

Procedure

WHS Electrical Safety

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SOURCE



STORE



SUPPLY



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1 Purpose

This procedure outlines Seqwater's processes to effectively manage the risks associated with performing electrical work and using electrical equipment at Seqwater workplaces.

2 Scope

This procedure applies to all Seqwater workers, business groups and work activities.

3 Definitions

Term	Definitions
Apprentice	A person who is undertaking an apprenticeship under the <i>Further Education and Training Act 2014</i> (Qld), in a calling that requires the person to perform electrical work
Approve commencement of switching	Approve commencement of switching means either written (signed) confirmation of actions or other confirmation, usually through a signed Permit to Work, providing notations are provided stating the time, method (person, phone or electronic) and person providing approval.
Approved authorised person (high voltage)	<p>Having appropriate organisation endorsement in writing for a specific function.</p> <p>A person with technical knowledge and sufficient experience who has been approved or has the delegated authority to act on behalf of the organisation, to perform high voltage switching. A register of all high voltage authorised personnel will be held and maintained by Seqwater.</p> <p>The following roles are Authorised Persons:</p> <ul style="list-style-type: none">• Switching Coordinator• Switching Operator• Switching Operator's Assistant• Recipient. <p>For roles and responsibilities of Authorised Persons see Section 3 of this procedure.</p> <p>Levels of authorisation requirements are defined in Appendix C, HVIA access requirements.</p>
Authorised worker (person)	<p>An authorised person means a person who:</p> <ul style="list-style-type: none">• has enough technical knowledge and experience to do work that involves contact with, or being near to, the electrical part• has been approved by the person in control of the electrical part to do work that involves contact with, or being near to, the electrical part, or is authorised to act for the person in control of the electrical part.
Broad supervision (electrical work)	This means the electrical apprentice does not require constant supervision but requires personal contact on at least a regular/occasional basis.

Term	Definitions
	Occasional supervision means being under instruction and direction with checks being carried out on completion of tasks.
Brownfield site	Land currently or previously used for industrial purposes or some commercial uses, it includes any land that is not a greenfield site. Land within brownfield sites has greater risks of the presence of underground services or contaminated soils.
Cat 0 – 4 PPE	<ul style="list-style-type: none"> Category 0: One layer of untreated natural fiber clothing; no minimum PPE Arc Rating (cal/cm²). Category 1: Fire-resistant shirt and fire-resistant pants, level 1 face shield, leather gloves; Minimum PPE Arc Rating: 4 cal/cm². Category 2: Category 1; Minimum PPE Arc Rating: 8 cal/cm². Category 3: Category 2 plus fire-resistant coverall; Minimum PPE Arc Rating: 25 cal/cm². Category 4: Category 2 plus multilayer flash suit; Minimum PPE Arc Rating: 40 cal/cm².
Cancellation/surrender of an Access Permit or Test Permit documentation	<p>An Access Permit or Test Permit has been surrendered and authorisation for access to work on or near, or test, electrical apparatus has been terminated.</p> <p>Each Seqwater high voltage site shall have available the following documents for inspection and/or audit:</p> <ul style="list-style-type: none"> High Voltage Switching Sheet Status Log (FRM-00522). Access Permit or Test Permit status log is located on the Switching Sheet (FRM-00438). High Voltage Switching Sheets issued or surrendered. Hard copies to be kept onsite and also scanned into CIS with the appropriate Work Order documentation. Access Permit or Test Permits in progress or surrendered. Site information including a single line high voltage diagram of the site. List of authorised persons held in LMS.
Cathodic protection systems	<p>Cathodic protection is a technique to control the corrosion of a metal surface by making that surface the cathode of an electrochemical cell.</p> <p>Cathodic protection can be achieved in two ways:</p> <ul style="list-style-type: none"> by the use of galvanic (sacrificial) anodes (passive) by 'impressed' current (active).
Certificate of Test	<p>For electrical installations, this certifies that the electrical installation, to the extent it is affected by the electrical work, has been tested to confirm that it is electrically safe and is in accordance with the requirements of the wiring rules and any other standard applying under the <i>Electrical Safety Regulation 2013</i> (Qld) to the electrical installation.</p> <p>For electrical equipment, this certifies that the electrical equipment, to the extent it is affected by the electrical work, is electrically safe.</p>
Competent person (electrical)	An electrical worker who has acquired, through training, qualifications, experience or a combination of these, the knowledge and skills enabling the person to perform the task.

Term	Definitions
Dangerous electrical event	<p>A dangerous electrical event includes:</p> <ul style="list-style-type: none"> • when a person, for any reason, is electrically unsafe around high voltage electrical equipment, even if the person doesn't receive an electric shock or injury • significant property damage caused by electricity or something originating from electricity e.g. electrical fire • unlicensed electrical work • unsafe electrical work • unsafe electrical equipment or electrical equipment that does not have Electrical Equipment Safety System (EESS) approval markings. <p>Note: high voltage means a voltage above 1000 V AC or 1500 V ripple-free DC.</p>
Direct / constant supervision (electrical work)	<p>This means personal supervision at all times, on a direct and constant basis, within visual contact and/or earshot (audible range). Constant basis refers to the continuous supervision of tasks being performed for the first time and until skill is demonstrated for the complexity of the task and work environment.</p>
Do Not Operate Board/Isolation Tag	<p>A safety sign attached to a high voltage isolation or earthing point by a Switching Operator on an apparatus that shall not be operated except as an item on a Switching Sheet or as required under a Test Permit with the approval of the Switching Coordinator. At some sites, where applicable, Do Not Operate Boards (DNOBs) may be used in place of Isolation Tags due to the nature of the isolation i.e. overhead switchgear.</p> <p>Do Not Operate/Isolation tags are available as an Seqwater stock store item.</p>
Earths	<p>Earths are fixed or portable devices that connect lines and apparatus to the general mass of earth.</p>
Earthed	<p>Electrically connected to the general mass of earth by a Conductor to provide and maintain the effective dissipation of electrical energy.</p>
Electric shock	<p>A sudden discharge of electricity through a part of the body.</p>
Electrical contractors licence	<p>The Electrical Licensing Committee issues this licence to persons or corporations who carry on the business of electrical contracting or employ a person to perform, as an employee, electrical installation work for contracted works to 3rd party customers.</p>
Electrical competency	<p>Electrical competency is the possession of knowledge and skills acquired through training, qualification and experience and the application of the knowledge and skills to confirm the electrical work is performed to the required safety standard/s.</p> <p>The knowledge and skills should be in accordance with the requirements of Electricity Legislation in Queensland and industry best practice.</p>
Electrical engineer	<p>An electrical engineer means:</p> <ul style="list-style-type: none"> • a person who is a registered professional engineer under the <i>Professional Engineers Act 2002</i> (Qld) and who is registered in the area or preserved area of electrical engineering under the <i>Electrical Safety Act 2002</i> (Qld) • a person who held a degree in electrical engineering granted by:

Term	Definitions
	<ul style="list-style-type: none"> - an approved school of engineering under the repealed <i>Professional Engineers Act 1988</i> (Qld) - an approved faculty of engineering under the repealed <i>Professional Engineers Act 1988</i> (Qld) before the repeal of that Act and who continues to hold the degree • a person who held, immediately before the commencement of the <i>Professional Engineers and Other Legislation Amendment Act 2008</i> (Qld), and continues to hold, a qualification in electrical engineering granted by a tertiary education institution that entitled the person to be admitted to the <i>Institution of Engineers Australia</i>, as a graduate member.
Electrical equipment	<p>Electrical equipment is any apparatus, appliance, cable, conductor, fitting, insulator, material, meter or wire:</p> <ul style="list-style-type: none"> • used for controlling, generating, supplying, transforming or transmitting electricity at a voltage greater than extra low voltage • operated by electricity at a voltage greater than extra low voltage • if the equipment forms part of an electrical installation located in a hazardous area • that is, or that forms part, of a cathodic protection system.
Electrical installation work	<p>The work of installing, altering or adding to an electrical installation, and includes supervising the work.</p> <p>(Note: the repair of previously installed work is Electrical Work and not Electrical Installation Work).</p>
Electrical installations	<p>Is defined as a group of items of electrical equipment. However, a group of items of electrical equipment is an electrical installation only if:</p> <ul style="list-style-type: none"> • all the items are permanently electrically connected together • the items do not include items that are works of an electricity entity • electricity can be supplied to the group from the works of an electricity entity or from a generating source.
Electrical isolation	<p>Means disconnected from all possible sources of electrical supply and rendered incapable of being made live without premeditated and deliberate operation.</p>
Electrical licence	<p>The Queensland Electrical Licensing Committee issues the following classes of electrical licences in Queensland:</p> <ul style="list-style-type: none"> • electrical mechanic licence • electrical linesperson licence • electrical fitter licence • electrical joiner licence • restricted electrical work licence • electrical work training permit.
Electrical supervisor	<p>Electrical supervisor is a person who has the electrical competency to manage/ supervise the electrical workers and the electrical work being performed on associated equipment and systems. The electrical supervisor is the most senior electrician in the work group.</p>

Term	Definitions
Electrical supervision	<p>Supervision and inspection of electrical assets, electrical work, electrical workers including apprentices and the regular, documented inspections of electrical work performed by electrical workers. Inspections verify policies, procedures and practices are complied with.</p> <p>The act of supervising the performance of electrical workers including apprentices is to check the electrical works are safe and are operated in a way that is electrically safe.</p>
Electrical work	<p>Electrical work means:</p> <ul style="list-style-type: none"> connecting electricity supply wiring to electrical equipment or disconnecting electricity supply wiring from electrical equipment manufacturing, constructing, installing, removing, adding, testing, replacing, repairing, altering or maintaining electrical equipment or an electrical installation <p><i>Examples of electrical work—</i></p> <ul style="list-style-type: none"> <i>installing low voltage electrical wiring in a building</i> <i>installing electrical equipment into an installation coupler or inter-connecter</i> <i>replacing a low voltage electrical component of a washing machine</i> <i>maintaining an electricity entity's overhead distribution system.</i> <p>Electrical work does not include the following:</p> <ul style="list-style-type: none"> 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 person carrying out the work is not exposed to an electrical hazard <p><i>Examples—</i></p> <ul style="list-style-type: none"> <i>painting electrical equipment covers</i> <i>repairing hydraulic components of an electrical motor</i> <i>replacing a drive belt on a washing machine</i> <ul style="list-style-type: none"> replacing electrical equipment or a component of electrical equipment if that task can be safely performed by a person who does not have expertise in carrying out electrical work <p><i>Examples—</i></p> <ul style="list-style-type: none"> <i>replacing a fuse</i> <i>replacing a light bulb in a light fitting</i> <ul style="list-style-type: none"> assembling, making, modifying or repairing electrical equipment in a workplace under the WHS Act 2011 that is prescribed under a regulation for this paragraph, if that is the principal manufacturing process at the workplace, and arrangements are in place, and are detailed in written form, for ensuring that: <ul style="list-style-type: none"> the work is done safely and competently the equipment is tested to confirm compliance with relevant standards building or repairing ducts, conduits or troughs (channels) where electrical wiring will be or is installed, if: <ul style="list-style-type: none"> the channels are not intended to be earthed wiring installed in the channels is not energised

Term	Definitions
	<ul style="list-style-type: none"> - the work is done under the supervision of a person licensed to perform electrical installation work • 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 a licensed electrical worker to carry out electrical work, on electrical equipment under the direct supervision of the electrical worker, if 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 a licensed electrical worker and only if the work is prescribed under a regulation for this paragraph • building, under the supervision of an electricity entity, an overhead electric line on structures that do not already carry an energised overhead electric line • laying, cutting or sealing underground cables that are part of the works of an electricity entity before the initial connection of the cables to an electricity source • recovering underground cables that are part of the works of an electricity entity after disconnection from an electricity source • altering, repairing, maintaining or recovering an overhead electric line that is part of the works of an electricity entity, if the work is performed under the entity's supervision and: <ul style="list-style-type: none"> - if the line is not on supports supporting another electric line—the line has been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where work is being done - if the line is on supports supporting another electric line—both lines have been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where the work is being done or an adjacent section of the other line • erecting structures for the support of electrical equipment <ul style="list-style-type: none"> <i>Examples of structures—</i> <ul style="list-style-type: none"> - <i>electric poles and towers</i> • locating, mounting or fixing in place electrical equipment, other than: <ul style="list-style-type: none"> - making or terminating electrical connections to the equipment - installing supply conductors that will connect the equipment to a supply of electricity • maintaining the structural parts of the electrical traction system on a railway, other than overhead electric lines, that forms part of the works of an electrical entity, if the work is structural work performed under a safe system of work.
Electrical worker	The electrical worker is a person competent and licensed in accordance with the <i>Electrical Safety Act 2002</i> (Qld).
Electrical worker register	A register of electrical workers and electrical apprentices is a legislative requirement. It lists the electrical competencies of each worker and is maintained in <i>Our Learning</i> .

Term	Definitions
Electrical work permit	A system designed to eliminate or minimise risks from electrical work activities by controlling when and how electrical work is undertaken in specific areas
Emergency switching	Unplanned switching for safeguarding personnel, preventing equipment damage, environmental harm or restoring supply or providing access for repair of apparatus.
Engineering electrical safety competency	Is designed to enable workers with existing electrical engineering qualifications to demonstrate current awareness and competency to inspect and risk assess electrical cabinets, enclosures and switchboards before work is carried out.
Exclusion zones	<p>Generally, the exclusion zones for overhead electric lines are:</p> <ul style="list-style-type: none"> • Untrained Persons – 3000mm (3m). • Authorised and Instructed Persons – 700mm (0.7m). <p>However, the exclusion zones vary depending on the:</p> <ul style="list-style-type: none"> • type of electric part (e.g. exposed part or overhead) – the voltage present (e.g. 240V or 33kV) • qualification / competency of the worker • type of activity (e.g. operating plant or vehicle). <p>Schedule 2 of the <i>Electrical Safety Regulation 2013 (Qld)</i> and the <i>Electrical Safety Code of Practice 2010 - Working near overhead and underground electric lines (Qld)</i> should be consulted to confirm the appropriate exclusion zone.</p>
Extra Low Voltage (EVL)	Means a voltage of less than 50v AC. or 120V ripple free DC.
Forward switching	Forward switching is the process of de-energising an electrical circuit as specified on a High Voltage Switching Sheet.
General supervision (electrical work)	This means the electrical apprentice does not require constant attendance of the supervisor but requires personal contact on a recurrent (periodic) basis. Periodic supervision means being under instruction and direction for tasks being performed.
Hazard	A situation that has the potential to harm a person and/or the environment and/or damage property.
Hazardous area	An area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions e.g. presence of vapours or gases, combustible liquids, dusts or fibres, or other flammable or explosive materials
Hierarchy of controls	<p>Identify the risk control actions and responsibilities by identifying controls in the following specific order:</p> <ul style="list-style-type: none"> • eliminate the hazard <p>If elimination of the hazard is not reasonably practicable, minimise the risk so far as reasonably practicable by:</p> <ul style="list-style-type: none"> • substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk • isolating the hazard from any person exposed to it • implementing engineering controls.

