Network Standard

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Title:
Assessment Procedure For Working On Poles

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Technical Approver		Authorised By			
Name	Greg Ross	Name		Jacob Bayley	
Designation	Senior Maintenance Standards Specialist	Designation		Manager NS & ES Network Strategy & Future Grid	

Revision

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0	30/06/2015	BMS Conversion	William Woods	Chief Engineer
1	18/09/2015	Included interim work restriction with 'A' Poles	William Woods	Chief Engineer
2	7/09/2017	Amendments to all the sections throughout the document	William Woods	GM - AM&O
3	7/02/2022	Amendments to clause "Apply Voltage Detector on Pole"	Duminda Thenuwara	Matthew Cupples
4	2025	Updated to Network Standard template. Amendment to timber pole and steel pole sounding and excavation. Moved Annexure B to Clause 5. Added Annexures A – E.	Greg Ross	Jacob Bayley

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Scope

This Network Standard defines the mandatory requirements for assessing a pole (including private poles) prior to work on the pole. Work on a pole includes linework either by climbing or elevating work platform (EWP), as well as substation, telecommunications, service and operating work which may be carried out from a pole platform, pole steps, ladder, EWP or other access method.

This Network Standard does not define the requirements or limitations for performing work on a pole (for example, exclusions, climbing methods, PPE requirements, traffic control) or for routine inspection and treatment of poles.

The requirements apply to all staff, contractors, Accredited Service Providers (ASPs), Telecommunication workers and any other personnel who have authority to work on Ausgrid poles. It also applies when Ausgrid staff or Ausgrid contractors work on poles belonging to other Authorities when working on behalf of Ausgrid.

The term ‘pole’ used throughout this Network Standard refers to poles, street lighting standards and columns and lightning masts in substations.

Reference Documents

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid’s Internet site at www.ausgrid.com.au.

Ausgrid Documents

Electrical Safety Rules

NEG-SE09 Management of CCA Impregnated Wood - Including Burning/Fire-Damaged CCA Poles

NS102 Working on or near Poles with Telecommunication Transmitters

NS128 Pole Installation and Removal

NS145 Pole Inspection and Treatment

NS156 Working Near or Around Underground Cables

NS174 Environmental Procedures

NS262 Private Mains Bush Fire Risk Audit

T0150 Bushfire Mesh Pole Wraps

Other Standards and Documents

ISSC 29 Guideline for Pre-Climbing and Climbing Assessment of Poles

ISSC 34 Guide for Height Safety within the NSW Electricity Supply Industry

Acts and Regulations

Electricity Supply (General) Regulation 2014 (NSW)

Electricity Supply (Safety and Network Management) Regulation 2014 (NSW)

Work Health and Safety Act 2011 and Regulation 2017 (NSW)

Clause	Standard Requirements

1 General requirements

1.1 Assessment process

1.1.1 A pre-work assessment shall be undertaken for all poles to be worked on to determine whether they are required to be supported or stayed when the work is being performed.

1.1.2 A pre-work assessment shall also be undertaken on adjacent poles when they are likely to be affected by the work

1.1.3 Pole support requirements shall be assessed by performing the following process prior to work commencing;

- Implement safety precautions in accordance with Annexure A,
- Assess the above ground condition of the pole in accordance with Clause 2,
- Assess the pole loading in accordance with Clause 3.
- Assess the below ground condition of the pole in accordance with Clause 4.
- Assess the condition of the upper portions and heads of timber poles in accordance with Clause 5.
- Assess the pole support requirements and private pole reporting requirements in accordance with Clause 6.

1.1.4 Poles which are assessed as not requiring support (or for private poles, reported) prior to work commencing shall also be assessed as work proceeds to determine whether it is safe to continue performing the work without supporting the pole.

1.2 Mandatory requirements

1.2.1 Fire-damaged or burning timber copper chrome arsenate treated (CCA) poles shall not be worked on unless the damaged or burning material is wrapped or treated prior to the work commencing (refer to Clause A4 and NEG-SE09).

1.2.2 Refer to Clause B5 when working on timber poles with fire mesh installed. Fire mesh shall be fully reinstated if it has been partially detached or fully removed to perform the condition assessment.

1.2.3 Pole loading shall not exceed the design capacity of the pole or pole reinforcement strength rating at any stage of the work except where the pole is supported or stayed using an approved Ausgrid method.

1.2.4 Additional loading shall not be applied to timber poles reinforced with Ausmose Oz-C splints.

1.2.5 Shock loading (a sudden and drastic change in load) or stress testing of the pole (including ‘push’ or ‘rope pull’ testing) shall not occur under any circumstances. Tension on overhead mains shall be released in a controlled manner.

1.2.6 The outcomes of the condition assessment and pole loading assessment shall be compared against the pole support criteria in Clause 6.2 to determine whether the pole is required to be supported while the work is being performed. The pole shall be supported while the work is being performed when any doubt exists about the condition or loading of a pole.

1.2.7 The outcomes of the condition assessment and pole loading assessment of private poles shall be compared against the private pole report criteria in Clause 6.3.

1.2.8 Poles shall only be supported by the following approved Ausgrid methods (also refer to NS128);

- Lashing the pole to be worked on to an adjacent pole (typical for poles being replaced).
- Temporary or permanent staying arrangements.

- Holding the pole with a borer / erector vehicle or mobile crane.

1.2.9 Existing attached overhead mains arrangements which hold the pole in balance (for example, athwartship arrangements) shall also be assessed to determine if the overhead mains provide adequate support while work is performed (including loading due to workers).

1.2.10 Other temporary pole support devices shall not be used unless they have been approved by Ausgrid following provision of structural engineering design and certification documentation demonstrating their compliance with the Safe Work Australia 'Safe Design of Structures Code of Practice' and Australian Standards for their intended use.

1.2.11 Poles, standards or columns with the following defects (identified or suspected) shall be immediately reported to the nominated Ausgrid representative or by external workers to the Ausgrid Emergency Line (13 13 88). The customer shall also be notified where the defect is on a private pole;

- Any pole that has evidence of movement in the ground, excessive lean (10 degrees or more), 350mm less depth in the ground than originally installed or which appear to be in danger of partial (head) or full collapse.
- Hazardous voltages on poles or attachments.
- Access covers which are missing or cannot be secured against unauthorised access.
- Conductors detached from insulators or lying on crossarms.
- Broken, loose or damaged attachments to pole, such as insulators, crossarms, luminaires, private switchboards or earthing wires / earth connections (**Note:** do not attempt to repair earth wires or earth connections).
- Timber poles with active termites and which are not undergoing termite treatment (refer to Annexure E).
- Timber poles with internal defects (fungal decay, rot) or fruiting bodies.
- Timber poles with 20% or more diameter reduction (or 10% on one side).
- Diameter reduction of 10% or more on private timber poles with original diameter less than 200mm or square section less than 175mm.
- Copper Chrome Arsenate (CCA) treated timber poles which are on fire or smouldering.
- Steel poles with folds / bends, perforations or pitted / scaling rust.
- Concrete poles with damage or spalling with exposed reinforcing bars.
- Fibre composite poles with significant physical damage or king-bolt pull through.
- Pole reinforcements / securing bands with pitted / scaling rust or thinning of the cross-section.
- Rag-bolt mounting with pitted / scaling rust, broken baseplate or welds, concrete foundation broken away or cracked, or with 2 or more missing nuts.

1.2.12 Non-urgent defects shall be reported by external workers via the Ausgrid website. (https://www.ausgrid.com.au/In-your-community/Our-services/Pole-inspection).

2 Pole above ground condition assessment

2.1 General requirements

2.1.1 The above ground condition of all poles to be worked on shall be assessed prior to work commencing to determine pole support requirements.

2.1.2 Safety precautions shall be implemented in accordance with Annexure A prior to commencing the above ground assessment.

2.1.3 All advertising material and loose materials (for example, loose sapwood) reachable from ground level shall be removed to perform the condition assessment effectively.

2.2 Above ground condition assessment requirements

2.2.1 The above ground condition of all poles to be worked on (including private poles) shall be assessed by performing a visual inspection of the full length of the pole for defects (without climbing).

2.2.2 The visual inspection shall include examination of the pole for the presence of defects which include, but are not limited to, the following:

- Pole markings identifying the pole as conditionally serviceable or condemned (**Note:** pole markings are not installed on defective private poles), and
- Pole instability or foundation failure due to reduced depth in ground (refer to Clause B1 for pole disc heights), excavations in close proximity to the pole or open trenches within 1.5m of the pole, pole movement, poor ground conditions / pole lean (10 degrees or more), excessive pole loading and ineffective staying / reinforcing of the pole (unusually tight or loose conductors), and
- Damage to the pole, pole top structures and pole reinforcements due to fire (refer to Clause 1.2.1 for fire damaged CCA poles), vehicles / machinery, other third-party activities and natural events (for example, lightning, vegetation), and
- Degradation of the pole head, pole top structures (crossarms, bracing, insulators, pole caps) and attached overhead mains, and
- Degradation of the pole material, pole reinforcements and pole mountings.

2.2.3 Timber poles (including private poles) shall also be examined for active termites, or current termite treatment activity (indicated by a termite tag with all 3 segments attached in accordance with Annexure E). **Note:** termite tags are not installed on private poles.

2.2.4 The visual inspection for degradation of the pole material shall include, but is not limited to, the following defects:

- For timber poles (including pole head) – examination for loss of strength due to termites or other insects, rot, knot holes, splits, bites / checks, fungal decay, fruiting bodies, diameter reduction, weathering, burning and bending of the pole. Measure or estimate the diameter or width reduction when identified.
- For steel poles – examination for loss of strength due to corrosion, perforations, folds, dents, flattened sections or bending of the pole.
- For concrete poles – examination for loss of strength due to spalling (sections of concrete broken away), cracked or bulging concrete, exposed or rusted reinforcing bars, and bending of the pole.
- For fibre cement poles – examination for loss of strength due to missing / loose / weakened / cracked cement matrix, king-bolt ‘pull-through’, and bending of the pole.
- For fibre plastic (fibreglass) poles – examination for loss of strength due to UV-affected / folded / deformed resin matrix, unbound or exposed fibres, and bending of the pole.

2.2.5 The visual inspection for degradation of pole reinforcements shall include, but is not limited to, the following defects:

- For reinforcing nails, splints or sleeves – examination of the reinforcement and securing bands / bolts for loss of strength due to corrosion or thinning of the cross-section, and examination for tight fitting of the pole against the reinforcement.
- For rebutted poles (in addition to previous Clauses) – examination (including probing through inspection holes) for loss of strength due to termites, rot or fungal decay within or immediately

above the steel caisson and corrosion of the steel caisson. Clear out drain holes if they are blocked.

Note: In accordance with AS/NZS 3000, private timber or steel poles shall not be reinforced.

2.2.6 The visual inspection for degradation of rag-bolt or pile mountings shall include, but is not limited to, the following defects:

- For rag-bolt mountings - examination for loss of integrity due to reduced depth in ground, corrosion of bolts / nuts / baseplate, cracking of the concrete foundation / baseplate / welds, cracked or broken grouting and missing or loose nuts. Tighten loose nuts and replace missing nuts prior to work commencing.
- For pile mountings - examination for loss of integrity due to reduced depth in ground, corrosion of bolts / nuts and missing or loose nuts. Tighten loose nuts and replace missing nuts prior to work commencing.

2.2.7 The above ground condition of timber poles and steel poles, standards and columns shall also be assessed by sounding the pole for internal defects prior to work commencing as follows:

- For timber poles (including reinforced poles) – if there are no active termites or if the pole is not undergoing termite treatment, sound the pole with a ball pein hammer in accordance with Clause C2.1. For reinforced poles, thoroughly sound the pole in the vicinity of securing bands or bolts.
- For steel poles – if there are no dents, bending, folds or perforations, sound the pole in accordance with Clause C3.

2.2.8 The condition and security of access covers (where installed) shall be assessed. Refer to Clause 1.2.11 where defective access covers are identified.

2.2.9 Compare the above ground condition assessment outcomes against the pole support criteria in Clause 6.2 and the private pole report criteria in Clause 6.3.

2.2.10 Record (photograph) external defects on the pole and defects on reinforcements, pole top structures, pole attachments and overhead mains. Upload the photographs to the nominated Ausgrid location.

3 Pole loading assessment

3.1 General requirements

3.1.1 The loading of all poles to be worked on (including reinforced poles and private poles) shall be assessed prior to work commencing to determine pole support requirements.

3.1.2 Additional loading shall not be applied to timber poles reinforced with Ausmose Oz-C splints (refer to Clause B4.1). They shall be supported while work is performed to replace them.

