

## Network Standard

**NETWORK**

Document No : NW000-S0043  
Amendment No : 5  
Approved By : Manager Asset Standards  
Approval Date : 11/12/2019

*Minor amendments approved on 12/04/2024*

NW000-S0043

**NS104 SPECIFICATION FOR ELECTRICAL NETWORK PROJECT  
DESIGN PLANS**



## ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff associated with the design and installation of Ausgrid's Network, and is for reference by field, technical and engineering staff.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on [www.ausgrid.com.au](http://www.ausgrid.com.au).

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document

## DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time. It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to make sure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

All design work, and the associated supply of materials and equipment, must be undertaken in accordance with and consideration of relevant legislative and regulatory requirements, latest revision of Ausgrid's Network Standards and specifications and Australian Standards. Designs submitted shall be declared as fit for purpose. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the designer must obtain authorisation from the Network Standard owner before incorporating a variation to a Network Standard in a design.

External designers including those authorised as Accredited Service Providers will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will ensure Network Standards are appropriately updated and that a consistent interpretation of the legislative framework is employed.

**Notes:** 1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Workplace Health and Safety Regulation 2017 (NSW) (Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

## INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

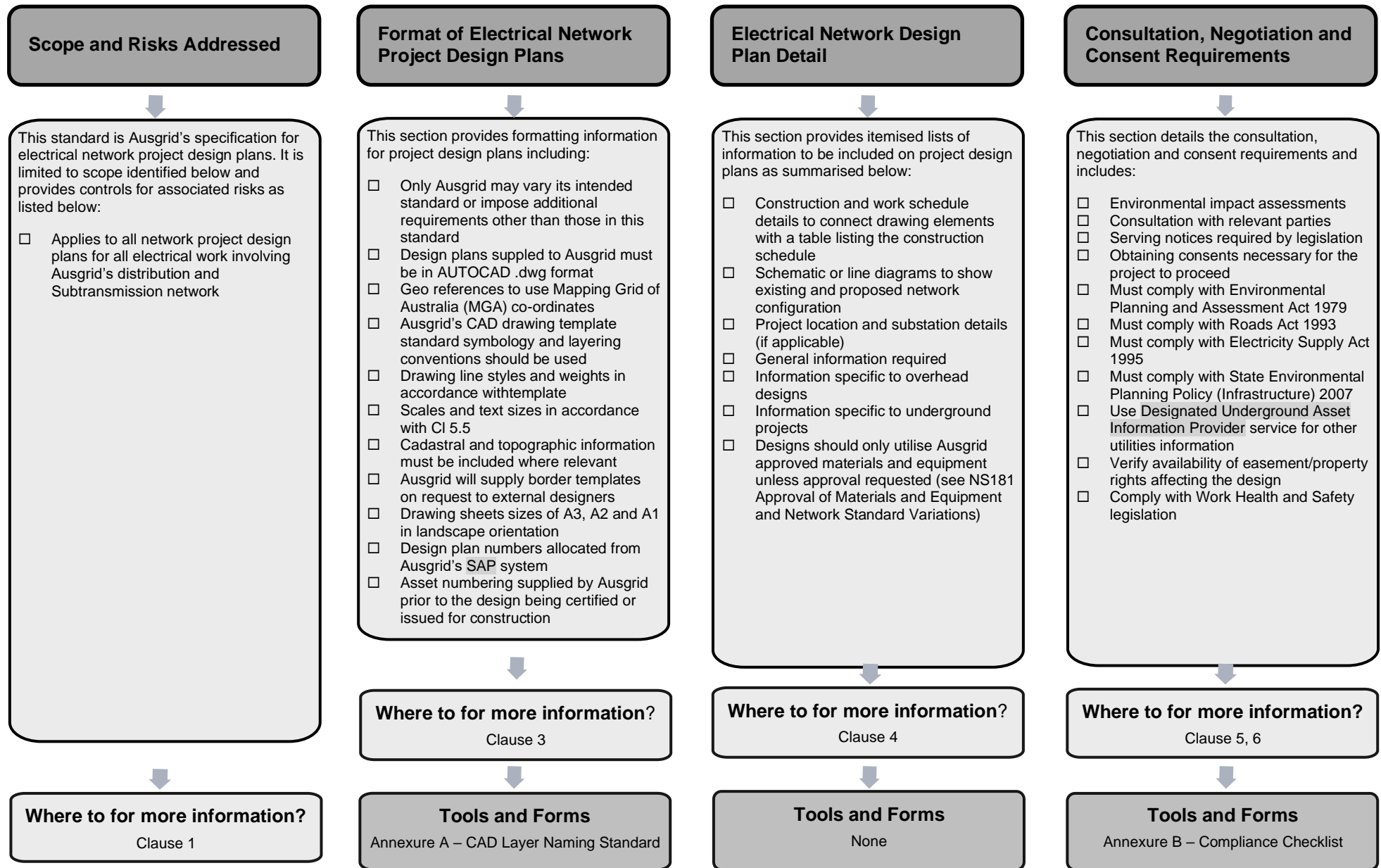
## KEYPOINTS

This standard has a summary of content labelled "KEYPOINTS FOR THIS STANDARD". The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the standard. To fully appreciate the content and the requirements of the standard it must be read in its entirety.

## AMENDMENTS TO THIS STANDARD

Where there are changes to this standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, Supersedes – document details (for example, "Supersedes Document Type (Category) Document No. Amendment No.").

# KEY POINTS OF THIS STANDARD



# Network Standard NS104 Specification for Electrical Network Project Design Plans

## Contents

1.0	PURPOSE .....	6
2.0	SCOPE .....	6
3.0	FORMAT OF ELECTRICAL NETWORK PROJECT DESIGN PLANS.....	6
3.1	Introduction .....	6
3.2	Standard design plan conventions .....	7
3.2.1	General .....	7
3.2.2	Mapping reference points .....	7
3.2.3	Aerial photography .....	7
3.2.4	Existing and proposed electrical infrastructure .....	7
3.2.5	Ausgrid CAD layer naming standard .....	7
3.3	Standard symbols .....	7
3.4	Drawing line styles and weights .....	7
3.5	Scales and text sizes .....	8
3.6	Cadastral and topographic information .....	8
3.7	Standard CAD drawing templates .....	9
3.8	Standard design plan tables and works schedule templates format .....	9
3.9	Title block .....	9
3.10	Drawing sheet sizes .....	9
3.11	Ausgrid design plan number(s) .....	9
3.12	Asset numbering .....	9
4.0	ELECTRICAL NETWORK PROJECT DESIGN PLAN DETAIL .....	10
4.1	Construction and works schedule details .....	10
4.2	Project staging detail .....	10
4.3	Schematic or line diagrams (as applicable) .....	11
4.4	Project location .....	11
4.5	New substation details (if applicable) .....	11
4.6	General information required on the design plan .....	12
4.6.1	Description of work .....	13
4.6.2	Mandatory notes .....	13
4.6.3	Embedded generaton .....	13
4.6.4	Other services .....	13
4.6.5	Earthing .....	14
4.7	Overhead design plan detail (if applicable) .....	14
4.8	Underground design plan detail (if applicable) .....	15
4.9	Approved material and equipment and network standard variations .....	16
5.0	CONSULTATION, NEGOTIATION AND CONSENT REQUIREMENTS .....	16
5.1	General .....	16
5.2	Environmental Planning and Assessment Act 1979 .....	17
5.3	Roads Act 1993 .....	17
5.4	Electricity Supply Act 1995 .....	18
5.5	State Environmental Planning Policy (Infrastructure) 2007 .....	18
5.6	Designs that affect other utility services .....	18
5.7	Proposed easements or leases .....	19

6.0 WORK HEALTH AND SAFETY LEGISLATION..... 20

7.0 RELATED DOCUMENTS..... 21

    7.1 General ..... 21

    7.2 Ausgrid documents ..... 21

    7.3 Other standards and documents ..... 22

    7.4 Acts and regulations ..... 22

8.0 DEFINITIONS ..... 22

9.0 RECORDKEEPING ..... 22

10.0 AUTHORITIES AND RESPONSIBILITIES..... 23

11.0 DOCUMENT CONTROL ..... 23

ANNEXURE A - CAD LAYER NAMING STANDARD ..... 24

A1 LAYER NAME COMPONENT - USE ..... 25

A2 LAYER NAME COMPONENT – VOLTAGE..... 26

A3 LAYER NAME COMPONENT – INSTALLATION ..... 27

A4 LAYER NAME COMPONENT - CATEGORY ..... 28

A5 LAYER NAME COMPONENT - DETAIL..... 29

A6 LAYER NAME COMPONENT - STATUS ..... 30

A7 LAYER NAME COMPONENT - VISIBILITY..... 31

A8 PROCEDURES FOR OUT OF SERVICE, ABANDONED OR REMOVED EQUIPMENT..... 32

## 1.0 PURPOSE

Network Standard NS104 is Ausgrid's Specification for Electrical Network Project Design Plans.