Term	Definitions
	<p>If a risk then remains, then minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls.</p> <p>If a risk then remains, then minimise the remaining risk, so far as is reasonably practicable, by ensuring the provision and use of suitable Personal Protective Equipment (PPE).</p>
High Voltage Access Permit	See 'High Voltage Isolation and Access Permit'
High voltage isolation lock	An individually keyed lock specifically used for HV isolations that is applied to a high voltage isolation or earthing point by a Switching Operator as part of steps on the High Voltage Switching Sheet (FRM-00438).
High voltage operational switching	<p>Where load shifting, blustering of HV equipment is required and there is no possibility of direct HV contact or intrusion into HV exclusion zones.</p> <p>Does not include normal day-to-day operational activity of stop/start of high voltage equipment.</p>
High Voltage Switching Sheet	<p>A High Voltage Switching Sheet (FRM-00438) is a documented procedure which details the step-by-step switching actions that are necessary to allow safe access to a high voltage installation and/or to restore that installation to its normal energised state. High Voltage Switching Sheets may be either blank or pre-drafted. All High Voltage Switching Sheets must be reviewed and signed off by a Switching Coordinator before HV switching can be undertaken by a switching party. See Section 15 for information on the High Voltage Switching Sheet (FRM-00438).</p> <p>There is no such document as a pre-approved switching sheet.</p>
High Voltage Switching Sheet Status Log	A high voltage Switching Sheet Status Log (FRM-00522) is a schedule used to record the High Voltage Switching Sheet numbers (in numerical order) and the dates when the sheets are issued and recovered. See Section 15 for the information on the High Voltage Switching Sheet Status Log (FRM-00522).
High Voltage Isolation and Access (HVIA) Permit	A High Voltage and Access (HVIA) Permit (FRM-00439) is a written statement that allows personnel access to high voltage parts. It is also used to record the electrical isolations and locations of earths necessary to make the equipment/areas electrically and mechanically safe. Operator earths shall not be removed while an Access Permit is currently open.
High Voltage Isolation and Access (HVIA) Permit Recipient	<p>A person suitably qualified and authorised by the Site Access and Works Control System to receive and surrender a HVIA Permit for the duration of work being performed on the equipment for which the Access Permit is issued.</p> <p>The Recipient shall also be responsible for the safety of Work Group/s signed on the Access Permit and if required, placement and removal of working earths.</p>
High Voltage Isolation and Access (HVIA) Test Permit Status Log	A HVIA permit status log is a schedule that is used to record the HVIA Permit numbers (in numerical order) and the dates when the permits are issued and recovered. See Section 15 for information on the standard High Voltage Switching Sheet Status Log (FRM-00522)
High Voltage (HV)	Voltages in excess of 1000 volts AC or 1500 volts ripple-free DC.
High voltage isolation	<p>Isolation is deemed to exist for an electrical part if an adequate break exists between the high voltage supply and the apparatus requiring access to confirm that lightning or switching surges will not cross the isolation point.</p> <p>Isolation points shall be clearly identified by attachment of a Do Not Operate tag. Operating handles that have facilities to lock the mechanism in the open</p>

Term	Definitions
	position shall be locked or made inoperable by other suitable means to achieve isolation.
High Voltage Test Permit	See 'Test Permit'
Isolation point	A suitable means of disconnection that prevents the inadvertent energisation of electrical equipment. Do Not Operate/Isolation tags shall be attached at isolation points.
Instructed person	A person who is acting under the supervision of an authorised person.
Job Safety and Environment Analysis (JSEA)	A step-by-step method of identifying hazards, evaluating the risk, implementing control measures and providing a safe system of work.
Live	Connected to a source of electrical supply or subject to hazardous induced or capacitive voltages. Generally, live refers to a conductor or conductive part intended to be energised in normal use, including a neutral conductor and conductive parts connected to a neutral conductor.
Line supervisor	A Line Supervisor is a person with day-to-day supervisory responsibilities for workers within a functional area of the business. A Line Supervisor includes, but is not limited to, Team Leaders, Coordinators and Level 4 or 5 Supervisors. A Line Supervisor is also considered a worker but has additional responsibilities for the implementation of the WHS Management System as identified in the WHS Management System and/or position description.
Live electrical work	Electrical work performed in circumstances in which some or all of the electrical equipment which is the subject of the electrical work is energised. Where isolations are required it is considered live electrical work until the isolation has been proven effective.
Low Voltage (LV)	An operating voltage that exceeds extra low voltage but does not exceed 1000V AC or 1500V ripple free DC as dined in <i>AS 3000 Electrical installations</i> (also known as the wiring rules).
Manager	A person with the responsibilities for managing a functional area of the business including the workers within the relevant functional area. This includes, but is not limited to, Level 3 Managers, General Managers and Project Managers. A manager is also considered a worker; however managers may have additional responsibilities for implementation of the WHS Management System as well as any additional responsibilities as an officer of the business.
New electrical ICT equipment	ICT equipment that is new and the supplier is deemed responsible for its initial electrical safety. New ICT equipment need not be tested but shall be examined for obvious damage.
Officer	<p>A person will be an "officer" for the purpose of the Work Health and Safety Act 2011 (Qld) and <i>Electrical Safety Act 2002 (Qld)</i> if the person makes, or participates in making, decisions that affect the whole, or a substantial part, of Seqwater's business or undertaking.</p> <p>Board members</p> <p>Members of the Seqwater Board are likely to be officers.</p> <p>The Board's role, powers, responsibilities and accountabilities are set out in the South East Queensland Water (Restructuring) Act 2007 (Qld), which informs the Board Charter setting out the role of the Board. The role of the Board includes setting Seqwater's strategic aims, "ensuring a framework of prudent and effective controls to enable risk to be assessed and managed"</p>

Term	Definitions
	<p>and to “monitor and assess senior management’s performance and implementation of strategy”.</p> <p>Members of the Executive Leadership Team</p> <p>A high-level consideration of Seqwater’s Executive Leadership Team suggests that the following non-exhaustive list of roles would also likely be considered officers for the purpose of the <i>Work Health and Safety Act 2011</i> (Qld) and the <i>Electrical Safety Act 2002 (Qld)</i> to the extent they make or participate in making decisions that affect the whole or a substantial part of Seqwater’s business:</p> <ul style="list-style-type: none"> • Chief Executive Officer • Chief Financial Officer • General Manager Operations • General Manager Water Supply Services • General Manager Asset Portfolio Development and Delivery • General Manager Strategy, People and Safety • General Counsel and Company Secretary • Other roles within the business. <p>While not all people in management roles will be officers, there may be other senior managers who are also considered to be officers for the purposes of the <i>Work Health Safety Act 2011</i> (Qld) and the <i>Electrical Safety Act 2002 (Qld)</i> because of their role in participating in the making of decisions affecting either the whole of, or a substantial part of Seqwater’s business.</p> <p>In either case, all managers will nevertheless have responsibilities as workers under the <i>Work Health Safety Act 2011</i> (Qld) and the <i>Electrical Safety Act 2002</i> (Qld). The duties of managers at Seqwater will be commensurate with their capacity for making decisions affecting the safety and health of other workers or other persons affected by work carried out by Seqwater.</p>
Operator earths	Earths capable of withstanding fault currents, placed by an authorised person. Placement and removal of operator earths shall be documented on a High Voltage Switching Sheet.
Our Learning	Seqwater’s online learning management system.
Permit User/2 nd Checker	The person who reviews section 3 of the permit and verifies that the documented controls are in place and appropriate for controlling the hazards of performing electrical work
Permit recipient	The person who is to undertake the electrical work and completes the relevant sections of the work permit. They must be competent to undertake the work and implement the appropriate controls.
Person in control of electrical equipment	The person in control of the electrical equipment may be a plant operator or manager, control room operator or coordinator.
Pre-drafted switching sheets	A pre-drafted Switching Sheet is a switching sheet that has been prepared for previous HV switching. Pre-drafted Switching Sheets require the same level of review and approval as a new switching sheet.
Restricted electrical licence	A restricted electrical licence authorises the holder to do electrical work linked to or for the purposes of their trade or calling. It is subject to restrictions or conditions as specified on the licence.

Term	Definitions
	<p>The work that can be performed under the authority of a restricted electrical licence is limited to:</p> <ul style="list-style-type: none"> • equipment in work area categories as detailed in the work area categories • operating at voltages up to 250 volts or 650 volts AC. <p>The work includes:</p> <ul style="list-style-type: none"> • replacement of flexible cord and or plugs on a like-for-like basis • testing for the safe isolation and restoration of equipment to be disconnected and reconnected • disconnection and reconnection of electrical wiring at equipment to the extent of allowing non-electrical work to be carried out • replacement of electrically operated equipment on a like-for-like basis. <p>A restricted electrical licence does not enable a worker to install or alter any part of the fixed electrical wiring system. This is considered electrical installation work.</p>
Reverse switching	Reverse switching is the process of re-energising an electrical circuit as specified on a High Voltage Switching Sheet.
Specified electrical equipment	<p>Used for the performance of manufacturing work:</p> <ul style="list-style-type: none"> • a cord extension set (extension lead) with a current rating of not more than 20 amps • a portable outlet device with a current rating of not more than 20 amps • electrical equipment, other than a portable safety switch that: <ul style="list-style-type: none"> - has a current rating of not more than 20 amps - is connected by a flexible cord and plug to low voltage supply. <p>Used for the performance of service work or office work:</p> <ul style="list-style-type: none"> • a cord extension set (extension lead) with a current rating of not more than 20 amps • a portable outlet device with a current rating of not more than 20 amps • electrical equipment, other than a portable safety switch that: <ul style="list-style-type: none"> - has a current rating of not more than 20 amps - is connected by a flexible cord and plug to low voltage supply - is moved during its normal use for the purpose of its normal use.
Safety observer	<p>In relation to the observing of the performance of electrical work, means a person:</p> <ul style="list-style-type: none"> • who is competent to help with the electrical work and to implement control measures in an emergency • who is competent to rescue the person performing the electrical work and to provide resuscitation • whose competence has been assessed in the last 12 months.
Safety observer exclusion zone	The exclusion zones for overhead electric lines vary depending on circumstances. In general, exclusion zone for all overhead electric lines is 3m. The exclusion zone for overhead communications lines is 1m.

Term	Definitions
Safety observer zone	Is an area in which it is possible that any part of operating plant, a person working on an elevating work platform, or a load being moved could enter the exclusion zone of live electric lines.
Safety switch	A residual current device (RCD), type 1 or type 2 safety switches.
Serious electrical incident	<p>An incident when a person:</p> <ul style="list-style-type: none"> was killed by electricity received a shock or injury from electricity, and was treated for the shock or injury by or under the supervision of a doctor received a shock or injury from electricity at high voltage, whether or not the person was treated for the shock or injury by or under the supervision of a doctor. <p>Note: high voltage means a voltage above 1000 V AC or 1500 V ripple-free DC.</p>
Switching	Any action that alters connections in an electrical circuit or any action specified on a High Voltage Switching Sheet.
Switching assistant	<p>An authorised person with appropriate training and experience who is competent to assist a Switching Operator. An approved person working under the direct personal supervision of a Switching Operator for the purposes of training.</p> <p>A switching assistant may carry out the switching tasks under the direction of a Switching Operator.</p> <p>First year electrical apprentices shall not be used as Switching Assistants. Apprentices other than first year apprentices may be used as Switching Assistants providing they meet the necessary training requirements.</p>
Switching coordinator	<p>An authorised person who has received specific high voltage training to enable them to check, approve and authorise high voltage Switching Sheets. No person shall be deemed to be authorised unless they have received formal training in high voltage switching techniques.</p> <p>The switching coordinator must not perform any other role when a switching program is being performed.</p>
Switching operator	<p>An authorised person who has received specific high voltage training to enable them to select, prepare and carry out high voltage switching operations. No person shall be deemed to be authorised unless they have received formal training in high voltage switching techniques.</p> <p>A Switching Operator may transfer responsibilities on a Switching Sheet to another authorised Switching Operator should they not be available to complete a Switching Sheet after notifying the Switching Coordinator.</p> <p>An approved person working under the direct personal supervision of a Switching Operator for the purposes of training.</p>
Switching sheet	Refer to the definition of High Voltage Switching Sheet.
Test Permit	<p>A Test Permit is a written statement that allows personnel access to restricted equipment/areas. It is also used to record the electrical isolation necessary to make the equipment/areas electrically safe. Operator earths may be removed for the purposes of applying test voltages to electrical apparatus while a Test Permit is open. After testing is completed, operator earths may have to be re-applied.</p> <p>Seqwater use the HV Test Permit (FRM-00949) for this purpose.</p>

Term	Definitions
Test Permit Recipient	A person qualified to receive and surrender a Test Permit for the duration of work being performed on the equipment for which the Test Permit is issued. The Test Permit recipient shall also be responsible for the safety of Work Group/s signed to the Test Permit and for directing the removal and placement of operator earths for performing tests.
Training Needs Analysis (TNA)	The identification of all training needs required by workers at Seqwater.
Untrained person	A person who is not an authorised person or an instructed person for the electric line.
Voltage levels	<p>Extra low voltage: means a voltage of less than 50V AC. or 120V ripple free DC.</p> <p>Low voltage: means exceeding extra low voltage, but not more than 1000VAC or 1500V ripple free DC.</p> <p>High voltage: Exceeding low voltage.</p>
Work group (electrical)	<p>A worker or team of workers reporting to the Access Permit or Test Permit recipient regarding work carried out under an Access Permit or Test Permit as directed by the recipient of that permit.</p> <p>The qualifications and experience of work group members shall be discussed with the switching coordinator prior to signing on a work group.</p>
Worker	<p>Worker means a person who carries out work in any capacity for Seqwater, including work as:</p> <ul style="list-style-type: none"> • an employee • a contractor or subcontractor • an employee of a contractor or subcontractor • an employee of a labour hire company who has been assigned to work at Seqwater • an outworker • an apprentice or trainee • a student gaining work experience • a volunteer • a worker of a prescribed class.
Working earths	<p>Earths placed at the work area under the coordination of a recipient to limit the rise in potential difference and capable of withstanding fault current at the work area.</p> <p>Working earths shall be rated at the expected fault current and duration of protection operation of the protective device.</p>
Workplace	A place where work is carried out by Seqwater and includes any place where a worker goes, or is likely to be, while at work. This includes a vehicle, vessel or other mobile structure.

4 Roles and responsibilities

Role	Responsibility
General Manager	<ul style="list-style-type: none"> • Approve, in consultation with the Manager, WHS, any requests to undertake work within an untrained person's electrical exclusion zone at an Seqwater controlled workplace.
Manager	<ul style="list-style-type: none"> • Provide adequate resources to comply with this procedure. • To the extent reasonably practicable, have a systematic process in place to manage electrical hazards at Seqwater workplaces within their area of responsibility. • Report any incidents relating to electricity to Seqwater's incident hotline (07) 3270 4040.
Manager, WHS	<ul style="list-style-type: none"> • Provide adequate WHS resources to provide advice, procedures, tools and templates to support the management of hazards associated with electricity and electrical work. • Implement a systematic process to monitor work activities to verify the hazard identification and risk management process. • Provide advice and support to the relevant General Manager on any requests to undertake work within an untrained person's electrical exclusion zone at an Seqwater controlled workplace. • Report serious electrical incidents, dangerous electrical incidents and electric shock incidents to the Electrical Safety Office in accordance with the <i>Electrical Safety Act 2002 (Qld)</i> and <i>Electrical Safety Regulation 2013 (Qld)</i> and assist with management of those incidents.
Electrical Supervisor	<ul style="list-style-type: none"> • Inform workers of electrical safety requirements at a level relative to the electrical hazards that those workers are, will, or might reasonably be exposed to. • Implement a systematic process to manage electrical hazards within their area of responsibility. • Communicate, consult, instruct and supervise workers involved in electrical work. • Regularly monitor and review workers involved in electrical work activities and regularly check that they have current and appropriate levels of training and competency for the electrical work being undertaken. • Inform Learning and Development Team of changes to worker competencies. • Regularly monitor and review the effectiveness of controls and implement corrective actions and treatment plans where required. • Report any incidents relating to electricity to Seqwater's incident hotline (07) 3270 4040.

