Iwan Davies

From: Easements&Development <Easements&Development@transgrid.com.au>
Sent: Thursday, 21 March 2019 11:41 AM
To: Iwan Davies
Subject: 2019-087 New England Solar (SSD 9255) - Notice of Exhibition (Agencies)
Attachments: 161214_TransGrid Fencing Guidelines_Final.pdf; TG Easement Guidelines for Third Party Development (V10).pdf; Work-near-overhead-power-lines-code-of-practice.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Good Morning Iwan,

TransGrid Reference Number: 2019-087

Proposal: New England Solar (SSD 9255) - Notice of Exhibition (Agencies)

Thank you for referring the above mentioned Development Application to TransGrid for review.

Please be advised after reviewing the proposed works at **New England Solar (SSD 9255) - Notice of Exhibition (Agencies)**

TransGrid Offers the following comments:

TransGrid is working closely with UPC Renewables in relation to the Solar Farm connection. TransGrid has already undertaken a formal connection enquiry response and has entered into a formal Connection Processes Agreement with UPC Renewables to complete a detailed scoping study and designs, with a view to enter into a formal project and connection agreements for the generation connection.

Please find attached TransGrid's easement Guidelines, Fencing Guidelines and Work Near Overhead Power Lines Code of Practice for your review

Regards

Michael

Michael Platt
Development Assessment and Control Officer | Network Planning and Operations

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TransGrid Fencing Guidelines

Earthing and isolation of fences in easements

TransGrid operates and maintains the high voltage electricity network across NSW and the ACT, which includes 99 substations and more than 12,900 kilometres of transmission lines and underground cables. The majority of this infrastructure is located on private land and is accessible by an easement.

An easement provides a 'right of way', allowing access for our staff and contractors to build and maintain electrical infrastructure on private property. If you have an easement registered on your property, there may be some restrictions on the activities performed or structures that can be placed within the easements, including fences.

All fences installed within TransGrid easements should be built with wooden or other non-conductive materials to minimise the risk of injury and/or damage to property. Where this is not possible and metal fences must be installed, certain requirements must be met and are outlined in these guidelines.

As the operator and manager of the high voltage transmission network across NSW and the ACT, TransGrid connects generators, distributors and major end users to the electricity they need, when they need it. At TransGrid, we keep you and your way of life connected. Our core role is to provide safe, reliable and efficient transmission services to NSW, the ACT and the National Electricity Market.

While transmission is a small component of the electricity bill, around 7% for households and businesses, we do not believe that consumers should pay more than necessary for a reliable electricity supply.

Our network comprises 99 bulk supply substations and more than 12,900 kilometres of high voltage transmission lines and cables. Interconnected to QLD and VIC, the network provides a strong electricity system enabling energy trading between Australia's three largest states along the east coast and supporting a competitive wholesale electricity market.

We believe in working with the communities we operate in. We help them learn about energy through our BeSafeKidz primary school education program. Each quarter we partner with different communities to support them grow and develop through our Community Partnership Program. While our easement teams work with landowners to ensure the safety of easements. For more information visit our website www.transgrid.com.au.

Risks posed by metal fences on easements

If a metal fence is installed near a high voltage transmission line, there is a possibility it could act as a conductor of electricity and dangerous currents may be carried along the fence.

These voltages may be an induced voltage from the fence being parallel to a nearby transmission line, or they may be a transferred voltage (or transferred potential), which occurs when a fence is installed too close to the high voltage transmission pole or tower (structure).

The amount of induced or transferred voltage can vary between different transmission lines and structures, and is also affected by the soil beneath the transmission line.

In some cases where a metal fence must be installed, TransGrid may request a detailed earthing assessment and additional measures may be required beyond those outlined in this guideline.

Ensuring the safety of existing metal fences

In some easements, metal fences have been installed by previous owners. It is important these existing fences meet TransGrid's guidelines to minimise the risk of injury or damage to property. This section outlines the guidelines for a fence which is located near or adjacent to a structure, or runs parallel to a transmission line. Despite the location of the fence, you should always follow these simple rules:

- A metal fence should never touch a transmission line structure
- A metal fence should always be at least 1m away from an underground earthing system

To find out the location of any underground earthing systems call "Dial before you dig" on 1100.

Fences near a structure

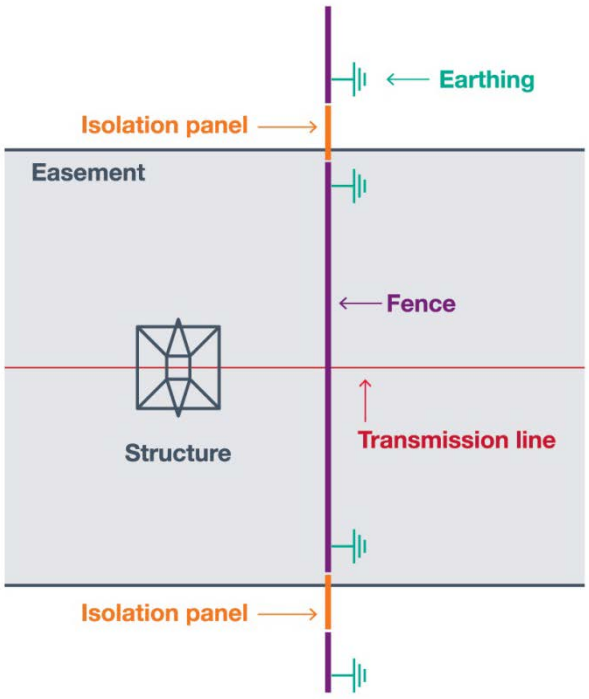
Metal fences that run across an easement, near the base of a transmission line structure, pose specific risks. To manage this risk the following steps must be taken:

- Install Isolation panels where the fence enters or exits the easement
- Provide earthing either side of the isolation panels

The diagram below (Diagram 1) shows an example where a fence runs across the easement. It is important the fence has isolation panels installed as it enters and exits the easement, ensuring it is earthed at either side. If the fence stops inside the easement, it will need to be earthed next to the last post.

If the fence is within 1m of the structure, the fence may need to be modified to ensure safety.

Metal fencing running across the easement near a structure

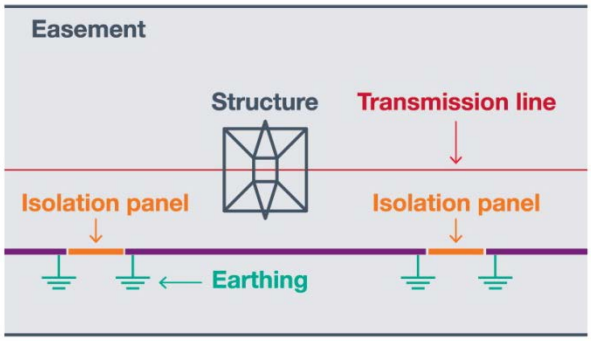


Fences parallel to a transmission line

Metal fences located within an easement and running parallel to a transmission line (see Diagram 2) also pose specific risks. To manage this, adhere to these requirements:

- Fences that run parallel with a transmission line past a structure should have earthing and isolation panels installed near each the structure
- An additional earth should be installed around the middle of each span if the fence passes more than one structure
- In addition to the above, any fence should be earthed at each end.

Metal fencing running parallel to the line in the easement



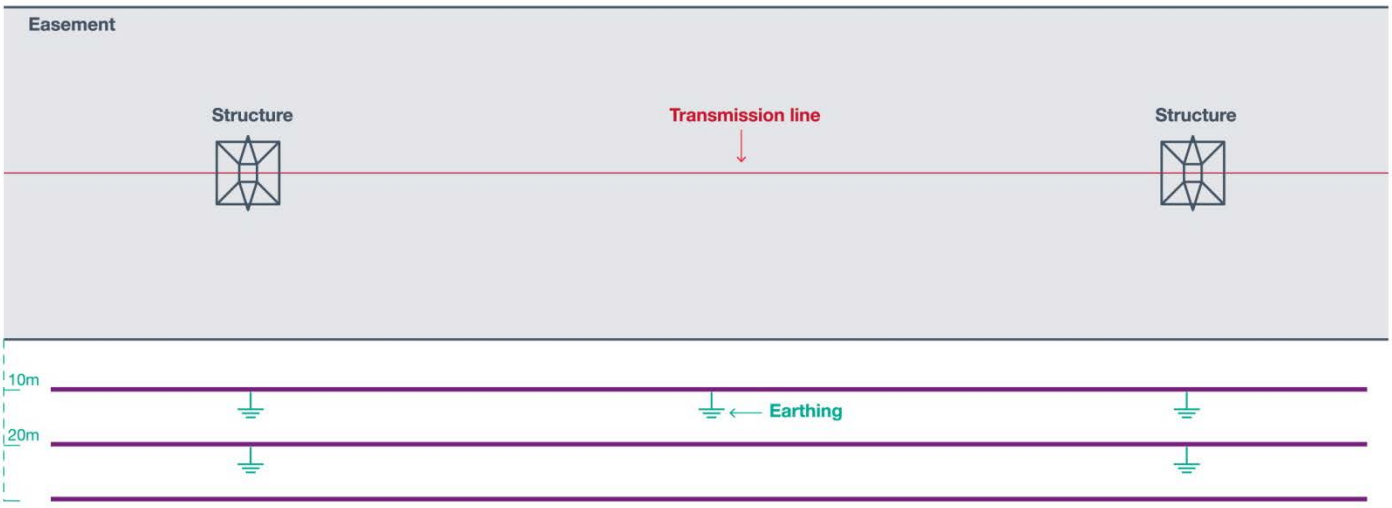
Fences outside the easement

The risk of transferred voltage reduces when the distance between the transmission line and the metal fence is greater. However, to minimise any potential risk of induced voltages, you must follow these requirements:

- Fences within 10m of the easement should be earthed once in line with each structure and once in the middle of each span
- Fences within 20m of the transmission line should be earthed once in line with each structure
- Fences more than 20m from the easement would not generally require earthing

The below diagram (diagram 3) shows the distance of a fence running parallel to an easement and the subsequent level of earthing required.

Metal fencing running parallel to the line on the edge of the easement



Installing a new metal fence in an easement

It is recommended all fencing located within an easement is made from wood or non-conductive materials. However, we understand in some cases metal fencing may be required. In these cases, follow these requirements to reduce the risks:

- Each separate strand of wire or metal fence panel should be effectively earthed at the edge of the easement, wherever the fence passes in or out of the easement area, and at any end of the fence located within the easement area
- Metal gates should be earthed by bonding across the hinges to the fence (in the case of a wire or other metal fence), or by suitable earthing arrangements at the gate post for fences of wooden construction
- All fence and gate earthing must be installed in accordance with the diagrams provided in this guideline.

Temporary fencing

Temporary fencing installed within an easement needs to be earthed. Where a typical chain-wire or weldmesh panel fence supported by concrete or plastic block bases is used, every second panel should be earthed and the pipe clamp between posts of adjoining panel posts should be replaced with a clamp arrangement made of wood or other non-metallic material.

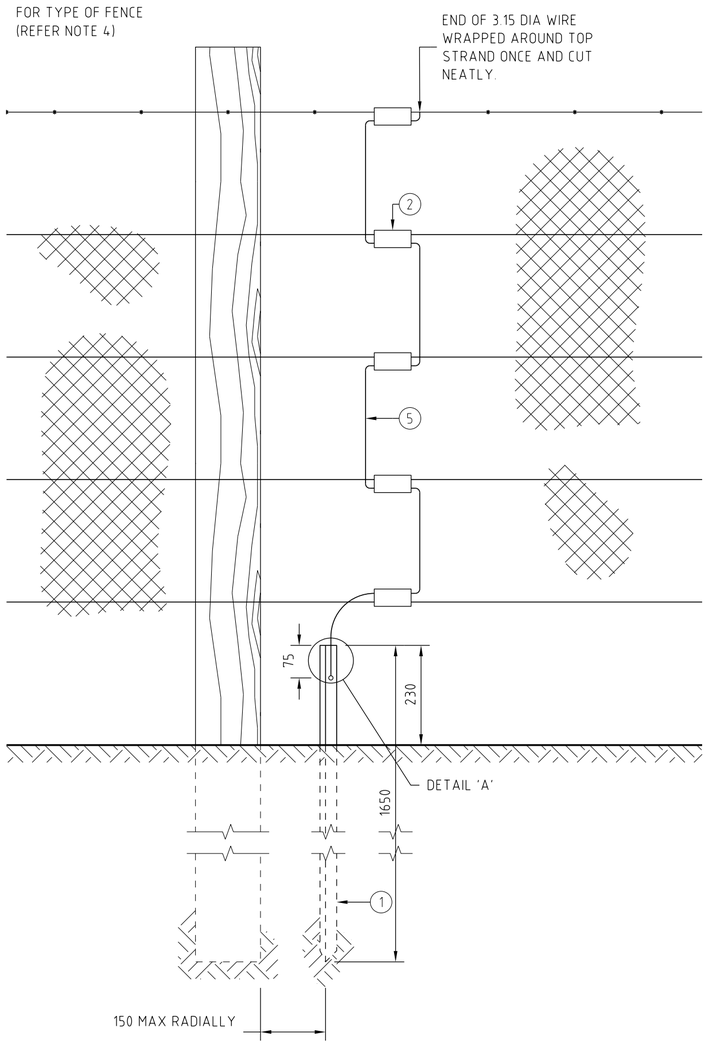
Other types of temporary fencing should be earthed and isolated in accordance with the requirements set out in this guideline.

For more information

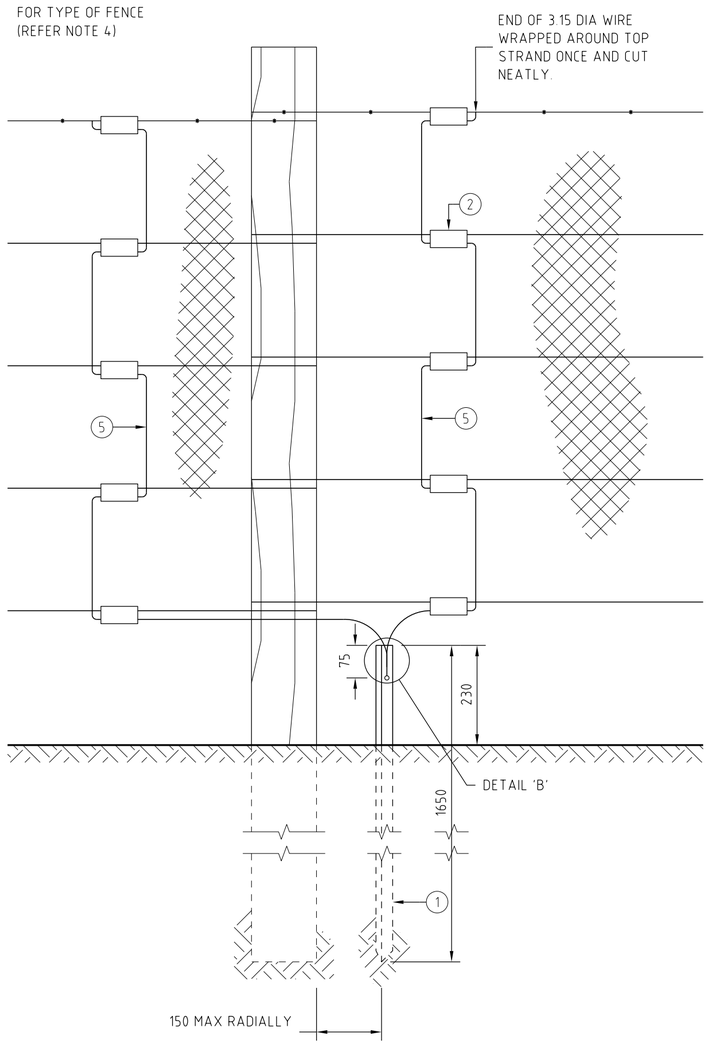
For further information please contact TransGrid on 1800 222 537.

Appendix A: Earthing of wire fence

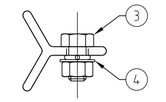
NOTES:
1. THE QUANTITY OF LINE CLAMPS (ITEM 2) IS DEPENDENT UPON THE NUMBER OF STRAIN WIRES ON EXISTING FENCES.
2. WHEN THE EARTH STAKE CANNOT BE DRIVEN TO POSITION AS SHOWN THE FOLLOWING PROCEDURE IS TO BE ADOPTED
   a) WHERE DRIVEN LESS THAN 610 mm:
      CUT OFF AT 230 mm ABOVE GROUND LEVEL AND DRILL TO TAKE CONNECTION BOLT.
   b) WHERE DRIVEN MORE THAN 610 mm:
      TO REMAIN UNCUT AND CONNECTION MADE IN THAT POSITION.
3. i) ARRANGEMENT 'A'
      ARRANGEMENT 'A' TO BE USED WHERE STRAIN WIRE IS CONTINUOUS AND UNBROKEN AT POST.
   ii) ARRANGEMENT 'B'
      ARRANGEMENT 'B' TO BE USED WHERE STRAIN WIRE TERMINATES AT POST AND IS NOT CONTINUOUS.
4. THE NUMBER OF STRAIN WIRES AND USE OF WIRE NETTING IS SHOWN AS ILLUSTRATIVE ONLY AS THE FENCE MAY BE AN OPEN STRAIN WIRE TYPE FENCE OR BE A WIRE NETTING CLAD STRAIN WIRE FENCE.

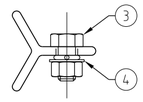


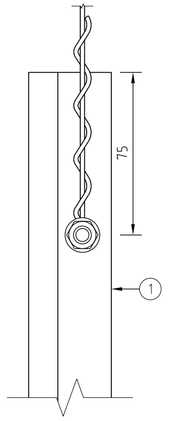
ARRANGEMENT 'A'
(REFER NOTE 3)



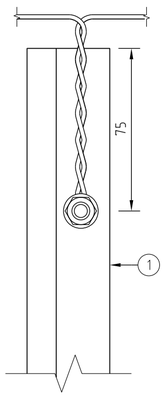
ARRANGEMENT 'B'
(REFER NOTE 3)







DETAIL 'A'



DETAIL 'B'

AS REQ'D		RW 85 017	5		FENCING WIRE 3.15 mm DIA.	S. GALV.
1	1	WA 65 011	4		8 (NOM) FLAT WASHER	S. GALV.
1	1	NA 01 181	3		M8 x 25 mm HEX. HD. BOLT & NUT	S. GALV.
AS REQ'D		EF 16 209	2		LINE SPLIT BOLT CLAMP.	BRASS
1	1	LM 76 003	1	TL-145554	EARTH STAKE 1650 mm LONG	S. GALV.
A	B	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
REQUIRED						

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT.	TAM	18-07-2016

REDRAW FROM TIFF TO DGN

TransGrid

TL-167142 WIRE FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016
APPROVAL STATUS	APPROVED	
SCALE		

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING OF WIRE FENCES

ARRANGEMENT

A2 | TL140089 | 01
PREFIX NUMBER SHEET | AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 22/11/2016 8:30:55 AM

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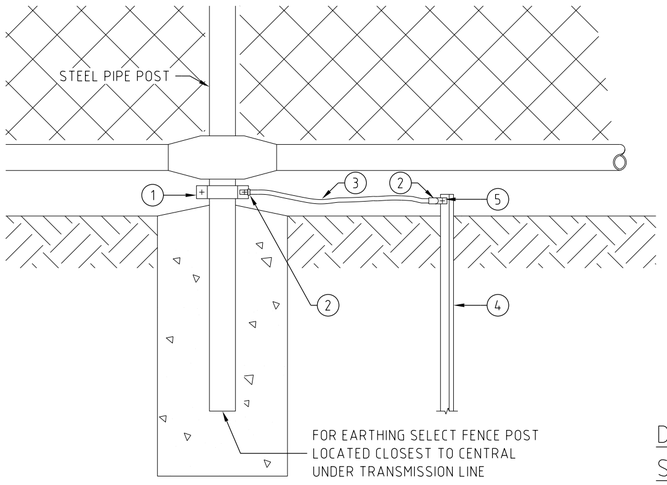
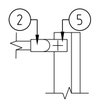
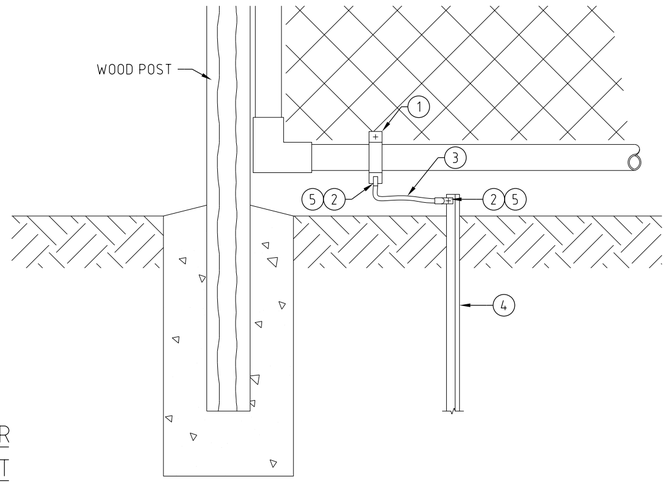
Appendix B: Earthing of steel fences



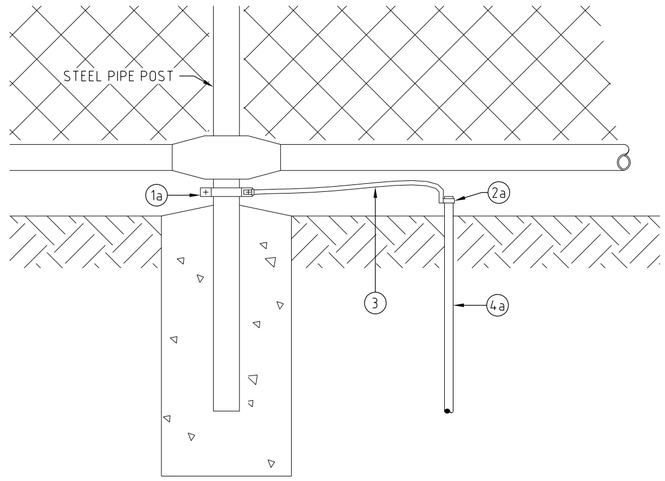
CHAINWIRE FENCE
ARRANGEMENT 1



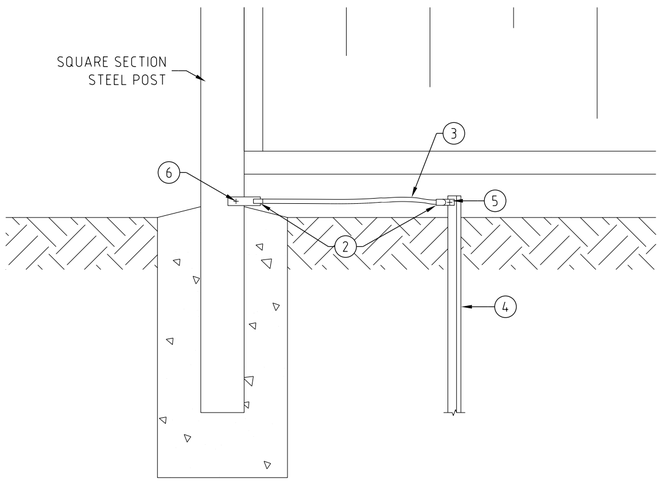
DETAIL FOR
STAR POST
ATTACHMENT



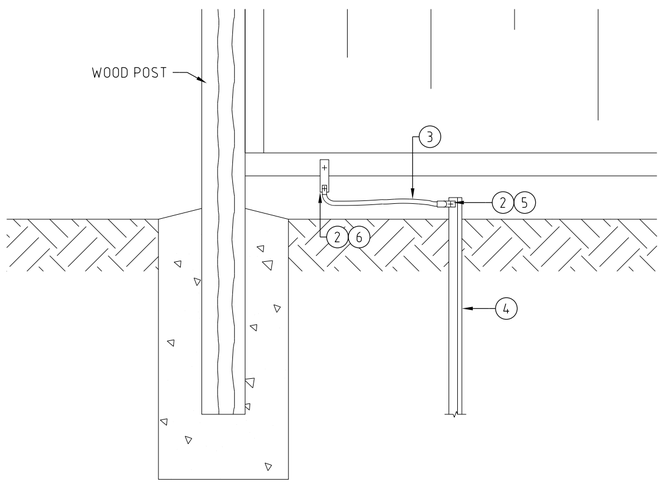
CHAINWIRE FENCE WITH WOOD POST
ARRANGEMENT 1A



DETAIL 1
ALTERNATIVE METHOD OF
EARTHING CONNECTION



COLORBOND FENCE
ARRANGEMENT 2



COLORBOND FENCE WITH WOOD POST
ARRANGEMENT 2A

NOTES:

1. DRIVEN EARTH RODS:
   RODS MUST BE DRIVEN TO A DEPTH OF AT LEAST 1200mm.
   RODS MUST BE LOCATED AT LEAST 300mm CLEAR OF CONCRETE FOOTING FOR FENCE POST.
   ROD MUST BE LOCATED AS CLOSE AS POSSIBLE TO BOTTOM FENCE RAIL.

2. CONNECTIONS TO FENCE & EARTH ROD TO BE PAINTED WITH AN "EXTERIOR GRADE" OF PAINT AFTER MAKING & TIGHTENING OF JOINTS.

3. STAR STAKES MUST BE GALVANIZED & NOT OF THE FULLY PAINTED TYPE.

4. FENCE EARTHING SHALL BE APPLIED TO THE FENCE POST. EARTHING OF THE BOTTOM RAIL (ARRANGEMENT 1A & 2A) SHALL ONLY BE APPLIED WHERE INSTRUCTED BY TRANSGRID.