3.1.3 Pole loading shall be assessed with approved design software where there is doubt about:

- the existing pole rating or pole loading, or
- pole loading due to the work being performed, or
- the pole or reinforcement rating, or
- the pole or reinforcement condition.

3.2 Pole loading assessment requirements

3.2.1 The existing loading for all poles to be worked on shall be assessed by performing a visual inspection of the pole and attached overhead mains (without climbing).

3.2.2 The visual inspection of loading on the existing pole structure and attached overhead mains shall include, but is not limited to, the following:

- Verifying pole disc details and pole rating.

- Verifying the rating of any reinforcing nails or splints.
- Examination of the existing pole top construction for crossarms, bracing or insulators which are bending or leaning due to tension from attached overhead mains.
- Examination of the existing attached overhead mains for span sag or tightness and span balance (similarities or difference in span lengths), and any effect they have on the pole (for example, bending the pole, causing pole lean).
- Examination of the effectiveness of existing pole support arrangements (for example, loose or corroded stay wires, reduced cover or corrosion on ground anchors, loose or degraded lashing rope).

3.2.3 The pole loading that will be applied due to the work being performed shall also be assessed. Causes of additional loading (considered as 'high stress work') include, but are not limited to, the following:

- People working from ladders, pole steps or pole platforms on the pole (particularly 'dynamic loading' when climbing, sawing / drilling or removing equipment near the head of the pole), or
- Altering the tension on existing overhead mains connected to the pole (for example, tightening spans, 'shock loading' of poles by cutting or dropping overhead mains without the use of tensioning devices) when the pole is not supported against the pull, or
- Removing existing overhead mains (excluding street lighting mains) or equipment when there are other conductors in tension on the opposite side of the pole, or
- Replacing or tensioning service lines on private poles, particularly termination poles such as 'A' poles (**Note:** replacement service lines on private poles shall be removed from the Ausgrid pole first and reconnected at the Ausgrid pole last, and tensioned at the Ausgrid pole), or
- Adding new overhead mains or network equipment (for example, tee-offs, air break switches, transformers, reclosers, pole mounted voltage regulators), telecommunications cables or equipment (particularly when the direction of the pole load is changed), or
- Adding new telecommunications cables or equipment.

3.2.4 Pole loading changes shall also be carefully assessed prior to performing work that is not typically considered 'high stress work' including, but not limited to, the following:

- Using a lugall, service puller or other similar device to take up tension and release a conductor for the purpose of creating slack to allow the insertion of a sleeve and/or replacing termination equipment (for example, insulators), or
- Untying conductors from a straight through pole where the load in adjacent bays is similar (ie. comparable span length, sag and conductor type/size) for the purposes of insulator or crossarm replacement., or
- Linework from an EWP, or
- Network control activities (for example, opening or closing links from a ladder), or
- Non-intrusive network maintenance activities (for example, reading substation, recloser or voltage regulator meters or operations counters), or
- Removing street lighting mains, or
- Removing or replacing service lines from serviceable Ausgrid poles, or
- Removing service lines from serviceable private poles (**Note:** service lines being removed from private poles shall be disconnected from the Ausgrid pole first), or
- Telecommunications work from a ladder (for example, working on power supplies).

3.2.5 Compare the pole loading assessment outcomes against the pole support criteria in Clause 6.2 and the private pole report criteria in Clause 6.3.

3.2.6 Record (photograph) existing pole loading defects, for example, tight mains or bending poles. Upload the photographs to the nominated Ausgrid location.

4 Pole below ground condition assessment

4.1 General requirements

4.1.1 The below ground condition assessment shall only be performed when the above ground condition and pole loading assessment indicates that it is safe to proceed.

4.1.2 The below ground condition of poles shall be assessed as follows prior to work commencing to determine pole support requirements;

- Determine whether a below ground assessment is required based on the work to be performed, the pole type and the above ground condition assessment.
- Determine whether the pole can be safely excavated.
- Initial (partial) excavation and below ground condition assessment.
- Full excavation and below ground condition assessment.
- Restore the excavation.

4.1.3 A below ground condition assessment shall not be performed on the following poles (including private poles);

- Timber poles which are not CCA treated and are less than 5 years old (based on the pole disc date – refer to Annexure B) unless the above ground assessment indicates a defect which extends below groundline, or
- Timber poles which are CCA treated and are less than 15 years old (based on the pole disc date – refer to Annexure B) unless the above ground assessment indicates a defect which extends below groundline, or
- Timber poles with active termites or which are under termite treatment (**Note:** termite tags are not installed on private poles), or
- Direct buried steel poles which are less than 5 years old unless the above ground assessment indicates a defect which extends below groundline, or
- Reinforced (nailed or splinted) timber poles, or
- Composite timber (rebutted) poles, or
- Concrete poles, or
- Fibre composite poles, or
- Rag-bolt or pile mounted poles, or
- Poles previously identified as defective or marked as conditionally serviceable or condemned (**Note:** pole markings are not installed on defective private poles), or
- Poles considered to be loaded close to or beyond their structural capacity (indicated by excessive lean or bending of the pole)

4.2 Safe to excavate criteria

4.2.1 Excavation shall not commence, or shall not continue, if the pole meets any of the following criteria;

- Pole stability is affected by, or suspected to be affected by, excavation of the pole, or
- For timber poles (including private poles greater than 200mm diameter) – the pole has active termites, reduced diameter of 10% or more from the original diameter on one side of the pole (20% across the whole pole), an internal defect, rot / fungal decay, or fruiting bodies.

- For timber private poles with a diameter less than 200mm or square section less than 175mm – the pole has active termites, reduced diameter of 10% or more across the whole pole, an internal defect, rot / fungal decay, or fruiting bodies.
- For steel poles (including private poles) – the pole has pitted / scaling rust, perforations, folds, bending or dents.

4.2.2 If a pole is identified as potentially unsafe based on the criteria in Clause 4.2.1 prior to excavation or during excavation:

- Cease excavation of the pole, and
- Immediately restore the excavation, and
- Report the potentially unsafe pole immediately to the nominated Ausgrid representative or the Ausgrid Emergency Line. The owner shall also be notified if the defect is identified on a private pole.

4.3 Below ground condition assessment

4.3.1 The below ground condition of the pole to be worked on shall be assessed by excavation and below ground visual inspection.

4.3.2 Poles (including private poles) shall initially be excavated to expose the pole material as follows (also refer to Clause D1):

- For unreinforced poles supporting overhead mains – excavate timber poles to a depth of 200mm or steel poles to a depth of 100mm in the neutral axis on one side of the pole.
- For unreinforced poles which do not support overhead mains – excavate timber poles to a depth of 200mm or steel poles to a depth of 100mm in the groundline area on one side of the pole, or directly under defects identified above ground.
- For sleeved steel ‘waterpipe columns’ – excavate around the full circumference of the column. Sleeved waterpipe columns shall not be excavated beyond a depth of 100mm below groundline under any circumstances.

Note: Some steel poles, standards or columns may have a protective epoxy coating below ground. This is designed to lengthen the life of the pole by protecting the galvanic coating under the epoxy. The epoxy coating shall not be removed or damaged.

4.3.3 The exposed below ground portion of the pole shall be visually inspected for the presence of defects which include, but are not limited to, the following:

- For unreinforced timber poles – examination for loss of strength due to termites or other insects, rot, splits, fungal decay, fruiting bodies or diameter reduction. The preservative bandage (if installed) shall be cut and removed to perform the examination (refer to the bandage handling requirements in Clause A12).
- For steel poles – examination for loss of strength due to corrosion / perforations, folds, dents or damage.

4.3.4 The below ground condition of unreinforced timber poles shall also be initially assessed for internal defects by sounding the exposed portion of the pole with a rounded point bar in accordance with Clause C2.2.

4.3.5 Full excavation of unreinforced timber poles and direct buried steel poles (excluding sleeved 6.5m waterpipe columns) shall be performed as follows only when the condition of the pole exceeds the safe to excavate criteria in Clause 4.2.1.

- Excavate to a depth of 350mm below groundline around the full circumference of the pole. Remove preservative bandages from timber poles (refer to Clause A12).
- For private poles - excavate to a depth of 200mm below groundline around the full circumference or all sides of the pole.

4.3.6 The fully exposed below ground portion of the pole shall be visually inspected for the presence of defects in accordance with Clause 4.3.3.

4.3.7 The condition of the fully exposed below ground portion of timber and steel poles shall also be assessed by sounding the exposed portion of the pole as follows;

- For timber poles (including reinforced poles) – sound the pole with a rounded point bar in accordance with Clause C2.2. Sounding shall be performed if active termites are identified as they have been disturbed by the excavation,
- For steel poles – sound the pole with the flat face of a hammer in accordance with Clause C3.

4.3.8 For timber poles identified with diameter reduction, measure or estimate the minimum below ground diameter of the pole, excluding any decayed timber detected by sounding.

4.3.9 The excavation shall be restored as follows when the below ground condition assessment has been completed;

- For timber poles, place all pieces of removed preservative bandage into the excavation or re-wrap the bandage around the pole if it has not been damaged and preservative product is still contained with the bandage.
- Restore the excavation in accordance with Clause D2. No part of the preservative bandage removed from timber poles shall be left exposed above groundline.

4.3.10 Compare the below ground condition assessment outcomes against the pole support criteria in Clause 6.2 and the private pole criteria in Clause 6.3.

4.3.11 Record (photograph) external defects on the pole. Upload the photographs to the nominated Ausgrid location.

5 Timber pole head condition assessment

5.1 General requirements

5.1.1 The upper portion and heads of timber poles (including private poles) shall be assessed where uncertainty exists about their condition as the pole is climbed or accessed.

5.1.2 The assessment shall be performed by authorised persons to determine whether it is safe to continue work on the pole.

5.2 Pole upper portion condition assessment requirements

5.2.1 The condition of the upper portion of the pole shall be assessed by performing a visual inspection for defects while climbing or accessing (for example, from an EWP) the pole.

5.2.2 The visual inspection shall include examination of the pole for the presence of external defects which include, but are not limited to, the following:

- Loss of timber strength due to termites or other insects, rot, knot holes, splits, bites / checks, fungal decay, fruiting bodies, diameter reduction, weathering, burning and bending of the upper portion of the pole.
- Damage or loss of timber strength around attachment holes which allow bolts to pull through or attachments to become loose / at risk of falling from the pole.
- Loss of timber strength due to a pipe / hollowing within the pole head.

5.2.3 When pole head splits are identified, assess whether the splits:

- Extend partially or fully across the diameter of the pole or pipe wall.
- Pass through the centre of the pole.
- Are in-line with attachment bolts.
- Extend down to, or past, attachment bolts.

- Are greater than 10mm wide at any point or multiple smaller splits which extend through the full diameter of the pole or pipe wall.

5.2.4 The condition of the upper portion shall also be assessed by sounding the pole for internal defects with a ball pein hammer in accordance with Clause C2.1.

5.2.5 At each identified or suspected internal defect location and if appropriately trained, perform an internal inspection using a 14mm drill where the sounding indicates the smallest (least) wall thickness. Measure the wall thickness at each location drilled.

Note: Poles owned by other authorities shall not be drilled for internal inspection

5.2.6 When a pipe is identified in the pole head:

- Measure the diameter of the pole head and the pipe.
- Measure the smallest (least) thickness of sound timber in the pipe wall.

5.2.7 Compare the timber pole head condition assessment outcomes against the pole support criteria in Clause 6.2 and the private pole criteria in Clause 6.3.

5.2.8 Record (photograph) defects on the upper portion and head of the pole. Upload the photographs to the nominated Ausgrid location.

6 Pole support and reporting criteria

6.1 General requirements

6.1.1 The outcomes of the above ground condition assessment, pole loading assessment and below ground condition assessment (where performed) of each pole to be worked on shall be compared against;

- the criteria in Clause 6.2 to determine whether the pole (excluding private poles) shall be supported or stayed when the work is being performed.
- against the criteria in Clause 6.3 to determine whether the private pole shall be reported and the owner notified due to identified defects.

6.1.2 The above ground condition (including the upper portions of timber poles) and loading of the pole shall also be continually assessed and compared against the criteria in Clause 6.2 and Clause 6.3 as the work progresses.

6.2 Pole support criteria

6.2.1 Poles with the following outcomes from the pole condition assessment and pole loading assessment shall be supported or stayed (excluding private poles) in accordance with Clause 1.2.8 while the work is performed.

