



Manual – Safe Electrical Work

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1. Definitions, Acronyms and Abbreviations

Appliance, Fixed	An appliance that is fastened to a support or otherwise secured in a specific location (AS/NZS 3000:2018 Wiring Rules).
Appliance, Hand-held	A portable appliance intended to be held in the hand during normal use, the motor, if any, forming an integral part of the appliance (AS/NZS 3000:2018 Wiring Rules).
Appliance, Portable	Either an appliance that is moved while in operation or an appliance that can easily be moved from one place to another while connected to the supply (AS/NZS 3000:2018 Wiring Rules).
Competent, Competent Worker	Means: <ul style="list-style-type: none"> For Electrical Work on energised Electrical Installations and/or Equipment (other than testing of Portable Appliances or residual current devices) - a Worker who is authorised under the NSW Home Building Act 1989-147 to do Electrical Wiring Work. For any other case - a Worker who has acquired through training, qualification or experience the knowledge and skills to carry out the task. (NSW Work Health and Safety Regulation 2017).
Construction Work	As defined by the NSW Work Health and Safety Regulation 2017.
Construction Workplace	A workplace where construction work as defined by NSW Work Health and Safety Regulation 2017 is carried out.
Electrical Disconnection and Reconnection Work	Means Electrical Work that is limited to: <ul style="list-style-type: none"> disconnection and reconnection of electrical wiring at the Electrical Equipment itself and only to the extent necessary to permit the non-Electrical Work to be performed, replacement of Electrical Equipment on a "like for like" basis, testing necessary for the safe isolation of the Electrical Equipment to be disconnected and reconnected, testing necessary for the safe operation of the Electrical Equipment, replacement of 'blown' fuses and resetting of "tripped" circuit breakers, Electrical Equipment operation at voltages above 50 and up to 1000 VAC and above 120 up to 1500 VDC, unless Hunter Water authorisation limits to a lower voltage. (NSW Service and Installation Safety Rules)
Electrical Equipment	Wiring systems, switchgear, control gear, accessories, Appliances, luminaires and fittings used for such purposes as generation, conversion, storage, transmission, distribution or utilization of, electrical energy (AS/NZS 3000:2018 Wiring Rules).
Electrical Installation	Electrical Equipment installed for the purposes of conveyance, control, measurement or use of electricity, where electricity is or is to be supplied for consumption. It includes Electrical Equipment supplied from a distributor's system or a private generating system (AS/NZS 3000:2018 Wiring Rules). In this document it does not include any electrical article connected to, and extending or situated beyond, any electrical outlet socket.
Electrical Wiring Work	Means the actual physical work of installing, repairing, altering, removing or adding to an Electrical Installation or the supervising of that work (from NSW Gas and Electricity Consumer Safety Act 2017-15 and referenced in NSW Home Building Act 1989-147 and NSW Home Building Regulation 2014).

Electrical Work	<p>Means:</p> <ul style="list-style-type: none"> connecting electricity supply wiring to Electrical Equipment or disconnecting electricity supply wiring from Electrical Equipment, or installing, removing, adding, replacing, repairing, altering or maintaining Electrical Equipment or an Electrical Installation. <p>Electrical work does not include the following:</p> <ul style="list-style-type: none"> Testing with a multimeter so long as competent to execute the test, work that involves connecting Electrical Equipment to an electricity supply by means of a flexible cord plug and socket outlet, work on a non-electrical component of Electrical Equipment, if the Worker carrying out the work is not exposed to an electrical risk, e.g., painting Electrical Equipment, replacing Electrical Equipment or a component of Electrical Equipment if that task can be safely performed by a Worker who does not have expertise in carrying out Electrical Work, e.g., replacing a light bulb, assembling, making, modifying or repairing Electrical Equipment as part of a manufacturing process, building or repairing ducts, conduits or troughs, where electrical wiring is or will be installed if: <ul style="list-style-type: none"> the ducts, conduits or troughs are not intended to be earthed, and the wiring is not energised, and the work is supervised by an authorised electrician, locating or mounting Electrical Equipment, or fixing Electrical Equipment in place, if this task is not performed in relation to the connection of Electrical Equipment to an electricity supply, assisting an authorised electrician to carry out Electrical Work if <ul style="list-style-type: none"> the assistant is directly supervised by the authorised electrician, and the assistance does not involve physical contact with any energised Electrical Equipment. carrying out Electrical Work, other than work on energised Electrical Equipment, in order to meet eligibility requirements in relation to becoming an authorised electrician (NSW Work Health and Safety Regulation 2017).
Electrical Worker	A Worker who carries out Electrical Work
Exposed Conductive Part	<p>A Exposed Conductive Part of Electrical Equipment that:</p> <ul style="list-style-type: none"> can be touched with the standard test finger as specified in AS/NZS 3100 Approval and test specification - General requirements for Electrical Equipment; and is not a live part but can become live if basic insulation fails (AS/NZS 3000:2018 Wiring Rules).
Extra Low Voltage (ELV)	A voltage not exceeding 50 VAC or 120 VDC ripple-free (AS/NZS 3000:2018 Wiring Rules).
Fault-finding	The action of analysing an Electrical Installation and/or Equipment not functioning as intended. Fault finding may be carried out before Repair work and can include inspection, measurement and/or testing.
Hazardous Area	<p>An area at risk of a fire or explosion due to the presence of flammable gas/vapour or combustible dust as defined by:</p> <ul style="list-style-type: none"> AS/NZS 60079.10.1 Explosive atmospheres—Classification of areas – Explosive gas atmospheres, or AS/NZS 60079.10.2 Explosive atmospheres – Classification of areas – Combustible dust atmospheres

High Voltage (HV)	A voltage exceeding Low Voltage (i.e. > 1,000 VAC or 1,500 VDC) (AS/NZS 3000:2018 Wiring Rules).
Hunter Water	Hunter Water Corporation
Hunter Water Authorised Electrical Worker	An Electrical Worker with the competency listed in Section 5.1 who has been authorised by Hunter Water to carry out a specified type of Electrical Work
Hunter Water Electrical Worker	An Electrical Worker working at a workplace owned, controlled or managed by Hunter Water
Hunter Water Worker	A Worker working at a workplace owned, controlled or managed by Hunter Water
Insulated	Separated from adjacent conducting material by a non-conducting substance or airspace permanently providing resistance to the passage of current, or to disruptive discharges through or over the surface of the substance or space, to obviate danger of shock or injurious leakage of current (AS/NZS 3000:2018 Wiring Rules).
Isolated	The definition of Hunter Water Manual - Isolation, Lockout and Tagging applies
Low Voltage (LV)	A voltage exceeding Extra Low Voltage (i.e.> 50 VAC or 120 VDC ripple-free), but not exceeding 1,000 VAC or 1,500 VDC (AS/NZS 3000:2018 Wiring Rules).
Maintenance	The routine actions required to keep the Electrical Installation and/or Equipment in a condition where it reliably functions as intended e.g. inspection, adjustment, cleaning, lubrication, and scheduled replacement of consumable parts.
Nominated Person	A Nominated Person as defined in the Hunter Water Standard – Electrical Safety
OEM	Original equipment manufacturer
PPE	Personal protective equipment
Plant	Includes: any machinery, equipment, appliance, container, implement and tool, and any component of any of those things, and anything fitted or connected to any of those things. (Work Health and Safety Act 2011-10)
Protected Extra Low Voltage (PELV)	An Extra Low Voltage installation compliant with the power supply, segregation and installation requirements of Clause 7.5 of AS/NZS 3000:2018 Wiring Rules
Qualified Electrical Supervisor	The holder of an endorsed contractor licence, or a supervisor certificate, authorising its holder to do Electrical Wiring Work
Repair	The actions required to return an Electrical Installation and/or Equipment to a condition where it reliably functions as intended following an unexpected failure, damage, misuse or inadequate Maintenance. Fault-finding may be required prior to Repair.
Safety Observer	Means, in respect to Electrical Work, a person who must: <ul style="list-style-type: none"> • understand all safety aspects of the work being observed, and • be Competent to implement control measures in an emergency, and • be able to rescue the Worker who is carrying out the work, if it is necessary and safe to do so, and • have been assessed in the previous 12 months as Competent to rescue and resuscitate a person.
SWMS	Safe work method statement
WI	Work instruction