5. DETAIL 1 SHOWS ALTERNATIVE ARRANGEMENT WHERE AN EARTH ROD IS USED IN PLACE OF A STAR STAKE.

DRG No.	S/L No.	ITEM	DESCRIPTION	MAT'L.
		6	M6/M8 SELF TAPPING SCREW WITH WASHER.	
		5	M8 BOLT AND NUT.	
TL-146911	ST50101	4a	COPPER CLAD EARTH ROD.	
TL-145554	LM76003	4	EARTH STAKE 1650 LONG.	M.S.GAL'V
		3	6mm^2 STRANDED GREEN/YELLOW PVC INSUL.	COPPER
		2a	EARTH ROD CLAMP.	
		2	CRIMP LUG 6mm^2 x 10mm ATTACHMENT HOLE.	E.TIN COPP.
		1a	"MUFFLER" CLAMP.	M.S.GAL'V
TL-140529		1	FENCE EARTHING CLAMP.	M.S.GAL'V

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:	TAM	18-07-2016
REDRAW FROM TIFF IMAGE TO DGN		

TransGrid

TL-829305 STEEL FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING OF STEEL FENCES

ARRANGEMENT

A2	TL192501	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 23/11/2016 10:29:15 AM

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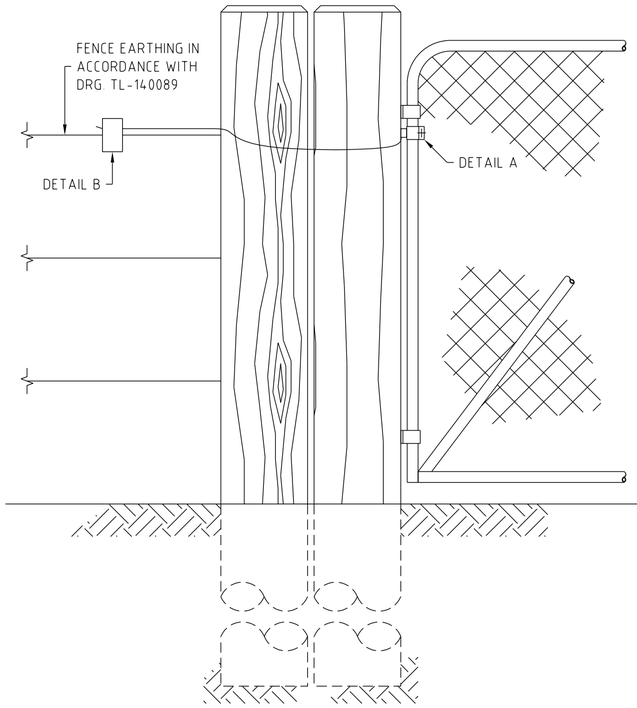
Appendix C: Gate earthing arrangement



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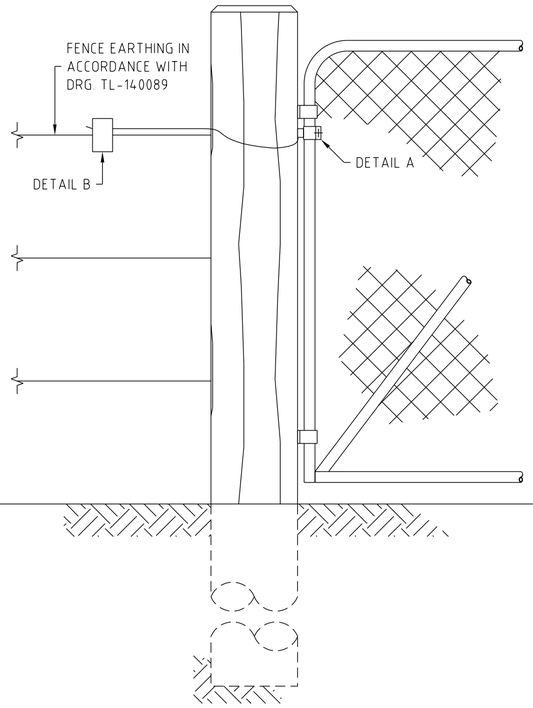

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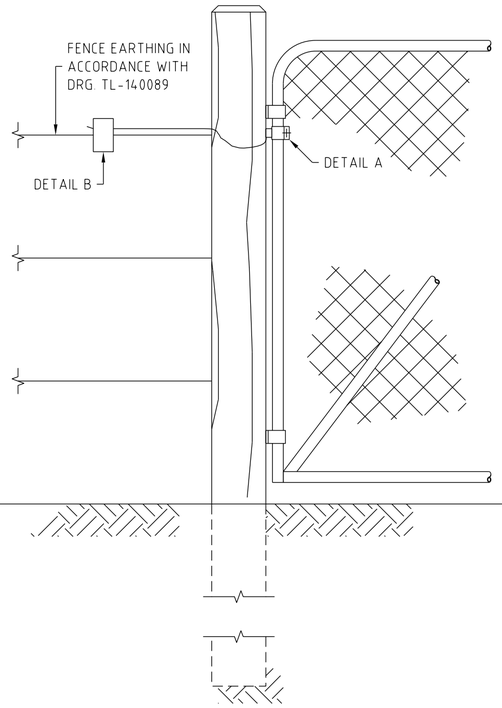

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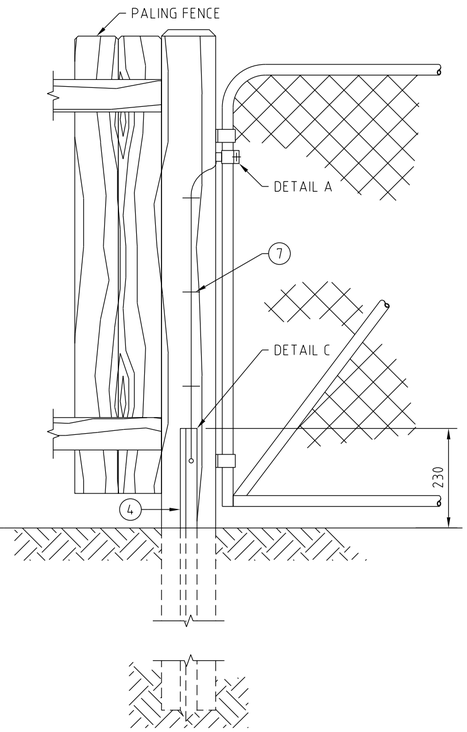
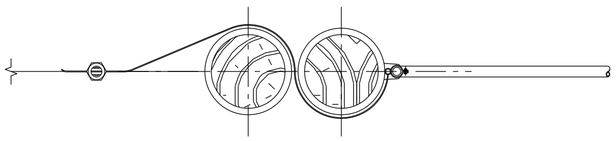
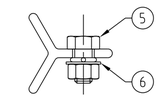


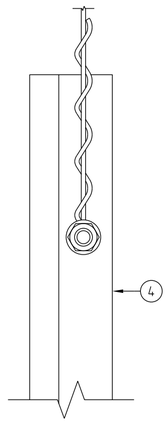
'TYPE 4'

ELEVATION
(TYPES 1 - 4)

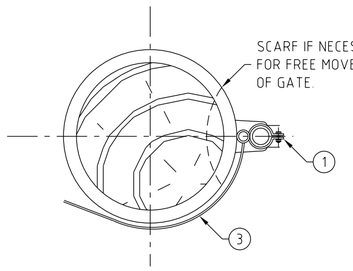


PLAN
(TYPES 1 - 4)

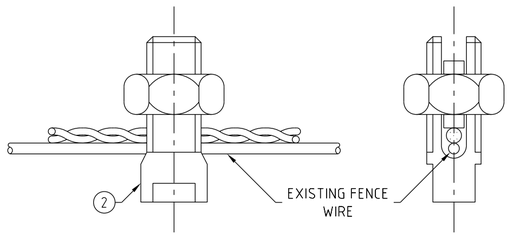




DETAIL 'C'



DETAIL 'A'



DETAIL 'B'

NOTES:

1. THE GATE EARTHING ASSEMBLY IS TO BE POSITIONED SO THAT MOVEMENT OF THE GATE IS NOT RESTRICTED AND AN EFFECTIVE ELECTRICAL CONNECTION TO THE FENCE EARTHING IS MADE.
2. WHERE EXISTING FENCE EARTHING IS CONSIDERED TO BE INADEQUATE OR ALTERNATIVELY IS NON EXISTENT THEN FENCE EARTHING TO DRG. TL-140089 IS TO BE INSTALLED.
3. IN THE CASE OF A PALING FENCE (TYPE 4). THE GATE IS TO BE EARTHED AS SHOWN. WITH THE EARTH STAKE AS CLOSE TO THE FENCE AS PRACTICABLE.

ARRG'T TYPE 4

REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
4	SN 92 289	7	———	STAPLES 4 x 40	S. GALV.
1	WA 65 011	6	———	M8 FLAT WASHER	S. GALV.
1	NA 01 181	5	———	M8 x 25 BOLT & NUT	S. GALV.
1	LM 76 003	4	TL-145554	EARTH STAKE 1650 LONG	S. GALV.
AS REQ'D	RW 68 031	3	———	GATE EARTHING 7/1.25 (6mm^2 MIN)	S. GALV.
1	CD 45 110	1	———	EARTH CLIP	S. GALV.

ARRG'T TYPE 1, 2 & 3

REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
AS REQ'D	RW 68 031	3	———	GATE EARTHING 7/1.25 (6mm^2 MIN)	S. GALV.
1	EF 16 209	2	———	LINE SPLIT BOLT CLAMP	BRASS
1	CD 45 110	1	———	EARTH CLIP	S. GALV.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN mm

AMENDMENT TEXT:	TAM	18-07-2016

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TransGrid

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
GATE EARTHING ARRANGEMENT

ARRANGEMENT

A2	TL140098	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE $$$$$$SYTIME$$$$$$PLOT_TIME$$

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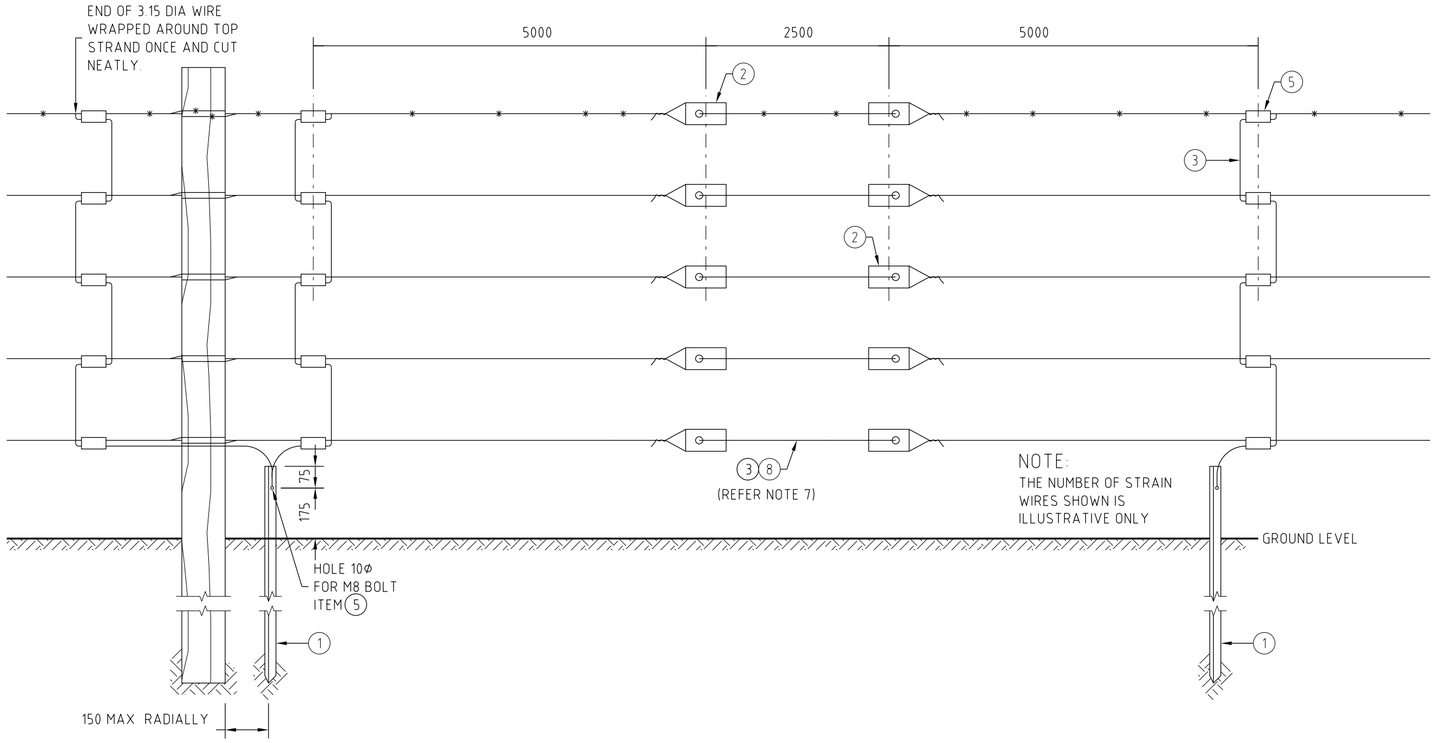
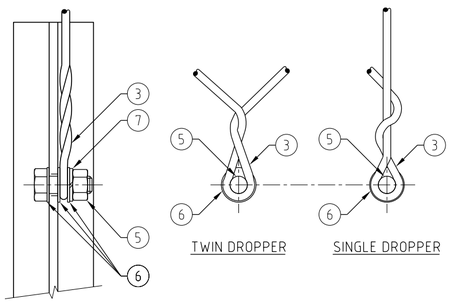
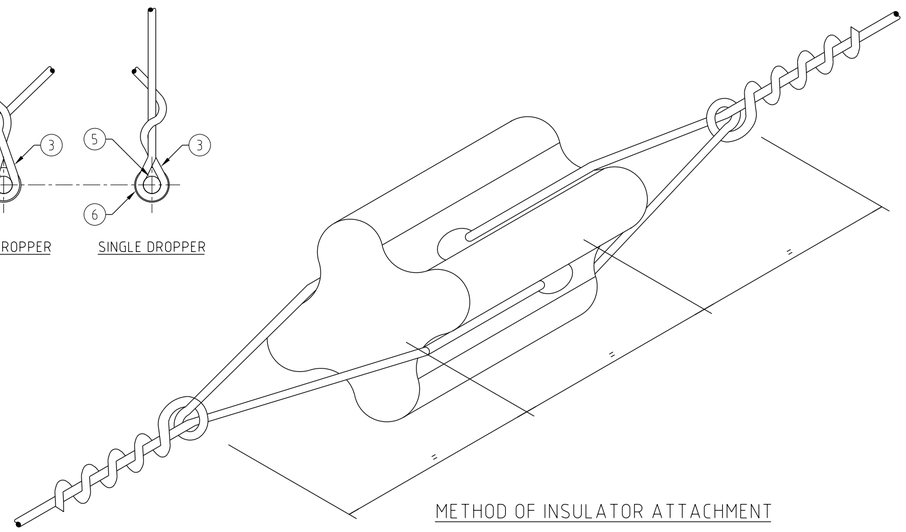
Appendix D: Wire fence isolation panel



NOTES:

1. FENCE NOT TO BE RETENSIONED TO MORE THAN 2kN.
2. THE QUANTITY OF LINE CLAMPS (ITEM 4) & INSULATORS (ITEM 2) IS DEPENDENT UPON THE NUMBER OF STRAIN WIRES ON EXISTING FENCES.
3. WHERE ROCK PREVENTS THE EARTH STAKE FROM BEING DRIVEN INTO POSITION AS SHOWN. THE STAKE MAY BE CUT OFF AT 250mm ABOVE GROUND PROVIDED A MINIMUM DEPTH OF 600mm IS ACHIEVED. WHERE THE STAKE IS DRIVEN INTO ROCK. THE HOLE SHALL BE BACK FILLED AND TAMPED WITH CLAY, SOFT SOIL OR ELSE A SLURRY CONSISTING OF A MIXTURE OF
   - 1 PART BY VOLUME OF CASTING PLASTER
   - 1 PART BY VOLUME OF BENTONITE
   - 4 PARTS BY VOLUME OF WATER
4. EARTH STAKES TO BE CONNECTED TO FENCE SECTION BEFORE FENCE IS CUT FOR INSULATOR INSTALLATION.
5. STAFF INSTALLING FENCE INSULATORS SHALL WEAR APPROVED INSULATING FOOTWEAR, OR STAND ON AN INSULATING RUBBER MAT ABLE TO WITHSTAND AN APPLIED VOLTAGE OF 15kV FOR ONE MINUTE.
6. THE METHOD OF ATTACHMENT SHOWN IN THE INSULATOR ATTACHMENT DETAIL IS APPLICABLE TO ALL PATTERNS OF INSULATORS HELD UNDER S/L LM 50 001.
7. WHERE FENCE INSULATORS ARE TO BE INSTALLED IN BARBED WIRE SECTIONS, BARBED WIRE IS TO BE USED IN PLACE OF 3.15mm FENCING WIRE. BARBS MAY HAVE TO BE SUITABLY TRIMMED TO ALLOW THE WIRE TO PASS THROUGH HOLES IN INSULATOR.





METHOD OF INSULATOR ATTACHMENT

AS REQ'D	RW 78 119	8	———	BARBED WIRE 2.5 mm / STRAND	S. GALV.
2	WA 80 011	7	———	M8 SPRING WASHER	SP. S. GALV.
6	WA 65 011	6	———	M8 WASHER	S. GALV.
2	NA 01 181	5	———	M8 x 25 BOLT & NUT	S. GALV.
AS REQ'D	EF 16 209	4	———	LINE SPLIT BOLT CLAMP	BRASS
AS REQ'D	RW 85 017	3	———	FENCING WIRE 3.15 DIA	S. GALV.
AS REQ'D	LM 50 001	2	———	INSULATORS	PORCELAIN
2	LM 76 003	1	TL-145554	EARTH STAKE 1650 mm LONG	S. GALV.
REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:	TAM	18-07-2016

REDRAW FROM TIFF IMAGE TO DGN

TransGrid

TL-829305 STEEL FENCE ISOLATION PANEL
TL-205446 RINGLOCK FENCE ISOLATION PANEL
TL-173774 WIRE MESH FENCE ISOLATION PANEL
TL-140089 EARTHING OF WIRE FENCES

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS
SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
WIRE FENCE ISOLATION PANEL

ARRANGEMENT

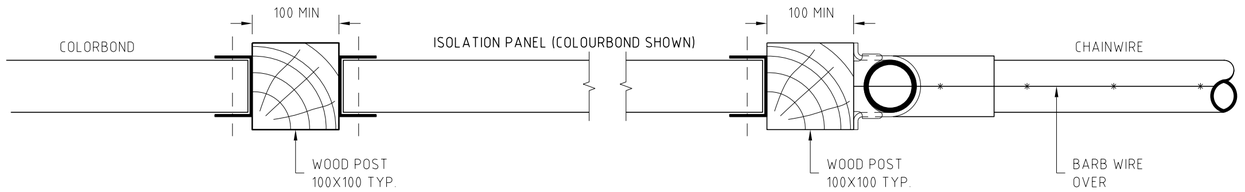
A2 | TL167142 | 01
PREFIX NUMBER SHEET | AMDT

400x566

PLOT ISSUE DATE 21/11/2016 10:00:26 AM | COPIED FROM | SUPERSEDES | SUPERSEDED BY | INDEX CLASS'N 36-03

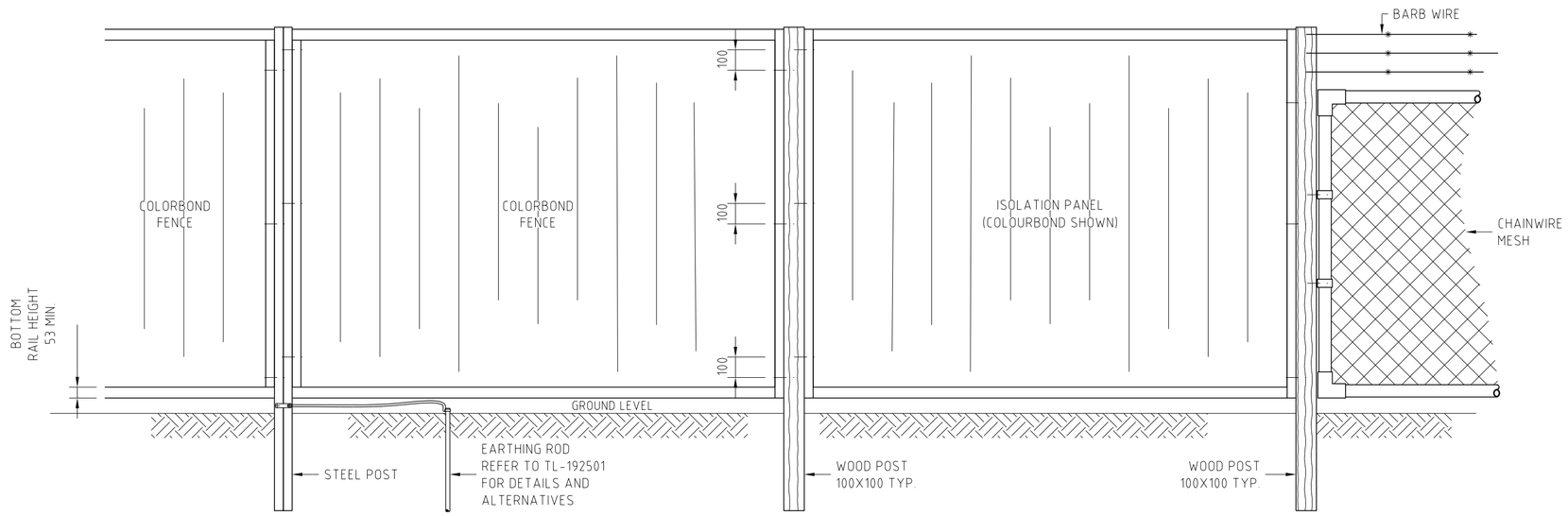
SOURCE DESIGN FILE: \\vsw08323\ics_share$\6\5468_13\TL-167142_01.DGN

Appendix E: Steel fence isolation panel



PLAN

SCALE 1:5



FRONT ELEVATION

SCALE 1:20

NOTES:

1. THE ISOLATION PANEL SHALL NOT BE EARTHED UNLESS SPECIFICALLY DIRECTED BY TRANSGRID.
2. THE FENCE ON EITHER SIDE OF THE ISOLATION PANEL SHALL BE EARTHED IN ACCORDANCE WITH TL-192501.
3. THE SCREWS USED TO FIX THE FENCE PANELS TO THE WOOD POST SHALL NOT PENETRATE MORE THAN 50mm INTO THE POST AND SHALL BE OFFSET AT LEAST 100mm FROM ANY SCREWS USED TO FIX THE PANEL ON THE OPPOSITE SIDE OF THE POST.
4. BOLTS SHALL NOT BE USED TO FIX THE FENCE PANELS TO THE WOOD POSTS.
5. IF WOOD POST ARE TO BE PAINTED THE PAINT SHALL BE NON-CONDUCTIVE.
6. THERE MUST BE NO METALLIC CONNECTIONS (INCLUDING BARBED SECURITY WIRE) WHICH CONNECT TO THE FENCE PANELS ON OTHER SIDE OF THE WOOD POST.
7. COLORBOND AND CHAINWIRE ARE SHOWN ON THIS DRAWING AS TYPICAL EXAMPLES.
   THIS DESIGN CAN BE APPLIED TO OTHER TYPES OF METAL FENCING PROVIDED THE GENERAL ARRANGEMENT CAN BE MAINTAINED.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:		

TransGrid

TL-192501	EARTHING OF STEEL FENCES
TL-829305	STEEL FENCE ISOLATION PANEL
TL-173774	WIRE MESH FENCE ISOLATION PANEL
TL-167142	WIRE FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	23-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
STEEL FENCE ISOLATION PANEL

ARRANGEMENT

A2	TL829305	00
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 23/11/2016 8:30:20 AM

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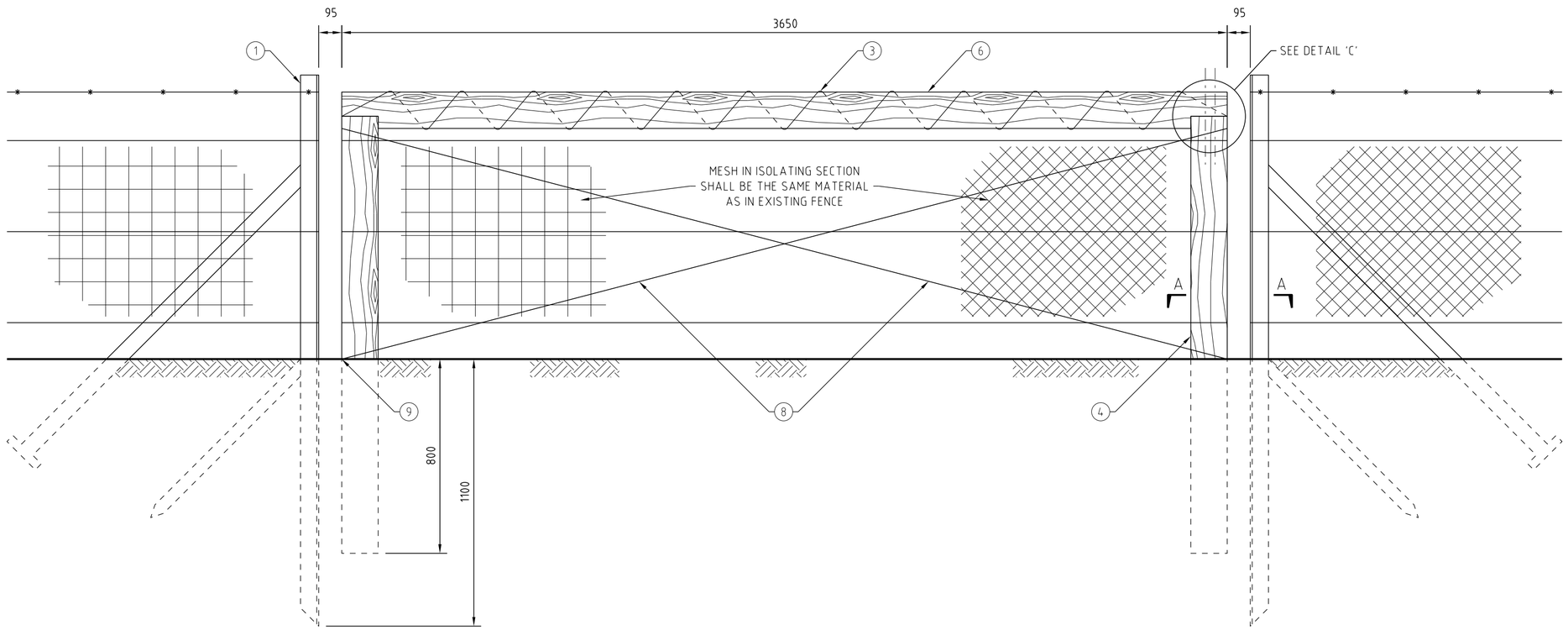
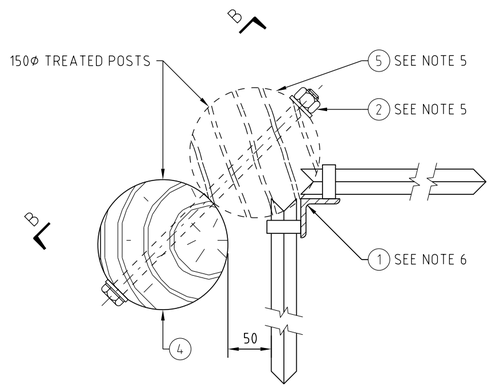
SOURCE DESIGN FILE: \\vsw08323\ics_share$\6\10519_2\TL-829305_00.DGN

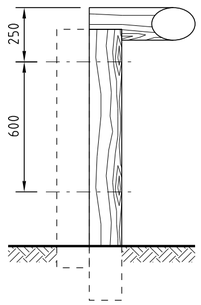
Appendix F: Wire mesh fence isolation panel



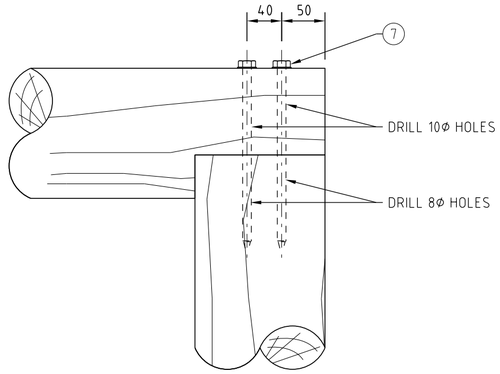
ELEVATION
SCALE: N.T.S.