Table 1: Pole support or staying criteria for all poles

Pole type	Inspection / Assessment Outcome
Any pole	Pole has previously been assessed and marked as defective.
	Pole is leaning or bending more than 10°.
	Evidence of pole instability, excavation in close proximity, pole movement or reduced depth in ground.
	The overhead mains attached to the pole are tight or unbalanced.
	Pole condition cannot be fully or effectively assessed due to obstructions or other reasons.

	Pole is not safe to excavate.
	Pole loading due to the work is likely to exceed the pole / reinforcement rating or condition.

Table 2: Pole support or staying criteria for timber, steel, concrete or fibre composite poles, standards or columns

Pole type	Inspection / Assessment Outcome
Timber poles	Active termites identified or pole is under termite treatment.
	Evidence of fruiting bodies or fungal decay.
	Any reduction in the pole diameter that exceeds 20% of the original diameter (or 10% on one side of the pole) due to rot, bites, termites, fire or damage. **Note:** CCA poles damaged by fire shall be wrapped (refer to NEG-OH09).
	An internal defect has been identified or is suspected.
	Pole head splits greater than 10mm wide which extend fully through the pole either: - in line with attachment bolts and which extend to (or past) the attachment bolts, OR - at right angles to the attachment bolts and extends more than 300mm past any attachment bolt. **Note:** The pole head shall be supported while work is performed.
	Pole head minimum wall thickness (where measured) is less than 40mm or pole head pipe is greater than half the diameter of the pole with multiple splits through the sound timber. **Note:** the pole head shall be supported while work is performed.
Steel poles, standards or columns	Dents, folds, flattened sections or bending (before or after sounding).
	Scaling / pitted rust, perforations (before or after sounding) or internal rust falls when sounded.
Concrete poles or columns	Missing / loose / weakened concrete that penetrates beyond the steel reinforcing.
	Corroded steel reinforcing.
	Loose / weakened / cracked concrete covering more than 25% of the pole circumference.
	Cracked concrete due to pole top load bending the pole.
Fibre composite poles	Missing / loose / weakened / damaged cement or resin matrix (including in the area around kingbolts).
	Cracked concrete due to pole top load bending the pole.

Table 3: Pole support or staying criteria for rag-bolt / pile mounted poles or reinforced poles

Pole type	Inspection / Assessment Outcome
Rag-bolt or pile mountings	Rag-bolt or pile mountings have scaling or deeply penetrating rust on the bolts, nuts or base plate, or cracked concrete foundation / base plate / welds.
	Rag-bolt mounting has 2 or more missing nuts, pile mounting has 10% or more missing nuts and nuts cannot be replaced prior to work.
Reinforced poles	Reinforcing nail, splint or sleeve has scaling / pitted rust or perforations, or loss of surface area (thinning of the cross-section).
	Any securing band or bolt has scaling or pitted rust, securing band is missing or loose, or pole is not held securely by reinforcement.
	Additional load to be applied to a timber pole reinforced with an Ausmose Oz-C splint.
	Strength rating cannot be determined through examination of the reinforcement or from SAP
	Composite timber pole has an internal defect greater than half the diameter or fungal decay within or immediately above the caisson.

6.3 Private pole report criteria

6.3.1 Private poles with the following outcomes from the pole condition assessment and pole loading assessment shall be reported in accordance with Clause 6.3.2.

6.3.2 Defective private poles shall be reported to:

- The nominated Ausgrid representative (by Ausgrid personnel / contractors in emergency situations), or
- The Ausgrid Emergency Line (by external workers), and
- The owner of the private pole (by Ausgrid[1] and external workers).

Table 4: Private pole reporting criteria

Pole type	Inspection / Assessment Outcome
Any private pole	Missing or severely damaged access covers, or loose or damaged attachment to pole, such as insulators, crossarms, switchboards, luminaires or earthing connections.
	Pole is leaning or bending more than 10°.
	Evidence of pole instability, excavation in close proximity, pole movement or reduced depth in ground.
	The overhead mains attached to the pole are tight or unbalanced.
	Pole condition cannot be fully or effectively assessed due to obstructions or other reasons.

[1] Ausgrid personnel shall notify owners of defective private poles using an A460 ‘Customer Installation / Private Mains Defect Report’ form.

	Pole is not safe to excavate.
	Pole reinforcement installed in contravention to AS/NZS 3000.
	Pole loading due to the work is likely to exceed the pole / reinforcement rating or condition.
Timber poles	Active termites identified.
	Evidence of fruiting bodies or fungal decay.
	For poles greater than 200mm diameter - any reduction in the pole diameter that exceeds 20% of the original diameter (or 10% on one side of the pole) due to rot, bites, termites, fire or damage.
	For poles less than 200mm diameter or 175mm square section - any reduction in the pole diameter that exceeds 10% of the original diameter due to rot, bites, termites, fire or damage.
	An internal defect has been identified or is suspected.
	Pole head splits greater than 10mm wide which extend fully through the pole either: - in line with attachment bolts and which extend to (or past) the attachment bolts, OR - at right angles to the attachment bolts and extends more than 300mm past any attachment bolt.
	Pole head minimum wall thickness (where measured) is less than 40mm or pole head pipe is greater than half the diameter of the pole with multiple splits through the sound timber.
Steel poles, standards or columns	Dents, folds, flattened sections or bending (before or after sounding).
	Scaling / pitted rust, perforations (before or after sounding) or internal rust falls when sounded.
Concrete poles or columns	Missing / loose / weakened concrete that penetrates beyond the steel reinforcing.
	Corroded steel reinforcing.
	Loose / weakened / cracked concrete covering more than 25% of the pole circumference.
	Cracked concrete due to pole top load bending the pole.
Fibre composite poles	Missing / loose / weakened / damaged cement or resin matrix (including in the area around kingbolts).
	Cracked concrete due to pole top load bending the pole.
Rag-bolt mountings	Rag-bolt mounting has scaling or deeply penetrating rust on the bolts, nuts or base plate, or cracked concrete foundation / base plate / welds.
	Rag-bolt mounting has 2 or more missing nuts and nuts cannot be replaced prior to work.

Annexure A: Safety Precautions (extracted from NS145)

A1 General Requirements

The following information has been extracted from Network Standard NS145 Pole Inspection and Treatment – minor amendments have been made to reflect the requirements of this Network Standard (NS146).

Poles are installed in all types of terrain, from suburban areas to mountainous terrain and coastal marine areas. It is not possible for this Network Standard to account for all specific safety precautions for every situation.

If at any stage during the inspection it is considered that the condition of a pole is potentially dangerous, or if the pole appears to be loaded close to or beyond its available capacity or in danger of immediate collapse, work shall cease. The work site shall be made safe and the situation immediately reported the pole to the nominated Ausgrid representative or the Ausgrid Emergency Line (13 13 88) so appropriate action can be taken. Owners of private poles shall also be notified where these circumstances are identified.

A2 Ausgrid's Emergency Line

The results of some inspections can reveal the existence of a hazardous situation on the customer's premises or Ausgrid's network, or the possibility that such a situation exists.

In such circumstances, as detailed in the sections that follow, the worker shall immediately contact the nominated Ausgrid representative or Ausgrid's Emergency Line when electrical safety hazards or when hazardous poles are identified. Owners shall also be notified of defects on private poles.

Upon contacting the nominated Ausgrid representative or Ausgrid's Emergency Line due to a hazardous situation, work shall cease. Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed, or Ausgrid staff attend to remove the hazard, or until directed otherwise by Ausgrid staff.

A3 Asbestos-Containing Paint

Work (other than visual inspections) shall not occur on poles confirmed or suspected as containing asbestos paint except for emergency situations. Work under emergency situations shall be performed with appropriate controls in place to manage exposure to asbestos (for example, asbestos Level 3 PPE).

The confirmed instances of remnants of friable asbestos paint on Ausgrid's poles have occurred within the areas of Rockdale, Kogarah, Hurstville and Bexley however, poles containing asbestos may be present in other areas. Confirmed instances include:

- poles with a band of white paint at ground level
- poles with 'grey' paint
- poles with 'black' paint at ground level

All poles tested have been recorded on the Asbestos Register and in GIS including those where no asbestos was present. Poles confirmed as containing asbestos paint are typically prioritised for replacement. Where a pole is found with 'grey', 'white' or 'black' paint and it is not listed in the Asbestos Register or GIS, contact the Hazardous Materials Hotline on 02-9394 6961 to arrange testing before planned work is undertaken.

Figure 1 – Examples of Poles with Remnant Friable Asbestos Paint

A4 CCA and Creosote treatment

Appropriate health precautions shall be used when working on CCA treated poles and poles treated with creosote.

Leather gloves shall be worn when making contact with the pole. Safety glasses and a disposable half-face particulate filter respirator shall also be worn when drilling holes in CCA treated poles due to the risk of pressurised liquid solution spraying from voids within the pole.

Work on fire damaged CCA poles shall be performed in accordance with NEG-SE09. Work shall not be performed on poles which are burning or smouldering. Smoke fumes and contaminated charred material shall be avoided – stay well clear and upwind of the pole. Immediately contact the nominated Ausgrid representative or Ausgrid's Emergency Line. CCA poles with previous fire damage but are not smouldering or burning shall be reported to the nominated Ausgrid representative.

Additional information regarding CCA treated poles is available in NEG-SE09.

A5 Synthetic mineral fibres

Appropriate health precautions shall be used when working on fibre composite poles where the synthetic mineral fibres have become exposed.

Disposable overalls, safety goggles, leather gloves and a disposable half-face particulate filter respirator shall be worn if contact needs to be made with fibre composite poles with exposed fibres.

A6 Falling Objects

Appropriate personal protective equipment (e.g. hard hat) shall be used when working at the base of a pole. Workers shall also be aware that falling objects present a hazard to other parts of the body.

A pre-work visual inspection shall be conducted to identify above ground hazardous objects such as:

- loose sapwood
- loose streetlights
- loose nuts
- loose vertical construction
- loose pole caps

- tools left on crossarms
- cracked, loose or damaged insulators.

Any immediately dangerous above ground hazards shall be reported to the nominated Ausgrid representative or Ausgrid's Emergency Line. Owners of private poles shall also be notified where these defects exist.

Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard.

A7 Hazardous Voltages

Workers shall be aware of voltage gradients (differences in voltage) that can exist on or near a pole (both above ground and below ground) and which can potentially cause electrical safety hazards. Hazardous voltages may occur due to damage or degradation of the pole and overhead mains or underground cables, including;

- conductors not being properly fixed to insulators (eg broken tie wires);
- low ground clearance of conductors;
- broken or missing earth wires, or loose earth connections;
- cracked or damaged insulators;
- conductive foreign objects (eg trees contacting overhead mains, fencing wires, metal chains);
- underground cable damage or degradation.

Workers shall take precautions to safeguard themselves and others against inadvertent contact with hazardous voltages.

Testing of each pole and any attached conductive structure shall be performed according to Ausgrid's Electrical Safety Rules to confirm the absence of hazardous voltages prior to initial contact with the pole or any attached conductive structure.

Any hazardous voltages identified shall be immediately reported to the nominated Ausgrid representative or Ausgrid's Emergency Line. Owners of private poles shall also be notified where these hazards exist.

Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard or until directed otherwise by Ausgrid staff.

A8 Visual Inspection of Earth Wires

Earth wires form part of an earthing system which can become damaged or degraded over time.

Prior to making initial contact with the pole, workers shall visually inspect above ground sections of earth wires connected to primary assets (for example, earth connections for overheads mains, UGOH's, air break switches, pole transformers or reclosers) to assess its condition and whether the earth wire is intact. Earth wires shall then be tested according to Clause A7 to confirm the absence of hazardous voltages.

If earth wires connected to primary assets are present on a pole, the below ground condition of the earth wire shall also be assessed and continuously monitored by visual inspections and retested according to Clause A7 to confirm the absence of hazardous voltages during and after excavation.

Workers shall not attempt to tighten loose earth connections or re-join broken / missing earth wires. Full phase to earth voltage may exist between the severed ends.

Any loose earth connections or broken / missing earth wires identified shall be reported immediately as a dangerous electrical safety hazard to the nominated Ausgrid representative or Ausgrid's Emergency Line. Owners of private poles shall also be notified where these defects exist.

Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard or until directed otherwise by Ausgrid staff.

A9 Single Wire Earth Return (SWER) Substation Poles

Work on any SWER Transformer poles shall only occur while the feeder is out of service and under access permit conditions. This work shall be completed in conjunction with Ausgrid's annual inspection of SWER pole earthing installations and in the presence of a member of Ausgrid's staff authorised to carry out such earthing installation inspections.