Role	Responsibility
Learning and Organisational Development (LOD) Unit	<ul style="list-style-type: none"> Develop and maintain a Training Needs Analysis (TNA) which includes training requirements for undertaking electrical work. Maintain the Electrical Worker Register for electrical workers and engineers performing work in their area of responsibility. Develop and implement a training schedule for electrical safety in accordance with the requirements of this procedure and the WHS TNA.
WHS Team	<ul style="list-style-type: none"> Provide advice, procedures, tools and templates to support the management of hazards associated with electricity and electrical work. Report trends and analysis of hazard identification and effectiveness of controls to relevant stakeholders. Complete workplace monitoring activities to verify the hazard identification and risk management process. Report any incidents relating to electricity to Seqwater's incident hotline (07) 3270 4040.
Electrical Worker	<ul style="list-style-type: none"> Only undertake electrical work allowed by the level of electrical licence held by the electrical worker and the electrical worker's training and qualification. Comply with the requirements of safety instructions relating to the use of electrical equipment. Report any incidents relating to electricity to Seqwater's incident hotline (07) 3270 4040.
Workers	<ul style="list-style-type: none"> Comply with the requirements of safety instructions relating to the use of electrical equipment. Report any incidents relating to electricity to Seqwater's incident hotline (07) 3270 4040.
Switching Coordinator	<ul style="list-style-type: none"> Familiarise themselves with the intent of the switching and understand the consequences of each operation on the network before commencing any Switching Sheet. Coordinate HV switching with the relevant Switching Operators and authorities. Direct and coordinate the progress of switching with all Switching Operators. Approve, issue and manage HV Access Permits. Maintain up-to-date records of the status of all Switching Sheets and HV Access Permits as they are executed. Direct any or all switching to cease if any danger arises to personnel, electrical apparatus or network security. Where applicable, undertake switching by remote control. If there are any abnormalities that aren't identified on the HV Access Permit, take appropriate action for reverse switching to be carried out safely. <p>Switching Coordinators may perform the following roles:</p> <ul style="list-style-type: none"> Switching Coordinator Switching Operator Assistant HV Permit Recipient

Role	Responsibility
	<ul style="list-style-type: none"> Individual of a work group. <p>Where after hours work is required, a Switching Coordinator may perform the role of Switching Coordinator and Switching Operator Assistant. Under no circumstance can a Switching Coordinator also perform the role of Switching Operator.</p>
Switching Operator	<ul style="list-style-type: none"> Carry out switching. Issue HV Access Permits. Familiarise themselves with the intent of the switching and understand the consequences of each operation on the network before commencing any Switching Sheet. Confirm switching is carried out using approved operating equipment in current test date. <p>Switching Operators may perform the following roles:</p> <ul style="list-style-type: none"> Switching Operator Switching Operator Assistant HV Permit Recipient Individual of a work group. <p>When a Switching Operator performs the role of a Switching Operator Assistant or HV Permit Recipient, the Switching Operator also has the responsibilities applicable to that role.</p>
Switching Operators Assistant	<ul style="list-style-type: none"> Consult with the Switching Operators to become familiar with the intent of the Switching Sheet. Understand the consequences of each operation when performing tasks as directed by the Switching Operator. Advise the Switching Operator of any abnormality observed during Switching Operations (e.g. dangerous situations, switch malfunctions). <p>A Switching Operator's Assistant may perform the following roles:</p> <ul style="list-style-type: none"> Switching Operator Assistant HV Permit Recipient Individual of a work group. <p>When a Switching Operators Assistant performs the role of a HV Permit Recipient, the Switching Operators Assistant also has the responsibilities of a HV Permit Recipient.</p>
HV Permit Recipient	<ul style="list-style-type: none"> Be satisfied that all necessary actions have been carried out to establish safe conditions of access. Receive the HV Access Permit granting access. Advise the work group of the scope of work, extent of isolation and earthing. Perform work within the constraints of the access on the permit. Direct placement and removal of the working earths if applicable. Surrender access and record on the permit upon the completion of work. <p>Where the permit recipient/work group are performing electrical work or there is a possibility of the work encroaching within a high voltage exclusion zone, the recipient must:</p>

Role	Responsibility
	<ul style="list-style-type: none"> supervise electrical safety at the worksite and where required appoint a safety observer if the work to be performed has the potential to come within the relevant exclusion zone. On appointment of the safety observer a recipient must: <ul style="list-style-type: none"> identify the observer to the working group instruct the work group to follow safety directions given by the safety observer instruct the safety observer that they shall not carry out any work while performing their role of safety observer.

In addition to the above roles and responsibilities, all workers must comply with the requirements of this procedure, the *Electrical Safety Act 2002 (Qld)* and the *Electrical Safety Regulation 2013 (Qld)*, to the extent they apply to the person.

5 General electrical safety requirements

5.1 Electrical safety obligations

Electrical safety obligations apply to all officers, managers, workers and other persons entering an Seqwater workplace.

The *Electrical Safety Act 2002 (Qld)* places a range of obligations on Seqwater to confirm that, so far as is reasonably practicable, persons are prevented from being harmed or property being damaged by electricity. This is achieved by imposing duties on persons who may affect electrical safety in the workplace.

5.1.1 Obligation of officers

Seqwater officers have an obligation to exercise due diligence to check that activities conducted at Seqwater workplaces are undertaken in a way that is electrically safe. This obligation includes, but is not limited to a duty to:

- acquire and keep up-to-date knowledge of electrical safety matters
- gain an understanding of the nature of the operations of the business or undertaking of Seqwater and generally of the hazards and risks associated with those operations
- confirm that Seqwater has available for use, and uses, appropriate resources and processes to eliminate or minimise risks to electrical safety from work carried out as part of the conduct of the business or undertaking
- confirm that Seqwater has appropriate processes for receiving and considering information regarding incidents, hazards and risks and responding in a timely way to that information
- confirm that Seqwater has, and implements, processes for complying with any duty of Seqwater under the *Electrical Safety Act 2002 (Qld)*, for example:
 - to confirm electrical risk to person or property has been eliminated, so far as is reasonably practicable
 - to confirm that all persons and property are free from electrical risk from the operation or use of electrical equipment
- verify the provision and use of the resources and processes mentioned in dot points 3 to 5 above.

5.1.2 Obligation of managers

All Seqwater managers have the obligation to provide, as far as is reasonably practicable:

- a systematic process is in place to manage electrical hazards at Seqwater workplaces within their area of responsibility
- that electrical equipment is electrically safe
- the electrical safety of all persons and property likely to be affected by electrical equipment.

5.1.3 Obligations of workers

A worker has the obligation to:

- take reasonable care for their own electrical safety
- take reasonable care to not adversely affect the electrical safety of other persons
- comply with the instructions given by a representative of Seqwater, for the electrical safety of workers
- use personal protective equipment (PPE), where:
 - the PPE is provided by the person in control of the electrical equipment for electrical safety purposes
 - the worker is properly instructed in the use of the PPE provided.
- comply with Seqwater policies and procedures relating to work health and safety and electrical safety at the workplace (including this procedure).

A worker must not wilfully interfere with or misuse anything provided for electrical safety at the workplace.

5.1.4 Do Not Operate tags

Unauthorised removal of 'Do Not Operate' tags, isolation tags and/or isolation locks or a failure to follow correct isolation procedures or high voltage procedures has the potential to cause serious injury or death and/or serious equipment damage and as such conduct of this nature will be treated seriously and may result in dismissal of the employee for serious misconduct.

5.1.5 Disciplinary action

Individuals found to have contravened any requirements of this procedure or of any supporting electrical guideline or work instruction may be subject to disciplinary action in accordance with Seqwater's Discipline Procedure (PRO-00962).

5.2 Risk management

Prior to undertaking electrical work or work activities involving a potential electrical hazard, a risk assessment must be undertaken to determine the hazards present, and the controls required, to allow the work to be undertaken safely. The outcome of the assessment must be documented in a Job Safety and Environment Analysis (JSEA)/Safe Work Method Statement (SWMS).

Risk assessments of electrical work or work activities involving a potential electrical hazard must be undertaken in accordance with the Hazard Identification and Risk Management Procedure (PRO-00657). In conducting an electrical risk assessment, the following five steps must be used:

- STEP 1 – Hazard Identification.
- STEP 2 – Risk Assessment (inherent risk).
- STEP 3 – Control risks (select using the hierarchy of controls).
- STEP 4 – Risk assessment with risk control measures (residual risk).
- STEP 5 – Monitor and review risk control measures.

5.2.1 Identification of hazards

The identification of hazards is a critical element in managing risks associated with work activities involving electricity.

Potential electrical hazards may be identified in a number of different ways including:

- consulting with workers and observing where and how electrical equipment is used
- regularly inspecting and testing electrical equipment and electrical installations as appropriate
- reading equipment labels and manufacturers' instruction manuals
- talking to manufacturers, suppliers, industry associations, and electrical safety specialists
- reviewing WHS incident reports.

Hazards from electrical equipment or installations may arise from, for example:

- the design, construction, installation, maintenance and testing of electrical equipment or electrical installations
- design change or modification
- inadequate or inactive electrical protection
- where and how electrical equipment is used. Electrical equipment may be subject to operating conditions that are likely to result in damage to the equipment or a reduction in its expected life span. For example, equipment may be at greater risk of damage if used outdoors or in a factory or workshop environment
- electrical equipment being used in an area in which the atmosphere presents a risk to health and safety from fire or explosion, for example confined spaces
- type of electrical equipment. For example, 'plug in' electrical equipment that may be moved around from site-to-site, including extension leads, are particularly liable to damage
- the age of electrical equipment and electrical installations
- work carried out on or near electrical equipment or electrical installations, including electric overhead lines or underground electric services.

Exposure to high electromagnetic fields may also present a potential hazard for workers with some medical conditions, for example workers fitted with a pace maker.

5.2.2 Assessing risk

Prior to undertaking any electrical work or work activities involving a potential electrical hazard, a risk assessment must be undertaken. Where work is being performed on energised electrical equipment, the risk assessment must be performed by a competent person.

The risk assessment should consider:

- the severity of an electrical risk (i.e. an assessment of the risk likelihood and consequence)
- whether existing control measures are effective
- what action you should take to control an electrical risk
- how urgently the action needs to be taken.

To assess the risk associated with electrical hazards, consider:

- What is the potential impact of the hazard?
- How severe could the electrical hazard be? For example arc flash, direct contact causing electrocution, fire or explosion causing serious burns or death.
- How many people are likely to be exposed to the hazard?
- How likely is the hazard to cause harm?
- Could it happen at any time or would it be a rare event?
- How frequently are workers exposed to the hazard?

Other factors that may affect consequence and likelihood include:

- the conditions under which the electrical equipment is used, for example wet conditions outdoors or confined spaces
- work practices and procedures, including isolations required to carry out maintenance
- the capability, skill and experience of relevant workers.

5.2.3 Selecting control measures

Once hazards have been identified and the risks assessed, appropriate control measures must be put in place.

The hierarchy of controls must be used to select the control that most effectively eliminates or minimises the risk in the circumstances, so far as is reasonably practicable. This may involve a single control measure or a combination of two or more different controls.

The chosen risk control measures should not, so far as is reasonably practicable, introduce new hazards to the work activity.

Hierarchy of control	Examples of risk control measures
Elimination	Eliminating risk factors by designing-in or designing-out certain features, hazards may be eliminated.
Substitution	Use extra-low voltage electrical equipment such as a battery-operated tool rather than a tool that is plugged into mains electricity.
Isolation	Isolating electricity so it is not live, thus preventing workers from coming into contact with electricity while undertaking work.
Engineering controls	Installing residual current devices (commonly referred to as safety switches) to reduce the risk of receiving a fatal electric shock.
Administrative controls*	Establishing exclusion zones, use of permits and warning signs.
Personal protective* equipment (PPE)	PPE includes protective eyewear, insulated gloves, hard hats, aprons and breathing protection. Most forms of PPE are not relevant to minimising electrical risks in workplaces, except in relation to energised electrical work.

* Administrative controls and personal protective equipment should only be considered where there is residual risk after the higher order controls have been utilised.

5.2.4 Reviewing risk control measures

Risk controls that are put in place to address electrical safety must be reviewed regularly to make sure they work effectively. Risk control measures must be reviewed in the following circumstances:

- where there has been an electrical incident
- when the control measures are identified as not effectively controlling the risk
- before a change at the workplace that is likely to give rise to a new or different risk to health or safety
- if a new relevant hazard or risk is identified
- if the results of consultation indicate that a review is necessary
- if a health and safety representative requests a review
- every two years.

5.3 Specific hazard and risk control

There are a number of things you should do to manage the risks to health and safety associated with electrical risks at the workplace including the following:

- confirm power circuits are protected by the appropriate rated fuse or circuit breaker to prevent overloading

- check that leads, including cord extension sets and flexible cables, are arranged so they will not be damaged. For example, avoid running leads across the floor or ground, through doorways and over sharp edges, and use lead stands or insulated cable hangers to keep leads off the ground. In many heavy industries, cable protection ramps are used to protect cables
- not using leads and tools in damp or wet conditions unless they are designed for those conditions
- check circuits where portable electrical equipment can be connected are protected by appropriate safety switches (as required by the ES Regulation) that are properly tested and maintained
- if safety switches, circuit breakers or other over current protective devices including fuses are triggered into operation, ensuring circuits are not re-energised until the reason for the operation has been determined by a competent person
- check safety switches are effective by regular testing (refer Appendix C)
- where necessary, isolate the electrical supply in ceiling areas before entering these areas.

Regular visual inspection of electrical equipment will assist in determining whether it is electrically safe. Visual inspection of electrical equipment may involve, in part:

- looking for obvious damage, defects or modifications to the electrical equipment, including accessories, connectors, plugs or cord extension sockets
- looking for discolouration that may indicate exposure to excessive heat, chemicals or moisture
- check the electrical equipment has a valid test and tag label.

5.4 Electrical incident reporting

Incident reporting applies to all electrical incidents involving employees, contractors and visitors to Seqwater sites. It applies to all sections of this procedure.

An electrical incident can include:

- Serious Electrical Incident
- Dangerous Electrical Event
- Electric Shock.

Incidents that are not necessarily electrical incidents but have electrical risk implications and could impact on the electrical safety of others must be reported.

A worker shall report all electrical incidents to the line supervisor and the Incident Hotline (07) 3270 4040 in accordance with the requirements of the Incident Notification Procedure (PRO-00388).

Any worker who has come into contact with electricity must undergo a medical examination as soon as practical after the incident.

The Manager, WHS must report all electrical incidents that meet the required reporting criteria, to the Electrical Safety Office as soon as practicable (and by the fastest means possible) after the incident has occurred.

The scene of any electrical incidents must not be interfered with apart from making the area electrically safe. Any electrical equipment involved in the incident or event must be securely stored for the purposes of investigation.

Investigation of electrical incidents and incident response is performed in accordance with Incident Investigation Procedure (PRO-00793).

5.5 General requirements for electrical equipment

All electrical equipment at Seqwater workplaces must be designed, constructed, installed, protected, maintained and tested and tagged in accordance with section 6.8, so as to minimise, so far as reasonably practicable, risks to health and safety associated with electrical hazards in connection with the electrical equipment.

The following are general safety rules when using electrical equipment or undertaking electrical work at an Seqwater workplace:

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- always check that the electrical equipment used has been tested and tagged and is in current test date
- all portable electrical equipment used must be connected to a safety switch (refer to Section 5.5.2 for further information on safety switches)
- if using a portable safety switch, always test that it trips after the equipment being used is plugged in, by pressing the test button on the side of the safety switch
- ladders and work platforms used for electrical work at Seqwater workplaces must be of fiberglass construction i.e. ladders made of conductive material (e.g. metal) must not be used to perform any electrical work
- never use a double adaptor or piggy back plug in a workshop, construction site or other work areas, including offices; use an appropriate power board
- if any electrical leads to portable equipment are damaged, or single insulated coloured cables are showing, do not use the equipment
- if personal electrical equipment is to be used at the workplace by a worker, the worker needs to visually check that it is safe, has been tested and tagged and is in current test date (i.e. radio, charger, etc.)
- look for obvious damage, defects or modifications to the electrical equipment, including accessories, connectors, plugs or cord extension sockets
- check that flexible cords are effectively anchored to equipment, plugs, connectors and cord extension sockets
- check that covers, guards, etc. are secured and working in the manner intended by the manufacturer or supplier
- check that ventilation inlets and exhausts are unobstructed.

All electrical equipment that is hired for use at an Seqwater workplace, or brought onto an Seqwater workplace by a third party must be:

- visually inspected to check that it is in a safe condition
- tested and tagged and is in current test date
- inspected, tested and tagged for the duration that the equipment is hired.