SECTION A-A
SCALE: 1:5



VIEW 'B-B'
SCALE: 1:20



DETAIL 'C'
SCALE: 1:5

NOTES:
1. THE CENTRAL ISOLATING FENCE SECTION SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF THE STEEL POST ASSEMBLY.
2. TREATED POSTS (ITEM 4) SHALL BE INSTALLED IN BORED HOLES 300Ø & 800 DEEP. BACKFILL SHALL BE BROKEN UP & TAMPED IN LAYERS NOT EXCEEDING 150.
3. STEEL POSTS & ANCHORS SHALL BE DRIVEN INTO THE GROUND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. THE TWO SIDE FENCE SECTIONS SHALL BE TERMINATED ON THE STEEL POST ASSEMBLIES. NO METALLIC CONNECTION SHALL BE MADE BETWEEN THESE FENCE SECTIONS & THE CENTRAL ISOLATING SECTION.
5. IN THE CASE OF RABBIT PROOF FENCING, WHERE REQUIRED BY THE PROPERTY OWNER, THE GAP AT EACH END OF THE CENTRAL ISOLATING FENCE SECTION SHALL BE CLOSED BY THE INCLUSION OF A SECOND POST (ITEM 5) AS DETAILED IN SECTION A-A.
6. THE CLEARANCE BETWEEN METAL PARTS OF THE CENTRAL ISOLATING FENCE SECTION & METAL PARTS OF THE FENCE SECTIONS ON EITHER SIDE SHALL BE A MINIMUM OF 50mm.
7. PINE POST & RAIL SHALL BE PRESSURE IMPREGNATED WITH COPPER CHROME ARSENATE SALTS.

✱SEE NOTE 5

REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
4	———	9	———	5 x 50 CLOUT HEAD NAIL	S. GALV.
AS REQ'D	———	8	———	3.15 FENCING WIRE	S. GALV.
4	———	7	———	M10 BOLT x 200 LONG	S. GALV.
1	———	6	———	TREATED RAIL 150Ø x 3650 LONG	PINE
✱ 2	———	5	———	TREATED POST 150Ø x 1100 LONG	PINE
2	———	4	———	TREATED POST 150Ø x 1800 LONG	PINE
10m	———	3	———	BARBED WIRE	S. GALV.
✱ 4	———	2	———	M16 BOLT & NUT	S. GALV.
1	HG 69 009	1	TL-806057 A2	STEEL POST ASSEMBLY	S. GALV.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES

AMENDMENT TEXT:	TAM	18-07-2016

REDRAW FROM TIFF IMAGE TO DGN

TransGrid

TL-167142 WIRE FENCE ISOLATION PANEL
TL-205446 RINGLOCK FENCE ISOLATION PANEL
TL-829305 STEEL FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
WIRE MESH FENCE ISOLATION PANEL

ARRANGEMENT

A2	TL173774	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 22/11/2016 12:07:51 PM

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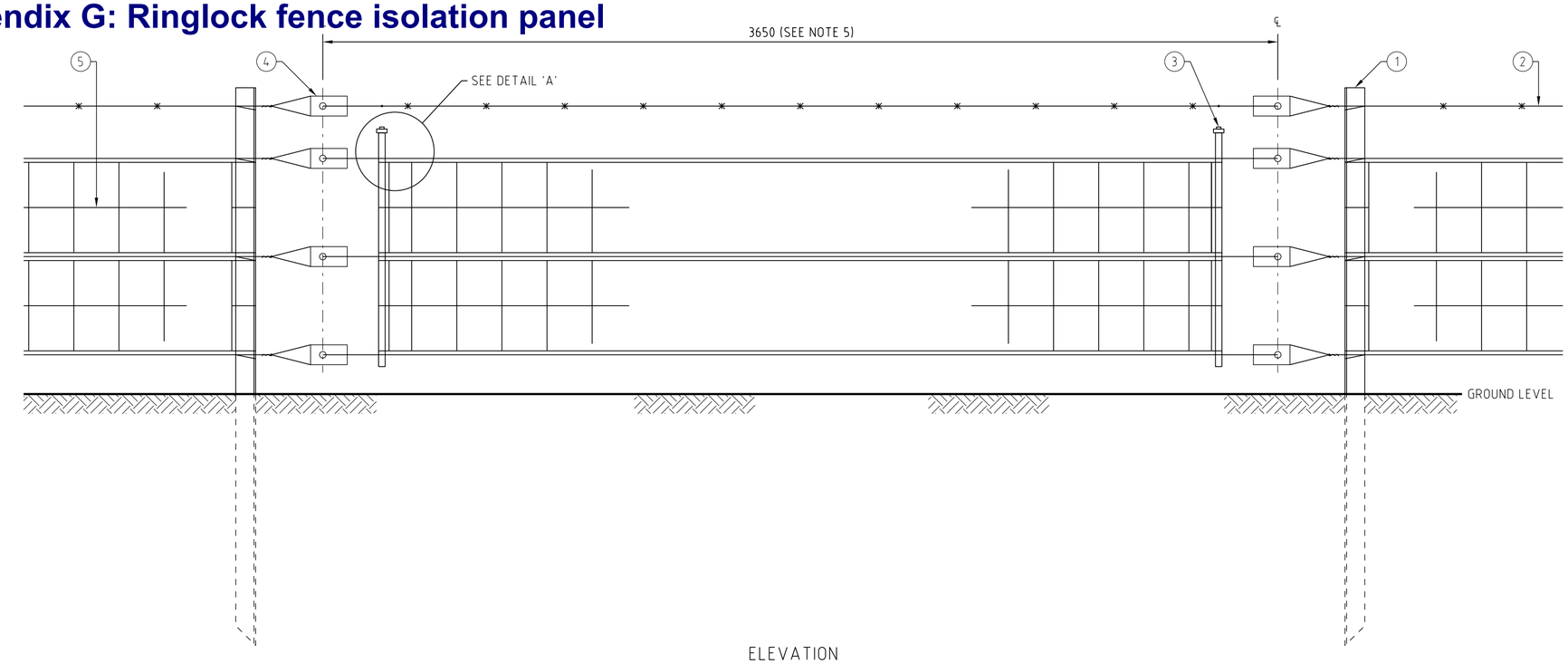
SOURCE DESIGN FILE: \\vsw08323\ics_share$\5716\3582_926\TL-173774_01.DGN

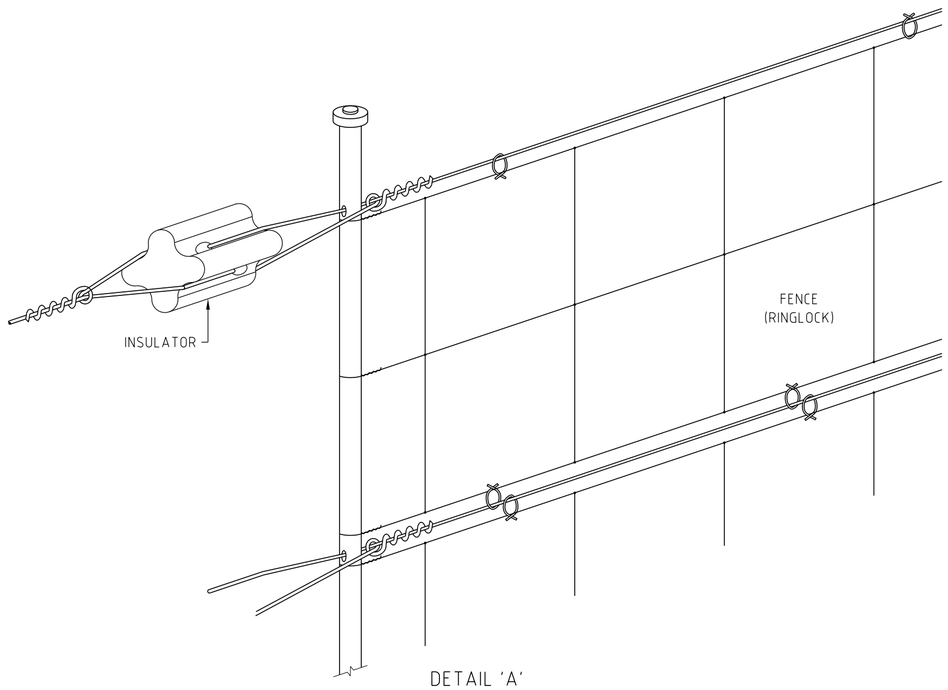
Appendix G: Ringlock fence isolation panel



ELEVATION
SCALE: N.T.S.

NOTES:

1. STEEL POSTS (ITEM 1) ARE TO BE DRIVEN INTO THE GROUND IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS.
2. THE NUMBER OF PLAIN & BARBED WIRE STRANDS IN THE ISOLATING SECTION TO BE AS IN THE ORIGINAL FENCE. FENCE TENSION TO BE MAINTAINED THROUGH ISOLATING SECTION.
3. WIRE & RINGLOCK OF ORIGINAL FENCE IS TO BE TIED TO THE STEEL POSTS ON EITHER SIDE OF THE ISOLATING SECTION (TO EARTH FENCE).
   RINGLOCK OF ISOLATING SECTION PANEL IS TO BE TENSIONED & TIED TO PIPES (ITEM 3) AT EACH END & TIED TO PLAIN STRANDS WITH STAPLES IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS.
4. NO METALLIC CONNECTION IS TO BE MADE BETWEEN THE MAIN FENCE SECTION & THE CENTRAL ISOLATING SECTIONS.
5. DISTANCE BETWEEN INSULATORS TO BE 3650mm MINIMUM. WHERE AN ISOLATING SECTION IS SPECIFIED TO BE INSTALLED IN A FENCE THAT IS LESS THAN 2600mm FROM A CONCRETE POLE OR STEEL TOWER THE LENGTH OF THE ISOLATING SECTION IS TO BE INCREASED TO PROVIDE A MINIMUM CLEARANCE OF 2600mm BETWEEN THE NEAREST POINT OF THE CONCRETE POLE / STEEL TOWER & THE EARTHED SECTION OF THE FENCE.
6. STAFF INSTALLING FENCE INSULATORS SHALL WEAR APPROVED INSULATING FOOTWEAR, OR STAND ON AN INSULATING RUBBER MAT ABLE TO WITHSTAND AN APPLIED VOLTAGE OF 15kV FOR ONE MINUTE.



DETAIL 'A'

AS REQ'D		5		RINGLOCK	S. GALV.
8	LM 50 001	4		INSULATOR	PORCELAIN
2		3		WATER PIPE (25mm N.B.)	S. GALV.
AS REQ'D		2		BARBED WIRE	S. GALV.
2	HG 69 009	1	TL-806057	STEEL POST L 90x6	S. GALV.
REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES

AMENDMENT TEXT		
REDRAW FROM TIFF IMAGE TO DGN	TAM	18-07-2016

TransGrid

TL-167142	WIRE FENCE ISOLATION PANEL
TL-173774	WIRE MESH FENCE ISOLATION PANEL
TL-829305	STEEL FENCE ISOLATION PANEL
TL-205446	RINGLOCK FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
RINGLOCK FENCE ISOLATION PANEL

ARRANGEMENT

A2 | TL205446 | 01
PREFIX NUMBER SHEET | AMDT

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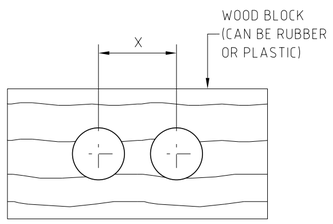
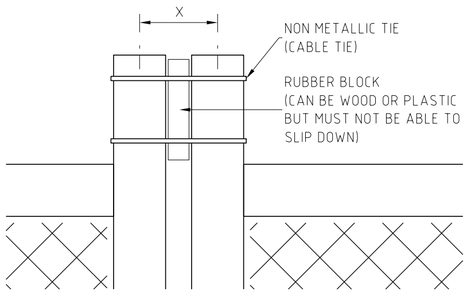
SOURCE DESIGN FILE: \\vsw08323\ics_share$\5716\3582_925\TL-205446_01.DGN

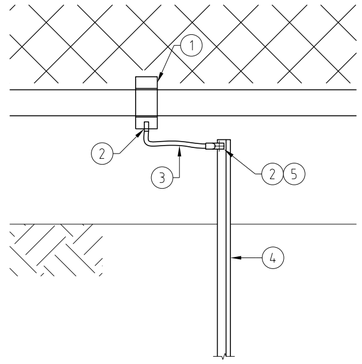
Appendix H: Earthing and isolation of temporary fencing



DETAIL 1
SCALE 1:5



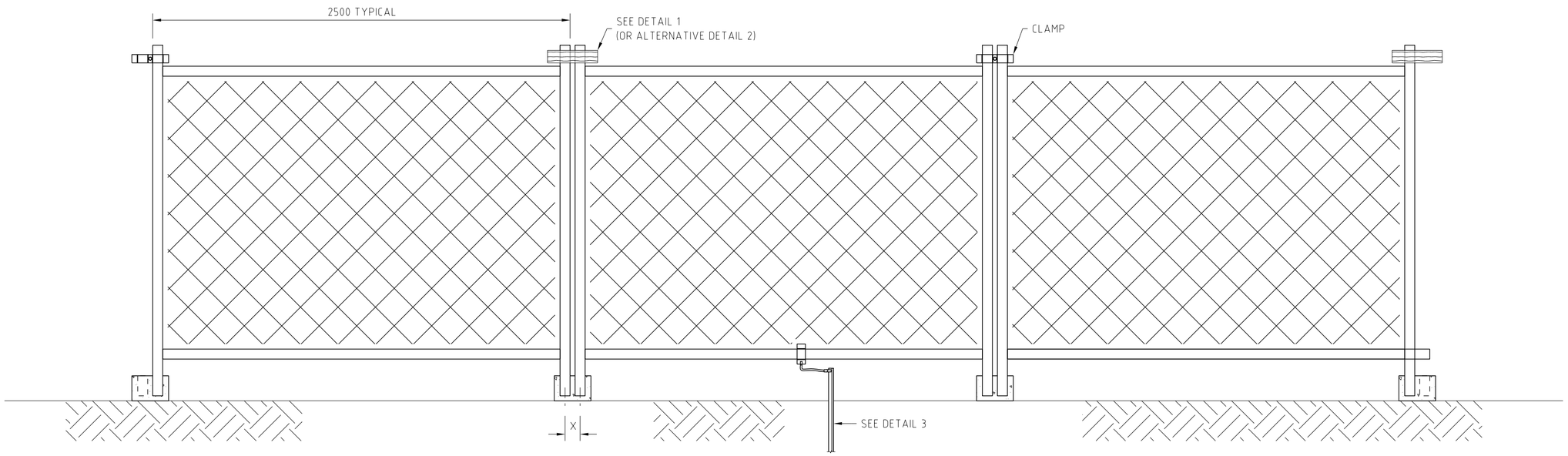
DETAIL 2
SCALE 1:5



DETAIL 3
SCALE 1:10

NOTES:

1. EARTH STAKES:
   MUST BE DRIVEN TO A DEPTH OF AT LEAST 1200mm.
   AND MUST BE LOCATED AS CLOSE AS POSSIBLE TO BOTTOM FENCE RAIL.
2. CONNECTIONS TO FENCE & EARTH STAKE TO BE PAINTED WITH AN "EXTERIOR GRADE" OF PAINT AFTER MAKING & TIGHTENING OF JOINTS.
3. STAR STAKES MUST BE GALVANIZED & NOT OF THE FULLY PAINTED TYPE.
4. REFER TO DRAWING TL-192501 FOR ALTERNATIVE EARTH STAKE/ROD CONNECTIONS.
5. ISOLATION AT EVERY SECOND PANEL CAN BE MADE AS PER DETAIL 1 OR DETAIL 2.
6. POST SEPARATION AT THE MOUNTING BLOCK (DIMENSION 'X') SHOULD BE MAINTAINED AS A MINIMUM AT THE TOP OF THE POST. POST SEPARATION SHOULD NOT BE LESS THAN 50mm IN ANY CASE.
7. FOR FENCES WHERE PANELS ARE SIGNIFICANTLY LONGER OR SHORTER THAN 2500mm THE DISTANCE BETWEEN ISOLATIONS SHOULD BE MAINTAINED AT THE PANEL INTERVAL CLOSEST TO 5000mm.



ELEVATION
SCALE 1:20

		5	M8 BOLT AND NUT.	
TL-145554	LM76003	4	EARTH STAKE 1650 LONG (STAR STAKE).	M.S.GAL'V
		3	6mm^2 STRANDED GREEN/YELLOW P.V.C INSUL.	COPPER
		2	CRIMP LUG 6mm^2 x 10mm ATTACHMENT HOLE.	E.TIN COPP.
TL-140529		1	FENCE EARTHING CLAMP.	M.S.GAL'V
DRG No.	S/L No.	ITEM	DESCRIPTION	MAT'L.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT.		

TransGrid

TL-192501 EARTHING OF STEEL FENCES.

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING AND ISOLATION OF TEMPORARY FENCING

ARRANGEMENT

A2	TL899207	00
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

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TransGrid Easement Guidelines

Third Party Development

Background

TransGrid acquires Transmission Line (**TL**) and cable easements to provide adequate clearance along the route of a TL for construction and maintenance work and to preserve certain property rights in perpetuity. These easements also ensure no work or other activity is undertaken under or near a TL or cable that could create an unsafe situation either for persons or for the security of the TL or cable.

The TL or cable easement area and its ongoing maintenance are control measures that cannot be compromised. Easements are established to prevent and mitigate against the following electrical safety risks:

- Infringement of electrical safety clearances e.g. due to an activity or vegetation growth;
- Electrical Induction e.g. due to parallel conducting materials;
- Step and touch potentials under fault conditions e.g. due to lightning or bushfire;
- Failure of structures or line equipment e.g. due to third party vehicle or plant impact;
- Transfer off easement of dangerous voltages, e.g. by services installed within the easement area; and
- Blowout of a conductor under high wind (or blow in of vegetation) e.g. into an adjacent structure.

TransGrid's paramount concern is the safety of people and property. TransGrid is also bound to maintain its infrastructure efficiently and cost effectively. The TL and cable easements, along with the accesses, have been designed to facilitate effective operational maintenance.

Development Approval Process

The *Environmental Planning and Assessment Act 1979* may empower Local Councils to act as the consent authority for development applications. In these situations, a Development Application (DA) is prepared and submitted to the Local Council for development consent.

The *State Environmental Planning Policy (Infrastructure) 2007* (SEPP), which commenced on 1 January 2008, requires Local Councils to consult with Electricity Network Operators before granting development consent for proposals that might adversely affect:

- existing electricity infrastructure; and
- easements for electricity purposes, even if no infrastructure has yet been constructed in the easement.

The Local Council must take into consideration any comments made by the Electricity Network Operator who has 21 days to respond to any written notification of a DA received by Council. Council must take into consideration any comments provided by the Electricity Network Operator before it determines any DA. TransGrid's initial response may be a request for additional information to assess a development that seeks to encroach or is immediately adjacent to our easements and infrastructure. Such a request is likely to then be forwarded to the applicant.

The party submitting the development application is required to consult with TransGrid in accordance with the *State Environmental Planning Policy (Infrastructure) 2007* (**SEPP**); the *NSW Occupational Health and Safety Act 2000*; the WorkCover NSW *'Work Near Overhead Power Lines'* Code of Practice 2006, and; the WorkCover NSW *'Work Near Underground Assets'* Guide 2007.

TransGrid Approval

The statutory approval authority should obtain a written approval from TransGrid for all proposed activities within an easement area in accordance with regulation 45 of the *SEPP.*

It is recommended that the development proponent consult with TransGrid prior to lodging a DA, so the proposed development may be assessed relative to TransGrid's easements and infrastructure within the specific locality. Statutory notification pursuant to regulation 45 of the SEPP may not always provide an adequate response time for TransGrid to assess any development proposed within or immediately adjacent to our easements and infrastructure. Therefore, it is considered to be in the best interests of any development proponent to thoroughly consult and attempt to resolve all and any issues with TransGrid prior to submitting a DA. In consulting with TransGrid prior to submitting the DA, the following information must be provided.

1. Detailed specifications and plans drawn to scale and fully dimensioned, showing property boundaries and other relevant information. Survey plans must clearly identify TransGrid's easements; any high voltage transmission infrastructure located therein (including stanchions); and horizontal clearances;

2. Three dimensional CAD file of the development, preferably in 3D-DXF format; and

3. TransGrid will also require an *Impact Assessment* of the development on TransGrid's infrastructure and associated interests (including easements). Details of how any adverse impacts will be managed, mitigated or resolved must also be provided. The *Impact Assessment* form is contained in **Appendix A** of these guidelines.

Upon receipt of the abovementioned documentation, TransGrid will assess the proposed development in relation to its impact on TransGrid infrastructure, easements and means of access. For complicated proposals the consultation process will be comprehensive and the proponent should allow sufficient time for this process prior to lodgement of a DA (see *Timeframes* below).

General Development Proposal Guidelines

1. Prohibited Activities and Encroachments

A number of activities and encroachments are not permitted within the easement area. These are detailed in the "TransGrid Easement Guide" contained in **Appendix B** of these guidelines.

Any *Development Proposal* should be designed in such a way that:

- It does not involve the listed activities, nor introduce the identified encroachments; and
- Does not encourage other parties to undertake such activities or introduce such encroachments in the future.

2. Development

The Development Proposal should be planned taking into consideration the policy of "*prudent avoidance*" as identified by The Right Honourable Harry Gibbs Report (*Inquiry into Community Needs and High Voltage Transmission Line Development*).

This report placed recommendations on the design of new TL's having regard to their proximity to houses, schools, work sites and the like and is equally valid when considering new developments proposed in proximity to existing powerlines and associated easements.

The policy not only considers electrical safety risks it also takes into consideration Electric and Magnetic Field (EMF). The EMF strength rises from the easement edge to beneath the conductors and the most practical way to achieve *prudent avoidance* is to keep any development entirely outside the easement area.

If it is desired to place any part of a development within an easement the proponent shall, in conjunction with the *Development Proposal*, undertake an *Impact Assessment* (see **Appendix A**) to be provided to TransGrid that covers the changes in risk and mitigation measures proposed. General development requirements are listed in **Appendix C**.

Relocating Infrastructure and Interruption to Transmission

The development proponent will be liable for any costs involved in any agreed relocation of TransGrid infrastructure as part of any proposed development. Depending on how the development proposes to encroach on TransGrid's easement, an earthing study and earthing modifications may be required at the developer's expense. Further, the developer will also be liable for any costs and penalties incurred as a consequence of interruptions to TransGrid's transmission operations arising from the development, whether planned or inadvertent.

Post Construction Compliance Statement

The Development Proposal, as provided to TransGrid, must include as-built plans compliant with TransGrid's drawing management system of the final construction where approval of an encroachment is granted. The as-built drawings must be accurate, scaled and display distances/measurements, demonstrating compliance to the agreed plans and implementation of agreed control measures.

Timeframes

TransGrid will respond to a Local Council notification of a proposed development within 21 days as required in the SEPP, however that response may not be an approval (or disapproval). If the Development Proposal does not meet the requirements of these Guidelines, or in the event further detailed engineering analysis is required, TransGrid may require the Development Proposal to be revised and resubmitted or additional information will be sought.

Developers are advised to consider TransGrid's requirements early in the process as discussed and not as an afterthought that could result in project delays, including the future demolition of any prohibited construction works. To this extent, development proponents and their consultants are encouraged to contact and meet with TransGrid in the preliminary planning and design stages of the development in order to establish what restrictions and prohibitions apply and what, if any conditional encroachments can be accommodated.

Further Assistance

For any further development enquiry assistance please contact the Enquiries Services Coordinator:

Enquiries Services Coordinator	Telephone	(02) 9620 0104
	Mobile	0427 094 860
TransGrid Community Liaison Group	Phone	1800 222 537
	Email	community@transgrid.com.au
	Website	www.transgrid.com.au

Appendix A - Development Proposal Impact Assessment

Details of the Development

Street Address	
Land and Title References	
Encroachment and/or Proximity to Easement	
Development Proposal's Clearances to TransGrid's high voltage infrastructure	
Detailed plans of development attached	

Safety

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are ground levels being changed within or in the vicinity of the easement? If so, by how much?	
Is any part of the development proposed within 30m of a transmission line structure or guy? If so, how close to the structure/guy?	
Will the development increase earth potential rise risk? (If unsure please consult with TransGrid Enquiries Services Coordinator.)	
Will the development contain metallic structures or services in the easement?	
Will the development result in voltages being transferred off the easement or bring remote earths onto the easement? (If unsure, please consult with TransGrid's Enquiries Services Coordinator.)	
Are public spaces or recreational areas proposed within or adjacent to the easement?	
Will the development encourage people to congregate and/or spend time within the easement or immediately adjacent thereto?	
Are structures with a height greater than 2.5m proposed on the easement?	
Will an Elevated Work Platform (EWP) be required to maintain any structures within the easement?	
Is infrastructure proposed that is a fire hazard, or that would encourage the storage or use of flammable material on the easement?	
Is infrastructure proposed that would require emergency workers (such as fire fighters) to come near, or their equipment to come onto or near high voltage conductors?	

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will the easement or the nature of the land in the vicinity of the easement, be altered in any way that would encourage prohibited encroachments to occur within the easement?	
Will access around any TransGrid structure be altered preventing EWPs, crane or other plant access? (Required for TransGrid maintenance purposes.)	
Will the development introduce other risks to maintenance staff when working within the easement?	
Will access to the easement be altered that would introduce risks to TransGrid personnel including, although not limited to, asset inspectors or patrol staff?	

Operations

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have any ground level developments been proposed (including roads, driveways, parking lots and turning bays etc) that would expose TransGrid transmission structures and lines to impact risk? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	
Will the development result in a change in water flows or drainage that could impact on the foundations or structural integrity of any TransGrid structure or guy-wire?	
Are excavations or surface activities proposed that would impact a TransGrid structure's foundations, stability or subterranean earthing systems? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	

Maintenance

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have roads, driveways or landscaping been proposed that would prevent or hinder TransGrid maintenance, or increase maintenance costs, for the above or below ground components of the transmission line structure?	
Will access to the easement or within the easement, be obstructed, restricted or altered?	
Have access roads, bridges, crossings and the like been designed to cater for the weight and size of TransGrid maintenance plant (EWPs and Cranes)?	
Does the development encourage the placement of obstructions that would prevent access for routine or emergency works?	