A10 Insufficient Depth in Ground

Road re-alignment work, landscaping or excavations, subsidence or erosion can result in a pole having less depth in ground compared to when it was originally installed. This can severely reduce the stability of the pole and pole movement may be evident. Refer to Clause D1 for further details. Clause B1 also describes the correct height of pole discs, which are a good indicator of pole sinking depth (refer to NS128 for the correct pole sinking depths).

Poles that have evidence of movement in the ground, excessive lean (10 degrees or more), 350mm less depth in the ground than originally installed or which appear to be in danger of collapse shall be immediately reported to the nominated Ausgrid representative or Ausgrid's Emergency Line and inspected before any excavation is carried out. Owners of private poles shall also be notified where these defects exist.

Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard or until directed otherwise by Ausgrid staff.

A11 Excavation Precautions

Pole excavation shall only be performed where the above ground inspection indicates that it is safe to proceed according to the criteria in this Standard. Extreme caution shall be exercised when excavating around a pole, particularly those poles that have cables (UGOH's) and other items attached to them. Contact with cables shall be minimised.

Workers shall use non-conductive tools or tools with non-conductive handles, or wear insulating gloves, when electrical assets are located. Underground cables shall be tested according to Clause A7 prior to, and after, excavation to confirm the absence of hazardous voltages.

Where a cable is observed as having damaged insulation (e.g. where the outer covering is partially removed exposing the underlying material) it shall be immediately reported to the nominated Ausgrid representative or Ausgrid's Emergency Line (13 13 88). Owners of private poles shall also be notified where these defects exist. Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard or until directed otherwise by Ausgrid staff.

Refer to Clause D1 for further details on precautions to be taken when excavating poles.

A12 Pesticide Precautions

The risks associated with the application of pesticides shall be managed by:

- Restricting the application of pesticides to trained and authorised workers;
- Handling pesticides according to the product label, the Safety Data Sheet (SDS) for the product and the precautions detailed below;
- Ensuring that bandages and wraps are installed with no parts appearing above ground;
- Applying the product strictly according to the manufacturer's product label requirements and any guidance provided by this Standard;
- Wearing PVC chemical resistant gloves when handling Bioguard wraps or Polesaver rods;
- Wearing oil resistant gloves and boots when handling Ausplast wraps;

- Washing clothing worn when handling Ausplast wraps after each days use.

A13 Copper Napthenate (CN) Timber Oil Precautions

The risks associated with the application of CN Timber Oil (Copper Napthenate paint) shall be managed by:

- Wearing synthetic rubber or PVC gloves and eye protection when handling or applying CN Timber Oil.
- Only applying CN Timber Oil with a brush.

Annexure B: Information About Ausgrid Poles (extracted from NS145)

B1 Finding the Pole Disc

The positioning of the identification disc on Ausgrid timber poles is as follows:

B1.1 Newcastle and Hunter areas (prior to March 1997)

Discs are fitted 2 metres from nominal groundline, which is 2 metres above ground when the pole is sunk to the standard sinking depth stipulated for that size pole in the Electricity Association specification drawing EAS 111.

B1.2 Sydney and Central Coast areas (prior to March 1997)

Discs are fitted four metres from the butt. In the 'Mackellar County Council' district (Sydney Northern Beaches area) poles were historically marked with a 'T' shaped notch 10 feet (approximately 3 metres) from the base of the pole.

B1.3 All Ausgrid areas (March 1997 to 2013)

Discs are fitted four metres from the butt.

B1.4 All Ausgrid areas (2014 to 2020)

Discs are fitted 2 metres from nominal groundline, which is 2 metres above ground when the pole is sunk to the standard sinking depth stipulated for that size pole in the Australian Standard AS3818.11.

B1.5 All Ausgrid areas (From 2021)

Discs are fitted four metres from the butt.

B2 Types of Pole Discs

B2.1 Poles 1974 Onwards

Poles purchased since 1974 are fitted with an aluminium identification disc, recessed into the timber, 4 meters from the butt.

B2.2 Pre 1982 Discs

Until 1982, pole sizes were designated only by length and application. High strength poles were termed 'heavy'. The discs were 40mm in diameter and included information such as length, year of purchase and timber variety.

An example of a pre-1982 disc is shown below. This disc shows an 11 metre, heavy grey ironbark pole purchased in 1979.

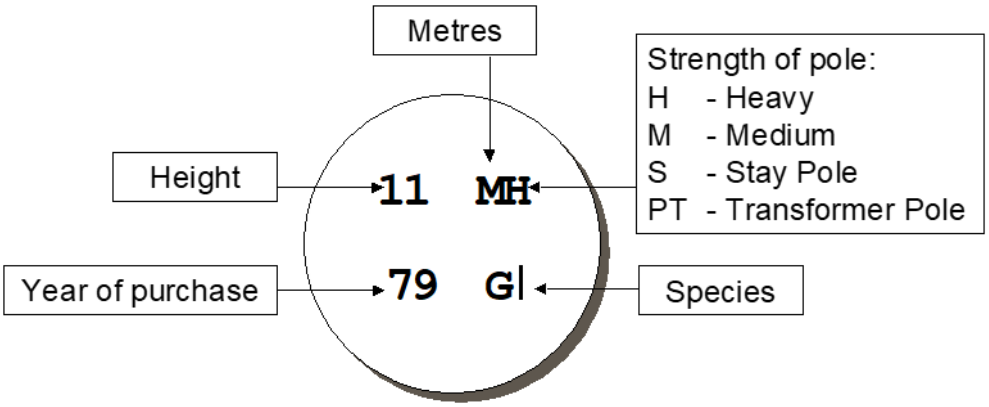

Figure 2 – Example of a pre-1982 pole disc

B2.3 1982 - 1988 Discs

Kilonewton poles were introduced in 1982. The new identification discs were 40mm in diameter.

An example of a 1982 - 1988 disc is shown below. This disc shows a 15.5 metre grey ironbark pole rated at 12kN, purchased in 1982.

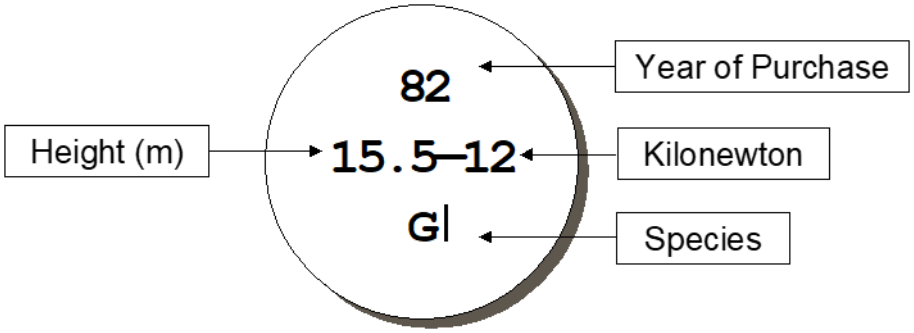

Figure 3 – Example of a 1982 - 1988 pole disc

B2.4 1988 Onwards Discs

A 50mm diameter disc was introduced in 1988 to enable more information to be recorded.

An example of a 1988 onwards disc is shown below. The disc shows a 9.5 metre tallowwood pole rated at 4 Kilonewton purchased in 1989. As there is no code, you can assume that the pole has not been fumigated.

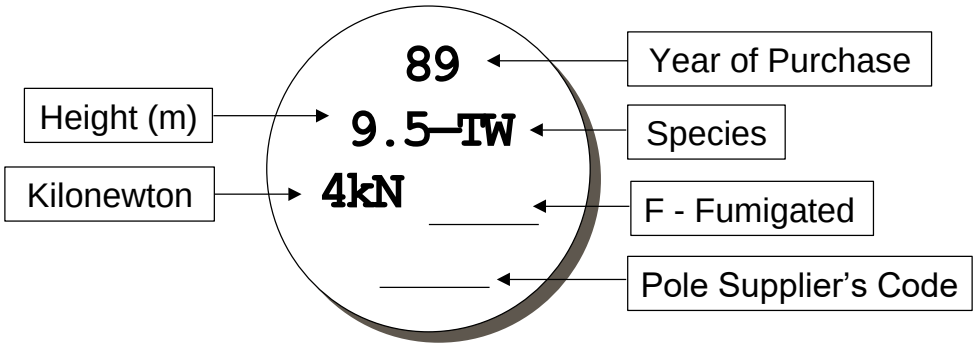

Figure 4 – Example of a pole disc from 1988 onwards

A number of disc options also became available to record additional information on the disc. Examples of these options are shown below.

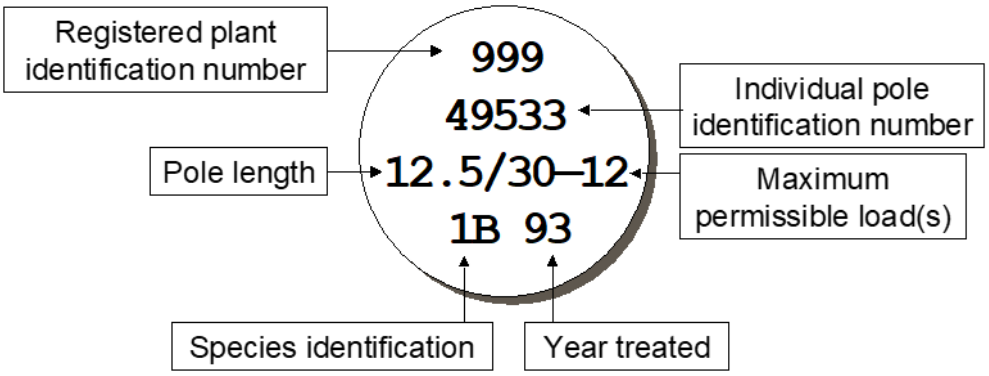

Figure 5 – Example of a pole disc from 1988 onwards (Option 1)

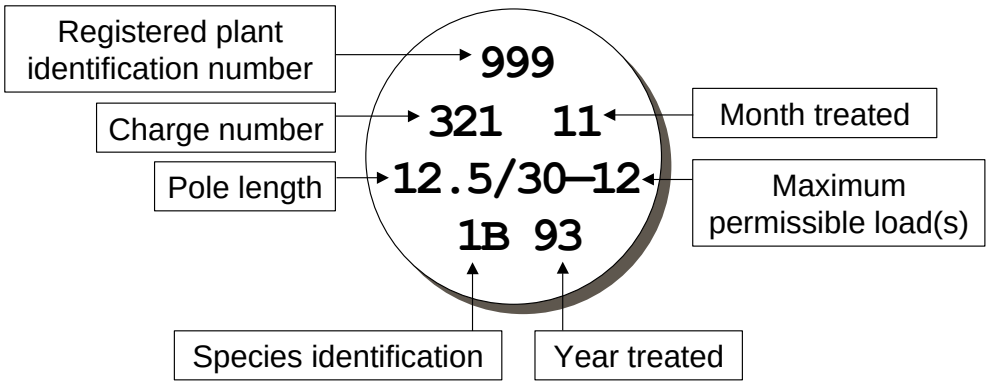

Figure 6 – Example of a pole disc from 1988 onwards (Option 2)

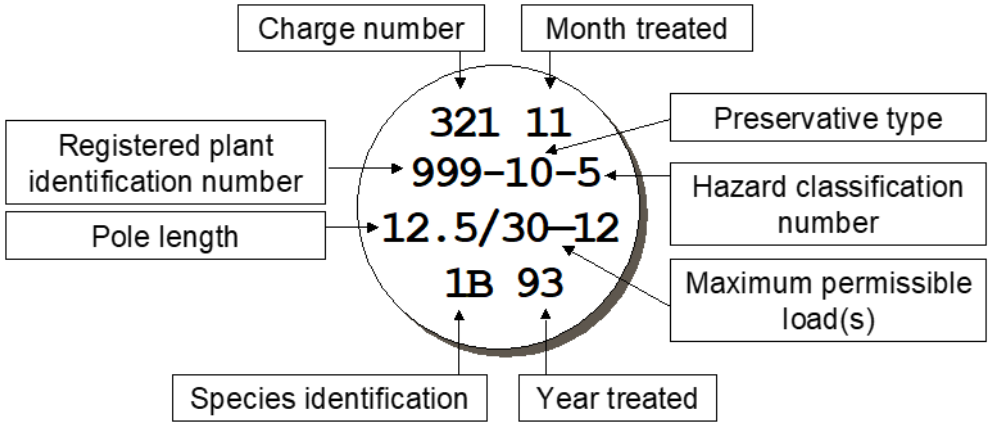

Figure 7 – Example of a pole disc from 1988 onwards (Option 3)

B2.5 Concrete Pole Disc

A diagram of a concrete pole disc is shown below.