Worker	<p>Worker includes all of the following:</p> <ul style="list-style-type: none">• an employee of Hunter Water,• a contractor or subcontractor to Hunter Water,• an employee of a contractor or subcontractor to Hunter Water,• an employee of a labour hire company who has been assigned to work at a Hunter Water workplace,• an outworker, or an apprentice of Hunter Water,• trainee of Hunter Water,• a student gaining work experience at Hunter Water, or• a volunteer at Hunter Water.
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2. Purpose

The purpose of this document is to eliminate, or where elimination is not reasonably practicable, minimise the potential for fatalities, injuries and incidents arising from the risks of the carrying out Electrical Work by Electrical Workers at workplaces owned, controlled or managed by Hunter Water.

This document is intended to satisfy the safe electrical work requirements of the Hunter Water Standard – Electrical Safety and requirements of the legislation mapped below:



As they apply to the following:

- Hunter Water Act 1991-53;
- NSW Work Health and Safety Act 2011-10;
- NSW Work Health and Safety Regulation 2017;
- NSW Electricity Supply Act 1995-94;
- NSW Electricity Supply (General) Regulation 2014;

- NSW Electricity Supply (Safety and Network Management) Regulation 2014;
- NSW Electricity Supply (Corrosion Protection) Regulation 2014;
- NSW Gas and Electrical Consumer Safety Act 2017-15;
- NSW Gas and Electrical Consumer Safety Regulation 2018;
- NSW Home Building Act 1989-147;
- NSW Home Building Regulation 2014;
- NSW National Electricity Act 1997-20;
- NSW National Electricity Law-20a;
- NSW National Electricity Regulation 2015;
- NSW Service and Installation Rules of NSW October 2019;
- Safe Work NSW Managing Electrical Risk in the Workplace Code of Practice September 2016;
- Safe Work Australia General Guide for Working In the Vicinity of Overhead and Underground Electric Lines July 2014;
- Safe Work Australia, Construction Work Code of Practice May 2018;

Where Hunter Water Electrical Workers are exposed, during the execution of their work, to damaging energies other than electricity (e.g. gravity, thermal, machinery, chemicals, dangerous atmospheres) this document will acknowledge the Hunter Water Electrical Workers' exposure to these risks and, unless a requirement particular to Electrical Work is required, it will reference existing Hunter Water business wide risk controls provided to eliminate or minimise the risks resulting from these damaging energies.

3. Scope

This document applies to:

- Electrical Work on any Electrical Installation or Equipment owned, leased or hired by Hunter Water or brought onto a Hunter Water workplace by contractors (or subcontractors) to Hunter Water, and
- All Hunter Water Workers.

4. Risk Management of Electrical Work

4.1 Electrical Hazards & Risks

Hunter Water Electrical Workers working on or near Electrical Installations or Equipment may be exposed to any of the following electrical hazards:

- Exposed energised parts
- Parts that become energised by fault conditions
- Wet, deteriorated or otherwise inadequate insulation
- Arc flash, explosion
- Overheating
- Stored electrical energy (e.g. batteries, capacitors, static charge)
- Induced electrical currents
- Lightning
- Electromagnetic radiation
- Electrical ignition of explosive atmospheres
- Inadequate electrical testing or measuring equipment
- Inadequate or incorrect isolation
- Fire & products of combustion

The likelihood (and hence risk) of electric shock, burns, disabling injuries or electrocution arising from the above listed electrical hazards can be increased by:

- Lack of competency
- Inadequate hazard identification, risk assessment and control of risks
- Human error
- Working alone
- Fatigue
- The work environment.

4.2 Electrical Risk Management

All applicable risk management actions required by the Hunter Water Framework - Enterprise Risk Management must be applied to all Electrical Work.

SWMSs and WIs for Electrical Work must be developed for all reasonably foreseeable Electrical Work tasks in consideration with:

- The broad brush risk assessment of the Hunter Water Electrical Operations,
- The applicable risk assessment of the task, and

- All OEM safe work instructions related to the Plant, Electrical Installation, and/or Equipment subject of the task.

All Electrical Work must be carried out in accordance with either:

- a published Hunter Water SWMS, or
- a published Hunter Water WI, or
- the equivalent to one of the above two types of document produced by an approved contractor to Hunter Water, and
- a Hunter Water Take 5 completed for the work or an equivalent document of an approved contractor to Hunter Water, or
- if two or more Workers work as a group, a Hunter Water On Site 3 in 1 or an equivalent document of an approved contractor to Hunter Water.

Where a Hunter Water SWMS or WI or, an equivalent document of an approved contractor to Hunter Water, does not exist for a specific Electrical Work task e.g. for an unforeseen task, the Electrical Work must be carried out in accordance with either:

- a specifically developed work instruction or
- an equivalent document e.g. JSEA, of an approved contractor to Hunter Water, and
- a Hunter Water Take 5 completed for the work or an equivalent document of an approved contractor to Hunter Water, or,
- if two or more Workers work as a group, a Hunter Water On Site 3 in 1 or an equivalent document of an approved contractor to Hunter Water

4.2.1 Confirmation of Installation &/or Equipment to be Worked On.

Electrical work must not be commenced until the Hunter Water Electrical Worker has confirmed the actual Electrical Installation and/or Equipment (including cables) that they have located and intend to work upon is actually the Electrical Installation and/or Equipment specified in the related work description documentation (LV Electrical Work Permit [where applicable], HV Access Permit, Maintenance Work Order, SWMS, WI or Take 5).

If a Hunter Water Electrical Worker is unsure of the identity of the Electrical Installation and/or Equipment subject of their related work description documentation they must contact their supervisor or permit issuer for assistance in making a correct identification.

4.2.2 Test Before You Touch

LV and ELV electrical isolations must be verified before any work commences as specified in Sections 22 & 22. HV electrical isolations must be verified before any work commences as specified in Hunter Water Manual - High Voltage Installation Safety Management Plan.

Note that the above required isolation verification may be by voltage measurements or other means such as visible break isolator or pre/post isolation test run of motor.

Hunter Water Electrical Workers must, after the isolations for their work have been made and verified as specified above, and prior to commencing work, confirm the absence of dangerous voltages by a voltage measurement of the conductive circuit parts of the Electrical Installation and/or Equipment to be worked upon i.e. Test Before You Touch.