The objectives of this Network Standard are:

- (a) To present the required format for design plans for electrical works.
- (b) To make sure that design plans meet required standards for consistency, quality and safety and provide sufficient information to enable the intended works to be cost estimated and constructed in accordance with Ausgrid's requirements.
- (c) To set out the principal requirements for obtaining Ausgrid's certification/approval for the works proposed in design plans.
- (d) To make sure all design plans are presented in a standard, consistent and easily interpreted format which will lead to:
  - a clear understanding of the intent of all aspects of the design.
  - a clear understanding of the responsibilities and scope of works to be undertaken by each party involved with constructing the designed assets.
  - an accurate recording of Ausgrid's assets which allows those assets to be correctly identified and located as required. (The integrity of Ausgrid's GIS relies upon the accurate recording of all Ausgrid's network assets).

## 2.0 SCOPE

This Network Standard applies to all network project design plans for all electrical works involving Ausgrid's network and:

- requires that all consultation, negotiation and consent obligations listed in this Standard are satisfied, and
- requires that the designer complies with all relevant provisions of the Work Health and Safety Act 2011 (NSW) and the Work Health and Safety Regulation 2017 (NSW) and prepares a Designer Safety Report in accordance with requirements of that Regulation.

## 3.0 FORMAT OF ELECTRICAL NETWORK PROJECT DESIGN PLANS

### 3.1 Introduction

The intent of the design plan is to provide a safe and unambiguous method for Ausgrid employees to record changes in and update Ausgrid's asset management systems and for construction employees to construct, upgrade or make changes to Ausgrid's network.

All design plans must be capable of being clearly and completely copied or printed.

The various Network Standards produced by Ausgrid cover the minimum design and construction requirements for components of the network.

Only Ausgrid may:

- vary its Standards (including by waiving or relaxing their requirements); or
- impose requirements in addition to those contained in its Standards.

## 3.2 Standard design plan conventions

This clause outlines the conventions that must be used for the production of electrical designs for network projects in standard CAD digital file format.

### 3.2.1 General

Design plans must be based on current CAD software. Files supplied to Ausgrid by ASP/3 designers must be “.dwg” format. Design plans should conform to Ausgrid’s standard symbology and layering conventions, which are shown in Ausgrid’s standard CAD drawing template, and should detail all existing and proposed electrical network infrastructure, together with any relevant cadastral information.

### 3.2.2 Mapping reference points

All design plans should be geo-referenced to Geocentric Datum of Australia GDA94, Mapping Grid of Australia MGA56 coordinates, units in metres.

### 3.2.3 Aerial photography

Raster images or aerial photography incorporated in the design plan should be placed on the Ausgrid Layer XT\_(image or picture name) as detailed in Table A1 – Layer Name Component – USE.

### 3.2.4 Existing and proposed electrical infrastructure

CAD or DXF files of existing electrical infrastructure must be sourced from the GIS. These files conform to Ausgrid’s standard layering specification and are geo-referenced in MGA coordinates.

Existing GIS information should be checked for accuracy with respect to what is actually constructed on-site. The correction of any inaccuracies is to be incorporated into the CAD design.

Proposed electrical network alterations must be based upon this existing information and use the same Ausgrid standard layering naming conventions and MGA coordinate references.

### 3.2.5 Ausgrid CAD layer naming standard

Standard layer names for existing and proposed electrical works are included in Ausgrid’s CAD template provided and are detailed in Annexure A - CAD Layer Naming Standards.

The CAD layer standard is made up of various components describing the existing and proposed electrical infrastructure (eg LV\_OH\_EXIST, HV\_SUB\_PROP etc)

## 3.3 Standard symbols

Ausgrid’s standard symbols for existing and proposed assets must be used for common infrastructure in all design plans.

Standard Symbols and their correct layer allocation are shown in Ausgrid’s standard CAD drawing template.

Wherever practicable, symbols should be shown in the correct location with respect to other infrastructure items eg overhead switch (LV links or HV ABSs) symbols should be shown on the correct side of the pole on which the switch is to be installed. Where necessary this and the associated connections should be detailed in a suitable note or sketch on the design plan to remove any confusion. It should be noted that in GIS symbols are shown cartographically (schematically) and therefore do not necessarily reflect the physical relationship between items eg in GIS overhead switches may be shown on the side of a pole opposite to which it is actually installed.

## 3.4 Drawing line styles and weights

Standard line styles and line weights are set up on the associated layers in Ausgrid’s standard CAD drawing template.

Ausgrid’s standard line styles and weights are to be used on all design plans.

### 3.5 Scales and text sizes

The design plan is to be legibly drawn at true scale (1 drawing unit = 1 metre). All symbols and annotations must be scaled so as to be legible in the design plans.

Scales must be standard metric scales to AS 1100.101. The preferred scale for most work is 1:500; however, 1:250 may be required for underground plans in high density areas. Other scales may be used as appropriate for the situation provided clarity is not compromised. As a guide, refer to Table 1 below for preferred scale usage.

**Table 1 – Preferred Drawing Scales**

Construction Plan Views	
1:250	High Density Plans
1:500	Urban Plans
1:1000	Semi-Rural Plans
1:2000	Rural Overhead Plans Only
1:4000	Rural Overhead Plans Only
Detailed Plan Views	
1:10	Congested high density areas
1:20	High density areas
1:50 (minimum allowed by NS149)	Chamber Substation layouts
1:100	Kiosk layout
1:200	General focus area
1:250	General focus area

The minimum text size is 2.5 mm, i.e. equivalent to font size 12 lower case type.

Refer to table below for applicable text sizes.

**Table 2 – Standard Text Sizes**

Name	Font Size	CAD Style
Data	2.5mm	Arial
Header	3.5mm	Arial
Title	5.0mm	Arial

Each design plan sheet shall have a scale bar drawn to indicate the scale of the plan, so that any scale variations after electronic transmission or photocopying will be detectable.

All separate plan sections shown on the design plan shall indicate the scale of the section and have a scale bar shown for that section.

### 3.6 Cadastral and topographic information

All design plans must include all proposed cadastral changes and topographic information associated with new or altered developments requiring electricity supply.

Cadastral and Topographic information required on design plans includes where relevant:

- Existing / Proposed road boundaries and names.
- Existing / Proposed lot boundaries.
- Existing / Proposed lot dimensions.

- Existing / Proposed Leases or Easements.
- Road centrelines.
- Existing / Proposed lot and house numbers.
- Surrounding prominent cadastral features (parks, rivers etc.).
- Contours – major / minor.
- 100 year flood area.
- Kerb and gutter definition.
- Driveways.

### 3.7 Standard CAD drawing templates

Ausgrid standard CAD drawing templates and border formats are to be used for all design plans. These templates provide a consistent format for use by the designer, construction employees and in Ausgrid's Asset Management Systems.

Ausgrid will provide Authorised ASP/3 designers with access to the latest version of the standard external CAD design template.

**Note:** It is the responsibility of designers to make sure they use the latest CAD template versions.

### 3.8 Standard design plan tables and works schedule templates format

The standard format for design plan tables and works schedule templates is to be used when presenting design data on all design plans. This format provides a consistent and structured layout that clearly describes the information relevant to the project. ASPs must use the tables and templates contained in Ausgrid's NET CAD external design template obtainable from Ausgrid's website: [www.ausgrid.com.au](http://www.ausgrid.com.au). Ausgrid employees may use tables and templates as approved for their particular work group.

The design tables and works schedules must not simply consist of words or references scattered across the plan but, where possible they should be logically grouped together on the same sheet as the referenced drawing. If this is not possible then they should be grouped onto a separate sheet and given the next sheet number.

### 3.9 Title block

The title block is incorporated into the standard drawing border template. All data fields in the standard title block should be completed as applicable.

### 3.10 Drawing sheet sizes

Design plan drawings should be drawn on A3, A2 or A1 sheets in landscape orientation.

### 3.11 Ausgrid design plan number(s)

All design plans shall be identified with a unique number allocated from Ausgrid's SAP system which must be included in the title block of the design plan. One SAP number may appear on multiple different drawings associated with a particular project. The SAP number must also be indicated on all electrical network installation and alteration work records.