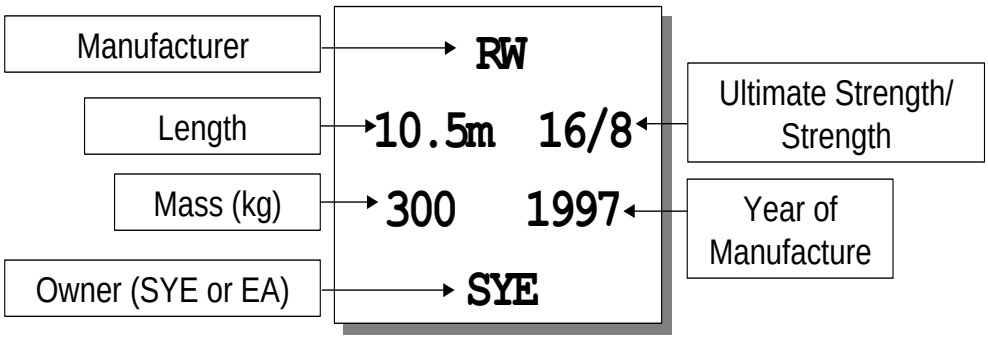

Figure 8 – Example of a concrete pole disc

B2.6 Abbreviations used on Discs

A sample of the abbreviations used on the discs include:

m = Metre
H = Heavy
BB = Blackbutt
GI = Grey Ironbark
SG = Spotted Gum

M = Medium
S = Stay Pole
PT = Transformer Pole

BS, RS, WS, YS = Stringybark
GB = Grey Box
GG = Grey Gum
GM = Gympie Messmate

SY, SO = Blue Gum
TW = Tallowwood
WM = White Mahogany

For a complete list, refer to the User Guide Annexure in the SAP Training Manual.

In the northern beaches area of Sydney, poles were once marked with a 'T' shaped notch 10 feet from the base of the pole which is a useful indicator for determining depth in ground.

B3 Pole Species, Treatments and Properties

Ausgrid currently uses two types of timber poles:

- Desapped Durable Species timber poles in very limited numbers, and
- Full length Copper Chrome Arsenate (CCA) Pressure Impregnated timber poles.

Ausgrid uses durability Class 1 and Class 2 timbers for power poles.

Many timber poles on the Ausgrid system have been treated with Creosote at some stage in their life. Creosote is a by-product from the production of coke. It contains a number of chemicals that are toxic to fungi and act as a termite repellent.

Almost all timber poles purchased since the early 1990's are full length CCA pressure impregnated poles.

B3.1 Desapped Durable Species Timber Poles

These poles have all (or most of) their sapwood removed and are Durability Class 1 species only. They are machined to remove their sapwood because it is not durable and have an octagonal (8-sided) appearance for a length of 4.5 m from the butt and are round dressed (i.e. 16-sided) for the remainder of their length. They are the strongest and most durable varieties of the eucalyptus (gum) family.

The durability of these poles comes from the chemical qualities of their heartwood, however their sapwood is not naturally protected. This sapwood when left untreated degrades rapidly and must not be included in pole strength calculations. However natural round timber poles with all of the sapwood still remaining and which have not been pressure impregnated over their full length can also be found in service in some areas.

B3.2 Full Length Pressure Impregnated Timber Poles

These poles are debarked only with all the sapwood remaining. Full length pressure impregnation treatment is applied to these poles to raise their durability. The preservation treatment can only penetrate the sapwood, the heartwood being impervious to this type of treatment. The treatment fully penetrates the sapwood thereby making it highly durable and therefore allowing it to be included in the pole's strength calculation. The sapwood is commonly impregnated with one of the following treatments:

B3.3 Copper Chrome Arsenate (CCA)

Creosote - has some advantages over CCA oxide as it reduces splitting in poles and renders the pole somewhat fire resistant. Pigmented Emulsified Creosote (PEC) treated poles, of regal species timber are in use in tidal areas where they could be subject to marine borer attack. These poles have been debarked but not desapped, and for additional protection are wrapped with Denso marine products between the high and low tide marks.

B4 Pole Reinforcements

B4.1 Poles Reinforced with Splints

Two types of reinforcing ‘splints’ have been installed on Ausgrid poles – ‘Oz C’ splints (supplied by Ausmose in the 1990’s) and ‘Osmo-C-Truss’ or ‘Osmo-C2-Truss’ splints (supplied by Osmose / Logsys Power Services commencing ~2023).

The Ausmose Oz C Splint is a steel ‘C’ section channel made from 6mm thick galvanised steel. They vary in length from 3.1 to 3.4 metres and are secured to the pole using four or more 52mm wide galvanised steel bands. Poles reinforced with Ausmose Oz C splints require at least 25% residual strength below groundline to provide the required support for the pole.

Figure 9 – Example of an Ausmose Oz-C splinted reinforced pole

The Osmose (Logsys) ‘Osmo-C-Truss’ or ‘Osmo-C2-Truss’ splints are of similar appearance and design to Ausmose Oz C splints however, the splints are embossed vertically along the above ground length of the splint with the splint details and a label for the splint details is attached to the pole above the splint (refer to Figure 10). Osmo-C-Truss splints are typically used for poles with a large diameter and Osmo-C2-Truss splints are used for typical distribution poles due to their lighter weight design.

Figure 10 – Examples of Osmose Osmo-C-Truss embossed details and pole label

These poles are unlikely to suffer timber failure above the reinforcement. Usually, the below ground section of the pole will degrade first resulting in the pole exhibiting an abnormal lean if the attached load is unbalanced or during wind gusts. The securing bands are designed not to hold the pole absolutely rigid so as to allow some movement rather than transferring all the stress to the section of the pole near the top of the reinforcement.

When the pole suffers below ground timber failure it must be replaced, however the pole cannot fall to ground and the necessity for replacement is not urgent unless the pole head movement may create a dangerous situation due to the proximity of traffic or reduction in conductor clearances.

Timber poles reinforced with Ausmose Oz C splints shall be marked as a defective pole after any inspection, irrespective of the inspection results, and shall be prioritised for replacement.

B4.2 Poles Reinforced with Nails

Two types of reinforcing ‘nails’ have been installed on Ausgrid poles – ‘RFD nails’ (supplied by UAM commencing in the 2000’s) and ‘Powerbeam’ nails (supplied by Genus PFA commencing ~ 2023). Powerbeam nails superseded RFD nails as the preferred nailing reinforcement option.

RFD nails are pressed steel section channels made from 6mm or 8mm thick galvanised steel. They vary in length from 2.4 to 3.15 metres long and are secured to the pole using four galvanised steel bolts. Poles reinforced using this product are capable of supporting twice the pole rating with no sound timber at groundline.

The securing bolts of RFD nails rigidly hold the pole in place therefore, no below ground pole inspection is considered necessary, other than an examination of the steel reinforcement to check for rust. However, because the pole can remain in service with no sound timber at groundline, care must be taken when inspecting the above ground section of the pole.

Figure 11 – RFD nail secured with bolts

Powerbeam nails are now used for nail reinforcing. Powerbeam nails are pressed steel section channels made from thick galvanised steel. They vary in length from 2.4 to 3.15 metres long and are secured to the pole using four galvanised steel bolts.

Powerbeam nails may also be secured to the pole using 2 to 4 galvanised steel bands and are considered to be ‘splinted’ poles. Poles reinforced using Powerbeam nails are capable of supporting twice the pole rating with no sound timber at groundline.

Figure 12 – Powerbeam nail secured with bolts

Figure 13 – Powerbeam nail secured with bands

When inspecting nailed poles, particular care shall be taken around the top securing bolts to ensure degradation does not continue in this section of the pole resulting in failure near the top of the reinforcement.

B4.3 Composite Timber Poles

Composite timber poles consist of a timber pole that has the section from a minimum of 300mm above groundline to the bottom of the pole, replaced with a steel reinforced concrete stub and a sliding steel sleeve, or a concrete filled steel caisson (steel tube partially filled with concrete).

In both cases the timber pole is 'joined' to the concrete filled steel tube, or concrete stub with sliding steel tube, by placing the machined down section of the pole into the steel tube (sliding or fixed). The quantity of remaining composite timber poles is small as many have been replaced since the time that they were originally installed.

Figure 14 – Example of a composite timber pole

The advantage of the concrete butt was that the pole did not have to be lifted as high, but it was more expensive. Use of a caisson necessitated the pole being lifted 0.8m to 1.35m so that it could be lowered into the caisson. There were approximately a dozen different sizes of replacement butts originally installed depending on the size and rating of the pole to be rebutted.

Composite timber poles are inspected visually for termites and fungal decay in a manner similar to timber poles. In addition, the inspection hole in the steel tube near the bottom of the pole must be cleared to allow water to drain out.

Composite timber poles shall be marked as a defective pole after any inspection, irrespective of the inspection results, and shall be prioritised for replacement.

B5 Fire Protection of Timber Poles

Fire mesh manufactured by Genics is being installed as a protective barrier against fire damage on selected timber poles. This product consists of a fibreglass mesh with a fire-resistant coating that allows the pole to ‘breathe’ under normal circumstances. When the mesh is affected by fire or extreme heat, the coating expands to fill the spaces in the mesh - this protects the portions of the pole covered by the mesh.

Genics fire mesh is supplied in rolls 900mm wide and is cut to size on site. It is installed around the full circumference of the pole from 200mm below groundline to approximately 1.5m above groundline (2 full wraps with a 50mm overlap between the wraps) and is secured in place with Tek screws. The mesh can be shaped to cover pole attachments such as UGOH’s or reinforcements.

The mesh can be pulled back, removed, cut or drilled to perform an inspection of the pole. The mesh shall be reinstalled and re-secured to its original state when the inspection has been completed – this can involve patching and securing an additional small piece of the mesh to the

pole to maintain the protective barrier when the mesh has been altered. Sounding of the pole can be performed with the mesh in place.

Refer to Technical Guide T0150 for further information.

Figure 15 – Examples of Genics fire mesh installed on timber poles

Figure 16 – Examples of partially removing or cutting Genics fire mesh for pole inspection

B6 How to Determine a Pole's Age for the Purpose of Maintenance

A pole's age shall be determined by the disc 'year' value only. The 'month' shall be ignored. For example, a CCA pole with a disc date of 2010 shall not be excavated in 2025, but excavation would be required if the inspection fell in or after 2026 (must be over 15 years old). Similarly, an

untreated timber pole with a disc date of 2020 would not be internally inspected in 2025, but internal inspection would be required if inspection fell in or after 2026 (must be over 5 years old).

Annexure C: Sounding Poles

C1 General Requirements

Timber poles and steel poles shall be sounded as part of the above ground inspection, and again as part of the below ground inspection, with the following exceptions:

- Sounding of timber poles shall not be performed when active termites have been identified or are suspected during the above ground inspection or when the pole is being excavated, or if the pole is undergoing termite treatment.
- Sounding of steel poles, standards or columns shall not be performed if dents, bending, folds or perforations have been identified during the above ground inspection or when the pole, standard or column is being excavated. Where sounding creates a dent, fold or perforation within the steel material, further sounding or inspection of the pole shall not proceed.

Poles shall be sounded sufficiently to detect any defect present. Where timber poles or steel poles, standards or columns have external timber or steel above ground or below ground that is in 'as new' condition a reduced amount of sounding may be appropriate. However, it is responsibility of the person performing the sounding to make sure sufficient sounding is performed to detect all defects in the inspection area.

The following information has been extracted from Network Standard NS145 Pole Inspection and Treatment – amendments have been made to include the requirements of this Network Standard (NS146) for sounding of the heads of timber poles.

C2 Guidance on Sounding Timber Poles

Sounding of timber poles above groundline shall be performed with a ball pein hammer. Sounding of timber poles below groundline shall be performed with a ball pein (where it is practical to do) when the pole is partially excavated, and then with a rounded point bar when the pole is fully excavated. When performing sounding of a timber pole, concentrate on:

- The sound that is developed.
- The amount the hammer or rounded point bar rebounds. This can also be described as the 'feel' of the pole.
- Whether or not the rounded point bar penetrates through the outer timber into an internal defect.
- Using a rigorous and methodical process to make sure defects are not missed.

C2.1 Guidance on the Use of a Ball Pein Hammer

The ball of a 16oz / 450g (or heavier) ball pein hammer shall be used to sound the above ground portion of wood poles as well as that area at and just below groundline where it is practical to do because it generates a more consistent sound regardless of the angle at which the ball strikes the pole. The weight of the hammer is important for the feel and sound of the centre of the pole as well as for the heartwood condition behind decayed or loosened sapwood. Tools other than a ball pein hammer, such as a flat faced hammer, or the back of an axe, shall not be used for sounding.