4.2.3 Currency of System Electrical Documentation

Electrical Workers can need to rely on electrical system documentation (e.g. single line and schematic drawings) to identify risks relating to electrical hazards that are not visually obvious (e.g. voltage levels, fault current levels, multiple sources of supply) to assist them to work safely.

Where Electrical Workers use electrical system documentation to assist them to work safely they must:

- confirm the currency of the documentation if they doubt its accuracy in any way, and
- Verify the information from the documentation by measurement, test, visual or some other applicable method before relying on the information for their safety.

4.2.4 Egress from Electrical Work Areas

Where Electrical Workers work in an enclosed space e.g. switch room, walk in enclosure, fenced switchyard or cable basement they must, before commencing work:

- Confirm that a safe, unobstructed emergency egress exists, and
- If more than one egress route exists confirm that all egress routes are unobstructed and that all egress gates or doors are operable from the Electrical Worker's side of the enclosed space

4.2.5 Low Voltage Rescue Kits

LV Electrical Work must not be carried out without an LV Rescue Kit being immediately available at the work location. The LV Rescue Kit does not have to be set up where a lone worker is present but should still be present on site. Electrical workers must be aware of the location of the nearest LV Rescue Kit prior to commencement of any Electrical Work.

Low Voltage Rescue Kits with the contents illustrated in Figure 1 are available to all electrical workers.



Figure 1 LV Rescue Kit Contents

4.2.6 Conductive Clothing & Jewellery

Clothing made of conductive fabrics or with conductive accessories and conductive jewellery must not be worn by Electrical Workers when carrying out Electrical Work on or near energised LV or HV Electrical Installations or Equipment, and should be avoided for all other types of Electrical Work.

4.3 Hazards Other Than Electricity

Risk assessments of work to be undertaken by Hunter Water Electrical Workers has identified that they can be exposed to other hazards in addition to electricity.

These hazards include, but are not limited to:

- Asbestos
- Irrisable atmosphere, contaminated or oxygen deficient atmosphere
- Explosive atmosphere
- Chemical Exposure, e.g. PCBs, battery acid, chlorine
- Falls
- Engulfment
- Drowning
- Exposure to sewage and other infectious substances
- Fire
- Arc Flash/Explosion
- Inadequate isolation

- Hazardous manual tasks
- Mobile Plant
- Moving parts of fixed Plant
- Noise and Vibration
- Remote or isolated work
- Stored Energy
- Venomous insects/spiders or reptiles

Risk controls for Hunter Water Electrical Workers in respect to these hazards are identified in and the applicable corporation wide risk control documentation.

5. Competencies of Hunter Water Electrical Workers

5.1 Electrical Work Competencies

Electrical Work carried out on Hunter Water Electrical Installations or Equipment must be by competent Workers who are authorised by Hunter Water to do the work.

The competencies for the various types of Electrical Work tabulated in Table 1 are the requirements of the NSW Home Building Act 1989-147 and the NSW Home Building Regulation 2014 or Hunter Water. Note that the referenced clauses in the NSW Home Building Act 1989-147 go beyond the scope implied by the Act's name and apply to 'any Electrical Wiring Work (whether or not it is also residential building work)'.

Table 1 Electrical Work Competencies

Electrical Work Type (Legislative Reference)	Competency Required
Electrical wiring work (see definition of Section 1) (NSW Home Building Act 1989-147 CI 24, NSW Home Building Regulation 2014 CI 16)	<p>Either a</p> <p>(a) Qualified Electrical Supervisor Licence.</p> <p>Or</p> <p>(b) Electrical Tradesperson certificate, but only if the work is done under the supervision of a Qualified Electrical Supervisor. The Qualified Electrical Supervisor who is supervising the tradesperson must:</p> <ul style="list-style-type: none"> • give directions that are adequate to enable the work to be done correctly by the individual performing it, and • personally ensure that the work is correctly done. <p>Or</p> <p>(c) A Trades Assistant, Apprentice or Trainee but only when a Qualified Electrical Supervisor:</p> <ul style="list-style-type: none"> • is present at all times where the work is being done by the individual, and • is available to be consulted, and

Electrical Work Type (Legislative Reference)	Competency Required
	<ul style="list-style-type: none"> • give directions relating to how the work is to be done, and • personally ensure that the work is correctly done. <p>Who has been (in addition to (a) or (b) or(c) or (d)) trained and assessed as competent in the requirements of:</p> <ul style="list-style-type: none"> • all applicable Hunter Water worker inductions, • this manual, • Hunter Water Standard –Electrical Safety, and <ul style="list-style-type: none"> • the following competencies which must be reassessed and revalidated at no more than 12 monthly intervals: <ul style="list-style-type: none"> ○ UETDTRRF06B Perform rescue from a live LV panel (or Hunter Water accepted equivalent), and ○ HLTCP201B – Perform CPR.
<p>Line Work (Defined as installation and maintenance of overhead power lines, excluding the standing of poles).</p>	<p>Either a</p> <p>(a) Line worker who has been trained and assessed as competent in the requirements of UET30206 – Certificate III in ESI – Distribution (or equivalent).</p> <p>Or</p> <p>(b) Cable Joiner who has been trained and assessed as competent in the requirements of UET30409 – Certificate III in ESI – Cable Joining (or equivalent).</p> <p>Who has been (in addition to (a) or (b)) trained and assessed as competent in the requirements of:</p> <ul style="list-style-type: none"> • all applicable Hunter Water worker inductions, • this manual, • Hunter Water Standard –Electrical Safety, and • the following competencies which must be reassessed and revalidated at no more than 12 monthly intervals: <ul style="list-style-type: none"> i. UETDTRRF06B Perform rescue from a live LV panel (or Hunter Water accepted equivalent), and ii. HLTCP201B – Perform CPR. <p>A Qualified Electrical Supervisor must supervise the above workers the Qualified Electrical Supervisor must:</p> <ul style="list-style-type: none"> • is present at all times where the work is being done by the individual, and • is available to be consulted, and • give directions relating to how the work is to be done, and • personally ensure that the work is correctly done.

Electrical Work Type (Legislative Reference)	Competency Required		
Electrical Disconnection and Reconnection Work (see definition of Section 1) (NSW Home Building Act 1989-147 Cl 24)	A Qualified Supervisor (Electrical Disconnection and Reconnection Work) (being the holder of an endorsed contractor licence, or a supervisor certificate, authorising its holder to do Electrical Disconnection and Reconnection Work). (Previously known as a Restricted Electrical Licence) who is either (a) authorised by a Nominated Person or his/her delegate to carry out Electrical Disconnection and Reconnection Work after having been trained and assessed as competent in the requirements of: <ul style="list-style-type: none">all applicable Hunter Water worker inductions,this manual, andHunter Water Standard –Electrical Safety. Or (b) directly supervised by an Authorised Hunter Water Electrical Worker after having been trained and assessed as competent in the requirements of all applicable Hunter Water worker inductions. Note: 3 different endorsements exist for Electrical Disconnection and Reconnection Work licences: <i>Hot water heaters; Appliances; Motors</i>		
Installation and Maintenance of Electrical Equipment in Hazardous Areas	Any Worker authorised for Electrical Work type ' Electrical wiring work ' as described above in this table who, additionally , is competent in the unit(s) below applicable to the work type carried out and the explosion protection technique of the equipment worked upon.		
Competency Unit		AS/NZS 4761:2018 Cl. No	Endorsed Ex protection technique
Perform compliance audits of hazardous areas and related electrical installation		2.14	Exd, Exe, Exi
Enter a classified hazardous area to undertake work related to electrical equipment		2.2	Exd, Exe, Exi
Use and maintain integrity of portable gas detection devices			Exd, Exe, Exi
Install Ex-protected equipment and wiring systems		2.5	Exd, Exe, Exi
Assess the fitness-for-purpose of Ex-protected equipment & Apply Ex-protection requirements to the design of electrical systems and installations		2.12 & 2.13	Exd, Exe, Exi
Maintain electrical equipment associated with Hazardous Areas		2.6	Exd, Exe, Exi
Conduct testing of Hazardous Area installations			Exd, Exe, Exi
Conduct visual and close inspection of existing electrical installations for hazardous areas		2.3	Exd, Exe, Exi
Conduct detailed inspection of electrical installations for hazardous areas		2.7	Exd, Exe, Exi
Fixed ELV Electrical Installations & Equipment	Any Worker authorised for Electrical Work type ' Electrical wiring work ' as described above in this table		