Projects involving the design or alteration of a chamber substation or sub-transmission lines must also include a drawing number allocated from Ausgrid's CAD drawing management system. Ausgrid will attach a copy of the approved drawings to the CAD drawing management system as required.

Ausgrid staff must lodge completed internal and external designs into Tracker to ensure work which modifies or changes any component of Ausgrid's network will be reflected in the asset management systems.

### 3.12 Asset numbering

Each proposed asset must be correctly labelled in the design plan and the correct asset symbol must be allocated to each such asset.

Ausgrid will allocate asset numbers for poles, pillars, HV and LV links, air break switches, substations etc. prior to the design plan being certified or issued for construction.

## 4.0 ELECTRICAL NETWORK PROJECT DESIGN PLAN DETAIL

The design plan must include the following details:

### 4.1 Construction and works schedule details

Each design plan must contain detailed construction/works schedules (as described in Clause 3.8) that clearly describe all work to be performed. If there are more than one party involved with design and/or construction then the responsibility for each part and for the connection between them shall be clearly identified on the plans.

**Note:** General disclaimers<sup>1</sup> on the design plan will not be accepted.

Each location where work is to be performed (eg a pole, pillar, link, pit, trench section etc.) must be individually identified on the design plan and referenced back to an appropriate standard design or works schedule table where the associated work is described in detail. Typical reference schemes are as follows:

- “A”, “B”, “C”, etc for joining section of plans on multiple sheets (or a locality and key plan showing the relationship between multiple sheets)
- “AA”, “BB”, “CC” etc for underground trench cross-section profiles
- “1”, “2”, “3”, etc for reference numbers for notes to particular points on the plan.
- “1-2”, “2-3” or “A-B”, “B-C”, etc for references between particular points on the plan eg “1-2” for cable between points “1” & “2”.
- Poles, street light columns, pits, pillars etc shall be referenced by either:
  - the Ausgrid asset number (allocated in accordance with NS148) eg “RP12345”, “RP12346”, etc or
  - for contestable projects before final asset numbers are issued: NP1, NP2, etc (NP = new pole)
- Mains between assets (poles) shall be referenced by the assets at either end eg “RP12345 – RP12346”, or “NP1 - NP2”, etc.

**Note:** Construction and works schedule referencing detail should, where possible, be located on the design plan in a geographically sequential order. Reference points can relate to individual assets/locations or to design sections/locations as relevant to the asset type.

### 4.2 Project staging detail

The design plan must clearly define and depict any staged or related works required (including associated staged Schematic or Line Diagrams) to be undertaken in association with the overall project design plan scope.

Examples of staged or related works may include (but not limited to) relocation of existing assets, decommissioning of redundant assets, transfer of existing connection services, supply or loads, etc. associated with a single design plan that needs to be undertaken in order to achieve successful completion of the overall designed works.

---

<sup>1</sup> General disclaimers (as distinct from General Information and Notations discussed in Clause 4.6) are not permitted since by their very nature they often benefit or cause detriment to other parties and can conflict with Ausgrid Network Standards and policies, environmental requirements, safety requirements, NECF requirements, liability and warranty guarantees, ANS and funding arrangements, legislation, design and construction contracts etc. General Information and Notations as discussed in Clause 4.6 are required to be placed on the design plan for the purposes of safety, legal, licencing, etc.

### 4.3 Schematic or line diagrams (as applicable)

Existing and proposed schematic and line diagrams must be shown on the design plan. They are required to show how the new works fit into the existing network and are necessary for the safe and reliable operation of Ausgrid's electrical network. They must include the following (where applicable):

- Sub Transmission Line Diagram (if applicable) must be included on the same sheet of the design plan as any other 11kV/LV Schematic or Line Diagram
- 11kV Single Line Diagram and/or 11kV schematic diagram indicating the distance from the nominated existing 11kV node to the nearest proposed future node
- LV Schematic Diagram is required if the new LV interconnects with or in any way alters the existing LV network (this may be existing and proposed versions of the LV network view on the design plan).
- If street lighting circuits are supplied independent of the LV supply then a separate street lighting schematic is required (this may be existing and proposed versions of the street lighting network view on the design plan).

**Note 1:** All schematic or line diagrams must reflect Ausgrid's standard System Diagram symbols (referred to in Clause 3.3 above) and should indicate the nearest isolation point on either side of the proposed work including all control points, relevant system switch and asset numbers.

**Note 2:** A schematic or line diagram is required (eg pole mounted substation replacement or rectification of low mains) to show the location of the work regardless of whether or not there is any change between the existing and final arrangement.

**Note 3:** If staged or related works are to be undertaken in association with the overall project design plan scope, then the appropriate HV, LV or street lighting schematic or line diagram reflecting those staged works (if applicable) must also be depicted on the design plan.

### 4.4 Project location

A locality sketch is to be included on all plans so that the project location is clearly shown on the drawing. It must include existing street and cross street details, in order to precisely locate the area in which the work is required. It may be an extract from a street directory or other street mapping system.

### 4.5 New substation details (if applicable)

- Sub. Name.
- Sub. number.
- Address.
- Sub. type – eg 'KK', 'KL', 'KJ', 'SI', 'P1', 'P3' etc.
- Size (kVA).
- Vector Group.
- Tap setting.
- HV switchgear eg HDO, RMIFS, RMICB, FS, etc including make and model.
- HV fuse details.
- Load cycle (in accordance with NEG PD01-1) - if the load cycle is indeterminable prior to commissioning, a default load cycle should be assigned as the following:
  - (i) load cycle A - for chamber, kiosks, outdoors enclosures and surface structure substations.
  - (ii) load cycle D - for Pole Transformers.
- Phasing detail (if applicable).
- LV board detail, eg 800/400/400Amp.
- LV distributor names and numbers.
- Transformer LV link rating.
- LV control type and size – eg LV CB, fuse.

- Earthing requirements (electrode and cable detail, combined or segregated).
- Location of the Earth Fault Indicator(s) (EFI) is to be shown on the proposed system diagram and substation schematic drawings.
- Substation piercing detail (to appropriate standard drawing and any site specific requirements – refer NS141 ).
- Substation detail plan showing details of surrounding environment and structures at 3m, 6m and 10m distances (when relevant to the design).
- Master options list and MDI CT ratio (for pole mounted substations).
- Easement plan detail (sketch on design plan, detailed survey drawing as separate sheet).

**Note:** The above detail is typical for all substation types. Chamber Substations will require additional relevant details and information in accordance with Ausgrid's Network Standards NS113 Site Selection and Construction Design Requirements for Chambers Substations, NS114 Electrical Design and Construction Standards for Chamber Type Substations and NS149 Drawing Content for Chamber Type Substations, Control Points, Cable Risers and Ductlines.

#### 4.6 General information required on the design plan

The following must be included:

- North point.
- Legend (must accurately reflect all symbols used).
- Clearly labelled property lines/boundaries.
- Lot and DP numbers.
- Street names, house numbers or Road Side Mail Box (RMB) numbers.
- Relevant details of proposed land use and title (eg number of dwellings, school, type of commercial, community or strata title etc).
- Any access problems, constraints or other matters affecting access.
- Details of any known asbestos including asbestos cement conduits or troughing should be marked on the design drawings (refer to Ausgrid's Asbestos Register for details of known locations).
- Any known structures, objects or other obstructions.
- Any relevant special features such as rock, sandy or flood prone areas.
- Design plan assets must be geo-referenced correctly (eg to an existing Ausgrid pole, pillar or survey peg etc).
- All proposed and existing assets must be accurately dimensioned and referenced to known cadastral points (eg lot, easement, road boundaries).
- Relevant feeder number(s), feeder zone and page reference must be shown.
- LV distributor/feeder number/name must be included (if applicable).
- Existing and proposed asset numbers – pole, pillar, ABS, control point, etc.
- Location and dimensions of existing and proposed easements to be shown where applicable.
- If it is proposed to extinguish any easements, these must be clearly marked.
- Street lighting details – category, location, size, type, mounting height, bracket type, etc.
- Details of any agreement to pay street lighting alteration/annual charges by Local Council/RMS/RailCorp (if applicable) must be provided as supporting documentation to design plan.
- Existing and proposed assets and assets that will be removed (eg poles, pillars, substations, links, ground and pole stays, street lights, overhead and underground circuits, etc) must be shown, with associated asset reference numbers, where applicable.
- Existing distribution centre(s) details:
  - (i) Location (ie address if applicable)
  - (ii) Number
  - (iii) Name

- HV and LV side identification of kiosk type substations.
- Protection details.
- LV voltage drop calculations (if applicable).
- Special environmental control requirements (if applicable).
- Notation on the design plan referencing any existing/proposed Pioneer schemes.
- Tree clearing requirements.
- Other relevant details pertaining to the project.
- Any additional information requested by Ausgrid.