The following guidance shall be followed when using a ball pein hammer:

- Test the timber pole by striking it firmly.
- A good pole will 'ring' or resonate when correctly struck with a hammer. The hammer blow will generate a distinctive solid sound, a sharp 'whack' or hard 'tap', and a noticeable rebound of the hammer when struck against solid timber.
- A degraded pole will not normally 'ring' or resonate when struck. Instead, it will give a dull 'thud' or a soft 'thump' sound, or a distinctly 'hollow' or 'drummy' sound. There may only be a small rebound of the hammer, or no rebound at all. The hammer may become embedded in the timber of poles in very poor condition.

- Where the timber surface is affected by minor decay it will be necessary to hit the pole harder in order to compress the decayed timber and generate an indicative sound. Where a 'good' sound cannot be generated this generally indicates a defect. Loose sapwood will generate a defective sound and further inspection will be needed to confirm it is only loose sapwood giving the bad sound.

Sounding prior to excavation (above ground sounding) shall extend from groundline (with additional focus on the portion within 50mm of groundline) to as high as can comfortably be reached (generally 2m above groundline). To sound a pole so that an internal defect is not missed it is necessary to perform at least 8 soundings (strikes) around the circumference of a round pole, or one on each flat face of a dressed pole, within 50mm of groundline, then repeat this at least 4 times around the pole at each 500mm interval above groundline to as high as can be comfortably reached. Reinforced poles shall be thoroughly sounded in the vicinity of securing bands or bolts.

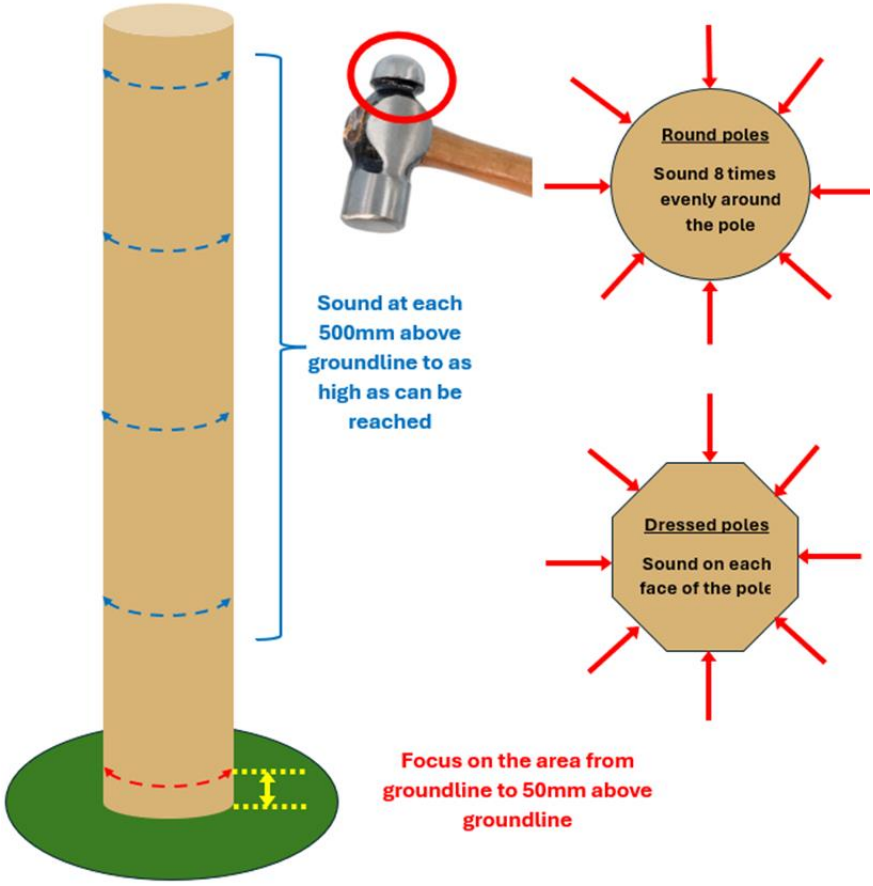

Figure 17 – Sounding above groundline with a ball pein hammer

Some poles will need to be sounded at much closer intervals than the minimum specified above, particularly where a defect is indicated at groundline. Where defects such as fruiting bodies, knots, checks, termite damage, loose sapwood, or other visual indicators are seen on the pole, a more thorough sounding shall be performed around and nearby the defect indicator.

Where uncertainty exists about the condition of the upper portions and heads of timber poles, sounding shall be performed in the following areas of the pole to identify internal defects:

- from the pole head to 2 metres below the pole head, or from the pole head to 1 metre below the lowest crossarm (whichever is the greatest length), and
- in other areas of the pole where a defect is identified or suspected as the pole is climbed or ascended in an EWP.

To sound the upper portions of a timber pole so that an internal defect is not missed it is necessary to perform at least 4 soundings with the ball of a ball pein hammer at the one plane (level) around the circumference of a round pole, or evenly around the flat faces of a dressed pole, then repeat this at intervals not exceeding 300mm from the previous plane sounded. Again, some poles will need to be sounded at much closer intervals where a defect is indicated. If the pole is being accessed using a ladder and pole steps, repeat sounding as above as the pole is climbed and at other defect locations identified or suspected from visual inspection

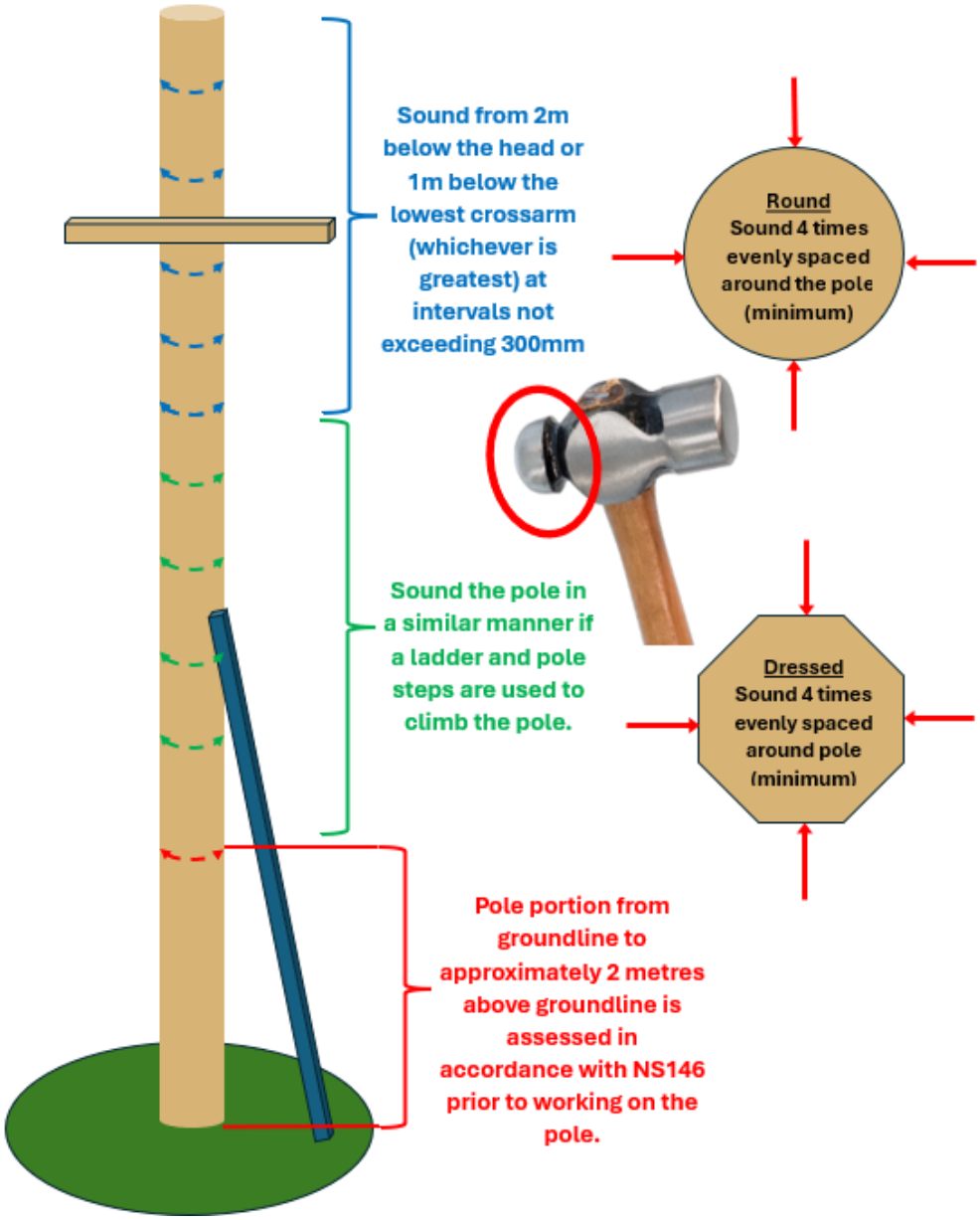

Figure 18 – Sounding pole upper portions with a ball pein hammer

C2.2 Guidance on the Use of a Round Pointed Bar

When a pole is excavated, a 6kg rounded point bar with a 15mm hemispherical point shall be used to test the external below ground surface of the pole in the partial excavation or from the bottom of the excavation up to groundline around the full circumference of the pole when it is fully excavated. The bar may be dual purpose with a chisel point one end and the rounded point on the other end. The chisel-end can be used to scrape soil and decayed timber from the pole. The

rounded end shall be used to test for areas of external decay and internal decay covered by a thin layer of good wood (typically less than 15mm).

Use of the bar shall not result in permanent damage to the face of the pole where the timber is in good condition, particularly CCA poles. A sharp point that will damage sound timber shall not be used under any circumstances.

Only CCA poles older than 15 years shall be sounded below ground with the rounded point bar

When the pole has been partially excavated, the exposed portion of the pole shall be struck with the rounded point bar to thoroughly sound the pole for internal defects within 50-100mm below groundline.

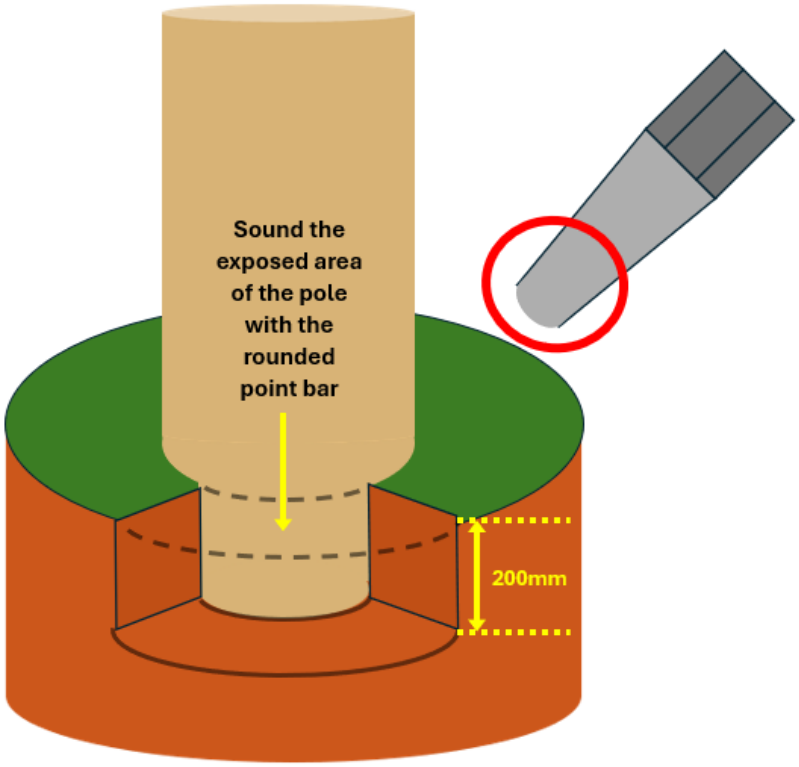

Figure 19 – Sounding below groundline with a rounded point bar

The following guidance shall be followed when using a rounded point bar when the pole is fully excavated:

- Use a rigorous, methodical process so that localised defective timber areas are not missed. Newer defect-free poles may not require as much sounding as older poles. The amount of sounding performed shall be sufficient to locate any defect.
- Strike the pole firmly at the base of the excavation so that the bar strikes the pole where it meets the soil. The bar shall deflect off the pole if it is solid, the rounded point of the bar embedding itself into the soil at the base of the excavation.
- After testing at the base of the excavation, the bar shall then be used to impact the pole immediately above this point, then test again every 50-100mm in a vertical line up to groundline. The pole shall be tested in this manner at least every 150-200mm around the pole. It is critical that this procedure be performed rigorously and methodically to make certain of the safety and strength of the pole.