Electrical Work Type (Legislative Reference)	Competency Required
Mobile Plant and vehicle ELV installations	<p>Either</p> <p>(a) Any Worker authorised for Electrical Work type 'Electrical wiring work' as described above in this table</p> <p>or</p> <p>(b) Tradesperson certificate in Automotive Electrics</p>
Work on or Near to Radio Frequency Transmitters	RF awareness training (for Hunter Water workers whose work has risk of RF exposure. For personnel who will work as an RF Worker a baseline medical examination is recommended)
Safety Observer for Pole Work	<p>The following competencies, in addition to any of the above competencies required for the work:</p> <p>i. UETDRRF02B Perform pole top rescue, and</p> <p>ii. HLTCPR201B – Perform CPR</p>
Electrical Engineering Inspection Work – <i>does not include any electrical wiring work</i> (allows opening of electrical cabinets and the use of various meters provided that the circuit is not to be broken)	<p>Either</p> <p>(a) Any Worker authorised for Electrical Work type 'Electrical wiring work' as described above in this table</p> <p>Or Both</p> <p>(b) Formal Qualifications in Electrical Engineering, either:</p> <p>i. 4 Year Bachelor's degree in Electrical Engineering; or;</p> <p>ii. Advanced Diploma Electrical Engineering; or;</p> <p>iii. Diploma Electrical Engineering; or;</p> <p>iv. Equivalent by Agreement.</p> <p>and</p> <p>(c) Formally Inducted in Hunter Water Electrical Induction and subsequently authorised to conduct such work by a nominated person as per the Hunter Water Standard – Electrical Safety.</p>

A Nominated Person or his/her delegate must:

- authorise Hunter Water Workers after establishing and verifying the Worker's competencies against those listed above, and

5.2 Additional Competencies for Hunter Water Electrical Workers

Hunter Water Electrical Workers may require additional competencies relating to work type, environment or operation of Plant, e.g. confined spaces, work at heights, forklift operator.

6. Isolation

All Electrical Work must be carried out with the Electrical Installation and/or Equipment Isolated (i.e. de-energised) except in the specific situations detailed in this standard.

All isolations must be made in accordance with:

- Hunter Water Manual - Isolation, Lockout and Tagging; or

- High Voltage ISMP.

7. PPE for Electrical Work

Hunter Water Electrical Workers must have and wear/use the **minimum** personal protective equipment (PPE) specified in:

- Hunter Water Standard - Protective Footwear Clothing and Glasses, and

Hunter Water Electrical Workers, unless working in an office environment and not carrying out Electrical Work, must always have:

- Outer Clothing rated to NFPA 70E HRC Category 2 (Note this excludes under garments and boots)
- long shirt sleeves buttoned at the cuff and not rolled up,
- all buttons on the front closure of shirts, except the collar button, buttoned up, and
- shirts tucked into trousers.

Hunter Water Electrical Workers must have and use the PPE specified in any SWMS or WI applicable to the work they are carrying out.

Hunter Water Electrical Workers must have and use the PPE prescribed for or signposted at any particular workplace.

The following additional PPE must be used by Hunter Water Electrical Workers in the following specific work situations:

- safety glasses when carrying out any Electrical Work,
- full face shield, conforming with relevant parts of AS/NZS 1337.1:2010 Eye and face protectors for occupational applications, and chemical resistant gloves when working with liquid electrolyte batteries or instruments or final control elements of chemical or sewerage/waste water systems,
- insulating gloves, of a voltage rating that exceeds the voltage of the circuit but not less than 650 VAC, when carrying out energised Electrical Work authorised in accordance with the requirements of this manual. When used, insulating gloves must be worn on both hands with leather gloves over them to prevent mechanical damage. If perspiration of hands occurs cotton under-gloves are to be worn. Insulating gloves must be air tested before each use by opening them out, squeezing the glove closed at the hand entry point and then checking for air leaking out of the glove.
- insulating mats when identified as a risk control for carrying out energised Electrical Work authorised in accordance with the requirements this manual, and
- NFPA 70E HRC Category 4 Arc flash protective clothing when working in a situation where arc blast has been identified as a risk. NFPA 70E HRC Category 4 Arc blast protective clothing is

provided and stored in switch room and locations where its use is required. **This is only required for direct switching purposes.**

- **When switching only** on switchboards of HRC Level 1 or above an Arc Flash Rated face shield and gloves shall be worn appropriate to the HRC level.

Individual switchboards are marked with their HRC Level by the following means and should be checked prior to commencing work with appropriate PPE or better worn to complete the task as required.



8. Installation Work

Electrical Installation work must only be carried out in accordance with the risk management requirements of Section 4.2 and by Hunter Water Authorised Electrical Workers – refer to Section 5.1.

Electrical Installation work must be carried out in accordance with:

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- Hunter Water SWMS – Electrical Installation Work, or
- a task specific Hunter Water SWMS or WI, or
- Hunter Water approved contractor equivalent document developed specifically for the installation work.

All installation work that is required to connect to existing Electrical Installations or Equipment must be carried out with the existing Electrical Installations or Equipment Isolated.

Installation work that requires interaction with existing energised cables must be carried out in accordance with this manual.

Any measurement of energised LV electrical parameters during installation work must be carried out in accordance with this manual.

The actual locations of all underground electrical services must be recorded during the installation of these services.

8.1 Construction Work

The Hunter Water Worker responsible for the construction/installation of an Electrical Installation or Equipment must ensure, prior to construction/installation commencing that:

- an adequate construction/installation plan/process has been developed and reviewed,
- the construction/installation plan/process has considered the information provided by the designer, manufacturer, importer or supplier of the Electrical Installation and/or Equipment,
- all stakeholders are aware of the timing and actions involved in the construction/installation process,
- the construction/installation plan/process has been appropriately risk assessed in accordance with the Hunter Water Framework - Enterprise Risk Management,
- the Hunter Water Workers constructing/installing the Electrical Installation or Equipment are provided with the available information for eliminating or minimising risks to health or safety, and
- the construction/installation of the Electrical Installation and Equipment is carried out by Competent Workers.