#### 4.6.1 Description of work

A description of all work to be performed is to be detailed in Ausgrid's standard design tables/schedule template format. ASPs must use the tables and schedules contained in Ausgrid's NET CAD external design template obtainable from Ausgrid's website: [www.ausgrid.com.au](http://www.ausgrid.com.au). Ausgrid employees may use tables and schedules as approved for their particular work group.

#### 4.6.2 Mandatory notes

Include the following note and make it clearly visible:

CHECK FOR OTHER SERVICES BEFORE BORING OR EXCAVATING – LODGE AN ENQUIRY AT [WWW.BYDA.COM.AU](http://WWW.BYDA.COM.AU) OR OTHER DESIGNATED UNDERGROUND ASSET INFORMATION PROVIDER.

Include the following notes and make them clearly visible:

THIS DESIGN PLAN CANNOT BE USED FOR CONSTRUCTION PURPOSES UNTIL THE LOCATION OF ALL EXISTING SERVICES IS VERIFIED.

THE INFORMATION PROVIDED IN THIS DESIGN PLAN MUST BE CHECKED ON SITE AND THE MOST CURRENT INFORMATION ON THE CONFIGURATION OF ALL SERVICES (INCLUDING AUSGRID'S NETWORK) MUST BE VERIFIED IMMEDIATELY BEFORE CONSTRUCTION COMMENCES BY CONTACTING A DESIGNATED UNDERGROUND ASSET INFORMATION PROVIDER.

ASSET INFORMATION MUST BE CURRENT AT THE TIME OF CONSTRUCTION, AS INDICATED BY THE DATES ON THE PLANS RECEIVED FROM BYDA OR OTHER DESIGNATED ASSET INFORMATION PROVIDER.

If the land base supplied by Ausgrid with the existing electrical infrastructure (see Clause 3.2.4) is retained in the design, include the following note and make it clearly visible:

THIS INFORMATION INCLUDES DATA FROM THE NSW DIGITAL CADASTRAL DATABASE BY LAND AND PROPERTY INFORMATION © 2016, USED UNDER CREATIVE COMMONS LICENCE VERSION 4.0.

Include the following note and make it clearly visible:

ALL WORKS TO COMPLY WITH AUSGRID NETWORK STANDARDS, UNLESS NETWORK STANDARD VARIATION IN ACCORDANCE WITH NS181 HAS BEEN APPROVED IN WRITING BY AUSGRID. IN THE EVENT OF A DISCREPANCY BETWEEN THIS CERTIFIED DESIGN AND AUSGRID'S NETWORK STANDARDS, THE NETWORK STANDARD REQUIREMENTS SHALL PREVAIL.

#### 4.6.3 Embedded generation

Any design specific detail relevant to an Embedded Generation connection is to be provided as supporting documentation to the design plan, with reference to the specific generator design document(s). These must be clearly stated on the design plan.

#### 4.6.4 Other services

A notation must be included to indicate where other services are located near a worksite and may impact on the construction of assets included in the design plan - for instance, telecommunications, gas, water, stormwater, sewerage or other assets.

### 4.6.5 Earthing

An appropriate earthing design is required for all sub transmission and distribution equipment that needs to be earthed in accordance with NS260 and NS116 respectively. An earthing design report is to be provided as supporting documentation to the design plan and the design plan must include a clear reference to the earthing design report. In addition, an earthing construction electrode and cable detail plan is required for each piece of equipment that requires an earthing design. This plan is to be included on the design plan.

**Note:** To manage the design of earthing systems for distribution equipment, Ausgrid has developed a design tool and database called 'NEOn' (Network Earthing Online). This is detailed in Ausgrid's Network Standard NS116 – Design Standards for Distribution Equipment Earthing.

## 4.7 Overhead design plan detail (if applicable)

The application name and version number of approved overhead line design software used in the design plan must be included.

Profiles of overhead designs must be drawn to scale and must include suitable vertical and horizontal scales.

Ground and conductor profiles including poles, conductors and ground clearances (as appropriate for the voltage) at maximum operating temperature (as nominated by Ausgrid) must be included. Profile drawings for designs prepared by Ausgrid may not be required on the design plan depending on internal design process requirements.

Typical maximum operating temperatures are shown in Ausgrid's Network Standard NS220 Overhead Design Manual.

For individual projects, the maximum operating temperature will be nominated by Ausgrid.

Pole loadings and details of ground strengths used in calculations are to be provided as supporting documentation to the design plan. Refer to NS220 Overhead Design Manual for advice.

The design plan must include the following where relevant:

- Overhead design software inputs and outputs as supporting documentation demonstrating design compliance (note: Ausgrid may require a copy of the line design file therefore the line design software must be capable of saving the file in a format that can be sent to Ausgrid for review).
- Span lengths.
- Conductor design and ruling spans.
- Type of pole – wood, steel, pillar standard, concrete, base plate mounted etc.
- Size/strength of each pole.
- Footing diameter and sinking depth of each pole.
- Footing backfill details for poles where required eg site spoil, select aggregate, cement stabilised, concrete (including strength (MPa) plus tamping intervals).
- A structural engineering report must be provided where pole footing strength may be impacted by civil works such as retaining wall, embankment/batter, piers, trenching works, etc. The report is to be provided as supporting documentation to the design plan; and the design plan must include a clear reference to the structural engineering report. The report must certify that the pole foundation is capable of supporting the pole when subjected to loads in accordance with Ausgrid's Network Standard NS220 Overhead Design Manual and Australian Standard AS/NZS 7000 – Overhead Line Design.
- Specific foundation design details in accordance with NS220. Soil types in most areas are available in GIS/Scout or via a site specific geotechnical report.
- Existing and proposed finished surface levels (ie RL (referenced to AHD if appropriate)).
- Type, size and strength of stay wires and fittings.
- The construction type/arrangement of each pole from Ausgrid Network Standards. Sketches showing any non-standard cross-arm/stay positions must be shown and approved in accordance with NS181.
- Conductor/cable types and sizes.

- GIS conductor code.
- Conductor design temperatures.
- If non-standard construction, conductor attachment heights and circuit separation at each pole must be shown and approved in accordance with NS181.
- Mid span clearances between circuits at worse case conditions for each span. These may be shown on the plan or included in supporting documentation. The worst case conditions are defined in the relevant Network Standards.
- Line deviation angle for each pole if required for construction.
- Coordinates for each new pole.
- Conductor tensions.
- Conductor stringing tables (including the following note: “Conductors shall be installed such that conductor bending radii at no time exceeds the limits recommended by the conductor manufacturer. Refer to appropriate Network Standards for typical minimum bending radii.”).
- Full detail of vibration damping design (if applicable).
- LV service(s) augmentation or relocation detail.
- Side of pole from which the transformer is to be hung, for pole transformer type distribution centres (although may need to be revised during construction to account for phasing).
- Side of pole from which crossarms or other equipment is to be installed, where a particular orientation is necessary to facilitate construction eg installation of UGOHs.
- Proposed bonds and terminations, and connection arrangements for aerial conductors and at underground overhead connections UGOHs.
- Location of surge arresters and earth point covers (CCT construction).
- Location of air break switches (ABS), HV and LV links UGOHs, surge arresters (SAs), current limiting arcing horns (CLAHs) etc, including the orientation relative to other infrastructure (eg side of pole on which to be constructed).

#### 4.8 Underground design plan detail (if applicable)

- The application name and version number of U/G design (cable pulling tension) software used in the design plan must be included.
- Trench/underbore/cable/conduit/pit detail(s) at each change of the configuration along any cable route.
- Calculated maximum cable pulling tension in kN (from cable pulling tension program).
- If cable pulling lubricant has been used in the pulling tension calculations, specify the following:
  - coefficient of friction used in the calculated cable pulling tensions.
  - approved lubricant (product name/code) to be used.
  - volume of lubricant required to achieve the desired coefficient of friction.
- Recommended direction of cable pull.
- Designed minimum internal cable bending radii for each cable section pull during and after installation.
- Cross sections of cable trench, road crossing, underbore and ductline.
- Proposed cable joints including types of joints, eg LV 2-39, HV 2-27, 3:1, 1:1 etc and connection arrangements. Non-standard joint kits will require separate Ausgrid approval in accordance with NS181 (manufacturer part codes to be noted on the design plan).
- Soil type (sand with sandstone, sandy clay, heavy clay etc) (if available). Soil types in most areas are available in GIS/Scout or via site specific geotechnical report.
- Cable types and sizes.
- GIS conductor codes.