Development Design & Construction

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Has the development been designed so that during the construction phase TransGrid is not restricted from undertaking normal maintenance and inspection activities?	
Has the development been designed so that during the construction phase prohibited activities or encroachments are not required in the easement area?	
Has the design health and safety risk assessment complied with the following WorkCover NSW instruments: • '*Work Near Overhead Power Lines*' Code of Practice 2006; and/or • *'Work Near Underground Assets'* Guide 2007?	

TransGrid's Rights

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are TransGrid's existing access rights preserved, pursuant to the terms of the easement?	
Will TransGrid be exposed to new or higher maintenance costs (e.g. landscaping or other development changes impacting easement access, use and maintenance)?	
Does a new deed of easement need to be negotiated by the development proponent?	

Preservation of Easement for Access

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will TransGrid's *Easement for Access* be affected?	
Does a new *Easement for Access* need to be arranged by the development proponent, including to supersede an existing registered right of carriageway?	

Appendix B - Prohibited encroachments and activities

TransGrid will use its powers under the Electricity Supply Act, involve WorkCover or take other legal action as required to prevent or halt prohibited activities.

1. Transmission Lines

Activities and encroachments that are **prohibited** within a Transmission Line (TL) Easement include, but are not limited to *(Note 2)*, the following:

- The construction of houses, buildings, substantial structures, or parts thereof.
- The installation of fixed plant or equipment.
- The storage of flammable materials, corrosive or explosive material.
- The placing of garbage, refuse or fallen timber.
- The planting or cultivation of trees or shrubs capable of growing to a height exceeding 4 metres.
- The placing of obstructions within 20 metres of any part of a transmission line structure or supporting guy-wire.
- Camping or the permanent parking of caravans or other camping vehicles.
- Public spaces or recreational areas which encourage people to spend time within or congregate within the easement.
- The parking or storage of flammable liquid carriers or containers.
- The installation of site construction offices, workshops or storage compounds.
- Flying of kites or wire-controlled model aircraft within the easement area.
- Flying of any manned aircraft or balloon within 60m of any structure, guy-wire or conductor.
- Flying of remote controlled or autonomous aerial devices (such as UAVs) within 60m of any structure, guy-wire or conductor.
- Placing any obstructions on access tracks or placed within the easement area that restricts access.
- Any vegetation maintenance (such as felling tall trees) where the vegetation could come within the Ordinary Persons Zone – refer to the WorkCover NSW '*Work Near Overhead Power Lines*' - Code of Practice 2006'.
- Any substantial excavation within 15 metres of a pole or supporting guy-wire or guy foundation or within 20 metres of a tower
- The climbing of any structure (any development that encourages or facilitates climbing will not be permitted).
- Any change in ground levels that reduce clearances below that required in AS7000.
- The attachment of any fence, any signage, posters, or anything else, to a structure or guy-wire.

  Note: Interference to electricity infrastructure is an offence under the *Electricity Supply Act 1995*.
- The movement of any vehicle or plant between the tower legs, within 5m of a structure, guy-wire or between a guy-wire and the transmission pole.

  Note: Any damage to electricity infrastructure is an offence under the Electricity Supply Act 1995.
- The storage of anything whatsoever within the tower base or within 10m of any tower leg.
- Any structure whatsoever that during its construction or future maintenance will require an Accredited person to access.

  Note: The final structure may meet AS7000 clearances, but may be accessible (e.g. by EWP) by Ordinary Persons within the Ordinary Persons Zone.
- Any work that generates significant amounts of dust or smoke that can compromise the TL high voltage insulation.
- The erection of any structure in a location that could create an unsafe situation work area for TransGrid staff.
- Burning off or the lighting of fires.

- Any activity (including operation of mobile plant or equipment having a height when fully extended exceeding 4.3 metres) by persons not Accredited or not in accordance with the requirements of the WorkCover NSW 'Work Near Overhead Power Lines' Code of Practice 2006 that is within (Note 1):
  - 3m of an exposed 132kV overhead power line
  - 6m of an exposed 220kV or 330kV overhead power line
  - 8m of an exposed 500kV overhead power line

  Note: Distances quoted are to the design conductor position (i.e. maximum sag and blowout)

The following activities <u>may possibly</u> be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Temporary parking of caravans and other large vehicles in the outer 3m of the easement area, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of flagpoles, weather vanes, single post signs, outdoor lighting, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of non-electric agricultural fencing, yards and the like.

  Note: Fencing that exceeds 2.5 metres in height or that impedes access would not be approved.
- The erection of metallic fencing less than 2.5 metres in height providing that it is earthed, located more than 20 metres from any part of a transmission line structure or supporting guy and greater than 4 metres of the vertical projection of the overhead conductors.
- The erection of electric fencing provided that the height of the fencing does not exceed 2.5 metres and provided that the fence does not pass beneath the overhead conductors.

  Note: Approval may be given for a portable electric fence to pass underneath the conductors provided that it is supplied from a portable battery-powered energiser that is located remotely from frequented areas. Where it is necessary for a permanent electric fence to pass beneath the overhead conductors, or where an extensive permanent electric fencing system is installed in proximity to a transmission line certain additional safety requirements will be required.
- The installation or use of irrigation equipment inside the easement.

  NOTE: An irrigation system will not be approved if it is capable of coming within 4 metres of the overhead conductors; exceeds 4.3 metres in height; consists of individual sections of rigid or semi-rigid pipe exceeding 4.3 metres; is capable of projecting a solid jet of water to within 4 metres of any overhead conductors; requires fuel to be stored within the easement; and/or requires an outage of the transmission line for it's operation.
- The installation of low voltage electricity, telephone, communication, water, sewerage, gas, whether overhead, underground or on the surface.

  Note: Services that do not maintain standard clearances to the overhead conductors that are within 15 metres from the easement centre-line, 20 metres from any part of a transmission line supporting structure or are metallic and within 30 metres of any part of a structure will not be approved. TransGrid may impose additional conditions or restrictions on proposed development.
- The installation of high voltage electricity services, subject to there being no practicable alternative and provided the standard clearances are maintained to the supporting structures.

  Note: Where extensive parallels are involved certain additional safety requirements may be imposed by TransGrid, depending on the particular case and engineering advice.
- Swimming pools, subject to TransGrid's strict compliance criteria.

  Note: Above ground pools will not be approved. In-ground pools will not be approved if there is a practicable alternative site clear of the easement area. If there is no practical alternative site, in-ground

pools including coping will not be approved if it encroaches more than 4.5 metres, or is less than 30 metres away from a transmission line structure. A site specific assessment by TransGrid is required.

- Detached garages, detached carports, detached sheds, detached stables, detached glass houses, caravans, site containers, portable tool sheds, pergolas and unroofed verandahs attached to residences on the outer 3 meters of the easement only.
- Prefabricated metal (garden) sheds. TransGrid approved sheds must be earthed.

  Note: Sheds exceeding 2.5 metres in height, with a floor area exceeding 8m², encroaching more than of up to 3 metres or within 30 metres of any part of a transmission line structure will not be approved. Connection of electric power will not be approved.
- Single tennis courts.

  Note: Tennis courts that hinder access are for commercial use or do not provide adequate clearances shall not be approved.
- Subdivisions. See ***Appendix C*** requirements.
- Roads, carparks, cycleways, walking tracks and footpaths on the outer part of the easement or as a thoroughfare across the easement, subject to horizontal and vertical clearances. Restrictions and other conditions on consent may also apply. These will not be approved when located within:
  - 20 metres of any part of a transmission line structure
  - 10 metres of the centre-line of a transmission line 132kV and below
  - 17 metres of the centre-line of a transmission line above 132kV

  Note: Roads and pathways that cross the transmission line as a thoroughfare may be permitted. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy, TransGrid may refuse consent or impose restrictions and other conditions on consent. Where a road passes within 30 metres of a transmission structure or supporting guy, the structure's earthing system may require modification for reasons including, but not limited to, preventing fault currents from entering utility services which may be buried in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered.
- Excavation – subject to restriction criteria.

  Note: Substantial excavations located within 20 metres of any part of a steel tower or pole structure and exceeding a depth 3 metres will not be approved.
- Quarrying activities, earthworks, dam or artificial lake construction.
- Mining. Approval would be based on the merits of the proposal and any related circumstances.
- Use of explosives.

Note 1: An encroachment or activity that is located outside the prohibited distance of the infrastructure but still within the easement will not necessarily be permitted. It will generally need to be addressed in the Impact Assessment and remains subject to TransGrid prior consent.

Note 2: The above list is not exhaustive and if there is any uncertainty as to whether an activity or encroachment is acceptable within an easement, please contact TransGrid. TransGrid may impose additional conditions or restrictions on proposed development.

2. Cables

The location of TransGrid's subterranean infrastructure and associated easements includes, but is not limited to, beneath private freehold and strata land as well as public roadways and railways etc. All development proposed within immediate proximity of TransGrid's subterranean infrastructure, including high voltage cables, stratum tunnels and conduits, must undertake a *Dial Before You Dig* search of any land where development is proposed, including roads adjoining a development site where subterranean services are proposed to be installed. The activities listed below are prohibited within cable easements:

- The storage of flammable liquids or explosives
- The planting or cultivation of trees or shrubs with extensive root systems
- The construction of houses, buildings or substantial structures
- The installation of fixed plant or equipment
- The placing of garbage, refuse or fallen timber
- Boring directly over the cable lay (eg. the installation of fencing or safety railing)
- The raising or lowering of existing ground surface levels
- Any excavation within 2m of an underground cable.

The following activities may be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Parking of vehicles

  Note: Parking will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, risking the crushing of the cable/ducts or erosion of the ground

- The operation of mobile plant and equipment

  Note: Such operations will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, whereby risking the crushing of the cable/ducts or erosion of the ground

- The erection of structures spanning the easement
- Excavation
- Concrete driveways
- The installation of metallic pipes, fences, underground or overhead cables and services
- Road-boring within approved distances of a high voltage cable.

Where TransGrid's prior written consent has been granted to undertake work near an easement and related subterranean infrastructure, including the tunnels and conduits that accommodate our high voltage transmission line cables, all works must be undertaken in accordance with the WorkCover NSW 'Work Near Underground Assets' Guide 2007. Further, all development works must comply with the TransGrid guidelines for subterranean infrastructure referring to the document titled "*Requirements for Working In the Vicinity of TransGrid Underground Cables".*

Appendix C - General Requirements for Developments and Subdivisions

The following list of current general requirements is provided for your information. It should be noted that the list is not exhaustive and, where there is any doubt concerning a particular activity within the easement area advice should be sought from TransGrid.

1. Completed Works

The completed works shall provide for the following considerations:

- A safe unobstructed working platform shall be preserved around the transmission line structures for access by EWP, cranes as well as other large plant and equipment. No obstructions of any type shall be placed within 30 metres of any part of a transmission line structure.
- Roads, streets etc (including kerb to property boundaries) and intersections shall not be located within 30 metres of any TL structure.
- Developments must meet the clearances requirements set out in AS7000 between their finished level and the conductor at its maximum operating temperature.
- Proposed roadway locations shall also take into consideration any street lighting requirements to ensure that statutory clearance requirements are followed. The design clearances should include future maintenance safety issues. TL outages will not be provided for street light maintenance. Access to the TL and its structures shall be available at all times for TransGrid plant and personnel. In this regard a continuous and unobstructed access way shall be retained along the easement.
- Where fences are required for security purposes access gates will be installed in an agreed location and a TransGrid lock will be fitted.
- Application of “prudent avoidance” in relation to electric and magnetic fields should always be observed.
- No increase in earth potential rise risks.
- All underground services installed more than 20 metres but within 30 metres of a TL structure shall be non-metallic. Utility services (including street lighting), whether above or below ground, shall not be installed without prior written approval of TransGrid.
- Excavation work or other alterations to existing ground levels shall not be carried out within the easement area without the prior approval of TransGrid. Approval will not normally be granted for such work within 20 metres of any supporting structure.
- Boundaries for new subdivided properties should not be located within the easement.
- Fenced boundaries for all new properties in the subdivision shall not be within 30 metres of any TL structure.
- A “Restriction-as-User” (88B Instrument) shall be placed on the titles of any created lots that may become affected by a TL easement. Any proposed activity within an easement area will require the prior written approval of TransGrid (appropriate wording will be advised when required).
- Any proposed development must not impact on TransGrid’s costs of inspecting, maintaining or reconstruction of the transmission lines.
- In order to comply with its statutory responsibilities to maintain adequate clearance between the conductors and any forms of vegetation, TransGrid maintains its easements as follows:
  - Tall growing species likely to infringe safe clearances are to be removed regardless of existing height at time of construction.
  - Trees likely to fall onto conductors or towers are also to be removed whether on the easement or off the easement (ref. Sec 48 of the Electricity Supply Act 1995).

- Shrubs and other vegetation of lower mature height within the easement will be reduced and managed, generally by slashing with ground level retained.
- Vegetation management will aim to reduce available fuel and subsequent bushfire risks in accordance with NSW Rural Fire Service Bush Fire Environmental Assessment Code that sets out the requirements for hazard reduction strategies such as Asset Protection Zones and Strategic Fire Advantage Zones.
- Removed vegetation will be mulched or chipped and removed from site or retained on site in accordance with owner/stakeholder requirements.
- Other works considered necessary in order to provide a safe working environment for maintenance staff, contractors and for the property owner/manager will be undertaken.

Proposed vegetation plantings, such as Riparian corridors, within the transmission line easements shall be compatible with the above maintenance requirements and must consider on-going vegetation control.

2. Construction

During construction, the development plans shall also provide for the following considerations:

- Vehicles, plant or equipment having a height exceeding 4.3 metres when fully extended shall not be brought onto or used within the easement area without prior TransGrid approval.
- Where temporary vehicular access or parking (during the construction period) is within 16 metres of a transmission line structure, adequate precautions shall be taken to protect the structure from accidental damage. Plans need to be submitted to TransGrid for prior approval.
- The easement area shall not be used for temporary storage of construction spoil, topsoil, gravel or any other construction materials.

3. Costs

The Developer shall bear all costs of any specialist design studies, TransGrid supervision, reconstruction or modification of the transmission line and its components, including consultation and design required to maintain clearances due to proposed ground level changes; road crossings within the easement; or due to any damage to the TL arising from the development.

Example of the Required Working Platform for Transmission Tower Maintenance

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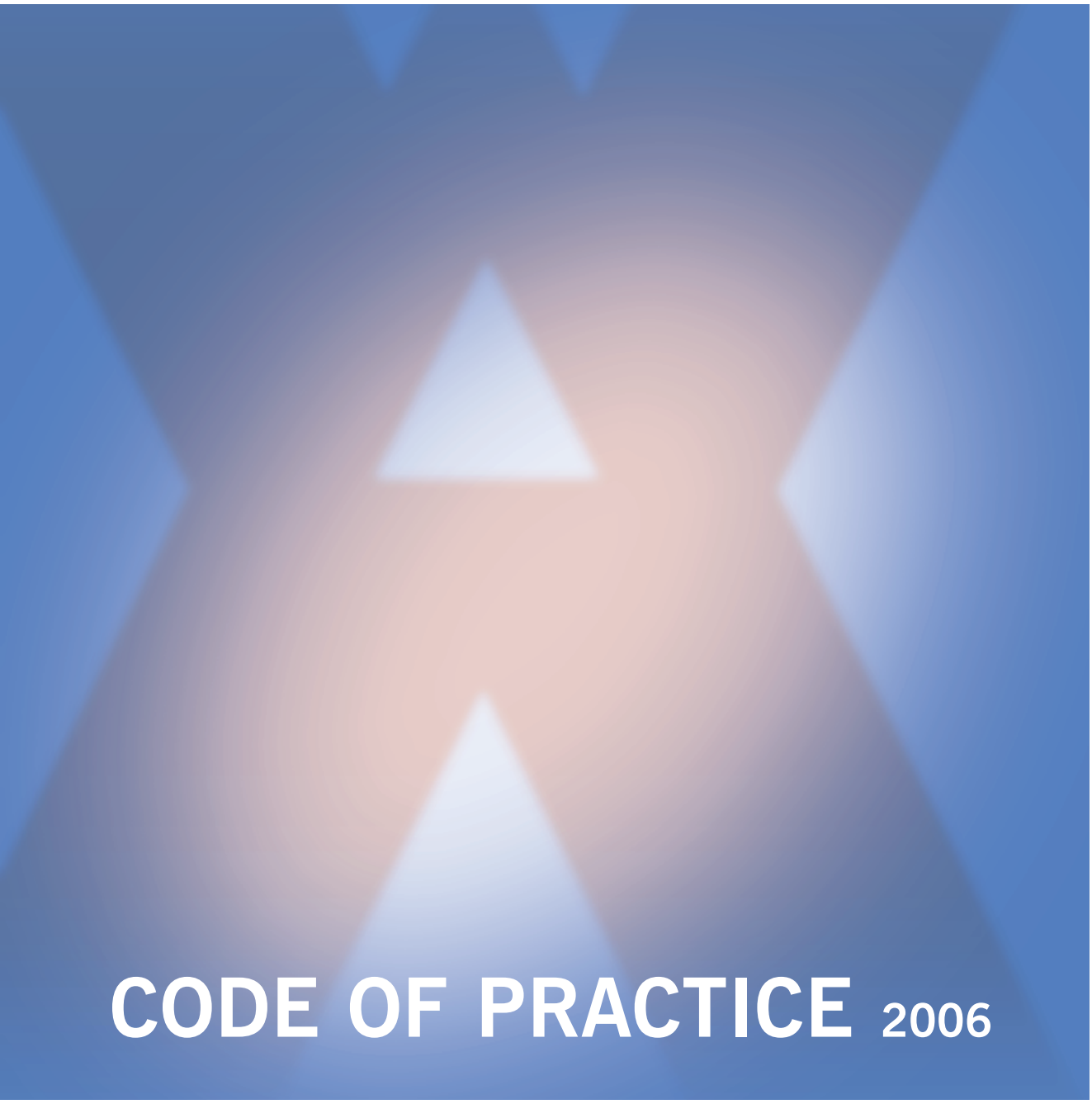
NEW SOUTH WALES

WORK NEAR
OVERHEAD POWER LINES



CODE OF PRACTICE 2006

WorkCover. **Watching out for you.**

New South Wales Government

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WHAT IS AN INDUSTRY CODE OF PRACTICE?

An approved industry code of practice is a practical guide to employers and others who have duties under the *Occupational Health and Safety Act 2000* (OHS Act) and the *Occupational Health and Safety Regulation 2001* (OHS Regulation) with respect to occupational health, safety and welfare.

An industry code of practice is approved by the Minister administering the OHS Act. It comes into force on the day specified in the code or, if no day is specified, on the day it is published in the NSW Government Gazette. An approved industry code of practice may be amended from time to time (or it may be revoked) by publication in the Gazette.

An approved industry code of practice should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare at work is being followed.

An approved industry code of practice is intended to be used in conjunction with the requirements of the OHS Act and the OHS Regulation but does not have the same legal force. An approved industry code of practice is advisory rather than mandatory. However, in legal proceedings under the OHS Act or OHS Regulation, failure to observe a relevant approved industry code of practice is admissible in evidence to establish an offence under the OHS Act or OHS Regulation.

A WorkCover Authority inspector can draw attention to an approved industry code of practice in an improvement or prohibition notice as a way of indicating the measures that could be taken to remedy an alleged contravention or non-compliance with the OHS Act or OHS Regulation. Failure to comply with an improvement or prohibition notice without reasonable excuse is an offence.

In summary an approved **INDUSTRY CODE OF PRACTICE**:

- ✓ gives practical guidance on how health, safety and welfare at work can be achieved;
- ✓ should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare in the workplace is being followed;
- ✓ can be used in support of the preventive enforcement provisions of the *Occupational Health and Safety Act*;
- ✓ can be used to support prosecutions for failing to comply with or contravening the OHS Act or OHS Regulation.

PREFACE

The aim of this code of practice is to protect the health and safety of persons from the risks arising when they are working near overhead power lines and associated electrical apparatus. It provides practical advice on implementing the requirements of the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*.

This code of practice provides practical guidance on the risk control measures, competency requirements and approach distances for workers working near overhead power lines. It applies to people with varying levels of qualification, training or knowledge.

This code of practice will assist employers, self-employed persons, employees, contractors and other parties involved in managing electrical risks associated with work near overhead power lines.

Use this code of practice to assess the effectiveness of your present arrangements when working near overhead power lines, and to check that all risks have been identified, assessed and eliminated or controlled.

This code of practice has been developed in consultation with members of the NSW electricity supply industry, including relevant unions and employer bodies. It is based on the earlier Electricity Association of N.S.W publication, *Interim Guide for Operating Cranes & Plant in Proximity to Overhead Power Lines*, and the Australian Standard *AS 2550.5 – 2002 Cranes, hoists and winches – Safe use Part 5: Mobile and Vehicle Loading Cranes*, which was gazetted as an approved industry code of practice on 21 September 2001 in the *Code of Practice: Technical Guidance*. In the event of any inconsistencies between the Standard and this code, the code shall prevail.

WHAT IS WORK NEAR OVERHEAD POWER LINES?

There are legislative obligations on employers, self-employed persons and controllers of premises in regard to undertaking work in close proximity, or at an unsafe distance, to overhead power lines. The term ‘near’ is utilised as a reference point for persons planning and undertaking this work.

Work ‘near’ overhead power lines means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming closer than the approach distances specified in this code. For the purposes of this code the term ‘near’ can be interchanged with other legislative or commonly used industry terms ie ‘close proximity’, ‘unsafe distance’ or ‘in the vicinity of’.

PERSONNEL WORKING NEAR OVERHEAD POWER LINES

This code of practice is based on the assumption that without appropriate technical knowledge and experience of electricity distribution networks and associated electrical apparatus, untrained personnel working or operating cranes or plant near overhead power lines will not be able to identify the operating voltage concerned, and will therefore not be able to recognise and avoid the inherent dangers of live overhead power lines. These personnel are termed ***ordinary persons***.

The approach distances specified in this code of practice take account of differing levels of technical knowledge, and are substantially greater for ordinary persons than for personnel who have been trained and assessed as having the necessary technical knowledge. These personnel are termed **accredited persons**.

HOW CAN WORKING NEAR LIVE OVERHEAD POWER LINES BE DANGEROUS?

Overhead power line contact is one of the largest single causes of fatalities associated with mobile plant and equipment.

Contact with live overhead power lines is a serious risk because any voltage that causes sufficient current to pass through the heart is potentially injurious or even fatal.

Contact with live electricity can also cause serious burns arising from the discharge of electrical energy. Other risks include fires and explosions that may immobilise the equipment involved.

You don't have to have a direct contact with a high voltage overhead power line to receive a fatal electric shock. ***Simply being too close can kill***.

WHAT DO THE SYMBOLS IN THE CODE OF PRACTICE MEAN?

To help you work out what you require, a number of symbols are used to highlight things you need to take into account and tools to help you do the job.

Consult and communicate with employers

Legal obligations that must be followed

The process of finding things that cause harm, working out how big a problem they are and fixing them.

Assess the risks in your workplace

Tools that can help you work out your plan

ACKNOWLEDGEMENT

In developing this code of practice WorkCover NSW has drawn on information contained in a number of codes of practice and industry guidelines issued by other State regulators or organisations. WorkCover NSW acknowledges the following publications, which have been incorporated in parts of this code.

- *Code of practice – Working near exposed live parts* – Queensland, Department of Industrial Relations, and
- *Framework for undertaking work near overhead and underground assets* – WorkSafe, Victoria, and
- *NENS 04-2003 National guidelines for safe approach distances to electrical apparatus* – Energy Networks Association.

CHAPTER 1 – ESTABLISHMENT

1.1 Title

This is the Code of Practice – Work near Overhead Power Lines.

1.2 Purpose

This code of practice provides practical guidance in order to protect the health and safety of persons working near overhead power lines and associated electrical apparatus. It provides guidance on the risk control measures, competency requirements and approach distances to live electrical conductors, including no go zones for cranes and plant (and their loads), as well as for vehicles, individuals and hand-held tools. It applies to persons with varying levels of qualification, training or knowledge.

This code of practice should be used instead of the *Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines – ISSC 26* issued by the Electricity Association of NSW in September 2001.

1.3 Scope

This code of practice applies to work, which is carried out near overhead power lines and associated electrical apparatus excluding:

- work on electricity network assets where the work is carried out in accordance with the requirements of the *Electricity Supply (Safety and Network Management) Regulation 2002* and the work is either:
    - by or for an electricity network operator, or
    - by an accredited service provider, or
    - by a telecommunications network operator.
- mobile plant or vehicles operating on a public road where the design envelope is not greater than the transit envelope and is in any case not greater than 4.6 metres in height (eg a side loading waste collection vehicle collecting waste bins from the side of a public road under overhead power lines);
- when the crane or item of plant is correctly stowed for travelling on a public road;
- work on a mine site;
- work involving low flying aircraft (eg crop dusting, pesticide or herbicide spraying, etc);
- work carried out by emergency services personnel, including state emergency service, fire, police, volunteer rescue association and ambulance personnel during a declared emergency or other local emergency incident. In this situation the agency should advise the network operator of the circumstances of the emergency work and ensure a safe system of work is applied by those emergency services personnel undertaking the work.

This Chapter 1 is introductory, describes the purpose of this code, and provides definitions. Chapter 2 explains the regulatory principles in the occupational health and safety legislation, which this code is intended to complement. Chapter 3 describes a framework for work near overhead power lines by outlining general risk management principles, competency requirements and approach distances for the work. More detailed risk management requirements for specific workplace activity are set out in Chapters 4 to 9 inclusive.

1.4 Authority

This is an industry code of practice approved by the Minister for Commerce, under section 43 of the *Occupational Health and Safety Act 2000*, on the recommendation of the WorkCover Authority of New South Wales ('WorkCover NSW').

1.5 Commencement

This code takes effect on [Gazettal /date]

1.6 Interpretation

1.6.1 Recommended practices

Words such as 'should' indicate recommended courses of action. 'May' or 'consider' indicate a possible course of action the duty holder should consider. However, you may choose an alternative method of achieving a safe system of work. For a further explanation, see 'What is an industry code of practice'.

1.6.2 Legal obligations

Words such as 'must', 'requires' and 'mandatory' indicate obligations, which must be complied with. Failure to comply with the code can be used as evidence in proceedings for an offence against the OHS Act or OHS Regulation (where the code is relevant to any matter, which it is necessary for the prosecution to prove to establish the commission of the offence).

1.7 Applicable legislation

Consult the OHS Act and the OHS Regulation for the specific legal requirements regarding occupational, health and safety responsibilities for work near overhead power lines.