The following work (where 'work' means any work carried out in connection with the construction, alteration, conversion, fitting-out, commissioning, testing, renovation, Repair, Maintenance, refurbishment, demolition, decommissioning or dismantling of a structure) which may be associated with the construction or installation of an Electrical Installation or Equipment that may fall under the definition of 'Construction Work' as defined in Chapter 6 of the NSW Work Health and Safety Regulation 2017:

- Work on buildings (structures) that are intended to house Electrical Equipment,

- Erecting structures that support electrical infrastructure e.g., overhead line poles, communications equipment poles or towers, foundations and structure for air Insulated switchgear,
- Excavation for installing cables or foundations of Electrical Equipment or its supporting structure,
- Work associated with a structure that is carried out on, under or near water,
- Fixed Plant on which outage work or overhaul work that involves or may involve work being carried out by 5 or more PCBUs at any point in time.

The above list is not exhaustive - refer to clause 289 of the NSW Work Health and Safety Regulation 2017 for full details of the definition of 'Construction'.

The 'Construction Work' may be defined as 'high risk Construction Work' if it:

- is carried out on or near energised Electrical Installations or services (for controls refer to Hunter Water Manual - Safe Work in the Vicinity of Overhead and Underground Electric Lines), or
- is carried out near a trench with an excavated depth greater than 1.5 metres, or
- is carried out in an area that may have a contaminated or flammable (explosive) atmosphere, or
- involves a risk of a person falling more than 2 metres, or
- is carried out in an area at a workplace in which there is any movement of powered mobile Plant or
- involves, or is likely to involve, the disturbance of asbestos, or
- is carried out on a telecommunication tower, or
- is carried out on or near chemical, fuel or refrigerant lines, or
- is carried out in or near water or other liquid that involves a risk of drowning, or
- involves tilt-up or precast concrete, or
- involves demolition of an element of a structure that is load-bearing or otherwise related to the physical integrity of the structure, or
- involves structural alterations or repairs that require temporary support to prevent collapse.

The above list is not exhaustive - refer to clause 291 of the NSW Work Health and Safety Regulation 2017 for full details of the definition of 'high risk Construction Work'.

Work associated with the construction or installation of Electrical Installations or Equipment that is defined as 'Construction Work' or 'high risk Construction Work' has obligations under the NSW Work Health and Safety Regulation 2017 additional to those addressed by this document.

The Hunter Water Worker responsible for the management of any work requiring the construction or installation of Electrical Installations or Equipment must, at the planning stage of the work, ascertain if any of the proposed work is defined as 'Construction

Work’ or ‘high risk Construction Work’ under the NSW Work Health and Safety Regulation 2017 and must implement the appropriate actions and risk controls.

Electrical Installations and Equipment on Construction Workplaces must comply with the requirements of AS/NZS 3012:2019 Electrical installations - Construction and demolition sites.

9. Commissioning Work

Following the completion of the construction and/or installation, Electrical Installations and Equipment must be verified as safe for use by the execution of a planned and documented commissioning process. Electrical commissioning work must only be carried out in accordance with the risk management requirements of Section 4.2, by HW Authorised Electrical Workers– refer to Section 5.1 and in accordance with a documented commissioning plan/process.

The Hunter Water Worker responsible for the Electrical Installations and Equipment to be commissioned must ensure, prior to commissioning commencing, that:

- an adequate commissioning plan/process has been developed, documented and reviewed,
- the commissioning plan has identified the competencies required for each member of the commissioning team,
- the commissioning plan has considered the requirements of the Hunter Water SWMS – Electrical Commissioning,
- the commission plan/process has considered the information provided by the designer, manufacturer, importer and supplier of the Electrical Installation and/or Equipment,
- appropriate documents for recording the commissioning process and its results have been developed and reviewed,
- the commissioning plan/process has been appropriately risk assessed in accordance with the Hunter Water Framework - Enterprise Risk Management
- the Plant is, so far as is reasonably practicable, safe to commission and without risks to the health and safety of any person,
- all stakeholders are aware of the timing and actions involved in the commissioning process, and
- the Hunter Water Workers commissioning the Electrical Installation or Equipment are provided with the available information for eliminating or minimising risks to health or safety.

Any corrections or alterations of the Electrical Installation or Equipment made during commissioning must be carried out with Electrical Installations or Equipment Isolated – refer to Section 7.

Any measurement of energised LV electrical parameters during commissioning work must be carried out in accordance with this manual.

9.1 Certificate of Compliance Electrical Work

The commissioning of Electrical Installations designed and installed to the requirements of AS/NZS 3000:2018 Wiring Rules must be tested and commissioned by a Hunter Water Authorised Electrical Worker to the requirements specified in AS/NZS 3000:2018 Wiring Rules and any additional requirements applicable to the type of Electrical Installation or Equipment.

Where a Hunter Water employee who is an Authorised Electrical Worker carries out, under Hunter Water's electrical contractor licence, Electrical Work of a type requiring the issue of a certificate of compliance electrical work the certificate must be issued to the parties required in NSW legislation with the copy for the owner of the electrical installation being issued to the appropriate supervisor or his/her delegate.

10. Maintenance Work

All electrical Maintenance work must be carried out in response to a Maintenance Work Order.

Electrical Maintenance work must only be carried out in accordance with the risk management requirements of Section 4.2 and by Hunter Water Authorised Electrical Workers – refer to Section 5.1.

Electrical Maintenance work must be carried out in accordance with:

- Hunter Water SWMS – Electrical Maintenance Work, or
- a task specific Hunter Water SWMS or WI, or
- a Hunter Water approved contractor equivalent document developed specifically for the maintenance work.

Where any uncontrolled hazard/risk related the operation of the Electrical Installation or Equipment being maintained or any other operative Plant may impact on the health and safety of the Maintenance Worker(s), the Maintenance work must be carried out with the Electrical Installation/Equipment and/or other Plant Isolated – refer to Section 6.

Any measurement of energised LV electrical parameters during Maintenance work must be carried out in accordance with Sections 22.1.

11. Fault-finding & Repair Work

Electrical Fault-finding and Repair work is often reactive (i.e. unscheduled, non-routine) and as such is Electrical Work that lies at the upper end of the Electrical Work risk spectrum. Although electrical Fault-finding and Repair work can be unscheduled it can, and must be, planned and risk managed.

Electrical Fault-finding and Repair work must only be carried out in accordance with the risk management requirements of Section 4.2 and by Hunter Water Authorised Electrical Workers – refer to Section 5.1.

Unscheduled electrical Fault-finding and Repair work must be carried out in accordance with:

- Hunter Water SWMS – Electrical Fault-finding and Repair Work, or an equivalent document of an approved contractor to Hunter Water and

- the OEM Fault-finding and Repair instructions, and
- a Hunter Water Take 5 completed for the work or an equivalent document of an approved contractor to Hunter Water, or
- if two or more Workers work as a group, a Hunter Water On Site 3 in 1 or an equivalent document of an approved contractor to Hunter Water

Where any uncontrolled hazard/risk related the operation of the Electrical Installation or Equipment being worked on during electrical Fault-finding and Repair work, or any other operative Plant, may impact on the health and safety of the Hunter Water Electrical Worker(s), the work must be carried out with the Electrical Installation/Equipment and/or other Plant Isolated – refer to Section 8.