- Installation materials eg backfill material etc.. If Thermally Stable Bedding (TSB) is required as the cable bedding material, the TSB shall be specified in the design plan as 'TSB - Footways, Unclassified roads & Classified Regional roads as per NS130' or 'TSB – Classified State roads as per NS130' in accordance with the site location of the proposed TSB installation.
- A certified structural engineering report must be provided where required eg design details of bollards, kerbs, site specific asset protection, walls etc. The report is to be provided as supporting documentation to the design plan with reference to the report stated clearly on the design plan.
- Cover requirements for underground cables, including details of surface cover type of any areas to be excavated including full details of any surface restoration that will be required.
- Existing and proposed finished surface levels (ie RL (referenced to AHD if appropriate)).
  - Elevation(s) showing the ground slope(s) adjoining a kiosk site, together with details of retaining walls and/or batter where required.

**Note:** Retaining walls and batter must be constructed of non-perishable material such as concrete or brick.

- Where shared trenching is proposed with Telstra, Optus or AGL, the arrangements and installations must be in accordance with the applicable trench sharing agreement.

#### 4.9 **Approved material and equipment and network standard variations**

The designer must include only Ausgrid approved standard designs, layouts, materials and equipment in the design.

In addition to already approved materials and equipment, ASPs, manufacturers and suppliers may request Ausgrid to consider approval of other materials and equipment. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations must be used. A copy of any successful NS181 approval(s) relating to the Design Plan must be submitted with the design for certification.

## 5.0 **CONSULTATION, NEGOTIATION AND CONSENT REQUIREMENTS**

### 5.1 **General**

The designer is required to meet a number of legislated requirements to consult with various public or government authorities and/or serve notices on such bodies regarding impending works on Ausgrid's network assets.

The designer is responsible for (among other things):

- complying with Ausgrid's requirements for environmental impact assessment;
- consulting with relevant parties;
- serving any notices required by legislation;
- obtaining any consents necessary for proposed works to proceed;
- if necessary, adjusting the design to take into account environmental considerations, submissions received or conditions imposed as a result of the consultations and notices referred to above; and
- liaising with Ausgrid's Property group to determine the most commercially appropriate location for new assets that are to be located on Ausgrid property.

**Note:** Where the designer has consulted with or notified relevant parties as required in this clause, all responses must be provided, including a statement of nil response if applicable.

Parties that are to be consulted include those:

- who are entitled by legislation to make submissions (eg Local Councils in accordance with Section 45 of the Electricity Supply Act 1995 and SEPP Infrastructure 2007 or adjoining land occupiers in relation to a proposed substation, and specified authorities for development in certain areas as required by the Infrastructure SEPP 2007);
- whose consent is required before the designed assets can be constructed (eg RMS in relation to assets proposed to be located in, on or under a classified road; Subsidence Authority NSW for works in mine subsidence areas);
- who may be able to provide information which may affect the design (eg Dial Before You Dig and utility providers);
- who may be affected by the proposed works (eg a neighbour over whose land an easement for proposed works will be required, or whose views may be impacted); or
- who may be needed to provide information to assist with the design (eg a surveyor engaged to advise of possible existing encumbrances on a development property).

Ready access to NSW legislation, including Environmental Planning instruments, is available via the internet. One source is <http://www.legislation.nsw.gov.au/>.

## 5.2 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act) and instruments under that Act are the primary sources of Ausgrid's obligations with respect to planning and development. Most activities conducted on Ausgrid's network are carried out under Part 5 of the EP&A Act, where Ausgrid is the determining authority.

Conditions of consent imposed on a private developer by local councils under Part 4 of the EP&A Act must also be taken into account when a design plan is drawn up.

Where Ausgrid is the determining authority for a proposed activity, the initial SER or REF undertaken under Part 5 of the EP&A Act must be completed in accordance with Ausgrid's NS174 Environmental Procedures. In the case of an SER, this includes:

- NS174A SER
- NS174B SER Guidance Notes
- NS174C Environmental Handbook for Construction and Maintenance

The person preparing or verifying the SER must have current certification in Ausgrid's SER training.

All SERs must be verified by Ausgrid and will be returned to the designer if they are not adequate or accurate.

Any activities that by their scope or location are likely to present any risks for Ausgrid as the asset owner may require specialist assessment. Examples include activities that have potential to affect threatened species, Aboriginal heritage, Ramsar wetlands, decommissioning substation, etc. In these instances, as specified in the SER, the SER must be referred to Ausgrid's Environmental Services for verification.

Ausgrid's environmental planning procedures are available on Ausgrid's Environmental website at [www.ausgrid.com.au](http://www.ausgrid.com.au)

## 5.3 Roads Act 1993

Classified roads fall into two major categories: state roads and regional roads, and include freeways, state highways, main roads, tourist roads and secondary roads.

If works are proposed on a classified road, consent is required under Section 138(1) of the Roads Act 1993 (NSW). To apply for a Section 138 consent, write to RMS for classified state roads or the relevant local council for classified regional roads to request approval, providing a description of the work and including a plan showing the extent of the works. Ausgrid employees should use the relevant templates from Appendix 1 of Ausgrid's Procedure to Seek Consent Under Section 138 of the Roads Act.

After Section 138 consent is obtained and prior to starting works, a road occupancy licence (ROL) will need to be obtained for works as outlined in Appendix 6 of the memorandum of understanding (MoU) between Ausgrid and RMS. An ROL is required in the Sydney region for all classified state roads,

classified regional roads, and local roads within 100 m of a traffic signal or a classified state road and in the Hunter region for all state roads.

All conditions imposed by the roads authority are to be clearly noted in the design plan documentation. Conditions imposed by the road authority may include but not be limited to: the manner or time at which works are to be carried out, particular design requirements, and / or a requirement for indemnities.

#### 5.4 Electricity Supply Act 1995

As noted in EGN174B SER Guidance Notes the Electricity Supply Act 1995 (NSW) requires the designer must submit a notice to the local council advising of proposed electricity works (other than routine repairs or maintenance), allow a minimum of 40 days for the council to respond and give proper consideration to any submissions made by the council.

#### 5.5 State Environmental Planning Policy (Infrastructure) 2007

In addition to the notices rerequired by the Roads Act and Electricity Supply Act, under State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) (Division 1, and Clause 42), 21 days notice may also be required to the local council. These notifications can be served concurrently.

Under Infrastructure SEPP (Division 1) specified development must not be carried out unless written notice has been given to the specified authority in relation to the development and any response received from that authority within 21 days after the notice is given has been taken into consideration.

Specified development includes development:

- adjacent to land reserved under the National Parks and Wildlife Act 1974 (NPW Act) – Office of Environment and Heritage (OEH)
- adjacent to a marine park under the Marine Estate Management Act 2014 – Marine Estate Management Authority
- adjacent to an aquatic reserve declared under the Fisheries Management Act 1994 (FM Act) – DPI
- in the Sydney Harbour foreshore area (SHFA) within the meaning of the Place Management NSW Act 1998 – Place Management NSW
- comprising a fixed or floating structure in or over navigable waters – RMS

Due consideration must be given to all submissions received. Details must be provide to Ausgrid of the notifications issued, any submissions consequently received, and how they have been addressed.

The above datasets are available on the WebGIS EL (refer to the WebGIS EL Report).

Adjacent is defined as areas or objects that are not separated by anything that is significant and are close enough for a person to pass easily from one to another, ie houses not separated by a road are adjacent.

Templates for consultation with local council and authorities are available here: <https://enviro.ausgrid.com.au/Consult.aspx>

Notification of a proposed substation must be given to neighbours irrespective of whether the substation is to be located in a road or public reserve or on private property.

#### 5.6 Designs that affect other utility services

Designs may affect the assets of other utilities. These assets may be underground or above ground (including underground cables & pipelines, overhead cables and radiofrequency transmitters). The designer shall consider the potential impact the proposed new electricity network assets may have on the assets of the other utilities and also the potential impact the assets of the other utilities may have on the proposed new electricity network assets. In addition to physical interference and damage, issues such as safe working distances (including safe working distances to radiofrequency (RF) transmitters), electrical induction, and earth potential rise, etc must also be considered.