5.5.1 Unsafe electrical equipment

If any electrical equipment is found to be faulty or is out of test date, the following actions must be undertaken:

- the equipment must be immediately disconnected or isolated and removed from use and tagged with an 'Out of Service' tag (and lock where practical)
- the line supervisor is to be notified immediately
- the 'Out of Service' tag (and lock where used) is only to be removed and the equipment returned to service when the piece of electrical equipment is repaired or replaced and tested and tagged by an electrical worker.

5.5.2 General requirements for safety switches

All portable electrical equipment used at an Seqwater workplace must be connected to either a fixed or portable safety switch.

All electrical safety switches installed or used at Seqwater workplaces must comply with the requirements of AS/NZS 3190 Approval and test specification – Residual current devices (current-operated earth leakage devices) when tested.

All safety switches, other than portable safety switches, at Seqwater workplaces must:

- be tested by a competent person under *AS/NZS 3760 In-service Safety Inspection and Testing of Electrical Equipment* immediately after it is connected
- be tested under, and at the intervals stated in *AS/NZS 3760 In-service Safety Inspection and Testing of Electrical Equipment*.

All portable safety switches at Seqwater workplaces must:

- be tested by pushing the test button on the safety switch immediately after it is connected
- be tested in accordance with, and at the intervals stated in, AS/NZS 3760 In-service Safety Inspection and Testing of Electrical Equipment.

5.5.3 Managing static electricity

Static electricity has the potential to cause inadvertent ignition of flammable mixtures and can also lead to other operating problems in electrical and control systems.

The management of static electricity must be undertaken in accordance with the *AS/NZS 1020 The Control of Undesirable Static Electricity*.

5.5.4 Wall penetration

Prior to penetrating walls all electrical services must be positively identified and the work plan must consider the following controls:

- Positively identify the location of the electrical services.
- If the penetration is adjacent to the electrical services, isolate the electrical services.
- If the location of the electrical services is unknown or cannot be confirmed, the electrical service must be de-energised prior to commencement.
- Confirm any electrical circuit in the vicinity is RCD protected.
- Wear insulated gloves and use insulated tools when penetrating the wall.

6 General electrical safety requirements for workers carrying out electrical work

6.1 Electrical supervision requirements

Supervision of electrical work must only be performed by appropriately trained and licensed electrical workers.

General intermittent supervision is appropriate where electrical work is undertaken under instruction and direction by an electrical worker with periodical contact and review. Where this type of supervision is undertaken, all work should be inspected by an electrical supervisor following completion to verify Seqwater requirements and standards have been met.

Direct constant supervision must occur where the supervisor is an electrical worker who directs a worker or apprentice in assisting the electrical worker in the performance of electrical work where the assistance does not involve physical contact with any energised electrical equipment. Where this type of supervision is undertaken, the supervisor may be one of the electrical workers of a two-man, work team. The supervisor must confirm, so far as is reasonably practicable, that the worker or apprentice does not come into physical contact with any energised electrical equipment by ensuring all relevant isolations are conducted and the equipment is tested to confirm it is not energised before they commence work.

For all electrical supervision, the following actions must be undertaken by the electrical worker undertaking the supervision to comply with the *Electrical Safety Act 2002 (Qld)* and the *Electrical Safety Regulation 2013 (Qld)* and Seqwater systems:

- take all reasonably practicable steps to confirm the electrical safety of workers involved in the electrical work
- provide electrical advice and support for all workers undertaking electrical work
- develop or review work procedures, risk assessments and work instructions to safely undertake electrical work

- train staff in correct applications of procedures and work instructions
- check that suitable controls are in place to manage the risks of undertaking electrical work
- undertake inspections on electrical work being performed to confirm that the electrical work is carried out in accordance with documented procedures.

An electrical worker who undertakes electrical work, or provides direct supervision of electrical work, is required to sign the work order associated with the work to assume accountability for the work undertaken.

Electrical supervisors are responsible for ensuring that all apprentices perform electrical work competently and safely with the appropriate level of supervision and do not come into physical contact with any energised electrical equipment.

Supervision requirements for workers performing electrical work on Seqwater workplaces is included in Appendix A of this procedure. Note that an apprentice/trainee cannot, in the first 6 months of the apprenticeship/training program work be:

- in the immediate vicinity of a live high voltage exposed part
- where there is a risk of contact with a live low voltage exposed part.

6.2 Electrical risk management

Prior to undertaking electrical work or work activities involving a potential electrical hazard, a risk assessment must be undertaken to determine the hazards present, and the controls required, to allow the work to be undertaken safely. The worker undertaking the electrical work must:

- be the holder of an electrical licence which authorises the worker to perform the work or be a qualified Electrical Engineer with an approved Engineering Electrical Safety Competency (which has nominated electrical work restrictions)
- undertake the risk assessment and document the outcome of the assessment in a Job Safety and Environment Analysis (JSEA)/Safe Work Method Statement (SWMS).

Risk assessments of electrical work must be undertaken in accordance with the Hazard Identification and Risk Management Procedure (PRO-00657).

6.3 Electrical work

Electrical Work is defined in the definitions (section 13) of this document. Electrical work at Seqwater workplaces must only be undertaken by workers who hold current electrical licences for the work that they are undertaking. Electrical Engineers who have completed an Engineering Electrical Safety Competency and are on the electrical register can carry out limited electrical work (refer definitions Engineering Electrical Safety Competency).

6.3.1 Electrical work qualifications

Seqwater employees with electrical licences

Seqwater employees will not perform overhead live line work. Overhead live line work is performed by suitably qualified contractors.

It is the responsibility of both the person requesting the electrical work to be undertaken, and the electrical worker performing the work, to make sure that the electrical worker is licenced for the electrical work to be undertaken.

Electrical licence details for Seqwater employees must be maintained in the Electrical Worker Register. This register located in the 'Our Learning System' must include:

- the electrical licence holder's name
- the number of the electrical licence, or if it is an external licence, the number, code or another way of identifying the electrical licence

- class of the electrical licence
- if the licence is a restricted electrical work licence - the type of electrical work stated on the licence
- the conditions or restrictions included in the licence
- the day the licence expires
- if the licence is an external licence - the jurisdiction.

Electrical supervisors will be informed from 'Our Learning System' to check the licencing requirements of employees within their area of responsibility continue to meet the requirements of the *Electrical Safety Act 2002 (Qld)* and *Electrical Safety Regulation 2013 (Qld)*. Likewise, Managers or supervisors of electrical engineers on the electrical register must check these engineers maintain currency of training. Employees must provide Seqwater's Learning and Organisational Development Team with the information they require to maintain the register.

Confirmation of electrical licence details can be obtained by undertaking a search of electrical workers on the Electrical Safety Office website at www.justice.qld.gov.au/fair-and-safe-work/electrical-safety.

Seqwater employees, qualified electrical engineers

The *Electrical Safety Act 2002 (Qld)* requires a person performing or supervising electrical work to be the holder of an electrical work licence authorising the person to perform the work. Section 55(3) of the Act lists exemptions from this requirement, including for the purpose of performance or supervision of electrical work in practising the person's profession as an electrical engineer.

Seqwater requires any Seqwater Electrical Engineer who is required to undertake electrical work as part of their duties to be included on the Electrical Workers Register. To be added to this register, the engineer must complete the Engineering Electrical Safety Competency module. This assessment will:

- verify the person's qualifications
- confirm that the person has read and understood the requirements of this procedure
- confirm the person has completed all pre-requisite training
- confirm the person has been issued with required PPE
- nominate any restrictions on permitted electrical work.

External contractors

Seqwater will only engage licenced electrical contractors to perform electrical work which the electrical contractor is licenced to perform. Electrical contractors will be engaged in accordance with the requirements of the Contractor Management Procedure (PRO-00808).

A licenced electrical contractor engaged to perform electrical work at an Seqwater workplace must provide their licence details on the work order for the work being undertaken.

On completion of the work, contractors shall provide a Certificate of Testing and Compliance or a Certificate of Testing and Safety. A Certificate of Testing and Compliance certifies the electrical installation, to the extent it is affected by the electrical work, has been tested to check it is electrically safe. A Certificate of Testing and Safety certifies that the electrical equipment, to the extent it is affected by the electrical work, is electrically safe.

Where work was completed under isolation the isolation officer will be provided the Certificate of Testing and Safety or Certificate of Testing and Compliance for review prior to re-energisation.

6.3.2 Preparing for general electrical work

No electrical work will be undertaken other than in accordance with this procedure.

No live low voltage electrical work is to be undertaken other than in accordance with section 7.

No live high voltage work will be undertaken other than isolation and access work in accordance with section 8.

All exposed parts of electrical equipment must be treated as energised or 'live' until the equipment is isolated and proved not to be energised, with any related high voltage exposed parts earthed.

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Before electrical work is carried out, all electrical equipment shall be tested to prove the electrical installation and equipment is electrically safe and that all personnel are not exposed to electrical risk.

Prior to commencing electrical work, the following actions must be undertaken:

- confirm that the electrical worker holds a current electrical licence or is an electrical engineer who has completed the Engineering Electrical Safety Competency (which has limitations on electrical work) for the work being undertaken
- a risk assessment of the activity must be undertaken, and risk control measures identified to eliminate or mitigate the risks as far as reasonably practicable
- a work activity must not proceed if prevailing weather conditions will increase the risk of workers receiving an electric shock
- the work area shall be clear of obstructions
- the electrical installation or equipment has been isolated, with locks and personal tags applied to the isolation point, in accordance with the Energy Tag and Lockout Procedure (PRO-00014)
- the electrical installation or equipment has been tested and proved to be de-energised prior to commencing the electrical work (where work is being undertaken on live installations or equipment, the requirements of Section 7 of this procedure must be applied)
- check all electrical safety and testing equipment is in test date and good working order
- check all electrical worker tools are in good working condition and suitable for the task
- confirm appropriate supervision is applied
- appropriate PPE and clothing is worn (Category 1 PPE for electrical work, Category 4 PPE for high voltage electrical work).

Detailed requirements for live low voltage electrical work and high voltage isolation and access are defined in the relevant sections of this procedure, sections 7 and 8 respectively.

6.3.3 Electrical isolations

All electrical isolations must be planned and performed in accordance with the Energy Tag and Lockout Procedure (PRO-00014). Isolations for electrical work can only be performed by an electrical worker who is an authorised isolator or approved by an authorised isolator.

As part of planning the isolation, the electrical worker who is an authorised isolator shall positively identify the isolation point or points of the equipment being worked on, by referring to site documentation and confirm the isolation by:

- consulting with the person in control of the electrical equipment
- utilising knowledge from training and/or experience.

If no site documentation is available, the electrical worker shall positively identify the isolation by:

- consulting with the person in control of the electrical equipment
- utilising knowledge from training and/or experience.

Additional non-positive isolations may be performed to further safeguard electrical workers from inadvertent equipment operation e.g. the removal of circuit control fuses from a motor starter. In some cases, there may also be two sources of supply, multi voltage types, back feeds, solar power feeds or incorrect isolation of supply. Testing stored voltage sources such as variable speed drives or capacitor banks involve additional risk and particular care should be taken when isolating and discharging stored voltage sources.

When performing an electrical isolation, the electrical worker shall do the following:

- Check they hold an electrical licence to perform the work.
- Understand the test procedures to be implemented and be competent in the use of the testing equipment.
- Wear PPE appropriate to the isolation being performed.
- Utilise a testing method that is safe and effective (preference for isolations and testing to be performed at circuit breakers where possible).

- Test the test instrument on a known voltage supply source and verify a positive (voltage present) indication. This should be a source that the worker has clear access to and does not involve coming close to or in contact with untested electrical parts or areas of high fault current.
- After the initial test for dead, immediately re-test the test instrument for operation on a known voltage supply to prove the test instrument is operational and this should indicate a positive (voltage present) indication. If a negative indication for voltage levels is shown on the test instrument, the cause shall be investigated, and the electrical parts shall still be treated as live.
- Test the electrical isolation by attempting to start the equipment. Attempting to start the electrical equipment shall be achieved by manual operation (or remote if no manual is available).
- Be aware that isolators can fail, and that some equipment may not start until a certain condition exists e.g. a limit switch is tripped.
- Test the electrical parts required to be touched by a phase to phase, phase to neutral, phase to earth and neutral to earth test. Any indication other than a no voltage (negative) state shall be investigated. The electrical worker shall exercise care not to trip possible essential circuits that a residual current device (RCD) may supply, as a phase to earth test may unintentionally trip circuits.
- Isolate equipment in accordance with the Energy Tag and Lockout Procedure (PRO-00014) including locking and tagging the isolated source.

After the above checks are made, the electrical worker shall then proceed with the electrical work.

6.3.4 Undertaking electrical work

As a minimum, all electrical work undertaken at Seqwater workplaces shall be undertaken in accordance with requirements of *AS 3000 Electrical installations* (also known as wiring rules) and an appropriate JSEA/SMWS.

Where Seqwater procedures and specifications exist that exceed the requirements of *AS 3000 Electrical installations*, the Seqwater procedures and specifications shall be followed.

The electrical worker shall perform any required electrical tests prior to restoration of supply. This shall include a visual inspection, earthing and/or insulation resistance tests, polarity and RCD tests.

All electrical work shall be recorded in CIS and a Certificate of Test shall be provided by external contractors for all electrical work performed on Seqwater workplaces.

6.3.5 Completing electrical work

On completion of the electrical work, the following must occur:

- all tools and equipment shall be removed from the work area
- all cables not connected shall be terminated with appropriate connectors. No bare conductors are to be left exposed
- all covers, and doors shall be placed securely in position, with switchboard external doors locked or bolted
- electrical workers shall remove any personal isolation locks or personal danger tags from the positive isolation point and reconnect the equipment to the electrical supply. If voltage checks are required to be performed, the appropriate PPE and clothing requirements must be worn
- any electrical equipment not able to be put back into service must be isolated from the supply at the circuit breaker or through the removal of the cable from the supply. Isolated equipment shall be isolated in accordance with the Energy Tag and Lockout Procedure (PRO-00014)
- the electrical worker who performed the electrical work, or the electrical worker who provided direct supervision of the electrical work, shall document the work completed on the work order, provide their electrical licence number and sign the work order to confirm that:
 - all work was undertaken in accordance with the *Electrical Safety Regulation 2013* (Qld) and/or the *Electrical Safety Act 2002* (Qld)
 - the electrical installation affected by the electrical work has been tested to confirm that it is electrically safe and is in accordance with the requirements of the wiring rules and any other standard applying under the *Electrical Safety Regulation 2013* (Qld) to the electrical installation

- the electrical equipment affected by the electrical work is safe.

Electrical equipment that has been de-energised must be re-energised through a controlled process in accordance with the Energy Tag and Lockout Procedure (PRO-00014), the relevant isolation plan, and must not be inadvertently re-energised.

When re-energising equipment, the electrical worker must inform other workers and/or the person in control of equipment that the equipment is about to be re-energised in accordance with the requirements of the Energy Tag and Lockout Procedure (PRO-00014).

6.4 Electrical tools, test equipment and safety

6.4.1 Electrical tools

At a minimum, the tools required to perform electrical work shall be insulated and rated at the voltages being applied to the tool (e.g. voltage indicators on the tool with fuse protection to prevent short circuits). When selecting electrical tools, the following must be considered:

- the device's function, range and class of accuracy must be appropriate to both the electrical work and the conditions where the work is being undertaken
- electrical test equipment shall be verified as working and safe for use before and after testing of the electrical equipment
- to confirm electrical safety, the combination of leads and instruments used shall be capable of withstanding the impulse voltages and fault current levels that could be experienced at the location
- the rating for test instruments and test probes used on 415/240V mains voltage equipment connected on the supply side of a main switchboard shall be Installation Category III (3) or IV (4)
- Type A probes (leads) should be used for measuring supply voltages (415/240 V AC). Therefore, workers who perform live testing or fault finding in switchboards shall use at least Category III (3) devices with Type A probes.