Specific responsibilities:

Clause 41(4) of the OHS Regulation requires a controller of premises to ensure that persons working in, or undertaking maintenance on, the premises (apart from those undertaking electrical work) are prevented from coming within an unsafe distance from any overhead power lines or live electrical installations unless a risk assessment determines otherwise.

Clause 64(2)(e) of the OHS Regulation requires employers to ensure that persons at work, their plant, tools or other equipment and any materials used in or arising from the work do not come into close proximity with overhead electrical power lines (except if the work is done in accordance with a written risk assessment and safe system of work and the requirements of the relevant electricity supply authority).

Other significant legislation:

The *Electricity Supply (Safety and Network Management) Regulation 2002*, which is administered by the Department of Energy, Utilities and Sustainability, requires that a person must not carry out work on or near a network operator's transmission or distribution system and a network operator must not allow a person to carry out work on or near its transmission or distribution system unless the person is qualified under the relevant requirements of the network operator's network management plan, to carry out the work; and the work is carried out in accordance with the relevant requirements of that plan.

1.8 Definitions

The following definitions are used for the purposes of this code of practice:

access authority means a written authorisation, issued by a network operator, which allows persons to work within the no-go zone.

accredited person means a person who has successfully completed a recognised training course relating to work near overhead power lines that has been conducted by a registered training organisation.

accredited service provider means a person who has been accredited by the Department of Energy, Utilities and Sustainability to undertake work on the electricity network.

approach distance means the minimum separation in air from an exposed overhead conductor that must be maintained by a person, or any object held by or in contact with that person. **Note:** Refer to Chapter 3 for relevant approach distances.

approved means approved in writing. This can be achieved by any, or a combination, of the following:

- providing a paper document;
- sending a facsimile;
- other equivalent means (eg e-mail).

authorised person means a person with technical knowledge or sufficient experience who has been approved by the network operator.

authorised representative of an industrial organisation of employees means an officer of that organisation who is authorised under the *Industrial Relations Act 1996*.

competent person for any task means a person who has acquired through training, qualification, experience, or a combination of them, the knowledge and skills to carry out the task.

conductor means a wire, cable or form of metal designed for carrying electric current.

construction work means any of the following:

(a) excavation, including the excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams,

(b) building, including the construction (including the manufacturing of prefabricated elements of a building at the place of work concerned), alteration, renovation, repair, maintenance and demolition of all types of buildings,

(c) civil engineering, including the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbours, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges and tunnels, viaducts, and works related to the provision of services such as communications, drainage, sewerage, water and energy supplies.

control measures measures taken to minimise a risk to the lowest level reasonably practicable.

crane	means an appliance intended for raising or lowering a load and moving it horizontally, and includes the supporting structure of the crane and its foundations, but does not include industrial lift trucks, earth moving machinery, amusement devices, tractors, industrial robots, conveyors, building maintenance equipment, suspended scaffolds or lifts.
de-energised	means not connected to any source of electrical supply but not necessarily isolated.
earthed	means directly electrically connected to the general mass of earth so as to ensure and maintain the effective dissipation of electrical energy.
earth moving machinery	means an operator controlled item of plant used to excavate, load or transport, compact or spread earth, overburden, rubble, spoil, aggregate or similar material, but does not include a tractor or industrial lift truck.
electrical apparatus	means any electrical equipment, including overhead power lines and cables, the conductors of which are live or can be made live.
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. **Note:** Overhead power lines on private property come under the control of the controller of the premises.
elevating work platform	means a telescoping device, scissor device or articulating device, or any combination of those devices, used to move personnel, equipment or materials to and from work locations above the support surface.
envelope	means the space encapsulating a plant item, including attachments such as rotating / flashing lights or radio aerials and is categorised as: **Design:** the space encapsulating all possible movements of the plant and any load attached under maximum reach. **Transit:** the area encompassing the normal height and width of a vehicle or plant when traveling to or from a worksite.
employee	means an individual who works under a contract of employment or apprenticeship.
employer	means a person who employs persons under contracts of employment or apprenticeship. **Note:** In some chapters of the OHS Regulation, the term 'employer' includes a self-employed person in relation to duties to other persons. See the definition of 'employer' in clause 3 of the OHS Regulation.
energised	means connected to a source of electrical supply.
exposed conductor	an electrical conductor that is hazardous because it has not been protected by a barrier of rigid material or by insulation that is adequate for the voltage concerned, under a relevant Australian Standard specification.
hazard	means anything (including work practices and procedures) that has the potential to harm the health or safety of a person.

high-risk construction work	means any of the following construction work, • involving structural alterations that require temporary support • at a height above 3 metres • involving excavation to a depth greater than 1.5 metres • demolition work for which a licence is not required • in tunnels • involving the use of explosives • near traffic or mobile plant • in or around gas or electrical installations • over or adjacent to water where there is a risk of drowning.
high voltage (HV)	means a nominal voltage exceeding 1,000 V a.c. or exceeding 1,500 V d.c.
hoarding	for the purposes of this code is containment sheeting positioned on the external face of a scaffold that serves as a physical barrier between a worker and live overhead power lines and associated electrical apparatus.
insulated	means separated from adjoining conducting material by a non-conducting substance which provides resistance to the passage of current, or to disruptive discharges through or over the surface of the substance at the operating voltage, and to mitigate the danger of shock or injurious leakage of current.
Interim Guide	means the *Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines – ISSC 26* issued by the Electricity Association of NSW.
isolated	means disconnected from all possible sources of electricity supply by means which will prevent unintentional energisation of the apparatus and which is assessed as a suitable step in the process of making safe for access purposes.
live	means connected to any source of electrical supply or subject to hazardous induced or capacitive voltages.
low voltage (LV)	means a nominal voltage exceeding 50 V a.c. or 120 V d.c. but not exceeding 1000 V a.c. or 1500 V d.c.
LV – ABC (Aerial Bundled Cable)	means an insulated cable system used for low voltage overhead distribution of electricity that is manufactured in accordance with the Australian Standard, AS/NZS 3560.
mobile crane	means a crane capable of travelling over a supporting surface without the need for fixed runways (including railway tracks) and relying only on gravity for stability, that is, with no vertical restraining connection between itself and the supporting surface and no horizontal restraining connection (other than frictional forces at supporting-surface level) that may act as an aid to stability.

mobile plant	includes plant that: (a) moves either under its own power, or is pulled or pushed by other mobile plant (b) moves on or around the work site, enters or leaves the site, or moves past the site (c) includes road vehicles operating at a worksite **Note:** This definition has been adopted for the purposes of this code of practice. This includes items such as earthmoving machinery, concrete boom pumps and tipper trucks operating at a worksite.
near	means a 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 code.
network operator	means the owner, controller or operator of an electricity network also known as an electricity supply authority.
no go zone	means 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 network operator. **Note:** • person includes hand tools, equipment or any other material held by a person. • plant includes the load, controlling ropes and any other accessories.
occupier	of premises includes: (a) a person who, for the time being, has (or appears to have) the charge, management or control of the premises, or (b) a person who, for the time being, is in charge (or appears to be in charge) of any operation being conducted on the premises.
operating voltage	means the a.c. voltage (phase to phase RMS) or d.c. voltage by which a system of supply is designated.
ordinary person	means a person without sufficient training or experience to enable them to avoid the dangers which overhead power lines and associated electrical apparatus may create.
overhead power line	means any bare or covered aerial conductors and other associated electrical parts that make up an aerial line for the distribution and transmission of electrical energy.
personal protective equipment (PPE)	items that workers can use to protect themselves against hazards. PPE includes insulating gloves, mats or sheeting, glasses and face protection. **Note:** A number of items of PPE are made and tested to Australian Standards. PPE that is not designated as meeting a recognised Standard may be unreliable in service, as its performance is unknown.

place of work	means premises where persons work.
plant	includes any machinery, equipment or appliance. **Note:** For the purposes of this code the definition includes a broad range of machinery and equipment, but not limited to, cranes, mobile plant, scaffolding, load shifting equipment, industrial lift trucks, earth moving machinery, amusement devices, tractors, rural machinery, vehicles, conveyors, building maintenance equipment, suspended scaffolds or lifts, implements or tools and any component or fitting of those things.
premises	includes any place, and particularly includes: • any land, building or part of a building • any vehicle, vessel or aircraft, or • any installation on land, on the bed of any waters or floating on any waters, or • any tent or movable structure.
OHS Act	means the *Occupational Health and Safety Act 2000*.
OHS Regulation	means the *Occupational Health and Safety Regulation 2001*.
safety observer	means an accredited person specifically assigned the duty of observing and warning against unsafe approach to overhead power lines and associated electrical apparatus, or other unsafe conditions.
safe work method statement (SWMS)	means a statement that: • describes how the work is to be carried out • identifies the work activities assessed as having safety risks • identifies the safety risks; and • describes the control measures that will be applied to the work activities, and includes a description of the equipment used in the work, the standards or codes to be complied with, the qualifications of the personnel doing the work and the training required to do the work.
self-employed person	means a person who works for gain or reward otherwise than under a contract of employment or apprenticeship, whether or not they employ others.
tiger tails	means pipe type cable covers, used as a warning to visually indicate the position of overhead power lines. **Note:** A tiger tail is also known as a torapoli pipe.
vehicle	means a truck (non tipping), car or utility, or other general purpose conveyance used for the carriage of persons, materials or goods.
voltage	means a potential difference between conductors or between conductors and earth.
work	means work as an employee or as a self-employed person.

CHAPTER 2 – CONSULTATION AND RISK MANAGEMENT

The OHS Act and the OHS Regulation require employers to address workplace health and safety through a process of risk management and consultation.

To effectively implement this code, employers need to be aware of these requirements and have procedures in place to apply them. Employers are advised to consult the OHS Act and the OHS Regulation as well as the *Code of Practice: Occupational Health and Safety Consultation* and the *Code of Practice: Risk Assessment* for details of these requirements and how they can be met. The following information is designed to provide an overview of legislative requirements.

The OHS Regulation requires employers (and self-employed persons) to identify hazards and to ensure that any risk of injury from electricity at a place of work is eliminated, or if elimination is not reasonably practicable, the risk is controlled.

Other legislative requirements particularly relevant to this code are clause 64 of the OHS Regulation, which requires that employers must ensure that persons at work, their plant, tools or other equipment and any materials used in or arising from the work do not come into close proximity with overhead power lines.

Controllers of premises also have obligations under section 10 of the OHS Act and clause 41 of the OHS Regulation for work that is carried out near overhead power lines.

This code of practice provides guidance on ensuring these requirements are met and should be implemented within a risk management framework. Risk management is a way of organising your efforts to determine safe systems of work. Following this procedure will help you identify the safety issues for work that is to be carried out near overhead power lines.

The following information is designed to provide an overview of:

- consultation
- risk management
- information, instruction, training and supervision

2.1 Consultation at the workplace

Employers must consult with employees when taking steps to assess and control workplace risks.

In order to consult with employees, employers are required to set up consultation arrangements and develop consultation procedures.

2.1.1 Consultation arrangements

The OHS Act provides three options for consultation arrangements under sections 16 and 17:

Arrangement	Number of employees	Requirement
OHS committee	20 or more employees	• requested by a majority of employees, or • directed by WorkCover
OHS representative	any size	• at least one employee requests an election, or • directed by WorkCover
Other agreed arrangements	any size	agreed to by both the employer and employees (in a small workplace it may be a regular safety meeting with employees)

Before using this code, an employer should ensure that consultation arrangements are in place. An employer may initiate the establishment of an OHS Committee or the election of an OHS Representative if the employees have not made such a request. When the consultation arrangements have been decided, clause 27 of the OHS Regulation requires employers to record them and advise all existing and new employees.

2.1.2 Consultation procedures

After setting up the consultation arrangements, employers need to consider when and how these consultation arrangements need to be applied.

2.1.3 When should consultation be undertaken?

Under section 13 of the OHS Act, employers have a general duty to consult employees when decisions are being considered that may affect their health, safety and welfare at work. Therefore, employers are required to consult with their OHS Committee, OHS representative or other agreed arrangement when such decisions are being considered. Decisions, which could affect health, safety and welfare for work near overhead power lines include:

- eliminating or controlling risks to health and safety from work
- assessing, reviewing and monitoring risks to health and safety from work
- planning, designing or changing work tasks or jobs
- purchasing new plant and equipment or substances
- using contractors at the workplace
- investigating incidents or accidents
- developing emergency procedures
- determining or reviewing consultation arrangements

Note: Any procedures that are developed to encompass these activities should incorporate consultation.

It may not be practical or reasonable to involve the OHS committee or the OHS representative in every decision. However, the employers or committee or representatives should agree on what process is needed to ensure that affected employees are consulted.

2.1.4 How should consultation be undertaken?

When engaged in consultation, section 14 of the OHS Act requires employers to:

- Share all relevant information with employees – for example, if an employer is going to change a work task, employees need to be told of any risk to health and safety that may arise and what will be done to eliminate or control these risks.
- Give employees reasonable time to express their views – employees need adequate time to assess the information given to them, obtain relevant safety information and consult with fellow employees to enable them to form their views.
- Value the views of employees and take into account when the decision is made to resolve the matter – in many cases, agreement will be reached on how the safety issues are to be addressed. When agreement cannot be reached, the employer should explain how the employee's concerns have been addressed.

2.2 Risk management at the workplace

Employers and self-employed persons must identify any foreseeable hazards, assess their risks and take action to eliminate or control them. Employees must be consulted as part of this process.

A hazard identification and risk assessment process must be carried out at the planning and preparation stage by the employer/contractor, in consultation with the persons doing the work near overhead power lines to determine what risks may arise when the work is being carried out. Safe systems of work must then be put in place to eliminate or control these risks. **Note:** For some work activities carried out near overhead power lines the safe system of work must also be documented in a safe work method statement. Refer to section 2.4.1.

The process of risk assessment and control is made up of the following steps:

- identify the hazards
- assess the risk(s) to the health and safety of persons arising from the hazards
- use appropriate control measures to eliminate or control the risk(s)
- monitor and review the control measures to ensure on-going safety.

2.2.1 Identify hazards

To ensure a safe and healthy workplace, employers must take reasonable care to identify all the foreseeable health and safety hazards, which could harm their employees or other persons in the workplace. Hazards may arise from the work process, the equipment and materials in use, the work environment, or other people involved.

Live overhead power lines are a potential hazard posing substantial risk of death or serious injury. In addition to electrical shock and electrocution, contact with overhead power lines, can result in:

- the electrifying of other objects such materials, tools and items of plant, with the potential for electric shock or electrocution;
- a rain of molten metal caused by contact between an energised conductor and another conducting medium;
- fire;

- explosion; or
- swift, unpredictable power line whiplash.

2.2.2 Assess risks

Once hazards have been identified, the risk they pose to health and safety needs to be assessed. Some hazards pose a greater risk than others do, and the frequency and duration of exposure can also affect the risk. Risk assessment involves considering the likelihood and severity of injury or illness being caused by exposure to the risk. Therefore the factors that need to be considered in a risk assessment should include the:

- harm that can be caused by exposure to the hazard
- number of people and the duration and frequency of exposure to the hazard
- capability, skill and experience of people exposed to the hazard.

The risk assessment process provides information on the factors, which contribute to the risk. This information will assist in determining what needs to be done to eliminate or control the hazard.

2.2.3 Eliminate or control the risk

The OHS Regulation prescribes the following hierarchy of controls that must be used to eliminate or control a risk to health and safety in the workplace. Refer to the following chapters of this code of practice to see how this must be applied to work near overhead power lines. In particular, consider the following:

Level 1: Eliminate the hazard by:

- discontinuing the work activity or arranging for the de-energising of the overhead power lines during the work or re-routing the overhead power lines away from the work activity.

Level 2: Minimise the risk by:

- substituting the system of work or plant (with something safer that does not come near the overhead power lines). This could mean using an alternate crane or mobile plant, which cannot encroach the approach distances specified in this code.
- separating the hazard. This could mean erecting a physical barrier to prevent a person or anything held by a person, or attached to the person, coming near the overhead power lines.
- introducing engineering means. This could mean substituting with a less hazardous process or modifying an item of plant or equipment to ensure it does not come near the overhead power lines.
- adopting administrative controls, by example, signage, warning barriers marking the worksite, safe work procedures such as maintaining a safe distance from overhead power lines and using a safety observer to warn people before they encroach the approach distances specified in this code.
- using personal protective equipment (PPE). (eg insulating gloves, safety helmets, eye protection).

The control measures at Level 1 give the best results and should be adopted where possible. The Level 2 measures apply in descending order of effectiveness and require more frequent reviews of the hazards and systems of work. In some situations a combination of control measures may be used such as engineering means and administrative controls.

2.2.4 Review risk assessment and control measures

Control measures should be reviewed on a regular basis. The frequency of their review should be determined by considering the significance of the risks associated with the hazard. However, a review should be undertaken in the following circumstances:

- new information is made available about the risks associated with the hazard
- an accident or incident occurs
- significant changes are proposed to the workplace or work system.

2.3 Information, instruction, training, and supervision

The OHS Act requires employers to provide such information, instruction, training and supervision as may be necessary to ensure the health, safety and welfare of their employees while at work.

Work near overhead power lines should not be performed unless those performing the work have received appropriate instruction and training. For example, the operator of any crane or mobile plant and the safety observer who carry out work within the accredited person zone specified in this code must have received training for work near overhead power lines conducted by a Registered Training Organisation. Refer to Appendix 4.

Employers must provide appropriate supervision and should recognise their supervisor's role in the management of the risks and the protection of employees. Close liaison between supervisors and employees is vital in ensuring the work is carried out in a safe manner.

Supervision of crane and plant operators working near overhead power lines should ensure that the control measures are fully implemented and followed at all times by employees. If you are supervising, it is your responsibility to ensure that the situation is safe for everyone.

The level and extent of supervision required will vary according to the safety aspects of each task and the skills of the worker. In determining the necessary level of supervision, an employer should consider:

- the complexity of the job environment in which the job is being done;
- the hazards at each work site;
- the worker's level of competence, experience and age.

The levels of supervision required for various tasks need to be described in policies and procedures.

2.4 Provision of information

Health and safety information may include:

- the results of any applicable written risk assessment;
- requirements of safe work method statements;
- a review of the written risk assessment and/or safe work method statements and standard operating procedures;
- any other relevant OHS information, such as type test information, documentation and signage.

Persons working near overhead power lines should always have, on request, access to written risk assessments and safe work method statements at the work site. Employers should brief employees and other workers as to the contents of written risk assessments and safe work method statements when work begins near overhead power lines, at regular intervals thereafter, and whenever there are changes to written risk assessments or new information about health and safety risks becomes available.

The employer should consult with their employees to ensure that such information and training is in a form that is accessible and easily understood. This is important where employees are from a non-English speaking background and/or have special needs or disabilities, and may have specific language or literacy requirements.

2.4.1 Safe work method statements

Chapter 8 of the OHS Regulation requires that safe work method statements (SWMS) be used for high risk construction work.

High-risk construction work may include, for example the following activities that may occur near overhead power lines:

- construction work involving structural alterations that require temporary support;
- construction work at a height above 3 metres;
- construction work involving excavation to a depth greater than 1.5 metres;
- demolition work for which a licence is not required;
- construction work involving the use of explosives;
- construction work near traffic or mobile plant;
- construction work in or around gas or electrical installations.

An example of a safe work method statement is included at Appendix 3 to assist in this.

2.5 Preparation for work to commence

Careful planning and preparation is an essential step to ensure that work is done safely. When preparing for the commencement of work all controls indicated by the risk assessment(s) and safe work method statement(s) as applicable must have been put in place and that no new hazards exist, or have been created.

Preparation should include:

- nature of the work planned and ways of dealing with changes as the work proceeds;
- the possible hazards and risks associated with the work;
- consultation with the network operator;
- communication and interaction between workers at the site;
- training, qualifications and competency of workers;
- checking the operation of plant and equipment, including the operation of limiting devices;
- proximity of persons, cranes, mobile plant, material and tools to overhead powerlines;
- proximity of persons to cranes and mobile plant;
- specific instructions for employees;
- workplace access and egress;
- emergency procedures, including first aid, evacuation and rescue; and
- environmental factors.

CHAPTER 3 – APPROACH DISTANCES WHEN WORKING NEAR OVERHEAD POWER LINES

3.1 Scope

This Chapter introduces a framework for work near overhead power lines. It provides guidance on general risk management principles, competency requirements and approach distances to live electrical conductors, including no go zones for cranes and plant (and their loads), as well as for vehicles, individuals and hand-held tools. It applies to persons with varying levels of qualification, training or knowledge.

This Chapter should be read in conjunction with the following Chapters, which provide risk management requirements for various types of workplace activity, including scaffolding (Chapter 6) and work near low voltage overhead service lines (Chapter 8), which specify a different set of approach distances to those described in this Chapter.

3.2 Basis of approach distances

This code is based on the assumption that without appropriate technical knowledge and experience of electricity distribution networks, workers that have not received training in overhead power line electrical hazards (ordinary persons) will not be able to identify the operating voltage of the live overhead power lines. When working near or operating cranes or plant near live overhead power lines such persons will not be able to recognise and avoid the inherent electrical hazards.

The approach distances specified in this Chapter take account of differing levels of technical knowledge and items of plant, and are substantially greater for ordinary persons than for personnel who are accredited. The approach distances for ordinary persons and accredited persons are based on those specified in the *National Guidelines for Safe Approach Distances to Electrical Apparatus*. In the National Guidelines, the approach distances were derived by –

- determining a distance to avoid electrical flashover; and
- providing additional allowance for inadvertent movements of the person, crane or plant relative to the overhead power lines, or the movement of the overhead power lines relative to the person, crane or plant.

3.2.1 Assessing the relevant approach distance

Prior to the start of any work near overhead power lines it is essential that the height and voltage of the overhead power lines (and if applicable the horizontal safety clearance) be assessed at the worksite. When assessing the relevant approach distances for the work a number of factors must be taken into account including,

- the possibility of errors in estimating distances, especially at higher voltages, where the approach distance is large. It may be necessary either to allow more clearance or to use methods that provide more accurate estimation of distances, for example, an ultrasonic cable height indicator, which provides a safe and accurate method of estimating distances near overhead power lines. If the height or voltage of the overhead power lines cannot be accurately determined consult the network operator.

WARNING

Do not attempt to directly measure the height of overhead power lines. Do not use conductive metallic objects or measuring devices such as metal tape measures for estimating the height of overhead power lines.

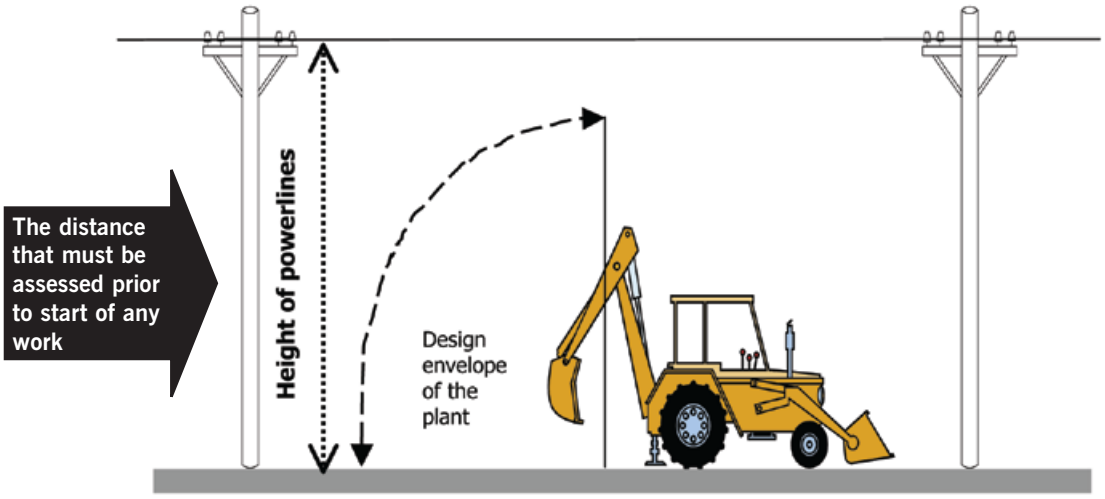


Figure 1: Distance that must be assessed for each worksite

- overhead power lines are made of metal and are therefore subject to expansion and contraction when heated and cooled. This can be a direct result of high ambient air temperature and/or excessive electrical load current passing through the conductors. Regardless of the cause, any expansion will result in gravity causing the power lines to sag downwards. Wind can also cause the power lines to swing from side to side. For this reason the approach distances must be increased either vertically or horizontally by the amount of conductor sag or swing at the point of work. Refer to Figure 2.

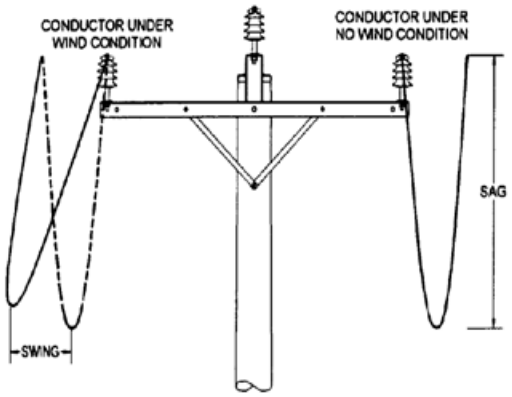


Figure 2: Illustration of overhead power line 'sag or swing'

- where more than one voltage is present, eg overhead power lines where two or more circuits operating at different voltages are supported on the same poles, the approach distance appropriate to each voltage must be maintained independently.
- increased clearances must be allowed where a risk assessment identifies a reasonable possibility of the load or lifting gear (crane hook, chains, slings, etc) moving or swinging towards the overhead power lines or associated electrical apparatus when the crane or item of mobile plant is operated.

3.2.2 Increases to approach distances

It is recognised that certain Australian Standards and industry practice in some States require greater approach distances than those described in this code. For certain types of work or classes of authorisation and competency, greater distances than that described in this code may be appropriate.

For example, the approach distances shown in Table 1 are less than those described in the Australian Standard AS 2550.5 Cranes, hoists and winches – Safe use Part 5: Mobile and Vehicle Loading Cranes, which is also gazetted as an approved industry code of practice. In the event of any inconsistencies between the Australian Standard and this code the approach distances specified in this code shall prevail.

Employers, self-employed persons and controllers of premises should determine the applicability of the approach distances described in this code for particular work circumstances and, if considered appropriate, specify greater approach distances for the work.

3.2.3 How close can I go to overhead power lines?

Once an assessment has been carried out of the worksite and the overhead power lines, a decision can be made on the approach distance for the proposed work. The approach distances and work zones described in this Chapter and illustrated in Figure 3 vary with the voltage of the overhead power lines and the level of accreditation of the person/s performing the work. The relevant approach distances are set out in the following tables:

- Table 1 provides the approach distances for ordinary persons. These are workers who have not received training in overhead power line electrical hazards and are restricted to work in the ordinary person zone. Refer to Section 3.3 and Figure 3.
- Table 2 provides reduced approach distances for accredited persons. These are workers who have successfully completed a recognised training course in overhead power line electrical hazards and are therefore permitted to work closer to the overhead power lines in the accredited person zone. Refer to Section 3.4 and Figure 3.
- Table 3 provides the approach distances for vehicles that are driven under overhead power lines. Refer to Section 3.6.