Designers are required to avail themselves of the Designated Underground Asset Information Provider service in order to assess possible effects of a proposed design on other utility underground

services. Information obtained about the infrastructure of other utilities, and in some cases, private services in public streets, must be given due consideration and design plans must be adjusted to accommodate other services. Designated Underground Asset Information Provider information may detail a utility's installations in easements on land not owned by the service provider.

In general, Designated Underground Asset Information Provider information is unlikely to extend to private installations on a property. When designs include works on private land the designer must use best endeavours to verify that there will be no conflict between proposed electricity network assets and private services on the property.

Special care must be taken to adequately consult all appropriate organisations and obtain and design to their conditions when proposed electricity network assets are located near the infrastructure of other utilities and agencies such as:

- TransGrid transmission lines or control/signalling cables.
- Any railway lines, especially crossings of rail corridors, noting that in New South Wales "rail corridor" includes all land owned or occupied by rail authorities.
- Electricity mains installations of RailCorp or ARTC, noting especially that while these are generally confined to the rail corridors they may also be located in public roads or on other land.
- Trunk gas or petroleum products pipelines.
- Trunk and other major telecommunications cables such as interstate coaxial cables.
- Waterways, noting that particular risks arise in navigable waterways (refer to NS268).

## 5.7 Proposed easements or leases

Where a design involves the installation of any network asset on private land, Ausgrid will require the landowner (i.e. the registered proprietor of the land) to grant and register, under the Torrens system of registration, appropriate interests in land in the form of leases or easements as detailed in Ausgrid's Network Standard NS143- Easements, Leases and Rights of Way.

Proposed substation sites and cable routes must not be physically obstructed and must not be encumbered by other easements or property rights for conduits, pipes, cables and the like, whether underground or overhead. Special care must be taken to locate the precise position of any existing private or other utility services on private land and a title search must be done to establish that there are no existing easements or other property rights affecting the proposed substation site, the proposed route of network cables to and from the substation, and any right of way to the substation. The services of a utility services locator and those of a title searcher / registered surveyor / solicitor may be needed in order to fulfil these requirements.

Before finalising a design plan that would require the registered proprietor to grant Ausgrid appropriate interests in land, the designer must ascertain that the registered proprietor has consented to grant the required property rights. This requirement applies equally to network assets to be installed on land to service that land and network assets that are designed to be located on adjoining or nearby land.

The property rights that Ausgrid requires may be represented on a separate drawing sheet associated with the design plan (eg sheet 2 of 2), or as a specific Easement/Lease inset drawing incorporated onto the design plan drawing, or a combination of both. The drawing should not include electrical design infrastructure, apparatus or cables. The details to be given of Ausgrid's entitlement to interests in land must be sufficient to enable a surveyor to use them in the preparation of survey plans for registration purposes.

**Note:** Pre-design consultation is also required with the owner of a property on which there is an existing easement if works, such as conductor uprating or pole replacement, are proposed within the easement. It is essential to check whether the terms of the easement allow such works to be constructed. Even where they do, consultation with the property owner is required as a matter of courtesy. In some instances existing on-site assets which are proposed to be uprated may be "protected electricity works" by virtue of Section 53 of the Electricity Supply Act 1995. If no existing property tenure rights exist, or the existing rights do not cover the proposed new works, then Ausgrid may require a new easement for

cables and kiosk substations and a lease for a chamber substation in accordance with NS143.

## 6.0 WORK HEALTH AND SAFETY LEGISLATION

All designs must comply with the requirements of the Work Health and Safety Act 2011 (NSW) and the Work Health and Safety Regulation 2017 (NSW). Ausgrid considers that electricity networks consist of both plant and structures and it requires designers to observe the provisions of the legislation that relate to both.

The designer must give adequate information to each person who is provided with the design plan for the purpose of giving effect to it. The information must include:

- Each purpose for which the plant, substance or structure was designed.
- The results of any calculations, analysis, testing or examination.
- Any precautions necessary to make sure that the plant, substance or structure is without risks to health and safety when used for a purpose for which it was designed or when carrying out any activity related to it, such as construction, maintenance and demolition.

In this context, Ausgrid requires the designer to provide adequate information regarding any plant, substance or structure associated with the design of any network asset, including overhead or underground distribution mains, overhead or underground subtransmission mains, distribution substations, street lighting, etc. In so doing, the designer must:

- (a) Identify hazards that may arise in the application of the design.
- (b) Assess the risks to health and safety arising from each hazard.
- (c) To the extent possible, eliminate or minimise all risks that may arise during the design development process by designing suitable control measures.
- (d) Review the control measures as required and control any residual risks. Provide each person who receives the design all necessary information regarding the safe use of the plant, substance or structure, including the information required by Items (a) to (c) above.
- (e) Provide a Designer Safety Report that identifies any unusual or atypical features of the design and all hazards and risks that are unique to the particular design.
- (f) Include in the Designer Safety Report an assessment of risks arising throughout the construction, operation and maintenance phases of all components of the design plan.
- (g) Include in the Designer Safety Report appropriate information on the identified hazards, assessment of risks, adopted control measures and the residual risks of all plant and structure comprising the design plan.

The designer must comply with the provisions of the WHS Regulation 2017 (NSW) (Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report to be presented to Ausgrid.

The Designer Safety Report must be prepared and presented to Ausgrid when the design development process is complete. It must identify all hazards relating to the design that create a risk to the health or safety of persons who will carry out any activity on the plant, substance or structure, and are unique to the particular design. This makes sure that the risks posed will be properly accounted for by persons constructing or using the designed assets, even though they do not usually arise in relation to similar assets.

All design work must be undertaken in accordance with all relevant legislation and regulatory requirements. In the event of any inconsistency between Ausgrid's Network Standards and WHS

requirements, designers' WHS obligations will take precedence. However, where an inconsistency is identified the designer must obtain authorisation from Ausgrid before incorporating a variation to a Network Standard in a design. External designers including those authorised as ASPs will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will help keep Network Standards appropriately updated and facilitate employment of a consistent interpretation of the legislative framework.

## 7.0 RELATED DOCUMENTS

### 7.1 General

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](http://www.ausgrid.com.au).

### 7.2 Ausgrid documents

- Bush Fire Risk Management Plan
- Company Form (Governance) - Network Document Endorsement and Approval
- Company Procedure (Governance) - Network Document Endorsement and Approval
- Company Procedure (Network) - Production / Review of Engineering Technical Documents
- Customer Installation Safety Plan
- Division Workplace Instruction (Network) – Production /review of Network Standards
- ES4 Service Provider Authorisation
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- NS100 Field Recording of Network Assets
- NS109 Design Standards for Overhead Supply Developments and Distribution Centres
- NS110 Design and Construction Standards for **Underground Residential Subdivisions**
- NS112 Design Standards for Industrial and Commercial Developments
- NS113 Site Selection and Construction Design Requirements for Chambers Substations
- NS114 Electrical Design and Construction Standards for Chamber Type Substations
- NS116 Design Standards for Distribution Equipment Earthing
- NS117 Design and Construction Standards for Kiosk Type Substations
- NS119 **Public Lighting Design and Construction**
- NS122 Pole Mounted Substation **Site Selection and Construction**
- NS125 **Construction of Low Voltage Overhead Mains**
- NS126 Construction of High Voltage Overhead Mains
- NS130 Laying Underground Cables up to and including 11kV
- NS135 Construction of **33kV, 66kV and 132kV Overhead Mains**
- NS141 Site Selection and Site Preparation Standards for Kiosk Type Substations
- NS143 Easements, Leases and Rights of Way
- NS148 Overhead Line Support, Street Light Column, Pit and Pillar Numbering
- NS149 Drawing Content for Chamber Type Substations, Control Points, Cable Risers and Ductlines
- NS168 Design and Construction of 33kV, 66kV and 132kV Underground Cables
- NS172 Design Requirements for Cable Jointing Pits and Vaults **and Bays**
- NS174 Environmental Procedures
- NS174A SER
- EGN174B SER Guidance Notes
- NS174C Environmental Handbook for Construction and Maintenance
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS220 Overhead Design Manual
- NS261 Requirement for Design Compliance Framework for Network Standards
- Public Electrical Safety Awareness Plan
- Public Lighting Management Plan

- Tree Safety Management Plan

### 7.3 Other standards and documents

- AS 1100 Technical Drawing – General Principles
- AS/NZS 7000 Overhead line design
- ENA Doc 001-2019 National Electricity Network Safety Code

### 7.4 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014 (NSW)
- Electricity Supply Act 1995 (NSW)
- Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act)
- Roads Act 1993 (NSW)
- State Environmental Planning Policy (Infrastructure) 2007 (NSW)
- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2017 (NSW)

## 8.0 DEFINITIONS

Refer to NS001 Glossary of Terms.