6.4.2 Electrical safety equipment

Each item of electrical safety equipment must be tested every 6 months. Items that pass the test are to be tagged with the next test date and returned to service. Any item that does not pass the test must be removed from service. After repair, an item must be tested before being returned to service.

Whenever an item of equipment is tested by an external organisation a written test report must be provided. The report must include details of the test methods used and the test results.

Insulating mats and covers

Insulating mats shall be inspected every six months by an approved testing facility and tested in accordance with *AS/NZS 2978 – Insulating Mats for Electrical Purposes*. Mats are to be washed with soap and water, stretched and examined for the following:

- blisters, cracks, cuts or holes
- embedded foreign matter
- defective fastenings.

Insulating gloves

Insulating gloves used for low voltage work shall be Class 00 and shall be Class 0 for high voltage isolation and access.

Insulating gloves are to be either:

- inspected and tested every 6 months by an approved testing facility in accordance with *AS 2225 – Insulating Gloves for Electrical Purposes*

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- replaced every 6 months.

Damaged or faulty insulated gloves must be appropriately disposed of and not used for electrical work.

Low voltage rescue kit

A low voltage rescue kit shall be inspected every six months by an approved testing facility and shall contain the following equipment:

- insulated crook
- insulating gloves
- 'Isolate Here in Emergency' sign
- burn dressings
- fire blanket
- torch.

6.4.3 Electrical test equipment

For the purposes of this section, electrical test equipment includes any item of equipment used to test or otherwise determine the status of an electrical item. An electrical test equipment register must be maintained for all electrical test equipment at each workplace where Seqwater electrical workers are based.

General requirements

Test instruments that are to be used or connected to electrical equipment should meet the following conditions:

- be suitable for the work in terms of their function, operating range and accuracy
- be in good condition and working order, clean and have no cracked or broken insulation. Particular care must be taken regarding the condition of the insulation on leads, probes and clips of test equipment
- pose no danger of electrocution to workers or damage to the electrical equipment during testing
- have suitably insulated leads and connection probes that enable connection or contact with energised parts to be made with minimal risk to the electrical worker
- provide suitable protection against hazards arising from over-voltages that may arise from or during the testing or measurement process.

Testing

Testing of electrical test equipment is to be undertaken every six months. Test results are to be recorded within the electrical test equipment register. Test equipment used for testing on low voltage circuitry shall be tested to 1000 volts AC and 1500 volts DC.

Calibration

Calibration of electrical test equipment is to be undertaken in accordance with manufacturers' requirements for each type of test equipment used, or every 12 months – whichever is the shorter. Calibration results are to be recorded within the electrical test equipment register.

Inspection

Prior to each use, electrical test equipment (including associated leads, clips, sockets, probes) are to be inspected for any damage to insulation. Each electrical test instrument is to have a durable sticker placed on it to indicate that it has been tested. The sticker is to contain information about who performed the test and when the next testing is due.

6.5 Electrical equipment

6.5.1 Electrical switchboards

The following is to be applied to switchboards located at Seqwater workplaces:

- All electrical switchboards must be kept free of obstructions and the doors kept locked (this should be included in the relevant workplace inspection checklist). Where opening the switchboard would provide immediate exposure to live parts, the switchboards must be locked (or require a tool to open) and signed 'Live Parts Enclosed'
- Electrical switchboards should be labelled or signed to warn of the level of electrical hazard, or otherwise. The 3 labels that should be used are:
 - Danger, Exposed Electrical Parts, Authorised Access Only
 - Danger, High Voltage, Authorised Access Only
 - Extra Low Voltage, No live exposed electrical equipment
- A minimum clearance zone of 600mm from an open switchboard door must be allowed in front of a switchboard and may be clearly indicated with yellow painted lines on the floor
- Where possible, protection from vehicle damage should be implemented
- Periodic inspections of switchboards by an electrical worker to provide scheduled maintenance (which may include advice on conducting thermo scans) and tests on switchboards in accordance with the applicable maintenance program
- Plans and drawings may only be stored inside a switchboard where appropriate storage compartments are available
- Spare parts and equipment must not be stored inside a switchboard if they have the potential to introduce hazards to the switchboard (i.e. remove parts from boxes to eliminate fire hazard, secure or store so that they do not cause hazards from falling onto workers, etc.).

Opening switchboards with immediate exposure to live parts

If there is a requirement to open an escutcheon panel, or switchboard that will provide immediate exposure to live parts, a JSEA/SWMS must be developed. Due to the risk of being exposed to live electrical parts only authorised personnel are permitted to open a switchboard or escutcheon panel. Authorised personnel are considered to be:

- electrical workers or
- electrical engineers that have been included on the Electrical Worker Register.

In addition, non-electrical workers may also access Control Systems boards or enclosures where the switchboard has undergone an assessment by an electrical worker to confirm that:

- low voltage and extra low voltage circuits are separated physically as much as possible and insulated as required by AS3000; and
- insulation and barriers, enclosures and shrouding meets IP2X or IPXXB.

6.5.2 Generators

All generators installed for use on Seqwater workplaces must comply with the requirements of Seqwater's Electrical Design and Construction Standard (E-SPE-STD-001), in particular section 5.3 – Generator Starter Batteries.

Fixed generators

Fixed generators used to provide backup electrical supply to Seqwater assets must comply with the requirements of AS 3010:2005 Electrical Installations – Generating Sets. In addition, the installation of fixed

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generators may be required to comply with requirements of electricity distributors and other relevant regulatory authorities.

All fixed generator installations and associated supply switching equipment must be designed by an appropriately qualified and experienced electrical engineer.

Portable generators

Depending on generator output, portable generators used at Seqwater workplaces must comply with the requirements of AS 2790:1989 Electrical Generating Sets – Transportable (up to 25 kW) and AS 3010:2005 Electrical Installations – Generating Sets.

Specialist advice shall be sought from an appropriately qualified electrical worker to identify the correct safety protection before using portable generators on Seqwater sites and if required, install a temporary earth that is confirmed by testing the earth resistance.

When using portable generators at Seqwater workplaces, the user of the generator must understand the electrical safety requirements associated with the generator, the purpose for which it is being used and that adequate risk controls are implemented.

When connecting a portable generator to a facility (i.e. pump station, water treatment plant) via a 'plug and play' configuration, the following must be considered:

- an interlock system must be installed to prevent incorrect connections being made
- a detailed work instruction and JSEA/SWMS have been developed to detail the connection process
- workers must be trained and competent in performing the connection activities and in the operation of the portable generator.

Any connection of a portable generator to an Seqwater facility where the connection is made directly into a switchboard using cable tails or lugs must only be undertaken by an electrical worker.

No other appliances shall be connected to a portable generator whilst it is connected to an Seqwater facility.

When identifying appropriate risk controls for the use of portable generators at Seqwater workplaces, the following must be considered:

- Where a generator is directly supplying a site switchboard, all sub-mains and final sub-circuits shall be protected by an RCD and earth electrode.
- Isolated winding generators shall only be used on construction or demolition sites with the following conditions:
 - Each winding shall supply not more than one item of Class 1 (earthed conductive parts) electrical equipment
 - One or more items of Class II (double insulated) electrical equipment may be connected to an isolated winding generator
 - Portable RCDs shall not be the source of electrical protection for workers as they will not operate as there is no neutral to earth connection upstream of the RCD
 - Two pole switching must be implemented as both conductors are considered to be live
 - The connection of the generating set bonding system to the general mass of earth through an earth electrode is not required or recommended as there is double insulation from the live parts to the frame.
- Generators providing electrical supply via permanently connected RCDs with maximum rated residual current of 30 mA, operating in all live (active and neutral) conductors, may be used to supply multiple items of equipment under the following conditions:
 - The RCD protected system allows the use of multiple Class I (metal frame with a bonding conductor) items as the first fault causes a residual current device to trip
 - The connection of the generating set bonding system to the general mass of earth through an earth electrode is not required or recommended.

6.5.3 Cathodic protection systems

All cathodic protection systems installed and operated at Seqwater workplaces must comply with the requirements of AS 2832:3:2005 Cathodic Protection of Metals – Immersed Structures and AS 2832.4:2006 Cathodic Protection of Metals – Internal Surfaces.

Additional requirements for the design, installation and operation of cathodic protection systems are defined in the Work Health and Safety Regulation 2013 (Qld) and the Safe Work with Plant Procedure (PRO-00867).

6.5.4 Asbestos or Asbestos Containing Material

Workers are prohibited from undertaking work on a switchboard or any other electrical equipment if the work has the potential to disturb asbestos or Asbestos Containing Material (ACM). Refer to the Asbestos Management Procedure (PRO-01752) for further information.

6.6 Electrical exclusion zones

When performing work, no person, plant or thing can come within an exclusion zone. A person includes any article of clothing worn by the person, and any conductive object the person is handling.

Electrical exclusion zones are minimum safe distances that must be maintained from live electrical parts. The exclusion zones apply to people, operating plant and vehicles, and extend in all directions, not just sideways. The exclusion zone distance is dependent on the following:

- the type of electric part (e.g. exposed part or overhead) – the voltage present (e.g. 240V or 33kV)
- the qualification / competency of the worker
- the type of activity (e.g. operating plant or vehicle).

Supervisors at Seqwater workplaces must identify an electrical exclusion zone and communicate this exclusion zone to all workers.

6.6.1 Exclusion zones for electrical parts

When working near energised electrical parts (not including working near overhead electrical lines), the risk management procedures in part 6.2 of this procedure should be followed.

If there is a safety risk associated with working near energised electrical parts a written risk assessment should then be made to help determine the risk level and decide on appropriate risk control measures. Risks include:

- electric shock if exposed energised parts are touched;
- explosion, for example if a metal tool is dropped onto bus bars causing a short circuit;
- exposed high-temperature parts causing burns to bare skin;
- electrical fires induced, for example, by allowing moisture or dust to enter electrical equipment;
- The following factors should be taken into account in assessing risks:
 - type of work carried out and tools or equipment used;
 - proximity of the work to energised parts;
 - the types of tools and equipment used in the work, for example the conductive properties of tools;
 - environmental conditions such as confined space, wet surfaces or unfavourable weather;
 - assessing the need to repair equipment while it remains energised, for example cleaning a low voltage switch room; and
 - work that may impose additional risks, for example welding or grinding that could damage adjacent electrical lines or equipment.

6.6.2 Overhead electrical lines exclusion zones

Exclusion zones associated with overhead electrical lines are listed in Schedule 2 of the *Electrical Safety Regulation 2013* (Qld). This includes the following exclusion zones set for an untrained person operating plant in proximity to overhead uninsulated (exposed) electric lines:

Voltage (nominal phase voltage of uninsulated electric line)	Minimum exclusion zone for plant
Voltage up to 132kV	3m
Above 132kV up to 330kV	6m
Above 330kV up to 500kV	8m

Exclusion zones set for an untrained person may be reduced subject to additional controls, including specific training and authorisation of plant operators and prior consultation with the relevant electrical supply authority. Refer to the Electrical safety code of practice 2010 – Working near overhead and underground electric lines (Qld) for further detail.

Work within an electrical exclusion must be avoided so far as it is reasonably practicable. Where work within an electrical exclusion zone set for an untrained person cannot be avoided, a risk assessment must be conducted, adequate control measures must be implemented to manage the risks and required approvals obtained as outlined below.

Restrictions for working near overhead electric lines

Seqwater employees are prohibited from undertaking work on overhead electrical lines. Work on overhead electrical lines is performed by suitably qualified contractors.

The following restrictions apply to working near overhead electrical lines:

- No person or item of plant on an Seqwater controlled workplace, is to enter the electrical exclusion zone for overhead electric lines set for an untrained person, unless:
 - there is evidence of consultation with the relevant electrical supply authority; and
 - the worker is an 'Authorised Person' or an 'Instructed Person'; and
 - a WHSMS Deviation Approval Form (FRM-00795) has been endorsed by the Manager, WHS and approved by the relevant General Manager.
- For any site controlled by a Principal Contractor (other than Seqwater), work must not be conducted within an electrical exclusion zone set for an untrained person without prior evidence of consultation with the owner of the electrical asset and prior written permission being received from a senior officer of the Principal Contractor. The Manager, WHS and the relevant General Manager must be notified prior to the commencement of the work within the exclusion zone.
- A trained safety observer/spotter (Refer to Appendix B for safety observer requirements) must be used when there is a risk of workers or item of plant entering an exclusion zone for overhead electric lines. Where a safety observer is used, workers must comply with the following conditions:
 - the safety observer should not be required to carry out any other duty during the time they are carrying out duties as a safety observer
 - be competent in observing, warning and communicating effectively (this may mean the use of electronic communications e.g. a two-way radio)
 - be aware of the electrical hazards and risks associated with the work
 - be able to warn about the approach to electrical apparatus
 - be able to stop the work if necessary
 - not be expected to observe more than one crane or plant at a time

- not be located in an elevated work platform
- the safety observer must mark the border of the exclusion zone with suitable markers e.g. red warning tapes or paint, which can easily be viewed by the machine operator and any other workers involved in the work.

Risk assessment

A risk assessment must be complete for all work occurring near overhead electric lines. This should consider:

- the location, height, arrangement and visibility of overhead electric lines and supporting structures like poles, towers and stay wires
- the voltage of electric lines and exposed energised parts and whether electric lines and parts are insulated or bare
- possible sway or sag of the electric line caused by wind or temperature changes
- weather conditions like storm activity, heavy rain or lightning
- site conditions including:
 - prevailing or unexpected winds their strength and direction
 - the terrain and possibility of unexpected ground surface movement under plant
 - vehicular traffic, pedestrians or livestock that could interfere with the work.
- the type of plant and machinery required including:
 - their design envelope, inherent stability and that of a suspended load
 - their dimensions and their operating characteristics, ease of manoeuvrability and conductivity if they are earthed
 - the minimum clearance distances from the closest part of the plant to electric lines
 - the possibility they may become energised by proximity to high voltage lines.
- nature, size and shape of loads to be moved include:
 - load stability, dimensions and surface area facing the wind
 - whether loads are conductive - all materials should be treated as such unless a competent person can confirm otherwise
 - non-conductive material may become conductive when in contact with high voltage material
 - how loads are secured and if any part of the load may move and enter within an unsafe distance
 - whether loads being carried above electric lines may accidentally fall onto them e.g. when moving a swimming pool from the street over energised electric lines into the yard of a home
- the type of work activities required and the frequency of the work tasks
- qualifications, competency, skill and experience of the people doing the work
- setting up and packing up processes
- work practices and procedures.

Risk controls

The risk of working near overhead electrical lines must be eliminated so far as is reasonably practicable. This may be done by contacting the relevant electricity supply authority to request that the powerlines be de-energised or re-routed away from the work area. Verification of any de-energisation must be demonstrated and confirmation received in writing from the relevant electricity supply authority before commencing work.

Where elimination of the risk is not reasonably practicable, the risk must be minimised so far as is reasonably practicable. In most cases a combination of controls at multiple levels of the hierarchy of control will be required to reduce the risk to as low as reasonably practicable.

If further guidance is required to select appropriate risk controls, consultation should occur with the relevant electricity supply authority before commencement of work.

The following are potential controls when working near overhead electrical lines:

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Hierarchy of control

In order of preference if elimination of the hazard is not practicable

Substitution controls:

- Using alternative plant which cannot enter an exclusion zone
- Using non-conductive tools designed to reduce the possibility of direct contact with the overhead electric line
- Using ultrasonic measuring devices instead of the mechanical types for measuring heights of overhead lines.

Isolation Controls:

- Erecting a physical barrier, made from non-conductive material, to prevent a person, anything held by a person, or any part of an item of plant or equipment entering an exclusion zone.

Engineering Controls:

- Limiting movement of plant with mechanical stops
- Fitting plant with programmable zone limiting devices
- Mechanically limiting slew speed of a crane to slow using electrically insulated plant and equipment
- Fitting vehicles/plant with earthing devices as required by legislation or the electricity supply authority.