Any electrical Fault-finding and Repair work that requires access to the enclosure(s) of energised LV Electrical Equipment that is not provided with insulation or barriers that provide a degree of protection of IP2X or better must be considered as working on or near exposed energised LV conductors and must be carried out in accordance with Section 22.1.

Any measurement of energised LV electrical parameters during Fault-finding and Repair work must be carried out in accordance with Sections 22.1.

12. Electrical Work in Explosive Atmospheres

A Nominated Person or his/her delegate must ensure all Hunter Water Electrical Workers have a basic understanding of the risks associated with electrical energy in explosive atmospheres (also known as Hazardous Areas or hazardous zones).

Electrical work in areas classified as at risk of explosive atmospheres must only be carried out in accordance with the risk management requirements of Section 4.2 and carried out by Authorised Hunter Water Electrical Workers with the Hazardous Areas electrical competencies relevant to the work they are undertaking (refer to Section 5.1) .

Before commencement of Electrical Work in an area classified as an explosive atmosphere the Electrical Supervisor for the task must obtain from the controller of the related workplace the applicable Hazardous Area classification and installation dossier documentation, read and understand the documentation, and implement all applicable safety requirements.

Except for intrinsically safe circuits, all Electrical Work in areas classified as at risk of explosive atmospheres must always be carried out with the electrical supply Isolated.

Refer to:

- Hunter Water Hazardous Areas Classification Report
- Hunter Water Hazardous Areas Electrical Installation Dossier(s)

13. Work in Areas Provided With Automatic Fire Suppression

Work areas provided with automatic fire suppression systems have warning signage and visual warning at the entrances to these work areas. Hunter Water Electrical Workers must read and understand any

warning signage or other documentation relating to automatic fire suppression system operation prior to working in an area where these systems are installed.

Automatic fire suppression systems are usually triggered from a fire and/or smoke detector. In the event of a fire outbreak the suppression system usually operates in two stages, the first stage being an alarm alerting everyone in the building/area to exit and the second stage being the release of the pressurised fire suppressant material. All Hunter Water Electrical Workers must promptly respond to any fire alarms and move to a safe location.

14. Asbestos Related Work

Some of the Hunter Water Electrical Installations or Equipment, or the buildings housing Electrical Installations or Equipment, may contain asbestos or asbestos containing materials (ACM). Hunter Water maintains an Asbestos Register and known occurrences of asbestos or ACM are 'Warning' signposted.

Any Electrical Work that may require disturbance of asbestos or ACM must be carried out in accordance with the requirements of:

- Hunter Water Standard - Asbestos
- Hunter Water SWMS - Asbestos
- WI 066 - Working on Asbestos Based Electrical Mounting Boards

15. Lead Work

Hunter Water electrical workers may have to join and repair lead sheathed cables.

When working with lead sheathed cables, gloves and any other appropriate PPE must be worn and hands and any other parts of the body that have contacted lead must be thoroughly cleaned at the completion of the work and prior to the consumption of any food and/or beverages.

16. Pole Work

Pole work must be carried out with the electrical equipment mounted on the pole isolated. Where it is not practicable to carry out the work with the equipment mounted on the pole isolated, then the work must be carried out in accordance with the applicable competency for the supply voltage – refer to Section 10 of Hunter Water Manual – Safe Work Near Overhead & Underground Electric Lines.

Access to pole mounted electrical equipment must always consider the fall prevention control hierarchy of Clause 79 of the NSW Work Health and Safety Regulation 2017.

Before working on any pole, Hunter Water Workers must satisfy themselves that the pole is safe to work on and in no danger of collapsing during the course of work.

No Hunter Water Worker must climb on/up or be supported by a pole without the written approval of a Nominated Person.

Where a Nominated Person approves a Hunter Water Worker climbing and working directly on a pole the following must be applied:

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- the pole must be inspected by a competent person and deemed to be safe to access,
- the Hunter Water Worker intending to climb and work on the pole must be authorised to do so (for competencies refer to Section 5.1) and must satisfy themselves that the pole is safe to work on and in no danger of collapsing during the course of work,
- the pole climbing and safety equipment utilised must have been manufactured in accordance with AS/NZS 1891.4:2009 and inspected prior to use to confirm that it is fit for purpose,
- a Safety Observer (for competencies refer to Section 5.1) must be present at ground level and located in a position that they can observe the work but not be at risk of falling objects, and
- a Pole Top Rescue Kit must be available at the Workplace.



Figure 2 Pole Top Rescue Kit

17. Work on Current Transformers

The secondary circuit of a current transformer **must not be open circuited** while the primary circuit is energised unless the secondary circuit of the current transformer has been short circuited to eliminate the risk of a dangerous voltage appearing at the secondary terminals.

18. Work on Capacitors

Capacitor installations (e.g. power factor correction, variable speed drives, dc power supplies) should have been provided an installed with danger/warning signage and automatic discharging circuits and in some instances interlocked doors that cannot be opened until the discharge is complete.

Electrical work on capacitors must not be commenced until:

- isolation has been made and verified in accordance with Section 222 for LV systems, or Section 233 for ELV systems or Hunter Water Manual - High Voltage Installation Safety Management Plan for HV systems, and
- any signposted capacitor discharge time has expired or if no discharge signage, wait 20 minutes providing that there is discharge circuits installed, and
- 'Test Before You Touch' has been carried out as specified by Section 4.2.2.

Capacitors must not be discharged by short circuiting or earthing using a hand held conductor or conductive tool.

Before handling oil insulated capacitors, confirm that there is no oil leakage as the oil may contain PBCs. If oil has leaked from the capacitor, use oil resistant gloves to handle the capacitor(s) and dispose of capacitors in accordance with environmental requirements.

19. Work on Batteries

Electrical work on battery systems must not be commenced until isolation has been made and verified in accordance with Section 22 for LV systems, or Section 23 for ELV systems or Hunter Water Manual - High Voltage Installation Safety Management Plan for HV systems.

Work on batteries with exposed terminals must always be carried out with Insulated tools and, where required, insulating mats.

Battery work must be carried out in accordance with the relevant parts of AS 2676.2 Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings - Sealed cells.

20. Work On or Near Radio Frequency Transmitters

Working on or near energised radio frequency (RF) transmitters can cause body heating and contact can cause burns or shock – for details refer to Hunter Water Standard – Electrical Safety. RF transmitters with the output energy levels to cause these health and safety effects are generally located in areas with limited or restricted access so the risk of inadvertent exposure is low.

Electrical work on or near RF transmitters must be carried out in accordance with the risk management requirements of Section 4.2, with the RF transmitter isolated wherever practicable and by Authorised Hunter Water RF Workers with the competencies relevant to the work they are undertaking (refer to Section 5.1).

Work relating to the installation of communications towers/poles is considered Construction Work and specific legislative requirements apply – refer to Section 8.1

21. HV Electrical Work

All HV Electrical Work must be carried out in accordance with the requirements of:

- this manual,
- Hunter Water Manual - High Voltage Installation Safety Management Plan
- Hunter Water Manual - Safe Work Near Overhead and Underground Electric Lines
- Hunter Water Response Protocol – Person Contacts Electricity
- Hunter water Response Protocol – Mobile Plant Contacts Electricity

22. LV Electrical Work

All Electrical Wiring Work on LV Electrical Installations and Equipment must be carried out in accordance with this manual.

