos dust may be generated by brushing past asbestos cable tape, or may be lying on surfaces underneath and immediately adjacent to taped cables. Aged and dry 'NC' compound, used as putty to seal cable entries to substations, may have a white dust on its surface. Asbestos dust presents a hazard if disturbed.

**All materials and equipment used for construction of Ausgrid's assets are to be free from Asbestos and/or Asbestos related products. Suppliers are expected to comply with the Occupational Health and Safety Act (NSW) together with the Occupational Health and Safety Regulation (NSW) and confirm in writing that all products supplied to Ausgrid contain no Asbestos related material.**



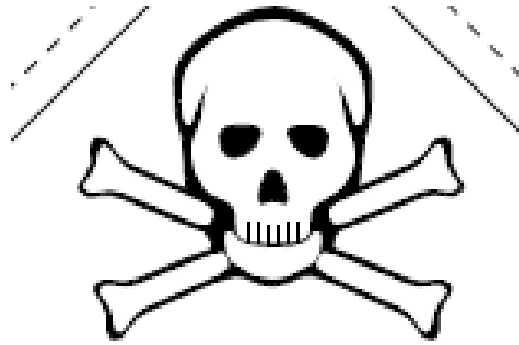
***Asbestos Cable Tape in Substation***



***Broken NC Compound***

## 13.2 Organo-chloride Pesticides

It is also important to note that some transmission trenches contain Organo-Chloride Pesticides (OCP) which are harmful to human health. If the proposed excavation work involves OCP contaminated soils in the vicinity of underground *transmission cables*, special protective gear must be worn and special handling procedures must be followed. Details of these requirements and precautions will be provided by Ausgrid's representative.