Administrative Controls:

- Fitting proximity sensors and a warning device to plant to alert operators when they are about to enter exclusion zones
- Making hazard more visible by using warning signs to indicate the location of overhead electric lines and defined work areas
- Arranging for the electricity supply authority to fit overhead lines with approved visual indicators such as tiger tails
- Managing and supervising the work to confirm safe work practices, including compliance with JSEA/SWMS and exclusion zones.

Personal Protective Equipment (PPE):

- Insulating gloves
- Electrical non-conductive safety footwear
- Safety helmets
- Standing on an insulating mat
- Minimum category 1 PPE.

6.7 Working near underground electrical services

Where electrical work requires excavation and trenching to access the electrical service, or there is a requirement to drive an object into the ground, the requirements of the WHS Excavation, Trenching and Penetrations Procedure (PRO-00302) must be complied with.

6.8 Electrical testing and tagging

Users of electrical equipment are responsible for confirming the equipment is tested and tagged before the equipment is used. Any equipment that has not been tested or is out of test date must not be used until it has been successfully tested and tagged.

All electrical equipment and RCD's must be tested and tagged. This includes the operational testing (manual) and the performance testing (electrical) of all RCDs.

Specific requirements for inspection, testing and tagging of electrical equipment at Seqwater workplaces are included in Appendix C of this procedure.

The inspection, test and tag process shall be undertaken in accordance with the requirements of AS/NZS 3760 *In-service Safety Inspection and Testing of Electrical Equipment*.

The following tag colours are used at Seqwater:

- January – June: White Tag
- July – December: Orange Tag
- Annual: Black Tag
- Five Years: Burgundy Tag.

In accordance with AS/NZS 3760: *In-service safety inspection and testing of electrical equipment*, requirements for testing and tagging do not apply to electrical equipment (such as suspended light fittings), installed at a height of 2.5m or greater above the ground, floor or platform, where there is not a reasonable chance of a person touching the equipment and, at the same time, coming into contact with earth or a conducting medium which may be in electrical contact with earth or through which a circuit may be completed to earth.

In addition, the standard allows that, any new equipment procured by Seqwater's ICT Team may initially be tagged by an ICT Team member with a burgundy tag after the equipment has been inspected to check it is not damaged. This tag must include:

- wording "new to service"
- date of entry to service
- date when next test is due
- statement "this appliance has not been tested in accordance with AS/NZS 3760".

The ICT team has trained and authorised people to test ICT related equipment in the offices only and any other equipment will be deferred to an electrical worker. ICT equipment will require testing and tagging 5 years after the date of entry to service.

A register of all electrical equipment shall be maintained for each workplace. This must record all operational testing (manual) and performance testing (electrical) of all electrical equipment and fixed RCDs.

7 Live low voltage electrical work

This section defines the requirements for competent persons to perform live low voltage electrical work on electrical installations or equipment at Seqwater workplaces. The requirements in this section are in addition to the general electrical safety requirements outlined in Sections 5 and 6.

Live electrical work must not be carried out unless:

- it is necessary in the interests of health and safety that the electrical work is carried out on the equipment while the equipment is energised
- it is necessary that the electrical equipment to be worked on is energised in order for the work to be carried out properly
- to perform fault finding, testing and commissioning while maintaining the proper performance of the electrical system
- when no other reasonable alternative is possible (for example to allow the ongoing electrical supply of critical services).

Where live electrical work is carried out, it must be performed by a competent person:

- who has tools, testing equipment and PPE that are suitable for the work and have been properly tested and maintained in good working order
- in accordance with a safe work method statement and Energised Work Permit (FRM-00415) prepared for the work
- with a safety observer (except where the work consists only of testing and a risk assessment indicates that the risks associated with the proposed work are no greater than a medium risk rating).

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7.1 Preparation of workers, PPE and test equipment

In addition to the general electrical safety requirements, the following actions must be undertaken prior to performing live electrical fault finding:

- a competent person must undertake a risk assessment prior to undertaking any live electrical work. The results of the risk assessment and the identified risk controls must be documented in a JSEA/SWMS specific to the work activity being undertaken, which must:
 - identify the electrical work;
 - specify hazards associated with the electrical work and risks associated with those hazards;
 - describe the measures to be implemented to control the risks; and
 - describe how the measures to be implemented to control the risks are to be implemented, monitored and reviewed.
- electrical workers must remove any metal rings, bracelets, watches that may have the potential to come in contact with an electrical part;
- where a risk assessment indicates that the live electrical work should be undertaken by two competent persons, the competent person performing the live electrical fault-finding work must confirm that an electrical safety observer is in place for the duration of the live electrical fault-finding work;
- the competent person performing the live electrical fault-finding work must place an in-test 1000V low voltage rescue kit adjacent to the area they will be working and that all parts of the kit are checked prior to work commencing;
- where a risk assessment indicates that the live electrical work should be undertaken by two competent persons, the competent person undertaking the live electrical work must instruct the electrical safety observer where the point of isolation is located and the method of operation of the switch. The tag from the rescue kit must be attached to this point of isolation before work commences;
- an electrical safety mat shall be placed on the ground where the competent person shall be standing;
- barriers must be erected to prevent unauthorised workers from entering the area where live electrical work is being undertaken;
- the minimum requirement for PPE when performing live electrical fault-finding work are:
 - approved full length flame resistant clothing (Cat 1 PPE for low voltage electrical work)
 - safety glasses or face-shield (determined by risk assessment)
 - electrical worker gloves (cloth inner, class 'OO' rubber, leather outer)
 - low voltage rescue kit
 - electrical safety mat
 - electrical non-conductive safety footwear.

A guide to the selection of PPE suitable for the type of work near operating currents is provided in Appendix F (an extract from *AS/NZS 4836 Safe working on or near low voltage electrical installations*) of this procedure.

All electrical test equipment used when performing live electrical fault finding must be insulated and rated for the voltages that will be applied to the tool e.g. electrical test equipment with voltage indicators and fuse protection to prevent short circuits.

When selecting electrical test equipment for use in live electrical fault finding, the following must be considered:

- the device's function, range and class of accuracy shall be appropriate to both the work being undertaken and the conditions in which the work is being undertaken
- the combination of leads and instruments used should be capable of withstanding the impulse voltages and fault current levels that could be experienced at the location
- the rating for test instruments and test probes used on 415/240V mains voltage equipment should be Installation Category III (3) or IV (4)

- Type A probes (leads) should be used for measuring supply voltages (415/240 V AC). Therefore, workers who perform live testing or fault finding in switchboards should use at least Category III (3) devices with Type A probes.

When selecting PPE and test equipment during the risk management process, consideration will need to be given to current industry practice as well as any advancement in technology that will protect workers from injury.

7.2 Performing live electrical fault-finding work

An Energised Work Permit (FRM-00415) must be completed before any live electrical fault finding work is performed. This is not required when testing for dead.

Any electrical parts not required to be energised during the live electrical fault-finding work must be isolated prior to commencing the work. All electrical isolations must be undertaken in accordance with the Energy Tag and Lockout Procedure (PRO-00014). If isolation is unable to be performed, any live parts not required for work shall be isolated by means of a non-conductive barrier or insulation material.

No electrical part shall come into contact with any part of the electrical worker unless it is tested and proven isolated with appropriate test equipment that has been verified as working before and after the testing of the electrical part.

7.3 Completing live electrical fault-finding work

After work is completed, all persons, tools and equipment shall be removed from the work area.

Any equipment not able to be put back into service shall be isolated from the supply by means of tags and locks or removal of the cable from the supply in accordance with the Energy Tag and Lockout Procedure (PRO-00014). All cables not connected at the completion of work shall be terminated with appropriate connectors. No bare conductors shall be present when work is complete.

After work is complete, all covers and doors shall be placed securely in position, with switchboard external doors locked or bolted.

Equipment placed back into service shall be checked it is functioning correctly.

8 High Voltage isolation and access

This section covers the use of the high voltage switching sheets, access permits and test permits to provide the safety of personnel and equipment when accessing, testing and isolating High Voltage (HV) equipment at Seqwater workplaces. The general electrical safety requirements of this procedure must be complied with prior to undertaking any HV isolation and access work. All electrical isolations must be planned and performed in accordance with the Energy Tag and Lockout Procedure (PRO-00014).

The processes defined in this section apply to the control of access, isolation, earthing, testing and work on HV electrical equipment at all Seqwater workplaces. A flowchart defining the process for undertaking HV access and isolation is included in Appendix D of this procedure.

8.1 High Voltage access requirements

Specific requirements for HV access and inspections at Seqwater workplaces are defined in Appendix E of this document.

Seqwater employees are prohibited from undertaking Live High Voltage Electrical Work. Live High Voltage Electrical Work will be performed by suitably qualified contractors.

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This procedure, including the site based high voltage installation line diagrams and manuals constitute Seqwater's HV Installation Safety Management Plan. Refer to the Electrical safety code of practice 2013 – Managing electrical risks in the workplace (Qld) for further information.

8.1.1 PPE requirements

All persons working on or in the vicinity of electrical apparatus subject to a HV Permit shall be clothed in an appropriate manner for protection against possible exposure to electrical shock, electrical flash or other injuries.

Any rings, metal watches, body piercing, bracelets or jewellery shall be removed prior to operating any HV equipment.

The minimum PPE requirements for undertaking HV work are:

- approved full length flame resistant clothing (Cat 4 PPE for high voltage electrical work)
- approved footwear (safety boots).

In addition, when working with specific HV apparatus (i.e. switching, racking circuit breakers, applying and removing earths or using voltage test equipment) workers must wear the following PPE:

- safety helmet with incorporated face shield or a full-face shield
- in-test approved Class O insulating gloves suitable for the voltages present in the installation.

Additional tools and PPE may be required dependant on the risks identified in the risk assessment undertaken for the task.

8.1.2 HV exclusion zones

Untrained persons shall not encroach inside the HV exclusion zone. Specifications of HV exclusion zones are defined in Schedule 2 of the *Electrical Safety Regulation 2013* (Qld) or the Electrical safety code of practice 2013 – Managing electrical risks in the workplace (Qld). Refer to the definitions for HV exclusion zones to 33 KV, HV test equipment.

All HV test equipment (HV voltage tester or Modiewark) used to confirm the absence of voltage potential on HV conductors must be tested (in date and free from damage) and confirmed to be operational immediately prior to and immediately after testing the HV conductor required to be earthed. Operational testing of HV test equipment must be conducted using the manufacturer's instructions specific to the test equipment being used. All required PPE must be worn while using HV test equipment.

The HV conductor being tested to prove de-energised by the HV test equipment must be treated as live until the test proves that the HV conductor is de-energised and the HV test equipment has been proven to be operational prior to and immediately after testing the HV conductor.

If the HV test equipment fails either of the operational check tests, then the HV conductor being tested shall be treated as live.

HV test equipment, including HV testers e.g. Modiewark, shall be tested by an approved test facility every six months. Testing shall include insulation testing and calibration. Test sticks shall only be used to test for voltages for which the test stick was designed.

All HV test equipment shall be tested in accordance with the *Electrical Safety Regulation 2013* (Qld) and the Electrical safety code of practice 2013 – Managing electrical risks in the workplace (Qld).

All HV test equipment shall be labelled after being tested. The label shall include the name of the organisation that conducted the test and the next due date for testing. Records of test of HV testing equipment shall be kept for a period of at least five years.

Portable earthing devices shall be tested on a six-monthly basis to confirm they are in good condition and capable of withstanding the fault currents that may be expected. A tag shall be placed on the earth to indicate the next due date for testing.

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8.1.3 Second worker

A minimum of two workers must be present when undertaking HV isolation and earthing operations. As a minimum, one of the workers must be qualified as a Switching Operator and the second worker must be qualified as a Switching Assistant. It is preferable that both workers involved in HV operations be qualified as Switching Operators.

Where after hours work is required, a Switching Coordinator may perform the role of Switching Coordinator and Switching Operator Assistant. Under no circumstance can a Switching Coordinator also perform the role of Switching Operator.

8.1.4 HV accreditation and authorisation

Seqwater must confirm that all workers required to perform work activities involving HV electricity are assessed as competent before providing authorisation to undertake any HV work. Only competent persons who have attained the competency required to perform their role are permitted to work on high-voltage electrical equipment. The following HV competencies apply to HV work.

- Operate Primary HV Switchgear
- Develop HV Switching Programs
- Co-ordinate HV Switching Programs
- Operate HV Secondary Switchgear.

The duration of validity for all HV authorisations is:

- Switching Coordinator, two years
- Switching Operator, two years
- Switching Assistant, two years.

Seqwater must reassess the competence of workers to perform HV work before renewing their HV authorisation. The High Voltage Authorisation Checklist (FRM-00629) must be used to reassess worker authorisations.

After 2 years from the initial accreditation, the HV authorised worker must undergo formal reaccreditation/refreshers training from a recognised training provider to a national competency level.

Competency based training in local area systems must be provided for new workers before they participate in any HV work and will be recorded in Our Learning.

8.2 Preparation for HV work

Prior to any HV Switching Sheets (FRM-00438) being prepared, the worker/s requiring access to the equipment shall discuss the task requirements with the Switching Coordinator and Operator to confirm that the scope of work is understood and all safety and operational requirements have been met. For example:

- Can the switching be done remotely, or will electrical workers have to manually perform the switching?
- Are confined spaces being entered?
- Has required PPE and other equipment been tested recently to statutory requirements?
- What is the planned outage for the equipment?
- What test certificates are required to be issued for the completed work?
- Have necessary approvals, as documented in section 5.7.2, been obtained if work is required within an overhead electrical line electrical exclusion zone?
- Are workers and/or service providers competent for the task and have appropriate work licences and approvals to come into an electrical part exclusion zone?
- Are there any contingencies in place should unforeseen circumstances occur?
- Has the person in control of the electrical equipment been consulted?

Once these issues have been addressed, preparation of HV Switching Sheets and HV Access Permit (FRM-00439) may proceed. The HV Switching Sheet is a step by step isolation instruction which interfaces with the

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Isolation Instruction in the Energy Tag and Lockout Procedure (PRO-00014) which also must be strictly followed.

The Access Permit Recipient must check that workers not involved in the HV work activity defined on the Access Permit do not enter the HV work area. Signs, barriers, caution tape or other visual warning devices may be used to restrict access.

Access to HV switch room access must be restricted. Only authorised workers approved and accompanied by a Switching Operator may enter a HV switch room.

Prior to undertaking any HV work that involves applying a potentially fatal test current, the HV Test Permit (FRM-00949) Recipient must check that barriers, tapes, signs and/or visual warning devices are in place to restrict access to the HV work area.

The process for securing access to HV equipment is defined in the flowchart included in Appendix D of this procedure.

The requirements for HV isolation and access are defined in tables 1 and 2 of Appendix E of this procedure.

8.2.1 Determine the requirement for high voltage access

The Switching Operator must determine the extent of work to be performed in the vicinity of HV lines or apparatus. Where work activities impinge on HV exclusion zones, HV isolations will be required. The Switching Operator must confirm the amount of isolation required to provide sufficient clearance from the HV lines and apparatus to enable safe access. This includes earthing if untrained persons could encroach on the exclusion zone.

8.2.2 Select and prepare the appropriate Switching Sheet

The Switching Operator must review all pre-drafted Switching Sheets to determine if the sheets provide HV isolation to meet the requirements of the work to be performed. In doing so the relevant High Voltage Single Line Diagrams must be reviewed.

If no pre-drafted Switching Sheet is available, the Switching Operator must complete a new Switching Sheet to provide the necessary isolation. As a minimum, a single line HV diagram (which is confirmed to be accurate) must be used to determine the most suitable isolation and earthing method. The process for preparing and undertaking the HV Switching sheet are define in the flowchart in Appendix D of this procedure.

8.2.3 Review and authorise the Switching Sheet

The Switching Coordinator must review the Switching Sheet to confirm it provides sufficient isolation for the Work Group to safely access the HV work area.