The approach distances vary with the voltage. They apply to:

- any part of a crane or item of mobile plant, including vehicles,
- any load being moved, including the slings, chains and other lifting gear,
- any person working at heights eg from an elevating work platform, scaffold, or other structure, or
- any hand tools, hand control lines, equipment or other material held by a person.

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

3.3 Ordinary Person Zone

Table 1 provides approach distances for:

- ordinary persons performing work near overhead power lines, (including plant, hand tools, equipment or any other material held by a person); or
- cranes (and their loads) and items of mobile plant operated by an ordinary person near overhead power lines.

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work performed by ordinary persons working outside but up to the approach distances specified in Table 1. The duties of the safety observer are described in Section 3.8.

TABLE 1

Approach distances for work performed by Ordinary Persons

Nominal phase to phase a.c. 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 d.c. voltage (volts)	**Approach distance (m)**
Up to and including +/- 1500 Volts	3.0

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

3.4 Accredited Person Zone

Table 2 provides approach distances for:

- 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); or
- 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 Table 2 are based on

- completion of a written risk assessment prior to the commencement of work,
- application of a safe system of work, which includes the use of a safety observer, and
- if determined by the written risk assessment, consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.

TABLE 2

Approach Distances for work performed by Accredited Persons, with a Safety Observer

Nominal phase to phase a.c. 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 d.c. voltage (volts)	**Approach distance (m)**
Up to +/- 1,500	1.0

Note: Special approach distances apply for scaffolding work (Chapter 6) and work near low voltage overhead service lines (Chapter 8).

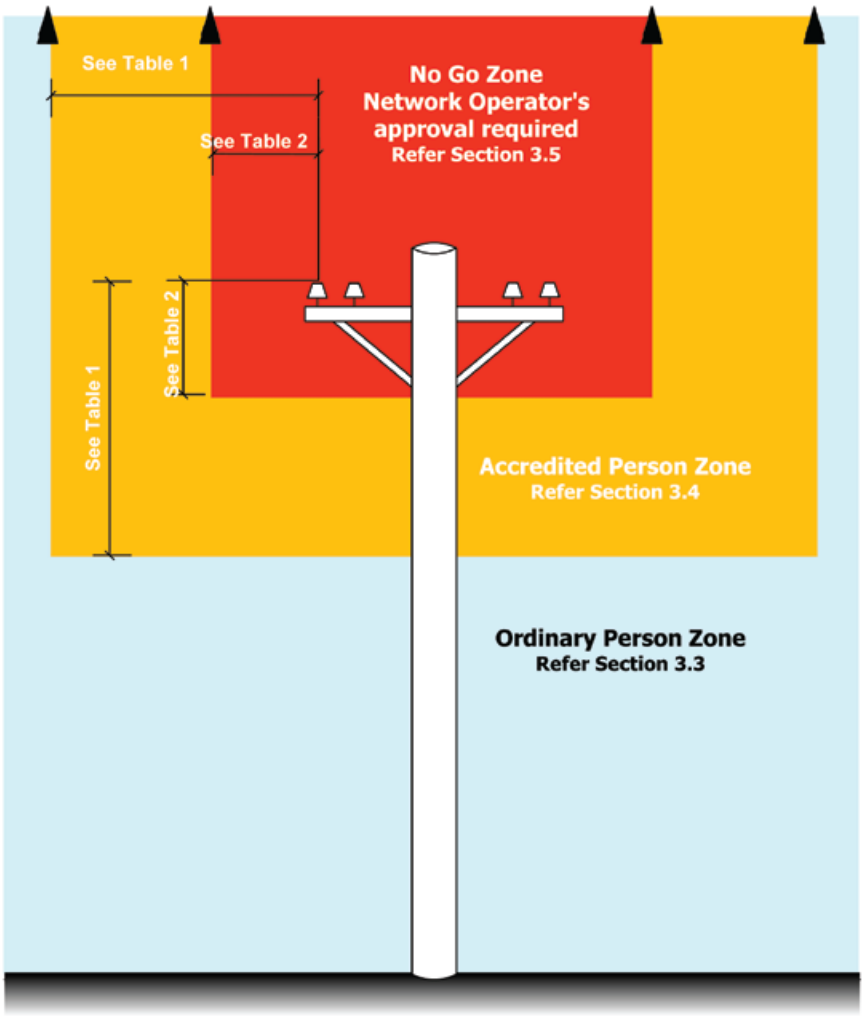


Figure 3 – Approach distances and work zones near overhead power lines

3.5 Work inside the No Go Zone – Approval of the network operator

The no go zone is 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 network operator.

Note:

- person includes hand tools, equipment or any other material held by a person.
- plant includes the load, controlling ropes and any other accessories associated with the plant.

If the work cannot be carried out without coming inside the no-go zone (closer than the approach distances listed in Table 2 or above the overhead power lines), prior to commencing work the employer must consult with and obtain the written approval of the network operator.

Note: The written approval should be available at the worksite and be able to be produced to a WorkCover Inspector, Principal Contractor, elected OHS representative, authorised representative or network operator.

3.6 Approach Distances for Vehicles

Table 3 provides 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 power lines.

When assessing the approach distance for a vehicle driven under overhead power lines a number of factors should be taken into account including:

- the approach distances specified in Table 3 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 Figure 5 below.

Figure 5: Transit envelope – The maximum overall height of the vehicle

- 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 for example the driver of a livestock transporter who may need to access the top of the vehicle to check livestock.
- where, as a result of the work being performed the distance between the conductors and the ground may decrease (for example when constructing a road or levee bank beneath overhead power lines or where the ground level is raised during the work), then the distance between the vehicle must be continually re-assessed to ensure that the relevant approach distances are being maintained.
- any additional assessment factors that may be relevant for the operation of the vehicle as described in section 3.2.1.

TABLE 3

Approach Distances for Vehicles

Nominal phase to phase a.c. voltage (volts)	**Approach 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 d.c. voltage (volts)	**Approach distance (m)**
Up to and including +/- 1500 Volts	0.9

3.7 Work near overhead power lines – General risk management principles

The approach distances set out in this Chapter are only part of an overall safe system of work, which must be implemented by employers and self-employed persons working near overhead power lines and associated electrical apparatus. In implementing a safe system of work consideration should be given to the following risk control measures:

- The employer has in place an effective risk management process, as part of a systematic occupational health and safety management system.
- Appropriate workplace hazard identification and written risk assessments are carried out as required by the OHS Regulation in consultation with the workers performing the work.
- Consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.
- The approach distances used are appropriate for the levels of accreditation of the workers performing the work. Refer to Sections 3.3 and 3.4
- Operators and other workers are provided with information and instruction about the safety precautions needed and the requirements of this code, as well as appropriate training, supervision and safe work practices and procedures.
- An essential requirement of a safe system of work is that workers are competent to carry out the work concerned. This code specifies the competency requirements (in respect of overhead power line electrical safety awareness) for crane and mobile plant operators and safety observers. Refer to Sections 3.8 and 3.9.
- An effective communication system is in place for the personnel performing the work.
- An effective process is in place to monitor compliance with the adopted risk control measures, safe work practices and procedures for work carried out near overhead power lines and associated electrical apparatus.

3.8 Competence and knowledge of this code

In order to carry out work at distances less than the approach distances specified in Table 1 the following workers must be accredited in accordance with Section 3.9 of this code,

- the operator of a crane,
- the operator of mobile plant (including an elevating work platform),
- a safety observer.

3.8.1 Training and Competence – Accredited Person

Accredited persons such as operators of cranes, mobile plant and elevating work platforms who carry out work closer than the approach distances specified in Table 1 and safety observers who observe the work must have successfully completed an appropriate training course (eg Crane and Plant Electrical Safety Course) relating to work near overhead power lines that has been conducted by a registered training organisation. Refer to Appendix 4 of this code for a training course framework, which is recognised by WorkCover NSW and network operators.

Note: 'Successful completion' includes a satisfactory competency assessment.

The registered training organisation, which provides the training and competency assessment required by this code must provide the person concerned with a statement of attainment or written certification of his/her successful completion of assessment, that has an identifying number particular to that person.

Employers should maintain appropriate training and assessment records for 'accredited persons' and other employees who carry out work near overhead power lines.

3.8.2 Maintenance of competency

The employer of accredited persons must ensure that those persons are either re-assessed or re-trained annually to ensure their on-going competency to perform activities associated with work near overhead power lines.

Re-assessment or re-training must cover as a minimum the knowledge and skills necessary to ensure safe work practices near overhead power lines, approved resuscitation procedures and emergency procedures to be followed in the event of an accident.

Following re-assessment, persons who have failed to maintain competency through the regular on the job application of learnt skills and knowledge must undertake refresher training and competency assessment.

3.9 Safety Observer – General requirements

The safety observer is a person specifically assigned the duty of observing the work near live overhead power lines and associated electrical apparatus in order to –

- warn personnel or the crane or plant operator so as to ensure the approach distances are being maintained, and
- warn of any other unsafe conditions.

The safety observer must –

- be used whenever the work activity is likely to be performed in the Accredited Person Zone.

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work outside but up to the Accredited Person Zone.

- be positioned at a suitable location to effectively observe both the overhead 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 in accordance with approved procedures or carrying out a specific task that is described in the safe work method statement eg a crane dogman holding a non-conductive tag line 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; and
- continue to monitor the work activity being carried out and have the authority to suspend the work at any time.

CHAPTER 4 – OPERATING CRANES AND MOBILE PLANT NEAR OVERHEAD POWER LINES

4.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where a person operates a crane or an item of mobile plant near overhead power lines, including, but not limited to the following items of mobile plant:

- cranes (including mobile cranes and vehicle loading cranes);
- concrete placing booms;
- elevating work platforms (EWPs);
- mobile plant (including truck operators engaged in tipping loads, restraining loads or other associated work);
- load shifting equipment (including forklifts).
- excavation and earthmoving equipment
- high load transportation vehicles

However, the application of this Chapter is not limited to any particular type or class of mobile plant or equipment.

Note: This chapter is not intended to cover cranes and mobile plant when they are retracted and correctly stowed when travelling on a public road or where the design envelope of the crane or item of mobile plant is less than 4.6 metres in height.

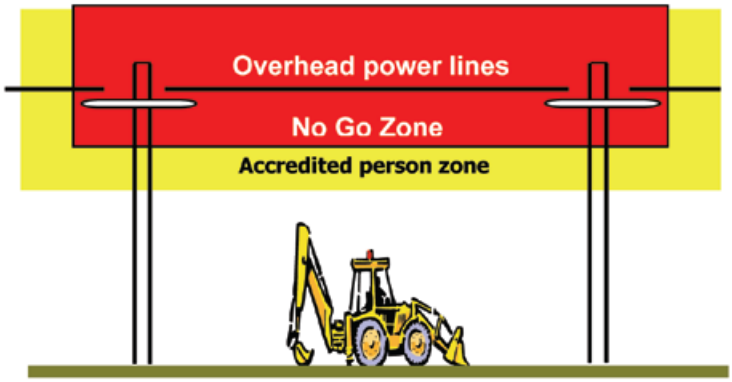
WARNING

For the operation of cranes, mobile plant and other types of load shifting equipment the approach distances specified in this code of practice are greater than those described in the National Certificate of Competency – Assessment Instruments. Where any discrepancy exists between the National Assessment Instruments and this code, the code shall prevail.

4.2 Hazard identification

Before operating a crane or item of mobile plant, the operator or other person in control of the work must take reasonable care to inspect the workplace to identify potential hazards, including any live overhead power lines or other associated electrical apparatus in the vicinity of the workplace.

All overhead power lines should be treated as live unless the operator of the crane or mobile plant has received an access authority or other form of written documentation from the network operator.



Mobile plant including cranes, excavators, EWPs, earth moving machinery, tipper trucks and concrete placing booms whose design envelope is within the approach distances specified in Table 1 must be controlled by safe systems of work as described in this chapter.

Figure 6: Cranes and mobile plant working near overhead power lines

4.3 Risk assessment

Risk assessment involves looking at the:

- likelihood (which is a combination of length of time and frequency of exposure); and the
- likely severity, of any injury or illness that may occur.

If you have identified a hazard involving overhead power lines where it is foreseeable that the work activity, crane or item of mobile plant will be required to or might inadvertently encroach on the approach distances specified for ordinary persons set out in Table 1, a written risk assessment must be completed which considers the following factors:

- consulting the network operator regarding the proposed work;
- can the electricity supply be de-energised?
- the location and voltage of the overhead power lines;
- the number of people involved and their individual needs;
- the nature of work undertaken;
- the nature, size and shape of the load to be moved, eg dimensions, surface area and whether the load is conductive;
- the setting up and packing up processes;
- the safe work practices and procedures in use;
- the type of crane, mobile plant, machinery and equipment to be used and its design envelope;
- site conditions, stability of crane or mobile plant and suspended loads;
- the potential for inadvertent movement of the crane or mobile plant, the load, persons and electrical equipment in the area;
- the qualifications, competency, skill and experience of people doing the work;
- vehicular traffic, pedestrians, or livestock that could interfere with the work;
- prevailing or unexpected wind strength and direction and weather conditions;
- foreseeable abnormal conditions that may exist at the worksite.

Having assessed the risks, action must now be taken to ensure that the risks are eliminated or controlled. Employers need to ensure adequate supervision of workers to make sure that control measures are applied.

Listed below in section 4.4 are steps to consider. Every workplace is different, so select the controls that are the right ones for you.

4.4 Control measures for cranes and mobile plant operating near overhead power lines

The highest practical level of control should be used. This does not preclude the additional use of appropriate lower level controls. In determining the control measures appropriate for a particular task consideration must be given to the terrain and ground conditions, weather conditions, lighting, and other work in the vicinity as well as the nature of the actual task to be carried out.

4.4.1 Elimination

Eliminate the risk of electrocution, electric shock or burns by arranging for the network operator to isolate the electricity supply for the duration of the work. Consideration may also be given, following consultation and agreement of the network operator, to re-route the overhead power lines away from the crane or mobile plant or replace existing overhead powerlines with underground cables.

WARNING

Even if it is believed that the supply has been isolated, it must be assumed that all conductors and components are live until an access authority or other form of written documentation has been received from the network operator.

The employer, self-employed person or operator of the crane or mobile plant should:

(a) discuss options for de-energising or re-routing the electricity supply with the network operator or in the case of work involving private overhead power lines, the person in control of the premises;

(b) consider working at another time when the electricity supply can be isolated; and

(c) investigate whether the section of the overhead power lines that needs to be de-energised can be isolated, while leaving the remainder connected.

4.4.2 Separation

If the risk cannot be eliminated, then separate the hazard from the crane or mobile plant and the personnel by:

(a) using an alternative crane or mobile plant which cannot encroach on the approach distances;

(b) limiting the hoisting, slewing or other movements of the crane or mobile plant such as:

- mechanical stops or interlocking of the motion of the crane or mobile plant to prevent it from being moved by power within the approach distance;
- mechanical constraints on the jib, boom, or other part of the crane or mobile plant likely to contact live overhead power lines or associated electrical apparatus as a result of surge or backlash;
- using cranes or mobile plant fitted with programmable zone limiting devices.

(c) setting up the crane or mobile plant in a position that keeps the design envelope outside the approach distance.

Note: Consideration should be given to any loads suspended by the crane or mobile plant or when being moved by load shifting equipment.

(d) minimising unexpected movement of the crane or mobile plant through:

- additional outriggers, supports or packing to increase the stability of the crane or mobile plant;
- preparation of the ground or surface, or adjustment or servicing of the crane or mobile plant, to minimise surge or backlash;

Increased clearances must also be allowed where there is a reasonable possibility the load or lifting gear (crane hook, chains, slings, etc) moving or swinging towards the overhead power lines or associated electrical apparatus when the crane or item of mobile plant is operated.

(e) providing marking barriers to define areas that the crane or mobile plant should not enter such as by:

- using rigid or tape barriers to mark off areas under overhead power lines;
- arranging for the network operator to mark the limit of the approach distance with high visibility 'bunting' or similar. Refer to Figure 7 below.

Figure 7: Illustration of a visual tape bunting fitted under overhead power lines.

(f) providing electrical separation between the people and hazard in accordance with the guidance outlined in Section 4.5 – Workers in contact with the crane, load or mobile plant.

4.4.3 Administrative controls

Support elimination and separation controls by taking the following precautions:

(a) managing and supervising the work to ensure that:

- the work is done very carefully and in an un-hurried, considered manner (haste can be dangerous);
- the employer's safe work method statements are rigorously followed;
- the appropriate persons involved in the work are accredited in accordance with the requirements of Section 3.8 of this code.

(b) making the hazard visible by arranging for the network operator to effectively identify exposed live low voltage conductors (up to an including 1000 volts) by using approved visual indicators such as sheeting or sleeves eg 'tiger tails'. In this situation the 'tiger tails' should extend a minimum distance of 5 metres beyond the extremities of where the crane or item of mobile plant will be operating. A competent person should visually inspect the tiger tails each day prior to commencing the crane, or mobile plant operations. If they have moved or been damaged the network operator should be contacted to ensure the tiger tails are replaced or located in the correct position. Refer to Section 9.1 of this code.

(c) planning for emergencies including:

- having fire-fighting equipment that is suitable for electrical fires at the site and readily accessible;
- having an appropriate first aid kit available at the worksite.

(d) ensuring that a safety observer is used whenever a crane, mobile plant or load is in motion and is likely to come closer than the approach distances listed in Table 1 and illustrated in Figure 3. The duties of the safety observer for work involving cranes and mobile plant is described in Section 3.9 of this code.

(e) considering the fitting of a warning device to the crane or mobile plant that alerts the operator when the crane or mobile plant has entered energised high voltage overhead power line zones. Warning: These devices are not a substitute for the proper management of safe work practices and procedures.

(f) using warning signs to indicate the location of overhead power lines and/or defined work areas. Refer to Figure 8 below.

Figure 8: Overhead power lines warning sign

4.5 Workers in contact with the crane, load or mobile plant

No-one may remain in contact with any part of a crane, load or mobile plant and the ground or other earthed situation while the crane or mobile plant is being operated closer than the approach distances listed for ordinary persons in Table 1 of this code, unless additional precautions are taken to prevent electric shock, as follows.

4.5.1 Operators

The operator may handle the controls of a crane or item of mobile plant while standing on the ground or while in an earthed situation only if -

- the controls are effectively insulated (consultation with the network operator will be necessary to verify effective insulation); or
- are wireless remote control; or
- the operator wears low voltage insulating gloves – provided that the live electrical apparatus is low voltage; or
- for low voltage, the operator stands on a rubber insulating mat 900mm x 900mm x 6 mm thick that is clean and dry; or
- the operator stands on an 'equipotential conductive mat' which is electrically connected to all metalwork associated with the controls.

4.5.2 Other workers

Other workers at the workplace may contact the crane, mobile plant or load while standing on the ground or while in an earthed situation only if one of the following control measures is observed -

- they wear low voltage insulating gloves – provided that the overhead power lines or electrical apparatus is low voltage; **or**
- effective insulation is provided on the overhead powerlines or electrical apparatus, or the crane, load or mobile plant or it's parts to ensure that even if it contacts the overhead powerlines or electrical apparatus, no–one would receive an electric shock; **or**
- control of the load by non-conductive tail ropes whenever uncontrolled motion could allow it to come within the approach distance (as long as the insulating properties of the rope are appropriate to the operating voltage), **or**
- they are positioning or removing lifting gear from a crane hook or the load while it is stationary; **or**
- they are adjusting outriggers, jacks, packing's, chocks or similar, as long as the crane, load or mobile plant is not being moved.

4.6 Competency requirements

In order to carry out crane and mobile plant operations closer than the approach distances specified in Table 1, the following personnel must be accredited as described in section 3.8 of this code,

- the operator of a crane,
- the operator of mobile plant (including an elevating work platform),
- a safety observer.

4.7 Safety observer for crane and mobile plant operations

A safety observer as described in Section 3.9 must be assigned the duty of observing the approach of a crane or mobile plant (and its load) to the live overhead power lines and associated electrical apparatus.

The safety observer must –

- be used whenever the crane, load, mobile plant or persons working from the plant are in motion and are likely to come closer than the approach distances specified in Table 1;

Note: Where a written risk assessment determines it necessary, the use of a safety observer should also be considered for work performed by ordinary persons working outside the approach distances specified in Table 1.

- be positioned at a suitable location to effectively observe both the overhead 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 in accordance with approved procedures or carrying out a specific task that is described in the safe work method statement eg a crane dogman holding a non-conductive tag line 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 crane or item of mobile plant at a time; and

- continue to monitor the work activity being carried out and have the authority to suspend the work at any time,

In addition to the above requirements, the safety observer must not be located on the workbasket of an elevating work platform while observing the work being undertaken from that workbasket.

A safety observer is not necessary in the following circumstances –

- for an item of stationary plant, once completely erected, if it is not located below the overhead power lines or electrical apparatus and is located horizontally outside the approach distances specified in Table 2;
- if an effective limiting device has been set to prevent any component of a crane, mobile plant or load coming closer than the approach distances in Table 2, as long as the limiting device is effective under stress conditions and is regularly inspected and tested by a competent person; or
- where, the design of the crane or mobile plant limits movement so that no part of the crane, mobile plant or load can come closer than the approach distances specified in Table 2.

4.8 Earthing systems for cranes and mobile plant

The chassis of a crane or item of mobile plant may, where practical, be earthed and bonded. A system of work must be adopted that ensures workers are kept clear of cranes and mobile plant when work is carried out near live overhead power lines and workers be advised of the effectiveness of the earthing system.

For specific advice and guidance about the earthing of a crane or item of mobile plant consult with the network operator.

4.9 Notices to be fixed to cranes and mobile plant

Cranes or items of mobile plant intended for use, or used, near live overhead power lines must be fitted with a warning notice or label, conforming to Appendix 1 of this code, listing the approach distances for ordinary persons as set out in Table 1.

The notice or label must be maintained in a legible condition and be displayed at each set of controls and must be readily visible to the operator.

Note: Where a crane or item of mobile plant is fitted with notices in accordance with the Interim Guide, the existing notices may be retained provided the plant is operated to the distances shown on the notice. Only columns described in the Table A notice for 'non-electrical work' or Table B for 'unqualified personnel' must be applied in relation to work under this code.

CHAPTER 5 – TREE AND VEGETATION MANAGEMENT NEAR OVERHEAD POWER LINES

5.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where a person works on trees such as, cutting, trimming, treating with chemicals or other processes, trees and other foliage near live overhead power lines where:

- a person or something the person is holding or is in contact with or could come closer than the relevant approach distance specified in either Table 1 or Table 2 of this code or;
- the work creates risk of damage to overhead power lines or electrical apparatus.

Tree and vegetation management carried out by or for network operators is excluded from this section as it is covered by the requirements of the *Electricity Supply (Safety and Network Management) Regulation 2002*.

5.2 Hazard identification and risk assessment

When carrying out the work, live overhead power lines are a potential hazard posing substantial risk of death or serious injury.

During tree and vegetation management electrical hazards can be encountered through a variety of circumstances. These include but are not limited to:

- branches or other vegetation falling onto power lines during trimming operations
- tools such as power saws or power trimmers coming into direct contact with power lines or other associated electrical apparatus
- mobile plant, for example an elevating work platform (EWP), coming into contact with overhead power lines or other associated electrical apparatus
- power lines becoming broken and falling on the ground, footpath or road
- wind blowing branches or limbs against overhead power lines
- high winds resulting in the loss of control while lowering materials
- unexpected movement of the worker, mobile plant or the vegetation relative to the worker.

If a hazard involving tree management work near overhead power lines has been identified, a written risk assessment must be undertaken by the employer to determine the risk to persons encroaching within the relevant approach distances. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

5.3 Eliminating or controlling risks – General risk factors

The risks associated with electrical hazards arise from coming near live conductors. The best means of eliminating the risks is to prevent people, their plant and equipment, as well as any materials from coming close enough to live conductors for direct contact or flash over to occur.

Care needs to be taken in planning the work to identify the ways in which people may be exposed to electrical hazards when the work is undertaken and determine the most effective means to ensure the approach distances are maintained from the live overhead power lines.

In addition to ensuring that the work near overhead powerlines is avoided, other factors should be considered:

- always assume an overhead power line or associated electrical apparatus to be energised or 'live' unless an access authority or other written documentation is received from the network operator.
- if a telecommunication cable is encountered, never assume that the operating voltage is harmless.
- a tree or branch of a tree can conduct electricity even in dry conditions. Never assume that a tree branch can safely rest on or against overhead power lines. If the tree or branch has the potential during the felling or cutting process to come closer than the approach distances specified in Table 1 the overhead power lines should be de-energised.
- trees that have grown into contact with live overhead power lines must not be cut by a person who is in an earthed situation (such as a standing on the ground or working from within the tree) unless a safe system of work is used that meets the requirements of the network operator.
- plant that comes near an overhead power line may become energised and pose a serious danger to the operator and any bystanders. Ensure that when operating plant (ie any machines (including chain saws), tools or equipment) near live overhead powerlines that the relevant approach distances are maintained. Operations should cease where trees or persons are in danger of coming closer than the relevant approach distances.
- manage traffic and pedestrians at the worksite to ensure approach distances are maintained and that members of the public are kept at a safe distance. If the work near overhead power lines requires a change in traffic direction or vehicle speed limits, full traffic control is required in accordance with the Roads and Traffic Authority's requirements.
- assess the weather conditions, including electrical storms, significant rain or excessive wind velocities that could impact on the proposed work.

5.4 Requirements for Ordinary Persons carrying out tree and vegetation management

An ordinary person must not:

- climb a tree closer than 3 metres to live overhead power lines, or cut any branch that may come closer than 3 metres to live overhead power lines as a result of the work, or
- allow any part of their body or anything they are holding or that is attached to their body, or anything they are using, to come closer than the approach distances specified in Table 1 of this code when carrying out the work near live overhead power lines.

Ensure the work is not carried out above overhead power lines or where any part of the tree or vegetation could fall or otherwise be carried closer than the approach distances specified in Table 1.

If there is a reasonable possibility of the work being carried out above overhead power lines or coming closer than the approach distances specified in Table 1 the work must be carried out by accredited persons who have been trained and have current competency to carry out 'tree and vegetation management' near live overhead power lines. See Section 5.5 of this code.