## 9.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

**Table 3 – Recordkeeping**

Type of Record	Storage Location	Retention Period *
Approved copy of the network standard	Document repository	Unlimited
Draft Copies of the network standard during amendment/creation	Work Folder for Network Standards	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	Records management system Work Folder for Network Standards	Unlimited

- \* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

## 10.0 AUTHORITIES AND RESPONSIBILITIES

For this network standard the authorities and responsibilities of Ausgrid employees and managers in relation to content, management and document control of this network standard can be obtained from the Company Procedure (Network) – Production / Review of Engineering Technical Documents. The responsibilities of persons for the design or construction work detailed in this network standard are identified throughout this standard in the context of the requirements to which they apply.

## 11.0 DOCUMENT CONTROL

**Content Coordinator** : Head of Asset Engineering Policy & Standards

**Distribution Coordinator** : Manager Asset Engineering Standards

## Annexure A - CAD layer naming standard

**Note:** All proposed assets must be placed in the Model space and all non-standard Ausgrid layers must start with the following prefix - XT\_.

The standard is made up of the following components:

USE, VOLTAGE, INSTALLATION, \_CATEGORY, DETAIL, STATUS and VISIBILITY

Note that the following points apply when using the layer naming standard:

- Not every layer name component is used in every layer name.
- A set of rules apply to determine the correct layer name.
- Every layer name has a USE and a STATUS specified except for External Source CAD data with a USE of XT, where no STATUS is required.
- Specific exceptions to the layer name standard are:
  - (i) PLE-DESIGN required for Perfect Light street lighting design;
  - (ii) VALIDATION\_ERROR required for validation;
  - (iii) Refnum, Required in AutoCAD; and
  - (iv) Layer 0. Required in CAD systems.
- Additional Layers can be created by the CAD user by using an XT Prefix to the layer name or by adhering to the standard. The standard allows User definition of the DETAIL and / or VISIBILITY component of the Layer Name.
- Proposed changes to the electrical network will be on layers where the STATUS component of the layer name is \_PROP.

## A1 Layer name component - USE

### USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

Is required for all Layers.

Provides the major grouping of layers and governs the alphabetical sort order

Conductors and equipment with more than one USE take on the highest ranking of USE according to the ranking in the following table.

The values for USE cannot be used in any other part of the layer name, except for layers with a USE of XT.

**USE** Can take on the following Values:

<b>XT</b>	<p>XT refers to data provided by an external source this could include photos, aerial images, google maps, point cloud, third party surveys etc.</p> <p>Used for CAD data provided by an external source. Layer names are created by adding the prefix of XT_ to the existing layer names of the external data. Layers with a Use of XT are ignored by the NET CAD Validation process. Where external data takes on a USE that becomes part of a proposed design, the object layer names are changed to the appropriate USE and with a STATUS of _PROP. eg Externally provided new subdivision cadastre will be moved to a BASE_CADASTRE_PROP layer.</p>
<b>BASE</b>	<p>Specified as BASE for all non-electrical objects in the design including cadastre and property information, map and area boundaries and drawing sheet information.</p> <p>Specified as BASE for electrical objects where there is no clear definition of the electrical use or voltage level in GIS or a specific electrical USE &amp; VOLTAGE is unknown or not relevant in the design. eg Cross Section of a proposed trench is on layer BASE_SECTION_PROP, Proposed System Diagram changes are in layer BASE_SYST-DIAG_PROP</p>
<b>POLE</b>	<p>Used for all poles and support structures and not ranked according to Network use. eg a HV pole has a USE of POLE, not a USE of HV.</p>
<b>AUX</b>	<p>Auxiliary conductors and equipment used for communications, protection, pilots and earthing including OHEW, OPGW, ADSS (Pink Network)</p>
<b>SV</b>	<p>Service connection conductors and equipment. Assumed to be 240/415 volt. Use HV or TR for high voltage service connections.</p>
<b>SL</b>	<p>Street Lighting conductors and equipment.</p>
<b>LV</b>	<p>Low voltage conductors and equipment. Assumed to be 240/415 volt. Also used for LV network lines in a geo-schematic</p>
<b>HV</b>	<p>High Voltage distribution conductors and equipment. Assumed to be 11kV unless specified by VOLTAGE. Also used for HV feeders in a geo-schematic.</p>
<b>TR</b>	<p>Transmission conductors and equipment which must always have a VOLTAGE specified except where INSTALLATION is specified as SCHEM or for Transmission annotation that does not relate to a specific voltage level on layer TR_ANNNO_EXIST. Also used for TR feeders and Zone Substations in a geo-schematic.</p>
<b>EARTH</b>	<p>Earthing cables and electrodes/equipment</p>

## A2 Layer name component – VOLTAGE

USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

Provides detail of the voltage level of conductors and equipment.

Omitted where Use is LV, SL, SV, BASE, POLE, AUX, or XT.

Omitted where Use is HV and the voltage is 11kV.

Specified where HV is a voltage other than 11kV. An additional prefix of “S” is used for Single Wire Earth Return Systems.

Specified for any TR USE conductors and equipment.

**VOLTAGE** can take on the following values:

<b>5</b>	5kV or 5.5kV High Voltage conductors and equipment. Used only when USE is specified as HV
<b>6</b>	6.6kV High Voltage Conductors and Equipment. Used only when USE is specified as HV
<b>S12</b>	12.7kV Single Wire Earth Return Conductors and Equipment. Used only when USE is specified as HV
<b>S19</b>	19.2kV Single Wire Earth Return Conductors and Equipment. Used only when USE is specified as HV
<b>22</b>	22kV High Voltage Conductors and Equipment. Used only when USE is specified as HV (may also be known as sub-transmission but still has USE specified as HV in CAD)
<b>33</b>	33kV Transmission and used only when USE is specified as TR
<b>66</b>	66kV Transmission and used only when USE is specified as TR
<b>132</b>	132kV Transmission and used only when USE is specified as TR

### A3 Layer name component – INSTALLATION

USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

Layers where INSTALLATION is OH or UG contain the actual conductors when no further CATEGORY or DETAIL is specified.

Conductors are to be connected together in the CAD design to form a continuous circuit but may change between OH and UG layers and between layers with a different STATUS.

INSTALLATION is omitted where STATUS is specified as ABAND or OOS.

**INSTALLATION** can be specified with the following values:

<b>OH</b>	Used for overhead bundled or aerial conductors or conductors attached to an external exposed surface. Omitted in Layer names where USE is specified as XT or BASE or POLE or where STATUS is specified as ABAND or OOS.
<b>UG</b>	Used for underground direct buried or conduited cables / conductors, or cables / conductors within a covered enclosure, cable risers and Submarine Cables. Omitted in Layer names where USE is specified as XT or BASE or POLE or where STATUS is specified as ABAND or OOS.
<b>SCHEM</b>	Specified as SCHEM for objects noted in the GIS as Schematic or Geoschematic. Made available in Scout with Network or Schematic Themes. Additional information relating to the contents of the layer is provided in CATEGORY and DETAIL layer name components where they contain geo-schematic detail. Alternatively, where CATEGORY and DETAIL layer name components are blank, used for schematic diagrams related to a design. Refer also to "SUB NAME" listed under the CATEGORY Layer Name Component and "Schematic Detail" listed under the DETAIL Layer Name Component
<b>SECTION</b>	Used for Sectional views including Underground Trench Cross Sections. Must have a USE specified as BASE with no specification for VOLTAGE. eg the layer named BASE_SECTION_EXIST contains all cross section information for all voltage levels and includes all annotation.
<b>DUCT</b>	Used for Duct Coverage of Underground cables and Trenches. Must have a USE specified as BASE with no specification for VOLTAGE.
<b>SYST-DIAG</b>	Used for imported or drawn System Diagram components. Always has a STATUS specified as EXIST or PROP for existing and proposed system diagram configuration.
<b>PROP-WORK</b>	Used to note proposed work that has already been recorded in the GIS. Layers where INSTALLATION is specified as PROP-WORK do not have a CATEGORY specified, do not have a DETAIL specified and always have a STATUS specified as EXIST
<b>CADASTRE</b>	Used for Cadastre detail with USE specified as BASE Additional layers are specified for related cadastre DETAIL. For example: BASE_CADASTRE_LOT_EXIST for Lot and DP numbers, BASE_CADASTRE_NUMBER_EXIST for Street numbers, BASE_CADASTRE_ANNO_EXIST for Street Names.
<b>MAP</b>	Used with USE specified as BASE for geographic map information. eg Existing contour information is on layer BASE_MAP_CONTOUR_EXIST. May also be used with USE specified as TR for specific transmission related map information.
<b>SHEET</b>	Used with USE specified as BASE for Drawing Sheet Borders, Title Blocks, Legends and all associated details including annotation. eg BASE_SHEET_EXIST
<b>ROAD</b>	Used for ROAD detail with USE specified as BASE Additional layers are specified for related road DETAIL. For example: BASE_ROAD_ANNO_EXIST.