All work on LV Electrical Installations and Equipment must be carried out in accordance with the following documents:

- NSW Work Health and Safety Regulation 2017,
- Safe Work NSW, Managing Electrical Risks in the Workplace Code of Practice, September 2016
- AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment,
- OEM safe work instructions.

All work on LV Electrical Installations and Equipment must be carried out with the Electrical Installation and Equipment Isolated except for situations meeting all of the requirements of Section 22.1 below.

Isolations made to allow Hunter Water Electrical Workers to safely work on or near LV Electrical Installations or Equipment must be:

- made in accordance with Section 6 and
- verified (i.e. proven to have effectively de-energised the LV supply) by a Competent Worker.
- secured in a manner that the LV supply cannot be inadvertently re-energised while the work is being carried out.

22.1 Work On or Near Energised LV Installations

In respect to Section 22.1 of this document and its subsections, 'on or near' in respect to energised parts of an LV Electrical Installation or Equipment means:

Proximity to energised, uninsulated conductors where there is a possibility of either of the following coming within 500 mm of the energised, uninsulated conductors:

- a person's body; or;
- any object which a person may be carrying or touching during the course of the work, that is not designed for use on energized conductors operating at that voltage.

Note: Conductors having a degree of protection of IP2X or better are not considered uninsulated.

LV Electrical Work on or near energised conductors of an LV Electrical Installation or Equipment must only be considered when:

- it is necessary in the interests of health and safety that the Electrical Work is carried out on the Electrical Installation and/or Equipment while it is energised, e.g. it may be necessary that life-saving equipment remain energised and operating while Electrical Work is carried out on the equipment, or
- it is necessary that the Electrical Installation or Equipment to be worked on is energised in order for the work to be carried out properly, or
- it is necessary for the purposes of testing to verify that a circuit is not energised, i.e. verification of isolation, or
- there is no reasonable alternative means of carrying out the work.

If work on or near energised LV Electrical Installations or Equipment is to be considered, the process detailed under headings 22.1.1 and 22.1.2 below must be implemented prior to the work commencing and the records specified in Section 255 must be kept. (For further detail of the process required refer to NSW Work Health and Safety Regulation 2017, clauses 158 to 162 inclusive.) Alternatively authorised energised LV electrical work may be carried out in accordance with Section 22.1.3.

Note that **'Test Before You Touch'**, as required by Section 4.2.2, **that is carried out after an electrical Isolation has been verified and locked out** is not considered to be LV Electrical Work on or near energised conductors of an LV Electrical Installation or Equipment.

22.1.1 Preliminary Steps

Before Electrical Work on or near energised conductors of an Electrical Installation and/or Equipment commences, the following must be implemented:

1. A documented risk assessment must be conducted by a Competent Worker in relation to the proposed Electrical Work, Note: NSW Work Health and Safety Regulation 2017, clause 12 permits risk assessments to be conducted, in certain circumstances, to a class of hazards, tasks, things or circumstances.
2. The area where the Electrical Work is to be carried must be cleared of obstructions so as to allow for easy access and exit,
3. The point at which the Electrical Installation or Equipment can be disconnected or Isolated from its electricity supply must be:
 - a. clearly marked or labelled, and
 - b. clear of obstructions so as to allow for easy access and exit by the Worker who is to carry out the Electrical Work or any other Competent Worker, and
 - c. capable of being operated quickly.

Note: Point 3 above does not apply to Electrical Work on an Electrical Installation or Equipment if:

- the work is to be carried out on the supply side of the main switch on the main switchboard for the Electrical Installation or Equipment, and
 - the point at which the Electrical Installation or Equipment can be disconnected from its electricity supply is not reasonably accessible from the work location.
4. Hunter Water must, prior to authorising the Electrical Work, consult with the person with management or control of the workplace where the energised Electrical Work is being carried out.

22.1.2 Execution of Energised LV Electrical Work

1. Hunter Water must ensure that Electrical Work on or near energised conductors of an LV Electrical Installation or Equipment (including live line work) is carried out:
 - a. by a Competent Worker who has tools, testing equipment and personal protective equipment (arc fault protection PPE may be required) that:
 - i. are suitable for the work, and

- ii. have been properly tested, and
 - iii. are maintained in good working order, and
- b. in accordance with a procedure that:
 - i. identifies the Electrical Work, and
 - ii. specifies the hazards associated with that Electrical Work and the risks associated with those hazards, and
 - iii. describes the measures to be implemented to control the risks, and
 - iv. describes how the risk control measures are to be implemented, monitored and reviewed,
 - v. is prepared for the work, and
- c. with a Safety Observer (as defined in Section 1)

Note: A Safety Observer is not required if:

- the work consists only of testing, and
 - the person conducting the business or undertaking has conducted a risk assessment under NSW Work Health and Safety Regulation 2017 clause 158 (1) (a) that shows that there is no serious risk associated with the proposed work.
- 2. Hunter Water must ensure, so far as is reasonably practicable, that the Worker who carries out the Electrical Work uses the tools, testing equipment and personal protective equipment properly, and
- 3. Hunter Water must ensure, so far as is reasonably practicable, that only persons authorised by Hunter Water enter the immediate area in which Electrical Work on or near energised conductors of an Electrical Installation or Equipment is being carried out, and
- 4. Hunter Water must ensure that, while Electrical Work is being carried out on or near energised conductors of an Electrical Installation or Equipment, all persons are prevented from creating an electrical risk by inadvertently making contact with an energised conductor of the Electrical Installation or Equipment. Note: Insulating mats complying with AS/NZS IEC 61111:2020 Insulating mats for electrical purposes, may be utilised to prevent inadvertent contact with proximate, exposed energised parts – insulating mats must be inspected for damage prior to use. AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment also gives guidance on risk controls for working on or near energised conductors of an Electrical Installation or Equipment.

5. The Nominated Person that authorised the work or his/her delegate must ensure that records relating to Energised LV Electrical Work are kept in accordance with **Section 255**.

22.1.3 Authorised Energised LV Electrical Work at Hunter Water Workplaces

At Hunter Water workplaces electrical work on or near energised LV electrical installations &/or equipment must be carried out in accordance with the associated safe work method statement and is only authorised for:

- verifying an electrical isolation by direct voltage measurement in accordance with Hunter Water SWMS Verifying Isolation by Voltage Measurement or
- fault-finding, where isolated fault-finding methods have been unsuccessful or are not a reasonable alternative;

The above listed SWMSs for energised LV electrical work have been developed to meet the requirements of Sections 22.1.1 and 22.1.2 for the specific tasks listed in each SWMS.

No other form of energised LV electrical work is authorised at Hunter Water workplaces, except by permission of a Nominated Person.

All measurement of LV Electrical Installation or Equipment electrical parameters must be in accordance with the applicable Hunter Water SWMS (see above) and the requirements of:

- Safe Work NSW Managing Electrical Risks in the Workplace Code of Practice, September 2016
- safe use instructions of the equipment OEM.
- AS 4836:2011 Safe working on or near low-voltage electrical installations and equipment

Where measuring devices are used for safety and/or electrical protection related tasks e.g. proving isolations, confirming earth continuity, the measuring devices must be positively confirmed as operative immediately prior to and immediately after carrying out the task.