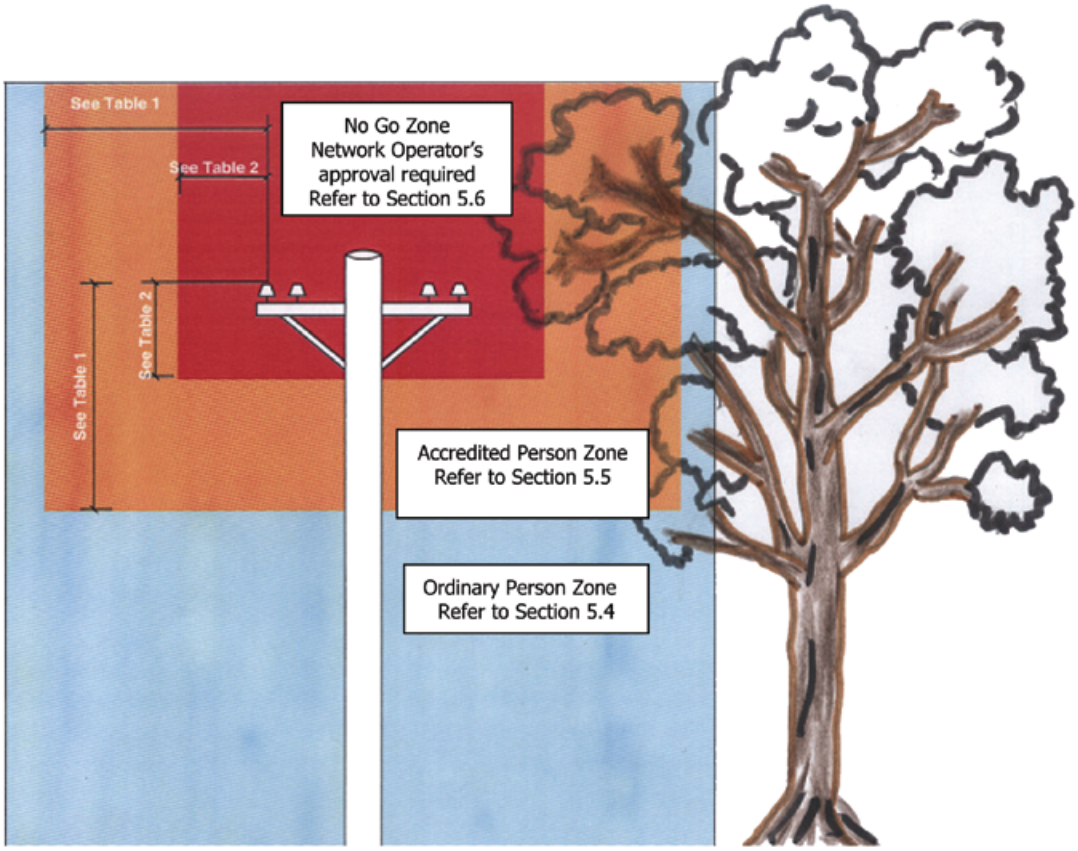


Figure 9 – Work zones for tree management near overhead power lines

5.5 Requirements for Accredited Persons carrying out tree and vegetation management

Accredited persons who have current competency to carry out 'tree and vegetation management' near live overhead power lines may carry out the work in accordance with the approach distances specified in Table 2 of this code provided the following requirements are observed,

- a written risk assessment is completed for the work and a safe system of work is implemented, which includes a safety observer, and
- if determined by the written risk assessment, consultation with the network operator regarding the proposed work and compliance with any conditions imposed by the network operator for the work.

Note: Training and assessment requirements for accredited persons, which include safety observers are described in Sections 3.8 and 3.9 of this code.

5.6 Tree management inside the No Go Zone – Approval of the network operator

The no go zone is 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 written approval of the network operator.

- person includes hand tools, equipment or any other material held by a person.
- plant includes the load, controlling ropes and any other accessories associated with the plant.

Work required on tree and vegetation that is inside the no-go zone (closer to live overhead power lines than the approach distances specified in Table 2 of this code) must only be performed by authorised persons approved by the network operator.

5.7 Trees or branches contacting live overhead power lines

While it is not permitted to work on trees where they (or their branches) may fall on overhead power lines, it is important to know what action to take if a branch or tree comes into contact with a live overhead power line, whether through pruning, wind, storm or other damage.

When this situation arises, *do not touch any part of the branch or tree*. If any part of a branch is touching live power lines, the entire branch may be 'live', including the leaves. Contact with any part of it may result in electric shock, burns or electrocution.

Immediately contact the network operator and keep all persons clear of the area while waiting for assistance.

Other aspects of tree and vegetation management safe work practices and procedures can be found in the *Code of Practice – Amenity Tree Industry.*

CHAPTER 6 – WORK INVOLVING SCAFFOLDING NEAR OVERHEAD POWER LINES

6.1 Scope

In addition to the general requirements described in Chapter 3, this chapter details any variations applicable where the work involves the erection, dismantling and use of fixed scaffolding near overhead power lines and associated electrical apparatus with an operating voltage up to and including 33 kV a.c. For scaffolding work above this voltage the network operator must be consulted and any special conditions imposed by the network operator complied with.

The guidance provided in this Chapter should be read in conjunction with AS/NZS 4576 – Guidelines for Scaffolding, which is an approved industry code of practice. In the Standard a 4 metre approach distance is provided for metallic scaffolding used near overhead power lines. This approach distance is used as a reference point for persons planning and undertaking scaffolding work as described in this Chapter.

For work involving the use of mobile aluminium scaffolding refer to the risk control measures for mobile plant that are described in Chapter 4 of this code.

6.2 Hazard identification

Before undertaking any scaffolding work where the work might come closer than the 4 metre approach distance specified in AS/NZS 4576 – Guidelines for Scaffolding, an inspection must be carried out at the worksite and reasonable care taken to identify any potential hazards.

Hazards may include:

- live overhead power lines and associated electrical apparatus;
- deteriorated or broken down insulation on the conductors or electrical apparatus;
- scaffolding coming into contact with overhead power lines; and
- possibility of hand held tools, equipment or materials coming into contact with overhead power lines.

6.3 Risk assessment

If a hazard involving overhead power lines has been identified, a written risk assessment must be undertaken by the employer to determine the risk to persons encroaching within the 4 metre approach distance. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk. If the scaffolding work is above 3 metres in height it must also be supported by a safe work method statement for the work. Refer to Appendices 2 and 3 of this code.

The following factors may be included in the risk assessment:

- the type of work activities being undertaken, tools, equipment, scaffolding and materials being used;
- proximity of the work activity or scaffolding to the overhead power lines;
- environmental conditions, such as rain, wind or uneven terrain, which may be bring a risk of unexpected movement of tools, equipment, scaffolding or material held by workers.

6.4 Eliminating or controlling risks – general risk factors

Once the hazards associated with scaffolding work near the overhead power lines have been identified and assessed, then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

1. Eliminating the hazard. This could involve de-energising the overhead power lines during the work. Consideration may also be given, following consultation and agreement of the network operator, to re-route the overhead power lines away from the scaffolding or replace existing overhead powerlines with underground cables.
2. Separating the hazard. This could mean erecting a physical barrier on the scaffold to prevent a person or anything held by a person, or attached to the person, encroaching with the 4 metre approach distance.
3. Minimising the risk by engineering means. This could mean substituting the scaffold with another means of access and egress, such as an elevated work platform or using an insulated fibreglass extension handle on a paint roller, instead of a conductive aluminium extension handle.
4. Introduce administrative controls. This may include planning and where relevant documenting the safe work method statements before starting work or using a safety observer to warn people before they encroach within the 4 metre approach distance. The duties of a safety observer are outlined in Section 3.9 of this code. Making the hazard visible by arranging for the network operator to effectively identify exposed live low voltage conductors (up to an including 1000 volts a.c.) by using approved visual indicators eg 'tiger tails'. Refer Section 9.1 of this code.
5. Use appropriate personal protective equipment. This includes the use of electrically tested insulating gloves by anyone who may be at risk of coming closer than the 4 metre approach distance.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

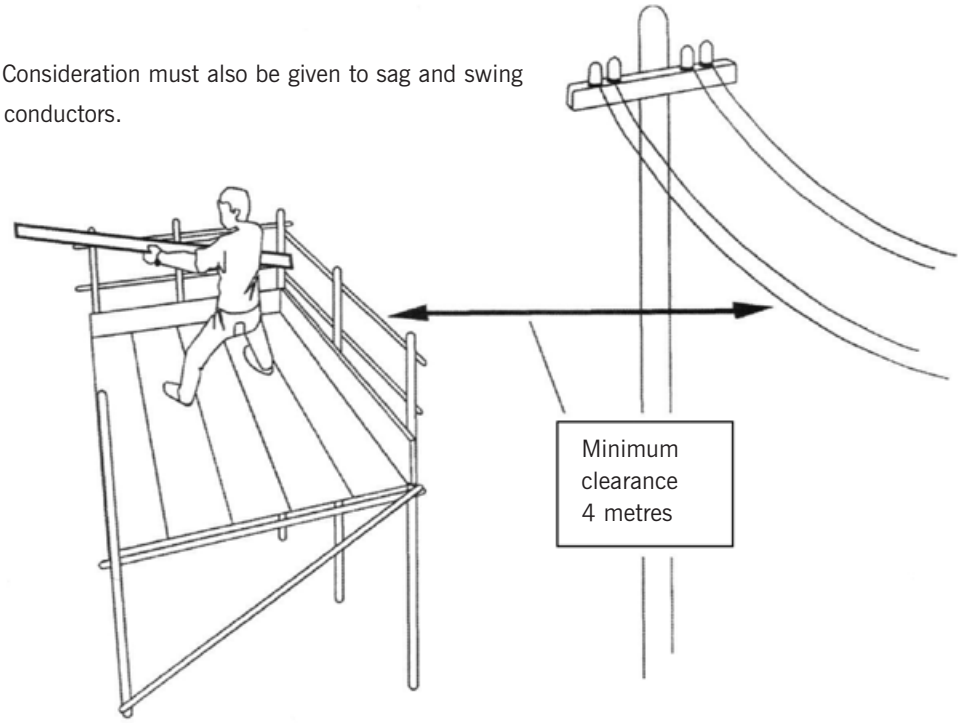
6.5 Control measures for the erection and dismantling of scaffolding near overhead power lines up to and including 33kV

(a) Ensure a thorough examination and assessment is undertaken of the surroundings prior to the erection or dismantling of the scaffold near overhead powerlines. No scaffold work should commence until the presence, location, type and operating voltage of all overhead power lines are determined by a competent person.

(b) Overhead powerlines should be de-energised and an access authority or other form of written documentation obtained from the network operator if the scaffold and the overhead powerlines is or has the potential to come within the 4 metre approach distance. Refer to Figure 10 below.

(c) If there is the risk that the 4 metre approach distance cannot be maintained, the network operator must be contacted and a written risk assessment and safe work method statement including safe systems of work developed for the activities associated with the erection, use and dismantling of the scaffolding.

Note: Consideration must also be given to sag and swing of the conductors.



Note: End protection omitted for clarity

Figure 10 – A 4 metre approach distance applies in any direction where metallic scaffold is erected, used or dismantled near overhead power lines.

(d) Where low voltage overhead powerlines (up to and including 1000 volts) cannot be de-energised and isolated, 'tiger tails' should be provided and installed by the network operator for the full length of the scaffolding plus a minimum distance beyond each end of the scaffolding of 5 metres. A competent person should visually inspect the tiger tails each day prior to commencing scaffolding operations. If the tiger tails have moved or been damaged the network operator must be contacted to ensure the tiger tails are replaced or located in the correct position.

Note: Tiger tails may be used to provide a useful visual indication to people working in the area of overhead power lines. They should not be regarded as providing protection against mechanical interference nor should they be regarded as providing electrical protection from electrical hazards. Refer to Section 9.1 of this code for further guidance.

(e) Electrical wires or apparatus that pass through a scaffold must be de-energised or fully enclosed to the requirements of the network operator. These requirements must incorporate full enclosure of the wires or electrical apparatus by a non-conductive material such as moisture resistant flooring – grade particle board, dry timber, dry plywood or similar dry non-conductive material as approved by the network operator. Refer to Section 6.6 and Figure 11.

(f) To prevent a person or anything held by a person, or attached to the person, coming closer than the 4 metre approach distance the network operator may require the erection of a hoarding on the external face of the scaffolding and, if applicable a suitable enclosure on the internal side of the scaffold. Refer to Section 6.6 and Figure 11.

Example of live low voltage overhead power lines passing through a scaffold that has been fully enclosed in a non-conductive material to the requirements of the network operator.

Figure 11 – Enclosure of overhead powerlines

6.6 Erected Scaffolding – Use of a hoarding and enclosure for reduced safety clearances

This section describes the requirements for the use of a hoarding and, if applicable, a suitable enclosure between an erected scaffolding and a live overhead power line when a non-conductive hoarding and enclosure is used to provide an impenetrable barrier to persons, tools, materials and equipment.

The A and B clearances shown in Figure 12 are horizontal safety clearances and vertical mechanical clearances from the conductors and will be advised by the network operator prior to the erection of the scaffolding near the overhead power lines.

The following installation conditions apply for the use of a hoarding and enclosure for reduced safety clearances,

- Gaps between fitted sheets of plywood must not exceed 3mm.
- No exposed cut or drilled holes are permitted in the sheets of plywood.
- Scaffolder is responsible for attaching plywood to the scaffold, and ensuring that the arrangement can sustain an appropriate wind load.
- Warning signs must be affixed to the safe side of the hoarding warning of the presence of the electrical hazard on the other side of the hoarding and warning that the hoarding must not be removed.
- A competent person should visually inspect the hoarding and, if applicable the enclosure on a daily basis to ensure the hoarding and enclosure are in a satisfactory condition and remain impenetrable.

Further guidance on the erection, dismantling and use of scaffolding can be found in the Australian Standard AS/NZS 4576 – Guidelines for Scaffolding.

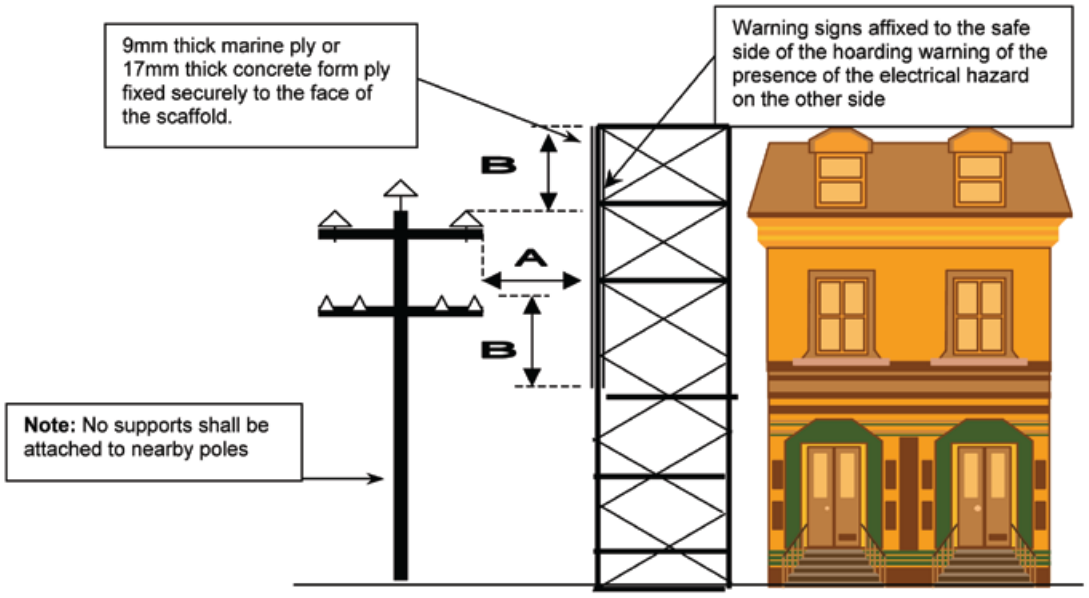


Figure 12 – Scaffolding with hoarding

CHAPTER 7 – AGRICULTURAL WORK NEAR OVERHEAD POWER LINES

7.1 Scope

In addition to the general requirements listed in Chapter 3, this chapter details any variations applicable where work is being conducted at rural workplaces where:

- the person or something the person is operating or holding could contact overhead power lines or come closer than the approach distances specified in Table 1 of this code or;
- the work creates risk of damage to overhead power lines or electrical apparatus.

Examples of such work include:

- the use of lifting or elevating plant or agricultural plant such as grain augers, hay bale elevators, cotton harvesting equipment, tipper and livestock transport trucks, travelling irrigators or harvesters under or near overhead power lines;
- handling irrigation pipes under or near overhead power lines;
- moving or relocating agricultural plant, such as folding cultivators, where the transit (stowed) height of the equipment is greater than its operating height;
- any other work that involves the risk of a person or anything attached to or held by a person, coming into contact with overhead power lines.

7.2 Hazard identification

Many people have been killed by electrocution when metal parts of agricultural plant (such as augers, field bins, harvesters or tip trucks) have come into contact with or close to live overhead power lines. Such accidents usually occur when the operator has not lowered the equipment before moving it or has raised the item of mobile plant upwards into the live overhead power lines. For example,

- working near and in the process may come into contact with machinery operating near overhead powerlines;
- driving machinery with tall attachments through paddocks where overhead powerlines exist; or
- operating or moving tipper trucks, mobile silos, field bins, harvesters or other large rural machinery (cotton harvesters, field irrigators) under or near live overhead power lines; or
- moving or re-arranging long metallic irrigation pipes.

Where work is carried out near live overhead power lines, the height and location of the power lines needs to be identified as part of an overall site hazard identification process. Contact should be made with the electricity network operator who can assist with this process.

Operators of agricultural plant and equipment also must be made aware of the design height and the transit (stowed) height of the mobile plant they operate.

7.3 Risk assessment

If a hazard involving overhead power lines has been identified, a written risk assessment must be undertaken to determine the risk of any part of the agricultural plant or equipment coming near or into contact with the overhead power lines. This step will help to determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

The following factors may be relevant to the risk assessment:

- the type of work activities being undertaken or agricultural equipment being used;
- proximity of the work to the overhead power lines and the height of the overhead power lines;
- environmental conditions, such as rain, wind or uneven terrain, which may bring an increased risk;
- visibility of the overhead power lines and their supporting structures;
- location of overhead power lines supporting structures such as poles and towers in relation to the agricultural work to be performed;
- how often the work will need to be done near the overhead power lines;
- proximity of stationery or fixed plant and equipment to overhead power lines.

7.4 Control measures for agricultural work near overhead power lines

Once the hazards associated with agricultural work near overhead power lines have been identified and assessed then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

1. Eliminating the hazard. Identify the location of overhead power lines and relocate the plant and equipment, such as a mobile silo or tipper trucks away from the overhead power lines. Lower augers before transporting to eliminate the risk of contacting overhead power lines. Keep mobile irrigator sprayed water at least 8 metres away from overhead power lines. Consideration may also be given, following consultation and agreement of the network operator, to relocating the overhead power lines or having them run underground. In this case consult with the network operator.
2. Separating the hazard. This could mean erecting a physical barrier to prevent any part of the agricultural plant encroaching the approach distance specified in Table 1.
3. Minimising the risk by engineering means. This could mean substituting with a less hazardous material, process or equipment. This could mean, for example, filling a silo through a ground-level filler pipe on the silo rather than using a truck-mounted auger or limiting the height of all mobile plant in order to maintain safety clearances from overhead power lines.
4. Introduce administrative controls. These include:
    - planning and documenting a safe system of work before starting work;
    - developing work procedures and travel routes for equipment and vehicles that ensure workers, their equipment and containers such as field bins, stock and tipper trucks do operate near or under live overhead power lines;
    - using another worker (to act as an observer) to ensure the work activity does not come closer than the approach distances specified in Table 1

- installing warning signs on gates to paddocks or on roadways where overhead power lines exist, (Refer to Figure 13 below);

Figure 13 – Overhead power lines warning sign

- having markers installed on overhead powerlines to make them easier to see and locate.

5. Use appropriate personal protective equipment. This includes the use of rubber soled boots, gloves and safety helmets when agricultural plant or equipment is being operated near overhead power lines.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

CHAPTER 8 – WORK NEAR LOW VOLTAGE OVERHEAD SERVICE LINES

8.1 Scope

In addition to the general requirements listed in Chapter 3, this chapter details any variations applicable where an ordinary person is required to carry out work near low voltage overhead service lines where the work involves:

- Minor building work such as painting; or
- Operation of motor vehicles (concrete trucks, furniture removal vans, etc); or
- Any other non-electrical work where there is a risk of contact with low voltage overhead service lines.

For the purposes of this code 'low voltage overhead service lines' covered by this chapter and illustrated in Figure 14 are:

- insulated low voltage aerial conductors and associated electrical apparatus that are connected from the point of supply (either the overhead power pole located on the street or the consumer's boundary) and terminated on the consumer's building, pole or structure at the point of attachment, or;
- insulated low voltage aerial consumers mains and associated electrical apparatus forming part of the consumer's electrical installation.

Note: For work involving cranes or mobile plant or work where any metal material is being handled (scaffolding, roofing materials and guttering) the risk control measures and increased approach distances described in other chapters of this code must be applied to the work.

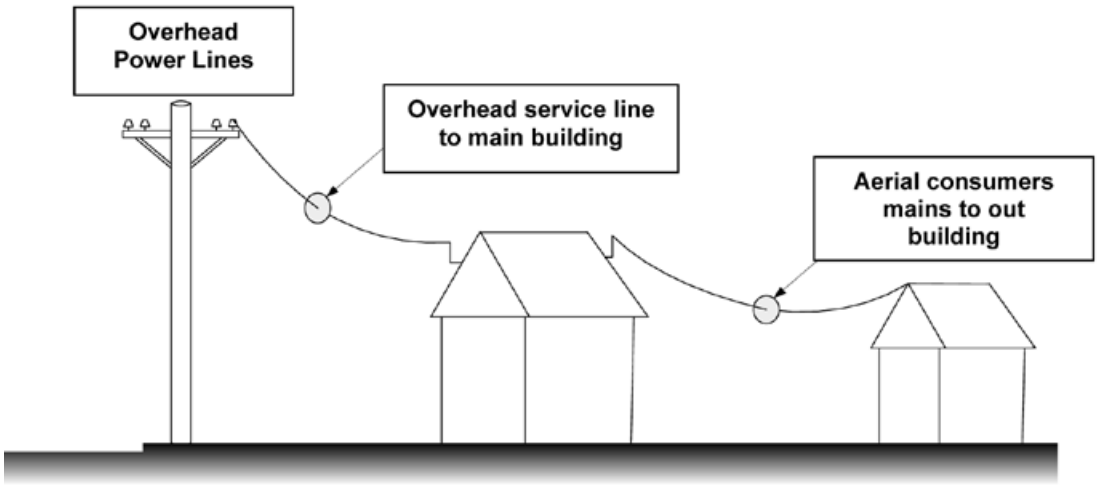


Figure 14 – Low Voltage Overhead Service Lines

8.2 Approach distances for work near low voltage overhead service lines

Table 4 provides approach distances for ordinary persons:

- performing minor building work near low voltage overhead service lines, (including hand tools held by a person); or
- operating cranes (and their loads) and items of mobile plant near low voltage overhead service lines; or
- handling metal materials near overhead service lines (such as scaffolding, roofing materials and guttering); or

- handling non-conductive materials near overhead service lines (such as timber, plywood, PVC pipes and guttering, etc); or
- driving or operating a vehicle under overhead service lines. **Note:** the approach distance specified in Table 4 is 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 0.6 metre approach distance specified.

TABLE 4

Approach distances for work near low voltage overhead service lines

Ordinary Persons (m)				
Hand held tools	**Operation of crane or mobile plant**	**Handling of metal materials (Scaffolding, roofing, guttering, pipes, etc)**	**Handling of non-conductive materials (Timber, plywood, PVC pipes and guttering, etc)**	**Driving or operating vehicle**
0.5	3.0	4.0	1.5	0.6

8.3 Work inside the relevant approach distances

If the work cannot be carried out without coming inside the relevant approach distance (ie closer than the approach distances listed in Table 4), prior to commencing work the employer or self-employed person must comply with the following requirements:

- identify the hazards,
- complete a written risk assessment for the proposed work,
- apply a safe system of work, and
- meet the requirements of the relevant network operator or in the case of overhead service lines forming part of the consumer's electrical installation, the controller of the premises.

8.4 Hazard identification

Before undertaking any work where the work might come closer than the specified approach distances an inspection of the worksite must be carried out and reasonable care taken to identify any potential hazards. Hazards associated with the low voltage overhead service lines may include:

- bare exposed live conductors;
- deteriorated or broken down insulation;
- damaged overhead service line mains connection box or damaged insulation around conductor clamps;
- deterioration of earthing of exposed conductive parts that are required to be earthed;
- voltage of the line is higher than the expected low voltage (240 / 415 volts a.c.); and
- possibility of hand held tools and equipment coming into contact with exposed live parts.

8.5 Risk assessment

If a hazard involving low voltage overhead service lines has been identified, a written risk assessment must be undertaken to determine the risk to persons encroaching within the specified approach distance for the work. This step will help determine the level of risk associated with the identified hazards and establish a priority list based on the level of risk.

The following factors may be relevant to the risk assessment:

- The type of work activities being undertaken, including how safe access and egress will be made to the work area;
- Tools or equipment being used, and the risk of mechanical damage to the low voltage overhead service lines if inadvertent contact is made with the conductors and electrical apparatus; Examples may include:
    - Handling a sheet of roofing material that inadvertently comes into contact with the service lines.
    - Use of cutting or grinding tools where the operator could loose control and come within the 0.5 metre approach distance.
- Proximity of the work to the low voltage overhead service lines;
- Environmental conditions, such as rain, wind or uneven terrain, which may bring a risk of unexpected movement of tools or equipment held by workers.

8.6 Control measures for work near low voltage overhead service lines

Once the hazards associated with work near low voltage overhead service lines have been identified and assessed then control measures must be implemented to eliminate the risk. If it is not practicable to do so, the risks associated with the hazard must then be controlled.

The use of specific control measures to eliminate or control identified risks should be done on the basis of the risk assessment. In particular, consider the following:

- Eliminating the hazard. This could involve de-energising the low voltage overhead service lines by arranging for the Network Operator or in the case of overhead service lines forming part of the consumer's electrical installation the controller of the premises to isolate the supply for the duration of the work or arranging for the re-routing of the low voltage overhead service lines away from the work area.
- Separating the hazard. If work has to be carried out in close proximity to the point of attachment and the power cannot be isolated, arrange for the Network Operator to fit insulated matting and 'tiger tails' at the point of attachment and over the overhead service lines before the work commences. Refer to Figure 15 below.

Figure 15 – Insulated matting and tiger tail fitted to overhead service line

- Minimising the risk by engineering means. This could mean substituting with a less hazardous material, process or equipment, for example, using an insulated fibreglass extension handle on a paint roller, instead of a conductive aluminium extension handle. Or carrying out sanding by hand near the point of attachment rather than using an electric disc sander.
- Introduce administrative controls such as planning and documenting the work procedures before starting work. Another administrative control could be using another worker (to act as an observer) to warn people before they encroach into the relevant approach distance.
- Use appropriate personal protective equipment. This includes the use of electrically tested insulating gloves by anyone who may be at risk of encroaching into the relevant approach distance.