The Switching Coordinator must issue the Switching Sheet with a unique number, prefixed by the site identification number to the Switching Operator (e.g. TWB xx/xx/13 PU03 – West Bank Water Treatment Plant Date Equipment Number TWB101212PU03).

The unique number and issue date must be recorded on the Switching Sheet log. The Switching Operator and Switching Coordinator cannot perform the same role on each Switching Sheet.

8.2.4 Positive identification of equipment to be isolated

Prior to forward switching and isolation of HV equipment, the Switching Operator and Switching Assistant must positively identify the HV equipment being accessed.

The identification of equipment must be undertaken by visually sighting the equipment being isolated and checking that any attached identification labels match the equipment and the items on the Switching Sheet and the High Voltage Single Line Diagram.

Any inconsistencies with equipment identification must be referred to the Switching Coordinator for clarification prior to commencement of switching. Any changes resulting from the identified inconsistency must be updated on the Switching Sheet and noted on the HV Single Line Diagram and a hazard notification should be raised.

8.2.5 Approve commencement of forward switching

The Switching Coordinator must approve the commencement of the forward switching in accordance with the Switching Sheet.

Consideration of the security of supply to the remainder of the workplace and to any other switching that may already have been performed on the high voltage system, must be considered before any forward switching is undertaken.

8.3 High Voltage Isolation and Earthing

8.3.1 Isolation

The Switching Operator must carry out forward switching in accordance with and in the order indicated in the Switching Sheet. All switching must be performed in the presence of a Switching Assistant.

The Switching Operator will carry out all switching operations whilst the Switching Assistant reads aloud the items on the Switching Sheet. The Switching Assistant observes the Switch Operator carrying out the switching operations to confirm the apparatus is operated in the correct and approved manner.

Any inconsistencies with switching order or logic must be referred to the Switching Coordinator for clarification. Do Not Operate Isolation tags must be attached to the points of isolation and earthing points.

Operation and/or actions on the Switching Sheet must be checked off as they are completed with the time and date noted and initialled by the Switching Assistant.

While it is preferable to have the same Switching Operator carry out the forward and reverse switching, this may not be possible due to worker availability and the duration of the HV access. Where the Switching Operator who performed the forward isolations is not available, another similarly qualified Switching Operator may perform the reverse switching when required.

The Work Group must install working earths where there is a need for additional earthing on the HV apparatus. These working earths must be recorded on the permit when applied and also recorded when they are removed.

Working earths are applied and removed under the control of the HV Access Permit or HV Test Permit Recipient.

8.3.2 Confirm isolations

The Switching Operator must confirm that an adequate visible break exists between the high voltage supply and the apparatus requiring access, so that lightning or switching surges do not cross the isolation point.

All isolation points must be identified by a Do Not Operate isolation tag and be locked in the de-energised or safe position in accordance with the Energy Tag and Lockout Procedure (PRO-00014).

8.3.3 Earthing

The purpose of earthing HV electrical equipment is to:

- enable protection equipment to operate and to limit the rise in potential difference at the HV work area, in the event that supply is inadvertently restored
- safely discharge induced or residual voltage.

Prior to undertaking HV operator earthing, the Switching Operator must complete a Switching Sheet for the work. The following should be used as a guide to undertake HV operator earthing activities:

- HV operator earthing shall only be applied as part of an approved switching sheet
- HV working earths shall be applied or removed under the control of a HV Access Permit or the HV Test Permit
- no other reason is acceptable to carry out HV earthing on unearthed equipment.

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Where possible or practicable (providing this does not introduce a hazardous situation) the Switching Operator must prove that the electrical apparatus is de-energised at the proposed point of application of earths.

All phases must be proved de-energised using an approved voltage detector before earths are applied. Correct operation of the voltage detector must be verified immediately before and immediately after proving de-energised.

Where the design of an electrical apparatus does not allow the testing to prove de-energised, an electrical apparatus with fault make earthing capability must be used after first checking other voltage or mechanical indicating devices that the electrical apparatus is de-energised.

8.3.4 Identification of apparatus to be earthed

A HV Single Line Diagram shall be available for all HV installations at Seqwater workplaces.

The apparatus to be earthed must be positively identified by the Switching Operator using the instructions on the switching sheet and the HV Single Line Diagram. Where required, additional sources of information (e.g. experienced electrical workers, site piping and instrument diagrams, etc.), may be required to positively identify the apparatus to be earthed.

8.3.5 Operator earths

The Switching Operator must connect earths to HV conductors at location/s that will enable the work area to be de-energised in the shortest possible time in the event of inadvertent re-energisation.

Operator earths must be applied to confirm electrical apparatus in the HV work area are earthed prior to the issue of an Access/Test Permit.

The Switching Operator must check that an operator earth is clearly identified by the attachment of a Do Not Operate Board (DNOB)/Isolation Tag in a prominent position.

For a set of three-phase portable earths (trifurcated earth), one DNOB/ Isolation Tag must be attached at the point of common connection of the three phases of the portable earths to the earth tail.

For single-phase earths, a DNOB /Isolation Tag shall be attached in a prominent position to each phase.

The following operator earths may be used (in order of preference):

- an earthing switch
- a portable earth connected to a permanent earthing point
- a portable earth connected to an earth electrode installed in accordance with Seqwater procedures.

The earthing method used must be adequate to manage the fault current at the location and must enable protection to operate.

The placement or removal of an operator earth must only be carried out if one of the following occurs:

- under the direction of a Switching Sheet with the approval of a Switching Coordinator
- under the direction of a Recipient of a HV Test Permit
- under the direction of a Recipient of a HV Access Permit with the approval of a Switching Coordinator in accordance with these procedures.

Operator earths applied under a HV Access Permit must remain in place as required by the HV Access Permit. If removal for testing is required, the HV Access Permit must be surrendered and a Test Permit issued in order for earths to be lifted. The operator earths must be replaced as soon as possible on the completion of the work or testing involving non-lethal current.

Where possible, operator earths associated with an Access Permit or Test Permit must be restored before an Access Permit or Test Permit is surrendered.

When restoration of operator earths is not practical, the Recipient must obtain approval from the Switching Coordinator to leave nominated operator earths removed.

On approval, the Recipient shall record details of all operator earths not replaced in the abnormalities section of the Access Permit or Test Permit.

If the location of operator earths changes or are to be changed during the course of work under an Access Permit or Test Permit, prior to operator earths being changed, all current relevant Access Permit or Test Permits must be surrendered and cancelled, and new Access Permit or Test Permits issued to reflect the new location/s of operator earths.

If using a circuit breaker in the closed position to earth electrical apparatus for the issue of an Access Permit or Test Permit, the circuit breaker must be made inoperable.

8.3.6 Working earths

Working earths are applied to limit the rise in potential difference in the HV work area and must only be applied to lines and apparatus within the isolation points listed on the Access Permit or Test Permit. The current-carrying capacity of a working earth shall be adequate to manage the fault current at the HV work area and must enable protection to operate.

The Access Permit Recipient must coordinate the placement and removal of working earths, only the Recipient or an individual of the Work Group under the direction of the Recipient may place or remove working earths.

The placement and removal of working earths must be recorded on the Access Permit or Test Permit in the working earth schedule.

All working earths associated with an Access Permit or Test Permit must, where practical, be removed before an Access Permit or Test Permit is surrendered.

When removal of all working earths is not practical (for example, they are required for the subsequent issue of a new Access Permit or Test Permit), the Recipient must obtain approval from the Switching Coordinator to leave the nominated working earths connected.

On approval, the Recipient must record details of all working earths not removed in the abnormalities section of the Access Permit or Test Permit.

Where a Switching Operator identifies working earths are still applied in a work area and the Recipient is not on site, the Switching Operator must make all reasonable efforts to contact the Permit Recipient.

If the Recipient is not contactable, the Switching Operator must investigate the situation to confirm that no worker will be endangered by the removal of the working earths and request approval from the Switching Coordinator to remove these earths.

8.3.7 Check condition of earthing leads / apparatus

The Switching Operator must check the condition of any earthing equipment and confirm it is suitable for the purpose for which it is being used, is in good condition and has been tested to confirm it is capable of carrying the prospective fault currents.

8.3.8 Application of earths

Earths shall be applied immediately after proving that the electrical apparatus is de-energised. All de-energised phases shall be earthed. Tail(s) of portable earths shall be connected to a permanent earthing point before connection to the electrical apparatus.

Where a permanent earthing point is not available, the tail(s) of portable earths may be connected to an approved earth electrode driven into the ground. The configuration of an earth electrode for HV earthing activities must be designed and approved by an appropriately qualified and experienced electrical engineer. Where an approved earth electrode is required to perform HV work, consideration shall be given to installing a permanent earthing point at that location for future HV work.

When undertaking HV work on overhead lines, earths must be applied as close as practicable to any workers required to work on the isolated system. This is to provide a line of sight, where possible, for the workers to the earths.

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Where an earth switch is available to use as an earth, it is preferable to close the earth switch prior to applying or removing portable earths.

Where a set of single-phase portable earths is installed at the work area, all phases of the portable earths shall be connected individually to a common earthing point.

HV electrical apparatus must not be earthed through fuses or circuit breakers that are designed to open/trip in the event of inadvertent energisation.

HV earthing through a circuit breaker is permissible prior to being issued with an Access Permit or Test Permit where specifically designed circuit breakers are installed. Where earthing through a circuit breaker is performed, appropriate risk control measures (i.e. energy tag and lock out) must be put in place to prevent the circuit breaker being operated.

Earths must be in place on electrical apparatus prior to and during the placement and removal of test leads. Earths must be applied with a positive action (i.e. there should be no hesitation when applying the earths to the apparatus).

8.3.9 Attach earth to substation earth grid

The Switching Operator must connect the earth tail to an established earth prior to connection to the electrical apparatus.

When disconnecting, the Switching Operator must disconnect the tail from the electrical apparatus before the tail is disconnected from the earth. Test to prove dead.

The Switching Operator must use approved HV test equipment such as Modiewark or HV voltage tester to test the electrical apparatus to which the earth will be attached. The HV test equipment must be proved operational immediately prior to and immediately after testing the conductors.

8.4 High Voltage access

The Switching Operator must issue the Access Permit or Test Permit to the Recipient after explaining the extent of isolation, any nearby live apparatus and the location of operator earths.

A Test Permit can only be issued once the current Access Permit is surrendered. If, after the Test Permit is surrendered, access to high voltage parts is required, another Access Permit must be issued.

Each Access Permit or Test Permit must be issued to a Recipient who must check that all members of the work group, who will approach the electrical apparatus, sign onto the Access Permit or Test Permit. If there is insufficient room for all members of the work group to sign onto the Access Permit or Test Permit, members may sign onto the continuation sheet providing the continuation sheet and number is noted on the Access Permit or Test Permit.

Before signing on to the Access Permit or Test Permit, all members of the work group must be:

- aware of their role in the work and the tools and PPE required
- familiar with the apparatus covered by the HV Access Permit or Test Permit
- aware of all isolation and earthing points
- aware of all adjacent live apparatus
- aware of emergency procedures.

Any worker involved in the issue or receipt of an Access Permit or Test Permit who is not satisfied with the conditions defined in the permit, may apply to the Switching Coordinator to have additional precautions implemented, either before the Access Permit or Test Permit is issued or during the work.

The Access Permit or Test Permit is considered active once the Recipient and the work group have signed on to the permit.

After the issue of an Access Permit or Test Permit, additional workers may sign on to the Access Permit or Test Permit after they have received appropriate instructions regarding the work from the Recipient.

An issuer of an Access Permit (Switching Operator) can also be the Recipient of an Access Permit or Test Permit.

8.4.1 Workers permitted to sign on to Access Permit or Test Permit

The Recipient is responsible for ensuring that all workers signing on to an Access Permit or Test Permit are competent to perform their role in the work activity and will not pose a risk to themselves or any other members of the work group.

8.4.2 Rejection of a worker

A Switching Coordinator must recommend the exclusion from an Access Permit or Test Permit any worker who, at any time during the work activity, is considered unsafe as a Recipient or member of a work group.

Any instances of unsafe work practices must be reported to the person in control of the electrical equipment.

8.4.3 Issuer also a Recipient

An issuer of an Access Permit (Switching Operator) or Test Permit (Switching Operator) can also be the Recipient of an Access Permit or Test Permit.

An Access Permit and Test Permit shall not be issued for the same electrical apparatus simultaneously.

8.4.4 Temporary cessation of work or absence of Recipients

Following a cessation of work (e.g. meal breaks) or when workers have been temporarily absent from the apparatus within the limits of approach, workers shall report to the Recipient to confirm the condition of the apparatus under the Access Permit or Test Permit and the condition of adjacent apparatus.

8.4.5 Transfer of Recipient

Transfer of a Recipient on an Access Permit is permitted provided the Switching Coordinator is notified and the full details of the incoming and outgoing Recipients are noted on the Access Permit. The work group must also be notified of the change of Recipients.

Transfer of a Recipient may occur only once during the life of an Access Permit. Test permits cannot be transferred.

8.4.6 Application of test voltages

Prior to the application of test voltages, a Test Permit shall be issued for the HV equipment under test. The following precautions must be taken to confirm the safety of workers and equipment:

- the area adjacent to where the test voltages are applied must be defined by warning tape or barriers
- workers in the vicinity of the testing area must be advised of the testing and a visual warning sign must be in place during application of test voltages
- safety observers must be positioned at locations to check that unauthorised workers do not enter the test area during the testing
- the test area must include all extents of the apparatus under test, e.g. both ends of a HV cable under test must be treated as a test area
- earthing (operator or working) must not be removed from equipment until all workers, other than those conducting the testing, have left the area
- no worker shall re-enter the test area unless for the purposes for of re-applying earths
- earths must not be re-applied until the equipment under test has been fully discharged and the application of earths has been approved by the worker in charge of the testing
- workers must be aware that test voltages may be present after the test equipment has been de-energised and that any test equipment that is not isolated can produce a lethal charge or current.

Note: Application of test voltages may result in capacitive charge currents being present after test voltages have stopped. In these cases, suitable capacitive discharge equipment must be used.

8.4.7 Carry out HV work

The HV Work Group must install working earths adjacent to the HV work area. These working earths must be recorded on the permit when applied and also recorded when they are removed.

Working earths are applied and removed under the control of the Permit Recipient.

8.4.8 High voltage access duration

Where HV access is required for a period longer than one day, the HV Access Permit may be left open for the duration of the required access. Under such circumstances, the Recipient and work group members must check the earthing and isolation at the start of each day's work to satisfy themselves that nothing has been changed and the isolation and earthing are still in place and the system is safe.

The Switching Coordinator must be informed that the HV Access work is continuing.

8.4.9 Signatories leaving facility

If any member of the work group who has signed onto an Access Permit or Test Permit leaves the facility for any reason, their replacement may assume their responsibilities.

This may only occur if the new member is of the same level of competence as the worker leaving and receives a detailed handover from the worker leaving the facility.

The new member must familiarise themselves with the permit, check all isolations and earth points and then sign onto the Access Permit or Test Permit.

8.4.10 Recipient failing to surrender an Access Permit or Test Permit

Where a Recipient who has received an Access Permit or Test Permit has left the worksite or cannot be located and the piece of equipment is required to be placed back into service, the following steps must be implemented and documented:

- All attempts must be made to contact Recipient to determine if the Access Permit or Test Permit is still current. If the Access Permit or Test Permit is not current, the Recipient must be directed to return to the workplace and surrender the Access Permit or Test Permit.
- Where a worker has received an Access Permit or Test Permit and is not available to surrender the Access Permit or Test Permit, the Switching Coordinator must advise the Recipient's Line Supervisor.
- The Switching Coordinator must satisfy themselves that the Recipient whose name is on the Access Permit or Test Permit is not available on site and/or every attempt to contact the Recipient has been made. If the Switching Coordinator personally investigates the high voltage isolation including the area where the Recipient was working and finds that no person is in danger or potential danger and no equipment is in an unsafe condition they will then contact the relevant level 3 manager. The Switching Coordinator shall also check that all Work Group members have signed off the Access Permit or Test Permit.
- The Switching Coordinator must explain the situation to the relevant level 3 manager and seek approval to surrender the Access Permit or Test Permit.
- If approval is given to surrender the Access Permit or Test Permit, the permit may then be surrendered. The circumstances relating to this must be recorded as a non-conformance and the Recipient's Line Supervisor must be advised as soon as possible. Any Access Permit or Test Permit and other documentation relating to the incident must be retained as evidence for further investigation.