## A4 Layer name component - CATEGORY

USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

Omitted where STATUS is specified as ABAND or OOS.

Generally omitted for conductors and poles.

Can have an \_EXIST or \_PROP status.

Must be specified for electrical objects of geo-schematics.

**CATEGORY** can take on the following values:

<b>JOINT</b>	Used for all electrical network Joints, Nodes, Potheads UGOHs and Terminations and any related numbers or annotation. Equipment with a CATEGORY of JOINT has no specification for INSTALLATION or DETAIL so that OH and UG joints and related detail are all displayed on the one layer
<b>PARTS</b>	Used for electrical network parts not included by a USE specification of POLES or a CATEGORY specification of JOINT. Any related numbers or annotations are also included on this layer without additional layers with further specification of related DETAIL. Additional layers with specification for INSTALLATION of OH or UG are used for PARTS where the specific installation Method is known. eg HV_PARTS_EXIST layer is used for an 11kV switch HV_OH_PARTS_EXIST used for an 11kV pole top capacitor HV_UG_PARTS_EXIST used for an 11kV cable riser
<b>AREA</b>	Used for Area definition from Scout. eg BASE_AREA_AF_EXIST
<b>LEGEND</b>	Used with the Layer Name Component of INSTALLATION specified as SHEET for legend information
<b>SUB and SUB_FDR</b>	Used with the Layer Name Component of INSTALLATION specified as SCHEM for geo-schematic diagrams. SUB takes on the actual supplying substation name and FDR takes on the name of the feeder out of the substation. eg The geo-schematic of 11kv feeder on panel 4 out of Manly ZS would be on a layer named: HV_SCHEM_MANLY_PANEL4_EXIST The geo-schematic of 33kv feeder 763 out of Merewether bulk supply Sub would be on a layer named: TR_SCHEM_MEREWETHER_763_EXIST. The actual substation and feeder names are not available for the Scout DXF extract directly and the layer name must be updated manually.

## A5 Layer name component - **DETAIL**

USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_**DETAIL**\_STATUS\_VISIBILITY

Omitted where STATUS is specified as ABAND or OOS.

Can have additional values other than those listed here as needed in the CAD design.

Some typical **DETAIL** values are given here:

<b>ANNO</b>	Used for Annotation
<b>NUMBER</b>	Used for numbers. Examples for Number POLE_NUMBER_EXIST for Pole Numbers BASE_CADASTRE_NUMBER_EXIST for Street numbers
<b>LOT</b>	Used for Deposited Plan and Lot details eg BASE_CADASTRE_LOT_EXIST
<b>“SCHEMATIC DETAIL”</b>	Used with the INSTALLATION component of the Layer name specified as SCHEM for geo-schematic diagrams and with the CATEGORY component containing the substation name relating to the geo-schematic objects. “Schematic Detail” is the actual feeder name or number or is specified as NUMBERS for all the Substations section numbers in a geo-schematic

## A6 Layer name component - STATUS

USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

A STATUS is required for All Layers except layers with a USE of XT.

Values for STATUS cannot be used in any other part of a layer name except where USE is XT.

STATUS can be specified with the following values:

<b>EXIST</b>	Used on all Layers showing details that are already recorded in Ausgrid's GIS except for the electrical conductors and equipment on layers with a STATUS specified as ABAND or OOS. A STATUS of EXIST may also include equipment that has INSTALLATION specified as PROP-WORK that is already recorded in the GIS.
<b>PROP</b>	PROP is used for details of the "proposed" new design created by the CAD user and that are to be uploaded to the GIS through NET CAD or manually updated in the GIS after energising. Any layer that does not have a STATUS specified as PROP will be ignored by the CAD upload process. Layers with a STATUS of PROP will also be ignored by NET CAD where INSTALLATION is specified as SCHEM.
<b>ABAND</b>	Used on Layers showing electrical conductors and equipment that are noted as abandoned in the GIS. Any conductors or equipment with a STATUS of ABAND must have a specification for USE but will not have a specification for VOLTAGE, INSTALLATION, CATEGORY or DETAIL. eg The HV_ABAND layer contains all HV OH and UG conductors and equipment and associated annotation. This status is not used for electrical conductors and equipment that are proposed to be abandoned as part of a CAD design as noted in 0
<b>OOS</b>	Used on Layers showing electrical conductors and equipment that are noted as Out Of Service in the GIS. Any conductors or equipment with a STATUS of OOS must have a specification for USE and may have a specification for VOLTAGE where needed, but will not have a specification for INSTALLATION, CATEGORY or DETAIL. e.g. The HV_22_OOS layer contains all 22kV HV OH and UG conductors and equipment and associated annotation. This status is not used for electrical conductors and equipment that are proposed to be taken Out Of Service as part of a CAD design as noted in 0

## A7 Layer name component - VISIBILITY

### USE\_VOLTAGE\_INSTALLATION\_CATEGORY\_DETAIL\_STATUS\_VISIBILITY

VISIBILITY is a suggested addition that may be added to a layer name by the CAD user

Additional Layers can be created by the CAD user to control the display of objects during the design process. The Visibility suffix to layer names is not provided in .DXF output from the GIS and is ignored when interpreting design information through NET CAD.

Some suggested naming and uses for a **VISIBILITY** suffix to existing Layer names are:

<b>OFF</b>	<p>Used to create an additional layer for some objects that can be turned off to make a design easier to read.</p> <p>eg If a design was too congested due to too many cross section views on the BASE_SECTION_EXIST layer, a new layer named BASE_SECTION_EXIST_OFF would be created and some of the cross section views moved to the new layer. The new layer would then be turned off so that some of the cross sections were not displayed. Any layer names ending with PROP_OFF will still be loaded into the GIS through the NET CAD process</p>
<b>STAGE1 to STAGE”n”</b>	<p>Used to separate design information into stages where proposed construction is to proceed in stages. eg HV_OH_PROP_STAGE1. “n” can take on any number in sequence to note the staging of the proposed construction. Note that any layer names ending with PROP_STAGE”n” will still be loaded into the GIS through NET CAD from a completed design</p>

## A8 Procedures for out of service, abandoned or removed equipment

CAD design for actual construction work often make changes to existing electrical assets or reveal a correction to how electrical assets are already recorded in the GIS. A standard method for treating these situations is needed in the CAD design so that changes are interpreted through NET CAD in a uniform way.

The following processes combine existing practices and feedback from CAD users and NET CAD employees to provide a standard for each situation:

(a) Equipment taken Out of Service (OOS)

Where existing equipment is to be taken out of service as part of a CAD Design but still left in place and able to be returned to service, the equipment will be:

- Left on its current layer with an “Existing” STATUS
- Remain its existing colour
- Have construction notes or a notation and leader to the equipment, in paper space, noting that the equipment is to be taken OOS, disconnected, triple sealed etc as appropriate.

**Note:** The Layer STATUS of “OOS” is only to be used for existing equipment that is already noted in the GIS as Out of Service.

(b) Equipment Abandoned

Where existing equipment is to be abandoned as part of a CAD Design but still left in place and able to be returned to service, the equipment will be:

- Left on its current layer with an “Existing” STATUS
- Remain its existing colour
- Have construction notes or a notation and leader to the equipment, in paper space, noting that the equipment is to be Abandoned.

**Note:** The Layer STATUS of “Abandoned” is only to be used for existing equipment that is already noted in the GIS as Abandoned.

(c) Equipment Removed

Where existing equipment is to be Removed as part of a CAD Design the equipment will be:

- Left on its current layer with an “Existing” STATUS
- Remain its existing colour

Marked with 0.5mm line thickness crosses that extend around an object or along a line.

Have construction notes or a notation and leader to the equipment, in paper space, noting that the equipment is to be Removed.