A combination of the above control measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

CHAPTER 9 – ADDITIONAL CONSIDERATIONS FOR WORK NEAR OVERHEAD POWER LINES

9.1 Tiger tails

Tiger tails may be used to provide a useful visual indication to crane, mobile plant operators and other persons working in the area of live overhead power lines, however, they do not protect people from the risk of electrocution or electric shock.

Figure 16 – Tiger tails fitted to overhead power lines

They are **not** to be regarded as effective insulation against contact by cranes or items of mobile plant and are not to be relied upon for mechanical protection. They should not be regarded as providing protection from electrical hazards. As such, the approach distances specified in this code are to be adhered to.

Tiger tails must only be fitted to overhead power lines by an electrically qualified person who is authorised by the network operator.

A competent person should visually inspect tiger tails at the worksite on a regular basis and prior to commencing crane, scaffolding or mobile plant operations. If the tiger tails have moved or been damaged the network operator must be contacted to ensure the tiger tails are replaced or located in the correct position.

WARNING

Tiger tails do not provide protection from electrical hazards and must only be fitted to the overhead power lines by an electrically qualified person who is authorised by the network operator.

9.2 Notification of incidents

The OHS Act and the OHS Regulation require employers to notify certain classes of workplace incidents.

Whether you are an employer, self-employed person and/or occupier you are required by law to notify incidents to WorkCover NSW and/or your workers compensation insurer as soon as practicable after becoming aware of the incident.

An occupier (of premises/workplaces) is someone who, manages or has responsibility for a workplace or a particular operation at a workplace, even though they may not be the employer.

Depending on the type of incident you may need to notify WorkCover and/or your workers compensation insurer. Some incidents classified as 'serious incidents' must be notified to WorkCover immediately. These 'serious incidents' include, but are not limited to the following;

- An incident where there has been a fatality,
- An incident where there has been a serious injury, and
- An incident where there is an immediate threat to life but result in no injury or illness.

In addition to the above, the OHS Act and OHS Regulation requires that certain occurrences that occur at the work place are not to be disturbed for 36 hours, (unless performing a rescue or permission has been given by WorkCover).

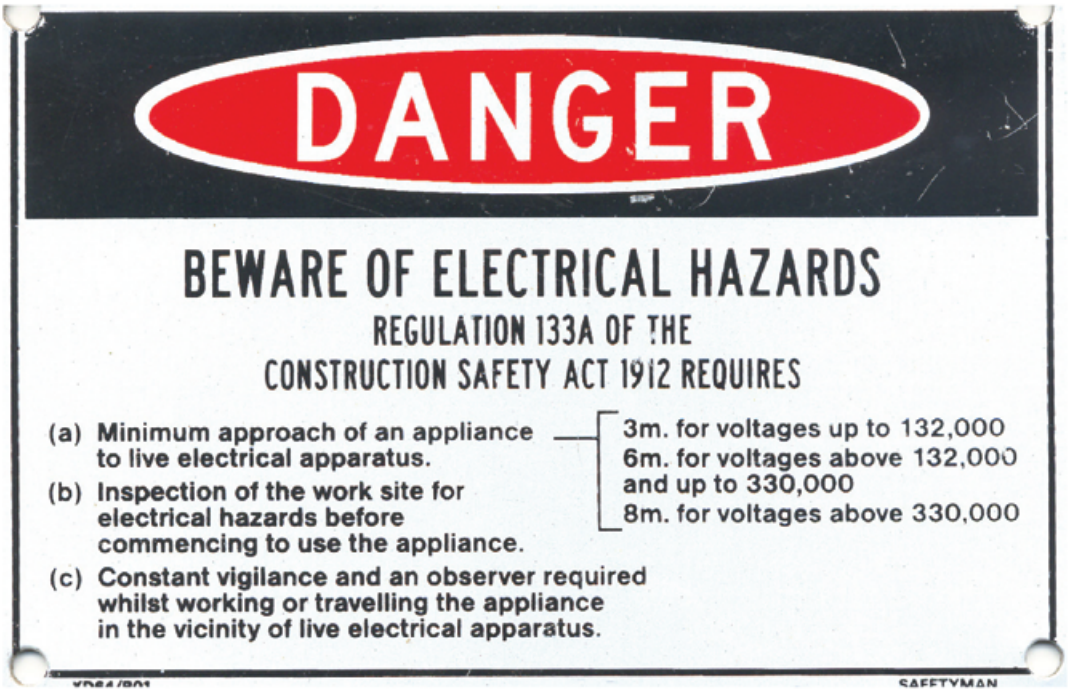
Working near overhead powerlines can be a high-risk activity and any contact with overhead power lines must be notified to WorkCover NSW and the relevant network operator in accordance with the requirements of the relevant legislation.

Serious incidents can be notified to WorkCover on **13 10 50** as an urgent investigation may be needed.

For more information regarding your legal obligations to notify incidents please refer to the OHS Act and OHS Regulation.

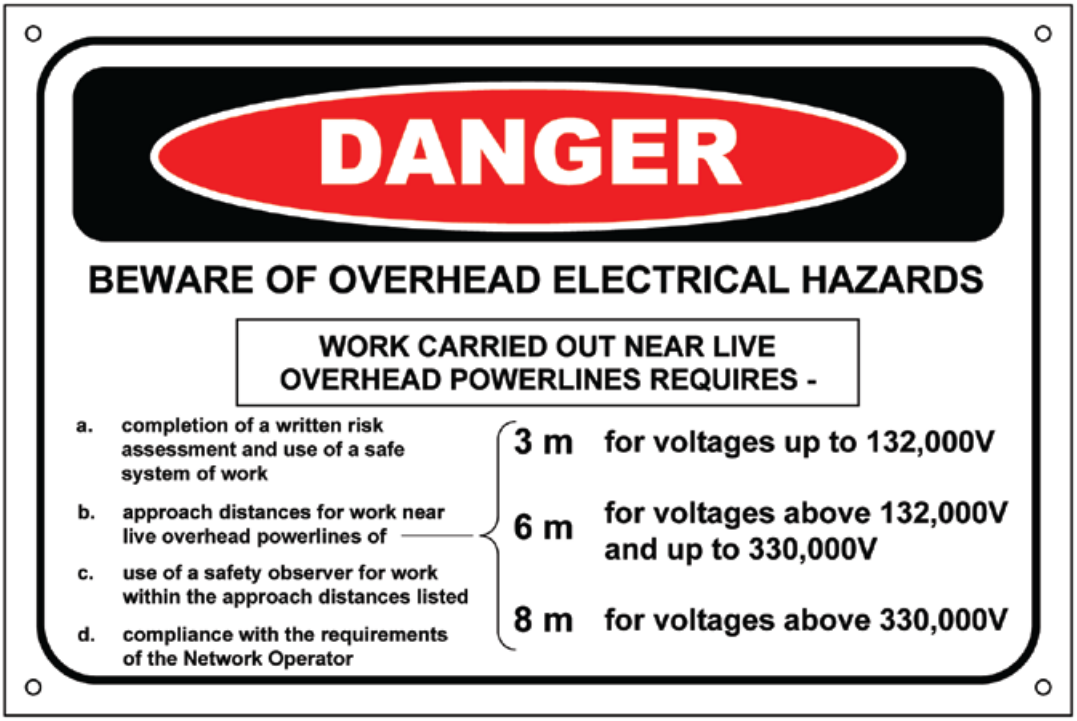
APPENDIX 1– WARNING NOTICE FOR OVERHEAD ELECTRICAL HAZARDS

(Dimensions 150 mm wide, 100 mm high, except if small plant item)



Notice that may remain fitted to cranes and mobile plant commissioned before 1 September 2001 (ie existing Notice as at the date of introduction of the OHS Regulation 2001)

Alternative Notice or Label for cranes and mobile plant commissioned after 1 September 2001



APPENDIX 2 – EXAMPLE OF A RISK ASSESSMENT CHECKLIST

Cranes and mobile plant working near overhead power lines risk assessment checklist

Worksite location:.....

Employer / Principal contractor:.....

Crane / Plant contractor:.....

Site Supervisor:.....

Network Operator:..... Contact phone:.....

This checklist is designed to help identify the hazards associated when operating cranes or mobile plant near overhead power lines that may encroach on the approach distances specified in Table 1 of this code. The checklist covers the main items described in Chapter 4 of this code. This checklist is not designed to cover all of the risks of working near overhead power lines and should be adapted as appropriate to meet the particular circumstances.

If you mark a NO box on the checklist, you need to take appropriate action to eliminate or control the hazard.

Section 1. PROJECT PLANNING AND INITIAL ASSESSMENT	**Yes**	**No**
Has the network operator been consulted regarding the proposed work?		
Do you know the height of the overhead power lines at the worksite?		
Is the voltage of the overhead power lines and associated electrical apparatus known?		
Can the overhead power lines be safely de-energised to allow work to proceed?		
Can the work be rescheduled to another time so that the overhead power lines can be de-energised?		
Has the network operator agreed to de-energise the overhead power lines and issued you with a documented clearance (access authority) so that work may proceed? Record N/A if not applicable.		
Have you ensured appropriate traffic management is in place at the worksite? Record N/A if not applicable.		
Have you assessed environmental conditions, including visibility and wind that could exist for the duration of the project that may adversely affect the work?		
Have you assessed the design and transit envelope of the crane or item of mobile plant being used for the proposed work in relation to the height of the overhead power lines at the worksite?		
Have you assessed the worksite where the crane or item of mobile plant is to be set-up, used and dismantled in relation to the location of overhead power lines?		
Additional planning and assessment factors:		

Section 2 – CONTROL MEASURES – OPERATING A CRANE OR ITEM OF MOBILE PLANT NEAR LIVE OVERHEAD POWER LINES	Yes	No
Have you completed a written risk assessment and identified all electrical hazards and non-electrical hazards, both actual and potential? All materials should be regarded as conductive unless you have definite knowledge to the contrary.		
Have you developed a safe system of work for the proposed work and determined the control measures required to eliminate or control the risks?		
Have you met the requirements of the network operator for the proposed work?		
Are workers trained, competent and confident in applying the particular procedures or techniques that are required for the task at hand?		
Do workers carrying out prescribed work tasks hold the relevant certificates of competency, eg crane operator, dogman, scaffolder, rigger, EWP operator?		
Have workers been authorised by the employer or person in control of the premises to work near live overhead power lines?		
Has a safe work method statement (SWMS) been completed for the task? Note: High-risk construction requires that an SWMS is completed for the work. Refer clause 209 of the OHS Regulation for further information.		
Is the work area clear of obstructions and is there a safe entry and exit?		
Are the necessary first aid and emergency facilities provided and accessible?		
Will an Accredited Safety Observer be present during the work task and assigned the duty of observing and warning against unsafe approach to overhead power lines?		
Additional control measures for the work:		

Section 3 – AFTER COMPLETING THE WORK	Yes	No
Have all workers been advised to treat the power lines as being live from this time?		
Has the network operator and all other relevant parties been advised that the work is completed?		
Additional measures following completion of work:		

_____ _____ ____ /____ /____

Checklist Completed By | Signature | (Date)

APPENDIX 3 – EXAMPLE SAFE WORK METHOD STATEMENT

Safe Work Method Statement (Part 1)		**Accepted:** Yes / No
Employer / Contractor: *Enter the name of the employer or contractor*		**Signed off:** *Enter the name of the person approving the SWMS*
Project: *Enter the name of project*		**Date:**
Job Description: *Enter the task to be undertaken*		
Procedure (in steps):	**Possible Hazards:**	**Safety Risks:**
1. *Write out the job step by step (Include all major phases of the work to be done)*	*Include all possible hazards. Some examples of hazards are: such as* • *Working near live overhead power lines* • *Falls from heights* • *Working near moving plant*	*High, Medium or Low*
2.		
3.		
4.		
5.		

Points to remember when writing out your work method statements:

- **Write out the job procedure step by step**
- **Put the main idea first**
- **Start each step with an action word. For example Isolate, erect**
- **Use active, not passive voice. For example check approach distance, erect ground barriers**
- **Keep sentences short and clear**
- **Choose words carefully**
- **Keep it simple**
- **Get somebody who does not know the job to read the work method statement to check if they understand the job.**

Control measures:

List all safety controls such as:

- *Access authority*
- *Safety Harness*
- *Mechanical Controls / PPE*
- *Safety Observer required*

Write all your work method statements after consulting the workers who are going to use them. You may then need to redraft them to include their suggestions. They may see a better and safer way of doing the job.

Note: The possible hazards, safety risks and control measures are placed side by side. This will make it easier for you to consider the possible hazards for each step and decide on the appropriate controls to over come each hazard.

Safe Work Method Statement (Part 2)

Project: *Enter name of project here*

Personal Qualifications and Experience	**Personnel, Duties and Responsibilities**	**Training required to complete proposed work**
Enter all the qualifications for everybody to undertake the tasks: *WorkCover Certificates, Training Certificates, Network Operator Certificates, experience in doing the tasks that may not require certificates.*		• *Safe electrical approach training*
Engineering Details / Certificates / Approvals	**Legislation / Codes of Practice / Standards**	
Enter details of certification that may be required to undertake tasks. Engineers Certificates for major lifts, plant usage eg EWP's.		
Plant / Equipment	**Maintenance Checks**	
List all major items of Plant and Equipment that will be used during the duration of the task. Eg: Mobile Crane, EWP, Vehicle loading crane, etc.		
Read and signed by all employees on site:		

Enter details of duties and responsibilities of Supervisors, Plant Operators and other employees. Enter such things as daily safety checks, weekly site inspections.

Detail here the training required by all personnel before the activity is commenced.

Enter here all Legislation, Codes of Practice and Standards that is relevant to the work to be undertaken. Refer to the requirements when completing the safe work method statements.

Detail here the system in place to ensure plant and equipment is serviced and maintained. Enter details of tagging for lifting equipment.

Safe Work Method Statement (Part 3) **Read and signed by all employees on site:**			
Project:	*Enter name of project here*		
Job Description:	*Enter the task to be undertaken*		**Revision No.:**
Name	**Company**	**Date Inducted**	**Signature**

APPENDIX 4 – MODEL TRAINING COURSE GUIDELINES – SAFE ELECTRICAL APPROACH TRAINING

Introduction

This model training course framework provides information for registered training organisations (RTO's) wanting to develop a competency assessed training course for non electrical persons wanting to acquire the necessary knowledge and skills of an 'Accredited Person' as described in this code.

The suggested minimum structured learning time for new students is approximately 12 hours, which includes a 2 hour assessment. The subject areas listed should be considered as the minimum course requirements; RTO's may wish to add additional topics as appropriate.

Persons successfully completing the training course are to be awarded a statement of attainment or certificate from the RTO that indicates the person's name and an identifying number particular to the holder of the qualification. The name and contact details of the RTO should also be displayed on the statement of attainment or certificate.

Unit 1 **Preparation to work safely near live overhead power lines as a non electrical worker**	Identification of the relevant legislative requirements including OHS Act 2000 and OHS Regulation 2001 including the Code of Practice – Work near overhead powerlines. Ordinary and Accredited Persons. Principles of electricity, 3 phase power system. Electric shock and resuscitation. Safe work practices and procedures. Identification and confirmation of the approach distances for safe work and access near live overhead power lines and associated electrical apparatus. Identification and implementation of safe systems of work including safe work method statements. Hazard identification, risk assessment and control options prioritised. Development of risk assessment documentation and safe work method statements. Permit systems and established supporting procedural systems. Responsibilities identified for the safety observer, crane and plant operator in accordance with requirements and established procedures /systems of work to ensure safety measures are followed in the event of an incident. Reporting and notification procedures for work closer than the approach distances identified in the Code of Practice – Work near overhead powerlines. Identification of electricity infrastructure for low voltage and high voltage overhead power lines. Relevant approach distances as defined in the Code of Practice – Work near overhead powerlines.

Unit 2 **Carry out the work safely near live overhead power lines as a non electrical worker**	Application of OHS principles and practices to reduce risk of incidents with overhead powerlines. Process for monitoring and reporting hazards and OHS risks to immediate authorised personnel for directions according to established procedures. Non routine events. Emergency procedures in the event of and responding to an incident. Working safely in accordance with instructions and established routines/ procedures.
Unit 3 **Complete the work safely near overhead power lines as non electrical worker**	Work schedules, requirements for returning work permit(s) and/or access authorisation permits. Process for reporting to authorised personnel incidents in accordance with established procedures. Work completion records, reports/data sheets for completed works.

Qualification and experience of the trainer:

Persons presenting the above training course should have relevant industry experience associated with the NSW Electricity Supply Industry and have as a minimum a 'Workplace Trainer and Assessor Certificate 1V 'and be conversant with all the relevant NSW Acts, Regulations, Codes and Industry Guides associated with work near live overhead power lines.

Overview of assessment:

Registered training organisations should ensure that assessment of the above training course be carried out in accordance with accepted industry and regulatory practice. Evidence for competence should be considered holistically and cover the essential knowledge and associated skills for work that is to be carried out safely near live overhead power lines by a non-electrical worker.

Trainees should be assessed across a representative range of contexts from the Units listed in the model training course including,

- Preparation to work safely near live overhead power lines
- Carry out the work safely near live overhead power lines
- Complete the work safely near live overhead power lines.

Further information on training and assessment for work that is to be carried out safely near live overhead power lines by a non-electrical worker can be found in the Australian National Training Authority document UETTDREL04A – Working safely near live electrical apparatus as a non electrical worker.

APPENDIX 5 – EMERGENCY PROCEDURE FOLLOWING CONTACT WITH LIVE OVERHEAD POWER LINES

Should contact be made with a live overhead power line or a flash-over occurs 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 overhead power line by moving the jib or driving the machine clear.
- If it is not possible to break the contact with the live overhead power line, the operator of the crane or mobile plant 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 overhead power line. The operator must remain in place until the power has been isolated, and the 'all clear' given by the network operator.

WARNING

When a crane or item of plant inadvertently contacts overhead power lines circuit protective devices may operate to automatically turn the power off. However some protection devices are designed to automatically reclose thereby re-energising the powerlines after a short period of time, typically 1 – 4 seconds.

- If it is essential to leave the cabin or the operator's position due to fire or other life threatening reason, then 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 eight metres from the nearest part of the crane or plant. Under no circumstances run or walk from the crane or 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 members of the public to keep 8 metres clear from the crane or item of 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 giving assistance.
- Untrained, unequipped persons should not attempt to rescue a person 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 giving assistance.

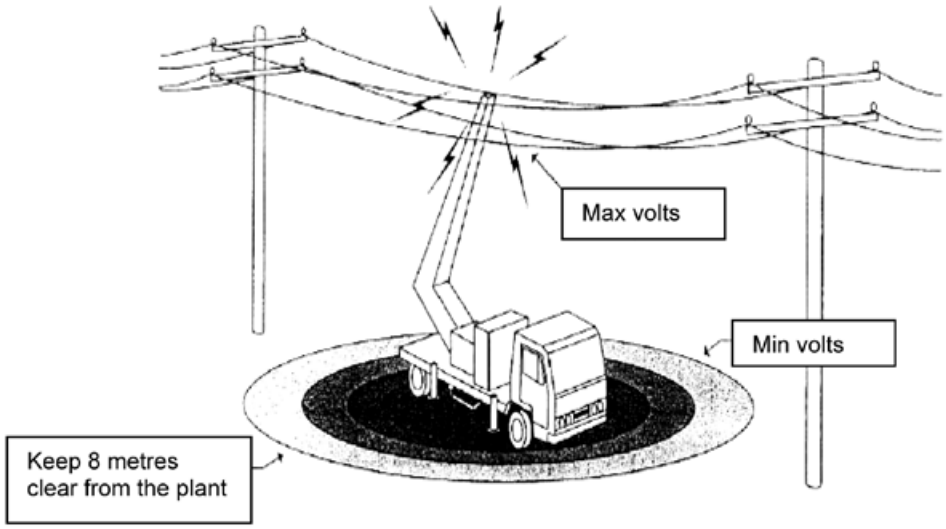


Figure 17: Affected area surrounding mobile plant when in contact with a live overhead power line

Post – incident inspection by a competent person

When a crane or item of mobile plant has been in contact with a live overhead power line, it should checked by a competent person for any damage to the components of the crane or mobile plant. Any actions recommended by the competent person are to be completed before the crane or mobile plant is returned to service.

Tyres on cranes and mobile plant that have been in contact with overhead power lines where electrical flash-over and current flow occurs through the rubber tyres should be considered as a potential hazard. These rubber tyres may catch fire, with the obvious potential for them to explode. Additionally, a lesser known danger may occur, which results when combustion takes place within the tyre, with no apparent external signs. When excessive heat is developed in or applied to a tyre as in the case from contact with overhead power lines, it can initiate a process known as pyrolysis, which is the decomposition of a substance by heat. This can generate a build up of flammable gases and pressure within the tyre, which may ultimately rupture or explode.

Vast amounts of energy can be released by a tyre explosion, often leading to significant equipment damage, serious injures or fatalities. Pyrolysis related explosions are very unpredictable, and have been known to occur immediately or up to 24 hours after initiation. An explosion can occur where no fire is visible and the danger area can be up to 300 metres from the tyre.

Any rubber tyred crane or plant item involved in an incident where contact is made with overhead power lines which results in discharges or flash-over of electrical current through the tyres should be considered as a potential hazard. If any personnel suspect there is a danger of a tyre explosion, as in the case of the mobile crane contacting overhead power lines, then the procedure should include:

- parking the crane in an isolation zone, with a minimum 300 metre radius,
- removing all personnel from the area, and not allowing access to isolation zone for 24 hours, and
- alerting fire fighting services

APPENDIX 6 – CASE STUDIES OF OVERHEAD POWER LINE INCIDENTS

CASE 1

Incident – Mobile Crane Operation

A mobile crane came into contact with 132,000 volt overhead power lines that were located adjacent to a worksite. At the time of the incident the crane driver had slewed the boom of the crane towards the overhead power lines, which resulted in the lifting chains swinging outwards, making contact with the power line.

Luckily no persons were injured, however the crane sustained extensive damage to the tyres, lifting rope and electrical system on the crane.

Contributing factors and relevant sections

Failure to:

- maintain relevant approach distance to the power lines and take outcome of the possibility of the lifting chains swinging towards the overhead power lines when the crane was operated. – Section 3.3
- carry out an adequate risk assessment of the worksite – Section 4.3
- implement appropriate control measures for the work – Section 4.4
- use a safety observer to observe the crane operations near the power lines – Section 4.7

CASE 2

Incident – Scaffolding Work

A worker died and three apprentice roof plumbers were injured when attempting to move an 8.9 metre high aluminium scaffold at a construction site. At the time of the incident the workers were moving the mobile scaffold over soft sand when the castor wheels located at the base of the scaffold sunk into the sand causing it to fall and make contact with 33,000 volt overhead power lines that were located adjacent to the construction site.

As a result of this incident the construction firm and roofing contractor were fined a total of $224,000 by the NSW Industrial Relations Commission.

Contributing factors and relevant sections

Failure to:

- carry out an adequate risk assessment of the worksite that took account of the ground conditions at the worksite – Section 4.3
- implement appropriate control measures for the work – Section 4.4.

CASE 3

Incident – Work on a rural property

The victim, a 17 year old rural worker, received a fatal electric shock due to a flashover when a steel flagpole came into close proximity with an 11kV overhead power line that was located above the entrance to a rural property. At the time of the incident the worker was attempting to erect the 5.2m flag pole at the main entrance gate to the property.

Contributing factors and relevant sections

Failure to

- identify the hazard of the overhead power lines – Section 7.2
- carry out a risk assessment of the worksite and implement appropriate risk controls – Sections 7.3 and 7.4.

CASE 4

Incident – Tipper truck operation

A tipper truck contacted an 11,000 volt overhead power line causing it to break and fall to the ground striking a worker who was at the worksite. At the time of the incident the tip truck was delivering a load of granulated bitumen to the worksite when the tip tray of the truck was raised upwards into the overhead power lines.

As a result of this incident the NSW Chief Industrial Magistrates Court fined the construction firm a total of $15,000.

Contributing factors and relevant sections

Failure to:

- plan the work and identify the hazard of the overhead power lines – Section 2.5 and 4.2
- maintain the relevant approach distance to the overhead power lines and take account of the height of the raised tray when the load was dumped at the worksite. Sections 3.3
- carry out a risk assessment of the worksite – Sections 3.7 and 4.3
- implement appropriate control measures for the work – Section 4.4
- use a safety observer to observe the truck operations near the power lines – Section 4.7.

APPENDIX 7 – USEFUL PUBLICATIONS

WORKCOVER NSW APPROVED INDUSTRY CODES OF PRACTICE

- *Code of Practice: Occupational Health and Safety Consultation*
- *Code of Practice: Risk assessment*
- *Code of Practice: Occupational Health and Safety induction training for construction work*
- *Code of Practice: Moving plant on Construction Sites*
- *Code of Practice: Amenity Tree Industry*
- *Code of practice: Technical Guidance*

Note: The Australian Standards listed below are also WorkCover approved industry codes of practice.

WORKCOVER GUIDES

- *Identification Tool for Electrical Hazards on-site*
- *Subby Pack – OHS contractor management tool*
- *Dangers of Power Lines when Pumping Concrete*
- *WorkCover Safety Alert – Tiger Tails*

Standards and Codes offer practical guidance on health and safety for work. However, these are subject to change from time to time. For further information contact the WorkCover Assistance Service on: **13 10 50**.

For information about the wide range of other codes of practice, certification guides and publications on OHS, rehabilitation and workers compensation, contact the Publications Order line: 1300 797 003.

Information on the latest laws can be checked at www.legislation.nsw.gov.au or contact (02) 9238 0950 or 1800 463 955 (NSW country only).

AUSTRALIAN STANDARDS

Australian Standards can be purchased from SAI Global by contacting the Customer Service Centre on 131 242 or over the net at http://www.saiglobal.com/shop

AS 2550.1 Crane, hoist and winches – Safe use Part 1: General requirements

AS 2550.1 Crane, hoist and winches – Safe use Part 5: Mobile and vehicle loading cranes

AS/NZS 4576 Guidelines for Scaffolding

NATIONAL ELECTRICITY NETWORK SAFETY GUIDELINES

National Guidelines can be purchased from the Electricity Supply Association of Australia by phoning 03 9670 0188 or over the net at http://www.esaa.com.au

- NENS 04-2003 *National guidelines for safe approach distances to electrical apparatus*

NETWORK OPERATORS – CONTACT NUMBERS

- Energy Australia: 13 15 25
- Integral Energy: 13 10 81
- Country Energy: 13 23 56
- Rail Corp: (02) 9379 4911
- Transgrid is divided into three regional areas:
    - Central Region – 1800 625 108
    - Northern Region – 1800 998 049
    - Southern Region – 1800 654 195.

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