22.1.4 Handling Fixed Energised LV Cables or Wiring

Handling of energised, insulated fixed LV cables or wiring is considered to be working on or near energised conductors of an Electrical Installation or Equipment and, if this work cannot be carried out with all cables de-energised and isolated, the requirements of Sections 22.1.1 and 22.1.2 must be applied.

'Handling of fixed Insulated LV cables or wiring' includes, but is not limited to:

- installing cables into or removing cables from cable support systems carrying existing, energised cables,
- tracing wiring in wiring ducts by hand,
- cutting the securing straps or ties of energised cables or flexible cords.

Flexible cords (e.g., Appliance connection leads or extension leads) are not considered 'energised, Insulated LV cables or wiring' in the respect of this section except in respect to the 3rd dot point above.

23. ELV Electrical Work

While Extra Low Voltage (ELV) levels should not be a source of a harmful electric shock they are often associated with stored energy systems with a high fault current capacity (e.g. batteries, capacitors).

Work on ELV systems containing batteries or capacitors with exposed terminals must always be carried out using Insulated tools and where required insulating mats.

23.1 Fixed ELV Electrical Installations

Work on fixed ELV Electrical Installations and Equipment must only be carried out by Hunter Water Authorised Electrical Workers – refer to Section 5.1. Whenever practicable Electrical Work on fixed ELV Electrical Installations and Equipment must be carried out with the system Isolated.

Energised Electrical Work on fixed ELV Electrical Installations and Equipment must only be carried out if the Electrical Installation and/or Equipment is fully compliant with the requirements of AS/NZS 3000, Wiring Rules, as either a Separated Extra Low Voltage system (SELV) or a Protected Extra Low Voltage System (PELV).

If the ELV Electrical Installation and/or Equipment is not a compliant SELV or PELV system, it must be considered an LV system (as required by AS/NZS 3000, Wiring Rules) and it must be worked on in a de-energised state or, if worked on in an energised state, the requirements of Section 22.1 must apply.

Refer also to the Hunter Water Standard – Electrical Safety for the ELV electrical safety requirements relating to impressed current cathodic protection systems.

23.2 Mobile Plant ELV Installations

Work on mobile Plant ELV Electrical Installations and Equipment must be carried out by Hunter Water Authorised Electrical Workers – refer to Section 5.1.

Whenever practicable, Electrical Work on ELV Electrical Installations and Equipment must be carried out with the system Isolated.

24. Instrumentation Work

A sensor or instrument must not be electrically disconnected or removed from its mountings unless the electrical supply to the sensor or instrument has been Isolated, except where the sensor or instrument is energised from a source of PELV or SELV compliant to of AS/NZS 3000:2018 Wiring Rules.

The impulse line of a sensor or instrument must not be disconnected unless:

- the process fluid has been Isolated at the applicable tapping point isolation valve,
- appropriate PPE is worn and/or used,

- the impulse line has been safely de-pressurised, and
- controls are in place to prevent the release of process fluids that are, or may create, a hazard for people and/or the environment.

25. Records

In relation to the implementation of the requirements of this document, the following records listed below must be created and maintained by the persons nominated.

1. Section 5, Authorised Electrical Workers. The record, maintained by the Electrical Engineering Team Leader or his/her delegate as a letter of authorisation.
2. Section 9, Commissioning Records and Certificates of Compliance Electrical Work issued to Hunter Water must be kept for the life of the electrical installation or equipment or until alteration or replacement makes them redundant.
3. Section 9 Copies of Certificates of Compliance Electrical Work issued by Hunter Water (as a contractor's licence holder) must be kept for at least 5 years.
4. Section 22.1.2, Energised LV Electrical Work. A copy of the procedure must be kept until the work to which it relates is completed and a copy of the risk assessment must be kept until at least 28 days after the work to which it relates is completed except in the case of a notifiable incident occurring in connection with the work to which the risk assessment or procedure relates, in which case the risk assessment and the procedure must be kept for at least 2 years after the incident occurred.

26. Related Documents

26.1 NSW Legislation

- Hunter Water Act 1991-53;
- NSW Work Health and Safety Act 2011-10;
- NSW Work Health and Safety Regulation 2017;
- NSW Electricity Supply Act 1995-94;
- NSW Electricity Supply (General) Regulation 2014;
- NSW Electricity Supply (Safety and Network Management) Regulation 2014;
- NSW Electricity Supply (Corrosion Protection) Regulation 2014;
- NSW Gas and Electrical Consumer Safety Act 2017-15;
- NSW Gas and Electrical Consumer Safety Regulation 2018;
- NSW Home Building Act 1989-147;
- NSW Home Building Regulation 2014;
- NSW National Electricity Act 1997-20;
- NSW National Electricity Law-20a;
- NSW National Electricity Regulation 2015;
- NSW Service and Installation Rules of NSW October 2019;

26.2 Codes of Practice

- Safe Work NSW Managing Electrical Risk in the Workplace Code of Practice September 2016;
- Safe Work Australia General Guide for Working In the Vicinity of Overhead and Underground Electric Lines July 2014;
- Safe Work Australia, Construction Work Code of Practice May 2018.

26.3 Australian Standards & Handbooks

- AS/NZS 1337.1:2010 Eye and face protectors for occupational applications
- AS 2676.2:2020 Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings - Sealed cells
- AS/NZS IEC 61111:2020 Live Working – Electrical Insulating Mats
- AS/NZS 3000:2018 Wiring Rules
- AS/NZS 3100:2017 Approval and test specification - General requirements for Electrical Equipment

- AS/NZS 60079.10.1:2009 Explosive atmospheres—Classification of areas – Explosive gas atmospheres
- AS/NZS 60079.10.2:2016 Explosive atmospheres – Classification of areas – Combustible dust atmospheres
- AS/NZS 4761.1:2018 Competencies for working with electrical equipment for hazardous areas (EEHA) - Competency Standards
- AS/NZS 1891.4:2009 Industrial fall arrest systems and devices
- AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment
- NFPA 70E – Standard for Electrical Safety in the Workplace
- IEE1584:2002 & IEE1584:2018 – Guide for Performing Arc Flash Hazard Calculations

26.4 Hunter Water Documentation

- Hunter Water Standard – Asbestos
- Hunter Water Standard - Electrical Safety
- Hunter Water Standard - Protective Footwear Clothing and Glasses
- Hunter Water Framework - Enterprise Risk Management
- Hunter Water Manual - High Voltage Installation Safety Management Plan
- Hunter Water Manual - Isolation, Lockout and Tagging
- Hunter Water Manual - Safe Work Near Overhead & Underground Electric Lines
- Hunter Water SWMS - Asbestos
- Hunter Water SWMS – Electrical Commissioning
- Hunter Water SWMS – Electrical Installation Work
- Hunter Water SWMS – Electrical Maintenance Work
- Hunter Water SWMS Verifying Isolation by Voltage Measurement
- Hunter Water SWMS Fault-finding by Direct Measurement of Electrical Parameters
- Hunter Water Work Instruction 066 - Working on Asbestos Based Electrical Mounting Boards
- Hunter Water Hazardous Areas Classification Report
- Hunter Water Hazardous Areas Electrical Installation Dossier(s)
- Hunter Water Take 5

- Hunter Water On Site 3 in 1

27. Document Control

Document Controller: Manager Capability Engineering

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1.0	26/02/2014	J. Burgess	Initial Release	26/02/2014	S. Mitchell	16/02/2016
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