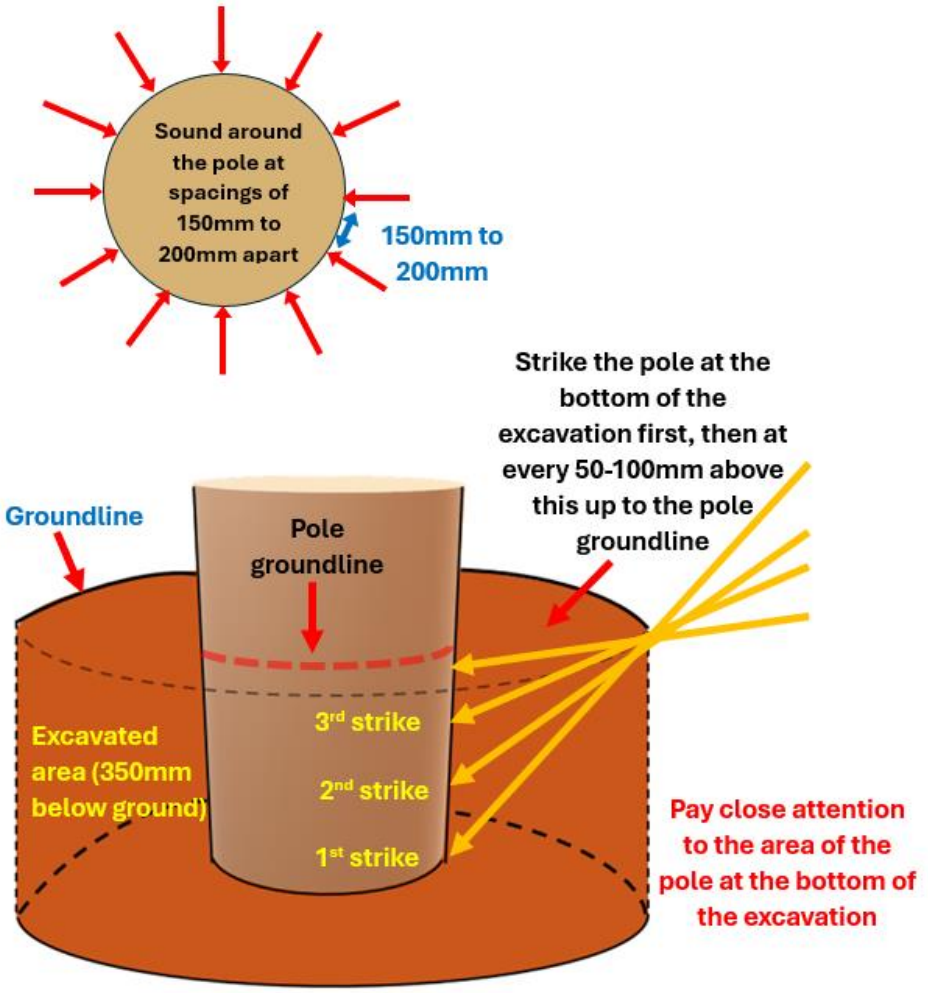

Figure 20 – Sounding below groundline with a rounded point bar

Note: private poles shall not be excavated beyond a depth of 200mm.

- Particular attention shall be paid to the area of the pole at, and just below, the bottom of the 350mm excavation and adjacent to assets or other obstructions attached to the pole such as UGOHs or concrete kerbs because these areas are less likely to be treated properly with pole preservatives during routine pole inspections and are much more likely to decay than areas that are treated properly.. If severe decay exists deep below the excavated area or behind an obstruction, there will commonly be detectable decay near the bottom of the excavation or adjacent to the obstruction. In most instances the pole's condition will improve with depth, however under some conditions the pole will deteriorate below the excavated area. Be aware of this and pay particular attention to what the bar finds below the excavated area.. The defect shall be reported to the nominated Ausgrid representative or Ausgrid Emergency Line if it extends below 350mm.
- A pole with a significant defect below the bottom of the excavation may also be loose in the ground, The worker shall be alert for any movement of the pole in-ground when struck with a bar at the base of the excavation.
- Where decay appears to be increasing behind an obstruction in the groundline area the situation is to be reported to the nominated Ausgrid representative or Ausgrid Emergency Line for consideration.
- By testing a pole in the manner described, the rounded point of the bar can penetrate decayed timber to reveal the true extent of the remaining sound timber.

- The pole shall not be hit excessively hard unless a defect is suspected, in which case the pole shall be hit very firmly. A bar with the correct rounded point will bounce off sound hardwood timber but will penetrate defects existing close to the surface of the pole. This procedure is critical to ensuring confidence in the soundness of the pole.
- Examples of situations where it would not be reasonably practicable to carry out the full recommended rounded point bar sounding process include poles with assets attached in the below ground area and poles placed adjacent to obstructions such as kerbs and fences.

C3 Guidance on Sounding Steel Poles, Standards and Columns

The purpose of sounding steel poles, standards and columns is to dislodge both internal and external rust and to expose any perforations in the steel. Sounding shall be performed above groundline and also below groundline when the pole, standard or column is fully excavated,

When performing sounding of a steel pole, standard or column concentrate on:

- Listening for falling or dislodged internal rust.
- Looking for dislodged external rust and dislodged galvanising / paint exposing rust.
- Looking for denting or perforating of the steel when the hammer strikes.

Steel poles, standards and columns shall be sounded by tapping the steel gently with the flat face of the hammer as the galvanised or painted surfaces may be damaged if the pole is hit too firmly. Pay close attention to the area from groundline to within 50mm above groundline when sounding as this is where corrosion typically occurs however, it is not always visible above groundline.

Sounding prior to excavation (above ground sounding) shall be performed as follows;

- 1 or 2 soundings (strikes) around the area just above groundline, and
- additional sounding at each location where surface bubbling, rust stains or scaling / pitted rust has been identified or is suspected.

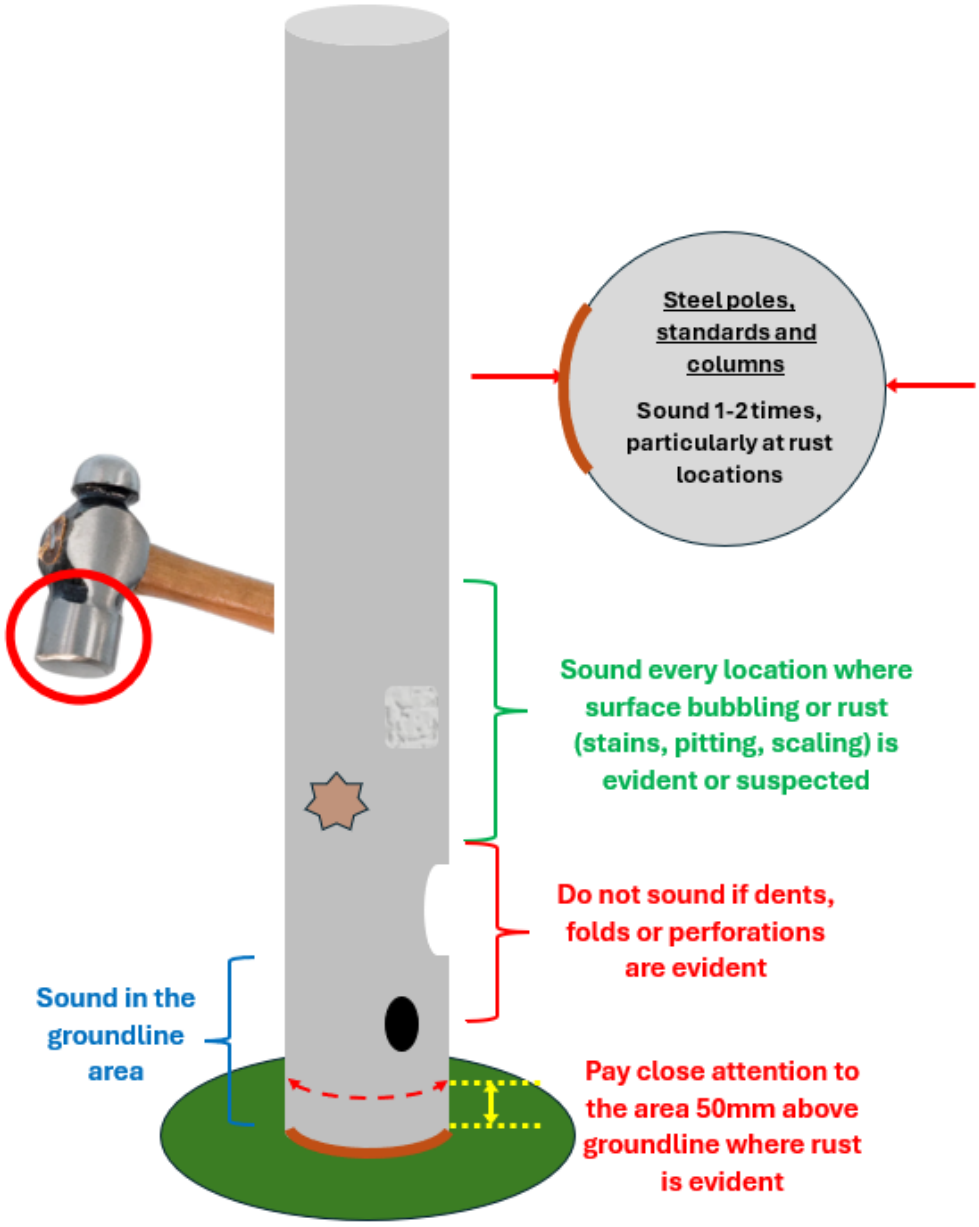

Figure 21 – Sounding Steel Poles, Standards and Columns Above Groundline

Sounding below ground shall be performed at each location where surface bubbling, rust stains or scaling / pitted rust has been identified or is suspected.

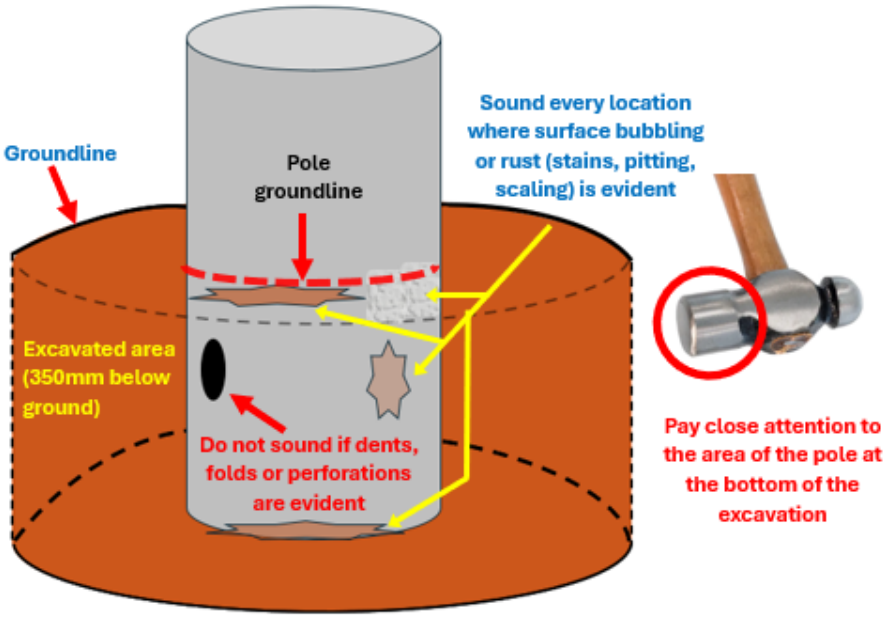

Figure 22 – Sounding Steel Poles, Standards and Columns Below Groundline

Note: private poles shall not be excavated beyond a depth of 200mm.

Annexure D: Excavation and Restoration (extracted from NS145)

D1 Excavating around poles

D1.1 General

The following information has been extracted from Network Standard NS145 Pole Inspection and Treatment – minor amendments have been made to reflect the requirements of this Standard (NS146).

Excavation is required around a pole to perform below ground inspections according to this Standard. Excavation may be 'partial excavation' to a shallow depth (typically done in a neutral axis on one side of a pole) to enable an initial below ground assessment of the pole condition, and 'full excavation' (where required) to perform a full assessment of the below ground condition of the pole.