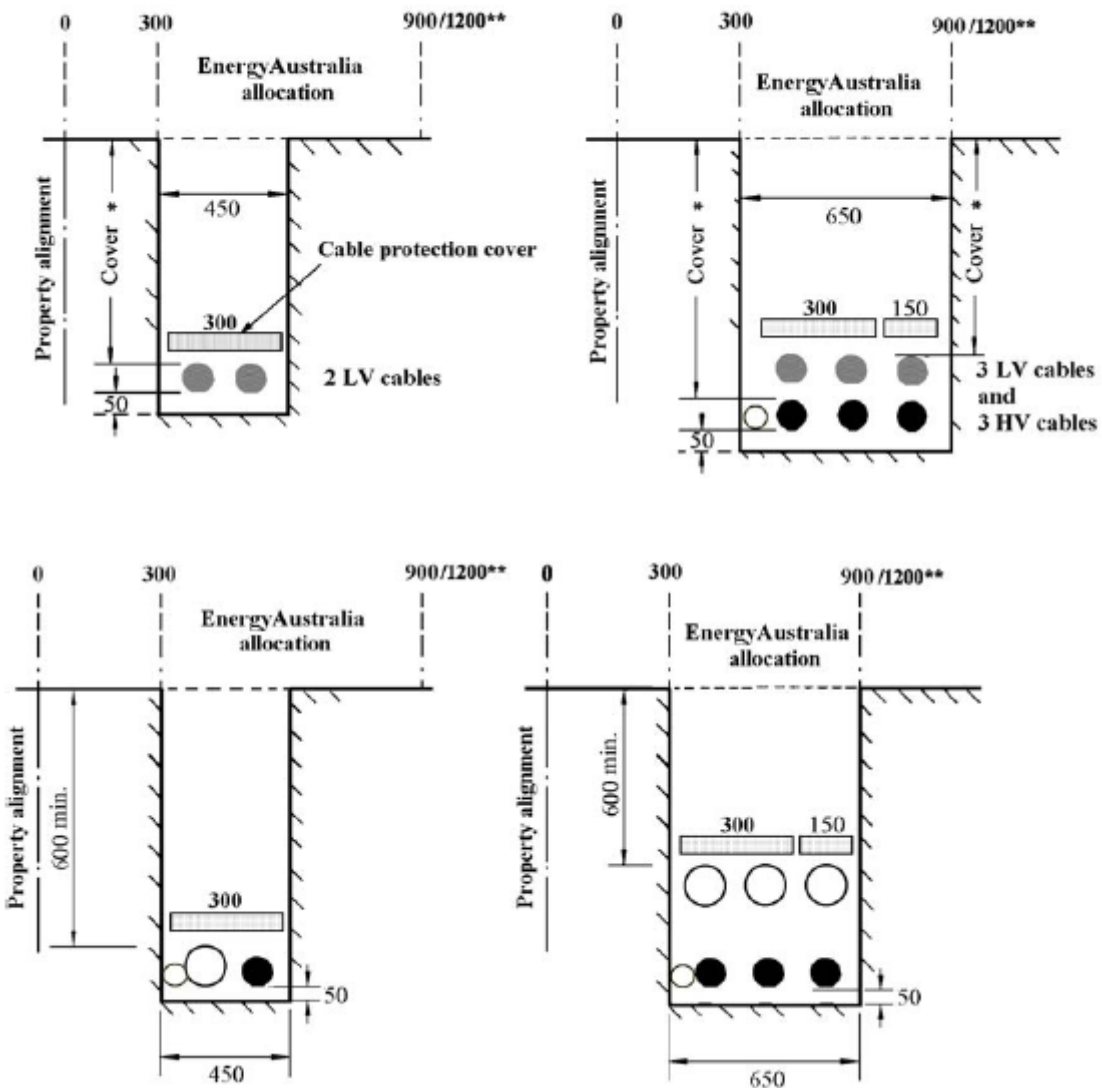


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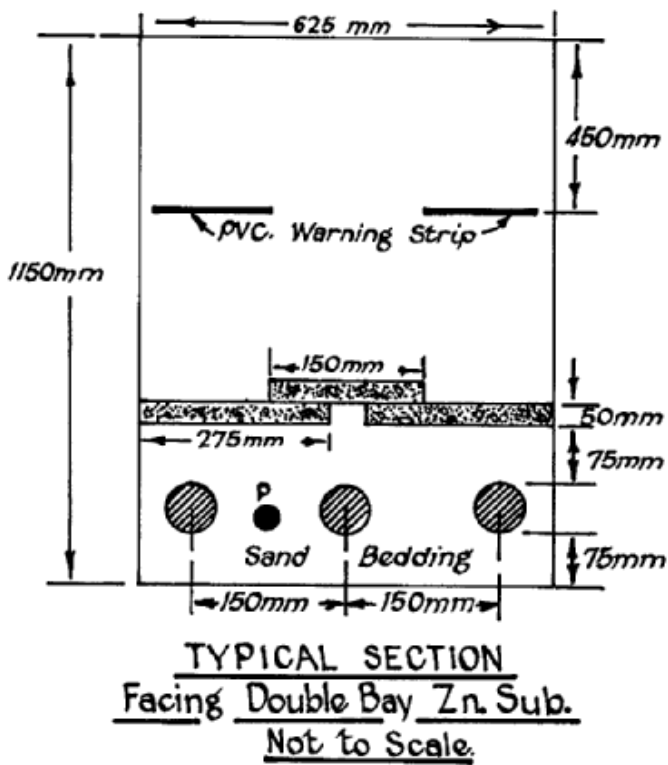
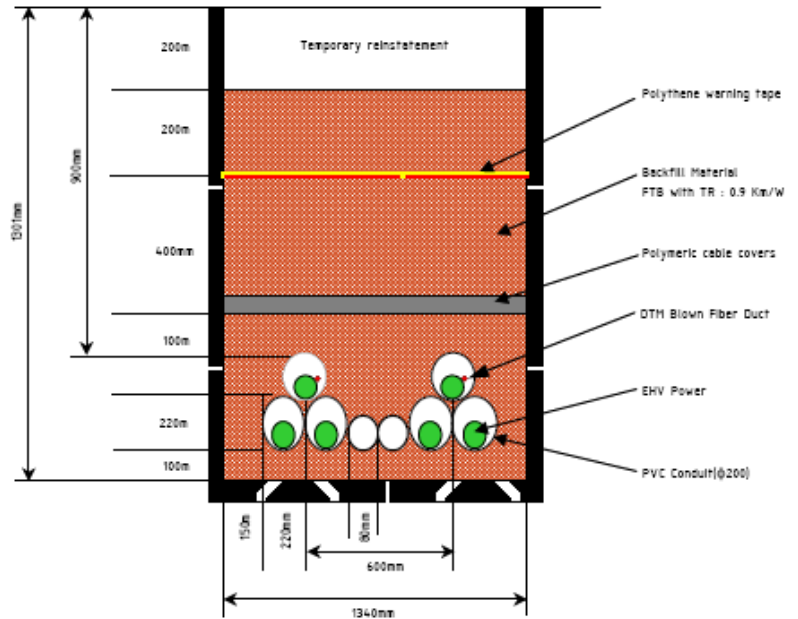
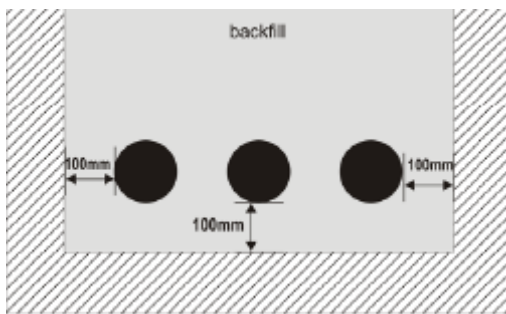
# 14 Typical Trench Configurations

Distribution cable networks vary in configuration, but some typical trench layouts similar to are shown in the following sketches:

## HV and LV Cables Laid Direct



Transmission cables – operating at between 33,000 and 132,000 volts, may be installed in trenches similar to some of the following examples:





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**Document Control**

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