Any excavation around a pole affects the stability of the pole to some extent. Electrical assets, including cables and earthing connections, as well as assets of other utilities, may also be attached to the pole, or in the ground near the pole, posing safety risks to the worker. Due to these factors, extreme caution shall be exercised when excavating around a pole, particularly those poles that have cables and other items attached to them.

Obstructions that are close to or hard up against the below ground portion of the pole such as cables, cable covers, pipes and kerbs may assist moisture retention that causes pole degradation faster than other areas of the pole (particularly timber poles) and may prevent inspection of the full below ground circumference of the pole. These obstructions can also prevent good application of preservative treatments. All soil shall be removed from around these obstructions to fully expose the asset and the adjacent pole material to improve the effectiveness of the below ground inspection. Concrete kerbs shall not be cut or damaged by excavation.

Excavation shall be performed according to the following Clauses and only when the above ground inspection of the pole indicates that it is safe to proceed with excavation.

For immediately dangerous situations, workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard.

D1.2 Pole Depth and Stability

When poles are installed, they are 'sunk' to a depth sufficient to provide suitable stability against the effects of wind and pole-top loading due to overhead mains or other apparatus (refer to NS128 for the correct pole sinking depths). The stability of a pole can be severely affected by reductions in its depth in the ground as shown in Figure 23.

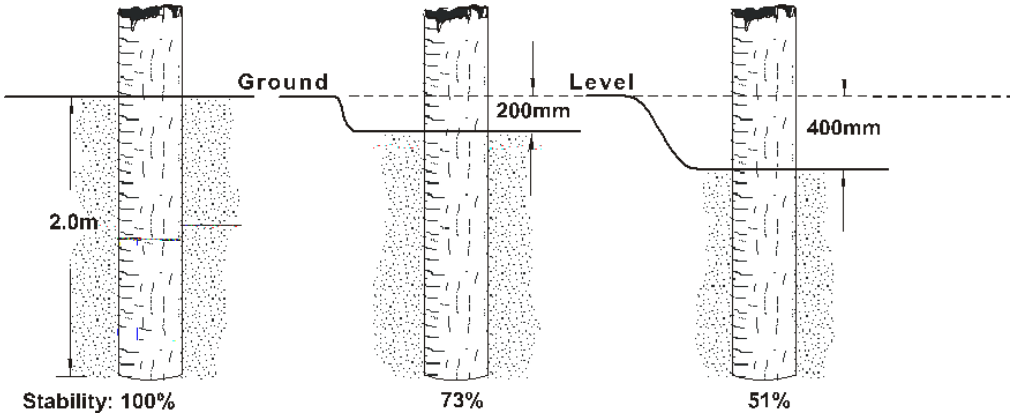

Figure 23 – Effect of Depth in Ground on Pole Stability

Reduced depth in ground compared to when the pole was originally installed can be caused by road re-alignment work, landscaping of the footpath, natural subsidence or erosion of the ground,

and other causes. The position of the pole disc is a good indicator of pole sinking depth – refer to Clause B1 for detailed information regarding the pole disc height from groundline or the butt (bottom) of the pole. Excavation around a pole to perform below ground inspections also temporarily reduces pole stability and shall be restricted to the depths stated in the relevant Clauses within this Standard. Reduced depth in the ground will typically result in the pole leaning and may eventually result in failure of the pole.

Workers shall assess pole depth in ground, pole lean (vertical alignment) and pole stability (including pole movement) prior to excavation and shall stop further excavation if there is any pole movement or evidence of pole instability while it is being excavated. Poles that are leaning 10 degrees or more, or where the depth in ground has been reduced by 350mm or more below the original ground line, shall be reported to the nominate Ausgrid representative or Ausgrid's Emergency Line (13 13 88) and inspected before any excavation is carried out. Owners of private poles shall also be notified where these defects exist.

D1.3 Excavating Around Electrical Assets

Where a cable enters the ground from a pole (for example, an underground to overhead connection, known as a UGOH), it shall not be assumed that the cable enters vertically from a depth below 350mm or perpendicular to the pole from an adjacent asset, or that it is clear of the remaining inspection area around the pole. These cables can be easily damaged by digging implements and this may cause a hazardous situation. Refer to NS156 for further details.

UGOH cables do not always run from the pole back to an adjacent distribution substation, pillar or customer in a straight line, nor do they always radiate out from the pole at 90°. UGOH cables may coil around the pole below ground to provide spare cable in case of a pole change-over or re-termination and they may be adjacent to poles that do not have these above ground cable installations (UGOHs) attached. Where it is suspected or confirmed that such cables exist near the pole that is being worked on, hand excavation shall be performed with care. If there is a high risk of cable damage, the pole inspection shall not proceed. The nominate Ausgrid representative or Ausgrid's Emergency Line shall be contacted to determine the most appropriate course of action before work can proceed.

Excavation of steel, concrete and fibre composite poles, standards or columns shall be performed in a similar manner to UGOH cables. Cables and conduits may enter these assets from any side below ground, or from underneath rag-bolt mounted or pile mounted poles, standards or columns.

When excavating or cleaning a pole around electrical assets, workers shall use non-conductive tools or tools with non-conductive handles or wear insulating gloves when working around electrical assets attached to a pole or electrical assets exposed below ground level.

Poles shall be thoroughly checked for defects immediately adjacent to attached cables (as the poles are not treated as effectively for fungal decay in these areas and is therefore more likely that defects will exist in these areas).

As underground LV cables may be subject to breakdown of insulation, the precautions detailed in the Ausgrid's Electrical Safety Rules shall be observed, including testing to confirm the absence of hazardous voltages.

Where a cable is observed as having damaged insulation (e.g. where the outer covering is partially removed exposing the underlying material) it shall be immediately reported to the nominate Ausgrid representative or Ausgrid's Emergency Line. Owners of private poles shall also be notified where these defects exist. Workers shall safeguard themselves and others against unsafe exposure to these hazards until the hazard has been removed or Ausgrid staff attend to remove the hazard.

D1.4 Cable Protection Covers

Electrical assets installed underground are required to be covered with a cable protection cover. Workers shall remove cable protection covers found in the excavation area surrounding a pole to enable the pole to be fully exposed for inspection and treatment.

Once a cable protection cover has been removed, further excavation near the cable/s shall not be completed with shovels or spades that require the use of two hands or other soil breaking implements. Only one-handed tools shall be used to remove the loose soil around the cables.

Figure 24 – Cable Protection Covers

D1.5 Excavating Paved Surfaces

Direct buried poles must be accessible for below ground inspection. Where they are found in locations where they cannot be correctly inspected (an example is shown in Figure 25), either the obstruction shall be removed to facilitate inspection, or the pole relocated.

Where the full pole inspection process cannot be performed, the situation shall be reported to the nominate Ausgrid representative or the Ausgrid Emergency Line. Owners of private poles shall also be notified where these circumstances are identified.

Figure 25 – Inaccessible Pole

Paved surfaces around direct buried poles must be removed to allow below ground inspection, however concrete kerbs must not be cut or damaged.

Any pole that has continuous paving installed within 200mm of the pole shall have the paving cut away to give a minimum clearance of 200mm around the pole and cold bituminous pre-mix material installed according to Clause D2.3 when the excavation is restored after the pole has been inspected.

After completion of the inspection and treatment process, the paving tiles that have been shaped to fit neatly around the pole shall be put back as they were found. All other surface material inside the defined inspection area shall be removed from site.

Where decorative concrete driveways or paths exist within 200mm of direct buried poles, the customer and Ausgrid must be notified, and agreement obtained prior to any cutting and removal being undertaken.

D2 Restoring Excavations

D2.1 General

When restoring the excavated area around poles it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Sandy loam shall be used for backfill top-up and surface reinstatement in all residential areas.

Remove any rocks larger than 50mm diameter, vegetation or creosote-impregnated soil from the backfill material and any wood shavings resulting from the inspection and/or treatment processes, paper or other rubbish. These foreign materials disrupt soil compaction and may promote termite activity. Vegetation shall not be placed in the excavation and covered with soil under any circumstances.

For poles with no attached earth down leads or UGOHs the inspection area around the pole is to be restored with the backfill material.

For poles with an attached earth down lead or UGOH, that half of the excavation including the underground portion of these electrical assets shall be reinstated with sandy loam. This is a safety measure to reduce the need for mechanical aids when digging around and adjacent to these underground electrical assets. The part of the excavation opposite the underground electrical assets shall be reinstated with the excavated material after removal of any foreign material as described above.

Where cable covers are found when excavating they shall be reinstalled when restoring the excavation. Where cable covers are not found above cables when excavating, the Pole Inspector shall install a piece of cable cover over all cables in the excavated area when restoring the excavation.

Backfill the excavation in layers of 100mm, ramming each layer to firmly compact the soil until fully reinstated. Take care not to damage the external preservative bandage. The backfill material is to be firmly tamped with a suitable tool so that it finishes:

- Slightly below groundline for unpaved areas.
- Approximately 50mm below the level of the pavement for paved areas.

All spoil that needs to be removed from the site shall be managed according to NS174C. If additional information is required, contact Environmental Services.

D2.2 Restoring Unpaved areas

The top surface shall be finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline.

Any parts of the preservative bandages removed for the condition assessment shall not be visible above groundline when they are placed back into the excavation.

Where turf has been removed to allow excavation, it shall be neatly reinstated on top of the compacted soil.

The work area shall be cleaned and all surplus material removed from site.

On private properties in rural areas, local soil found on site may be used for surface reinstatement around the pole rather than importing clean sandy loam to site where:

- the property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

The surrounding area must be left in an ‘as found’ condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and potholes be created that may present a hazard.

D2.3 Restoring Paved Areas

All excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving.

The inspection area around the pole shall be reinstated with 50mm thick cold bituminous pre-mix material (refer to Figure 26) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

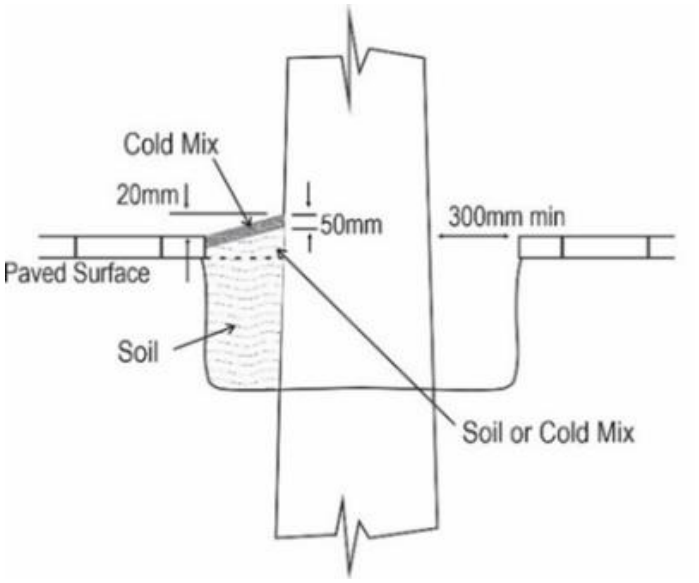

Figure 26 – Cold Mix Installation

If using cold bituminous pre-mix material, the pre-mix material shall be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence.

The work area shall be cleaned with a broom and all surplus material removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being performed.

Annexure E: Defective Pole Markings and Termite Tags

E1 Defective pole markings

Poles which have been identified as defective (conditionally serviceable or condemned) are currently marked with an orange self-adhesive band or strip with black ‘X X X’ symbols in accordance with Figure 27.

Defective poles have also been marked in accordance with Figure 28 in the past – the pole may also have an orange band with black symbols attached to the pole where an ‘X’ has been painted onto the pole.

Defective poles shall not be worked on unless they are supported during the work.

Figure 27 – Current methods for marking defective poles

Figure 28 – Previous methods for marking defective poles

E2 Termite tags

Termite tags are attached to timber poles when a termite infestation is identified in or near the pole and termite treatment commences to eradicate the termites. The tags are stamped with the treatment date and have segments of the tag removed as the treatment and follow-up inspections progress in accordance with Figure 29.

Timber poles with active termites shall not be worked on unless they are supported during the work.

Step 1

A termite tag is attached to the pole to identify that active termites have been located in or near the pole.

Termite treatment has not commenced because there is no date stamped into the top 'T' segment of the tag.

Step 2

The termite treatment has commenced but active termites are still present.

The month and year of the treatment have been stamped into the top 'T' segment of the tag.

Step 3

The first follow-up inspection has been completed.

The bottom 'T1" segment of the tag is removed to show that there are no active termites.

Step 4

The 12-month follow-up inspection has been completed.

The 'T2" segment of the tag is removed to show that there are no active termites.

Figure 29 – Termite tag details and changes shown as termite treatment progresses