Recipients who failed to surrender the Access Permit or Test Permits shall on returning to work be subject to disciplinary action as stated in section 5 of this procedure.

8.4.11 Surrender Access Permit or Test Permit

Before surrendering an Access Permit or Test Permit, the Recipient must confirm that all work group members that signed on to the Access Permit or Test Permit have signed off the permit.

Each member of the work group signs off the permit and acknowledges that they no longer have access to the HV apparatus and will now treat the apparatus as live.

The Recipient must also check all working earths have been removed and the area is clear of all tools and equipment. The Recipient must advise the Switching Operator that the permit has been surrendered, the condition of the apparatus that was being worked on and record any abnormalities on the Access Permit or Test Permit.

The Recipient of an Access Permit or Test Permit must be the last member of the Work Group to sign off the permit before the Access Permit or Test Permit is surrendered.

If, due to exceptional circumstances, it is not possible for a Work Group member who signed on to an Access Permit or Test Permit, to sign off the form, the Recipient must:

- confirm that the work group member is no longer at the facility or is incapacitated such that he/she is unable to sign off the Access Permit or Test Permit
- the work group member must be contacted and advised by telephone (if possible) by the Switching Coordinator that the Access Permit or Test Permit will be surrendered. If contact with the worker is not possible, they must be advised of surrender of the permit upon returning to the workplace.

After the above procedure has been followed, the Switching Coordinator may sign off in the work group member's absence. The Recipient must counter-sign as witness to the Switching Coordinator's signature.

If an Access Permit continuation sheet has been completed, the recipient must confirm that work group members who signed on to the continuation sheet have signed off the Access Permit or Test Permit.

8.4.12 Lost Access Permit or Test Permit

If any Access Permit or Test Permit is deemed to be lost or destroyed, the Recipient and the work group working under the Access Permit or Test Permit Recipient must be notified immediately. The Switching Operator must investigate the loss and must cancel the lost permit and issue a new permit.

The Recipient and work party working under the lost permit must be advised that a new permit will be issued. If the lost permit is recovered, it must be forwarded to the Switching Operator who will cancel the permit.

The loss of any Access Permit or Test Permits must be immediately reported to the Switching Coordinator.

8.5 Re-energisation of High Voltage equipment

The Switching Operator must obtain permission from the Switching Coordinator to commence the reverse switching in accordance with the Switching Sheet.

The Switching Operator must confirm that all earthing has been removed as detailed on the Switching Sheet and Access Permit or Test Permits. All pre-energisation tests must be checked to confirm they have been performed.

If a pre-prepared Standard Work Reverse Switching Sheet is not available, the Switching Operator must prepare reverse switching instructions and document them on a new HV Switching Sheet.

The new reverse switching instructions must be developed by consulting the site single line high voltage diagram and the previous forward Switching Sheet to confirm all operator earths previously applied for isolation are removed.

If a Reverse Switching Sheet is prepared after the surrender of the Access Permit or Test Permit, the Switching Coordinator must check the Reverse Switching Sheet for correct logic and to confirm it provides sufficient information to allow the correct restoration of the high voltage supply.

The Switching Operator must confirm that all necessary pre-energisation checks have been performed and passed. Results of testing must be noted and/or attached on the Access Permit or Test Permit as necessary.

For example, if HV motors, cables or switchgear has been maintained, a certification of test from the service provider must be issued stating the apparatus is safe to be returned to service prior to re-energisation.

The Switching Operator must also check the area where the work covered by the Access Permit or Test Permit was undertaken to visually determine that all workers, tools, equipment and working earths are clear of the work area and any covers are secured and in place.

The Switching Operator must carry out the reverse switching in accordance with the Switching Sheet.

Reverse switching must only be performed with a Switching Assistant.

The Switching Operator executes the switching operations while the Switching Assistant reads out the items on the Switching Sheet and checks that the Switching Operator carrying out the switching is operating the correct apparatus in an approved manner.

After completing the reverse switching, Switching Sheet and all permits are to be returned to the Switching Coordinator for filing. The Switching Coordinator will update the status log as required.

8.6 High Voltage records

The Switching Coordinator has the responsibility to file all completed Switching Sheets (FRM-00438), High Voltage Access Permits (FRM-00439) and High Voltage Test Permits (FRM-00949) after they are completed.

A copy of the Switching Sheets, Access Permits and Test Permits should also be scanned into CIS and stored with the associated work order where applicable.

8.6.1 Existing high voltage installation test results

On the reinstallation of HV apparatus the results of the electrical testing must be recorded on the work order for the work undertaken.

A Certificate of Test is to be completed on every work order involving high voltage electrical work.

8.6.2 New high voltage installation test results

On a new installation of HV apparatus, results of the testing completed must be recorded by attaching a copy of the Certificate of Compliance to the work order or project paperwork as per *Electrical Safety Regulation 2013* (Qld), Part 10 section 221 as shown below:

High voltage or hazardous area electrical installations are not to be connected to an electricity source without being inspected.

- A person must not connect or reconnect a high voltage electrical installation, or an electrical installation located in a hazardous area, to a source of electricity after electrical installation work or electric line work (the electrical work) has been performed on the electrical installation unless:
 - the electrical work has been inspected by an accredited auditor; and
 - the accredited auditor has confirmed that the electrical installation, to the extent it is affected by the electrical work, has been tested to confirm it is electrically safe and complies with the requirements of the wiring rules and any other standard applying under this regulation to the electrical installation.
- A person must not, at a particular place, connect a HV electrical installation, or an electrical installation located in a hazardous area, to a source of electricity for the first time at the place unless:
 - the electrical installation has been inspected by an accredited auditor; and
 - the accredited auditor has confirmed that the electrical installation has been tested to confirm it is electrically safe and complies with the requirements of the wiring rules and any other standard applying under this regulation to the electrical installation.
- This section applies, in addition to the other provisions in this division about the connection or reconnection of an electrical installation, to a source of electricity.

8.7 Emergency HV switching

An authorised worker may carry out emergency switching where personnel safety and equipment damage may be at risk.

Emergency switching shall generally be performed to isolate equipment without a written Switching Sheet. The Switching Coordinator must investigate the emergency switching and document the incident.

The Switching Coordinator must document the reasons for emergency switching and check all areas prior to further switching and/or restoration of supply.

In an emergency situation or for an urgent business need, such as a major flood event or major breakdown, where factors such as, but not limited to, fatigue management have to be addressed, a HV authorised worker from another region may be deemed authorised by the relevant Switching Coordinator for the duration of the event.

9 Training requirements

Training and induction will be provided in accordance with the Training and Competency Management Procedure (PRO-01574).

All training records will be stored in Our Learning, while certificates and copies of assessments will be kept in the REX Learning/Compliance folder for the individual.

9.1.1 Electrical workers

All electrical workers undertaking electrical work must be appropriately qualified and inducted and have undertaken the appropriate training to perform the required role.

The Department of Justice and Attorney General's Electrical Licensing Committee define the roles and responsibilities for electrical worker in Queensland.

The classes of electrical licences issued by Queensland's Electrical Safety Office are as follows:

- Electrical Mechanic Licence
- Electrical Linesperson Licence
- Electrical Fitter Licence
- Electrical Jointer Licence
- Restricted Electrical Work Licence
- Electrical work training permit.

Electrical licences (other than an electrical work training permit) are valid for a period of five years. Electrical work training permits are valid for 1 year.

Prior to renewal of an electrical licence, an electrical worker must undertake an assessment to confirm that they have the appropriate electrical knowledge and skills and that they are undertaking electrical work in a safe manner.

All workers trained as safety observers for the performance of live electrical work and Low Voltage Rescue (LVR), must be assessed as competent within the previous 12 months.

A safety observer/spotter that is being used for work in the vicinity of overhead power lines must have completed accredited training in overhead electrical awareness and emergency response that has been approved by the electrical supply authority (e.g. Energex).

9.1.2 Electrical engineers

All electrical engineers (refer definitions, Section 13) will hold university electrical engineering qualifications and undergo an assessment of competency using the Engineering Electrical Safety Competency module if their

employment requires the ability to perform electrical work under the *Electrical Safety Act 2002 (Qld)* and *Electrical Safety Regulation 2013 (Qld)*.

9.1.3 Cardio pulmonary resuscitation & low voltage rescue

All electrical workers and electrical engineers included on the Electrical Worker Register are required to achieve and maintain competency in Cardio Pulmonary Resuscitation (CPR) every 12 months.

All workers trained as safety observers for the performance of Low Voltage Rescue (LVR) are required to achieve and maintain competency in Cardio Pulmonary Resuscitation (CPR) every 12 months.

Electrical workers may require additional training to perform specialised rescue procedures associated with the type of work in which they are engaged e.g. rescue from a pole top, rescue from a confined space.

9.1.4 High voltage isolation and access training

Seqwater is responsible for ensuring that all workers performing HV authorised roles receive the required training and are assessed as competent to perform the role before authorisation or re-authorisation is provided. Seqwater must maintain a register of all authorised workers including details of any restrictions.

An authorised worker can be one of the following:

- Switching Coordinator
- Switching Operator
- Switching Operator's Assistant
- HV Permit Recipient.

Authorisation to perform a role may be restricted according to one or more of the following:

- voltage level
- location
- type of electrical work
- any other factor, as determined by Seqwater.

Training and authorisation to undertake an authorised role at an Seqwater workplace is valid for a period of two years. A breach of legislation or Seqwater electrical procedures may lead to the withdrawal of a worker's authorisation(s).

9.1.5 Non-electrical workers

All non-electrical workers who may be exposed to electrical hazards as part of their duties must complete the Electrical Risks for Non-Electrical Workers awareness course.

Any workers undertaking work near overhead or underground electrical services must also complete the Electrical Safety - Overhead and Underground training course.

10 Record keeping

All records are to be retained, archived and disposed of in accordance with the Queensland State Archives General Retention and Disposal Scheme for Administrative Records.

Seqwater must record the performance of all electrical work, including live electrical work undertaken by Seqwater workers. Risk assessments and safe work method statements developed for electrical work must be kept and made accessible for 28 days after the work is complete or two years if there is a dangerous electrical incident or serious electrical event.

Electrical contractors who undertake electrical work at Seqwater workplaces must provide Seqwater with a Certificate of Test at the completion of the work.

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The following electrical work records shall be maintained to validate electrical compliance:

- register of electrical workers and electrical apprentices
- appliance test and tagging registers
- RCD Testing Registers
- records of performance of live electrical work
- certificate of testing and safety
- testing and maintenance of safety equipment (including calibration and repairs)
- register of suitability of testing equipment.

11 References

11.1 Legislation and other requirements

Description	Status	Location
AS/NZS 3190 Approval and test specification – Residual current devices (current-operated earth leakage devices)	Active	www.saiglobal.com/online
AS/NZS 3012 Electrical installations – Construction and Demolition	Active	www.saiglobal.com/online
AS 2832:3 Cathodic Protection of Metals – Immersed Structures	Active	www.saiglobal.com/online
AS 2832.4 Cathodic Protection of Metals – Internal Surfaces	Active	www.saiglobal.com/online
AS 2790 Electrical Generating Sets – Transportable (up to 25 kW)	Active	www.saiglobal.com/online
AS 3000 Electrical installations (also known as wiring rules)	Active	www.saiglobal.com/online
AS 3010 Electrical Installations – Generating Sets	Active	www.saiglobal.com/online
AS/NZS 3012 – Electrical Installations – Construction and Demolition Sites	Active	www.saiglobal.com/online
<i>Electrical Safety Act 2002 (Qld)</i>	Active	www.legislation.qld.gov.au
<i>Electrical safety code of practice 2013 – Managing electrical risks in the workplace (Qld)</i>	Active	https://www.worksafe.qld.gov.au/laws-and-compliance/electrical-safety-codes-of-practice
<i>Electrical safety code of practice 2013 – Working near overhead and underground electric lines (Qld)</i>	Active	https://www.worksafe.qld.gov.au/laws-and-compliance/electrical-safety-codes-of-practice
<i>Electrical Safety Regulation 2013 (Qld)</i>	Active	www.legislation.qld.gov.au
How to Manage Work Health and Safety Risks Code of Practice 2011 (Qld)	Active	https://www.worksafe.qld.gov.au/laws-and-compliance/codes-of-practice
Professional Engineers Act 2002 (Qld)	Active	https://www.legislation.qld.gov.au/view/pdf/2003-01-01/act-2002-054

Description	Status	Location
Professional Engineers and Other Legislation Amendment Act 2008 (Qld)	Active	https://cabinet.qld.gov.au/documents/2014/May/Engineers%20Bill/attachments/Bill.pdf
AS/NZS 3760 – In-service safety inspection and testing of electrical equipment	Active	www.saiglobal.com/online
AS 2225 – Insulating Gloves for Electrical Purposes	Active	www.saiglobal.com/online
AS/NZS 2978 – Insulating Mats for Electrical Purposes	Active	www.saiglobal.com/online

Supporting procedures

Description	Status	Location
PRO-00962 Discipline Procedure	Active	QPulse
E-SPE-STD-001 Electrical Design and Construction Standard	Active	REX Ref: D14/5591[V2]
PRO-00002 Integrated Management System Internal Audit Procedure	Active	QPulse
ERP-00079 WHS Emergency Preparedness and Response Procedure	Active	QPulse
PRO-00014 WHS Energy Tag and Lock out Procedure	Active	QPulse
PRO-00657 WHS Hazard Identification and Risk Management Procedure	Active	QPulse
PRO-00388 WHS Incident Notification Procedure	Active	QPulse
MAN-00211 WHS Management System Framework	Active	QPulse
PRO-00867 WHS Safe Work with Plant Procedure	Active	QPulse
PRO-01574 – Training and Competency Management Procedure	Active	QPulse
PRO-00302 WHS Excavation, Trenching and Penetrations Procedure	Active	QPulse
PRO-00808 Contractor Management Procedure	Active	QPulse
PRO-01752 Asbestos Management Procedure	Active	QPulse

11.2 Supporting documents, forms and templates

Description	Status	Location
Engineering Electrical Safety Competency	Not Active	QPulse
Energised Work Permit (FRM-00415)	Active	QPulse
Excavation and Trenching Permit (FRM-00413)	Active	QPulse
High Voltage Access Permit (FRM-00439)	Active	QPulse
High Voltage Test Permit (FRM-00949) (also called Test Permit)	Active	QPulse

Description	Status	Location
High Voltage Switching Sheet Status Log (<u>FRM-00522</u>)	Active	QPulse
High Voltage Switching Sheets (<u>FRM-00438</u>)	Active	QPulse
High Voltage Authorisation Checklist (<u>FRM-00629</u>)	Active	QPulse
Job Safety and Environment Analysis Template (<u>TEM-00013</u>)	Active	QPulse

Appendix A – Electrical apprentice supervision requirements

The following electrical apprentices' supervision requirements table is to be used as a guide only and is dependent on the electrical apprentice's level of competence.

Type of Work	Apprentice/ Trainee (Year)	Supervision Required
New installations (not connected to electricity supply)	1 st 2 nd 3 rd 4 th or Final	Direct Direct/General General Broad
Alterations and additions (existing installations)	1 st 2 nd 3 rd 4 th or Final	Direct Direct General Broad
Maintenance of installations and equipment	1 st 2 nd 3 rd 4 th or Final	Direct Direct General Broad
Workshop tasks	1 st 2 nd 3 rd 4 th or Final	Direct General General/Broad Broad
Live work	1 st 2 nd 3 rd 4 th or Final	* * * Direct
Isolation of installations and equipment	1 st 2 nd 3 rd 4 th or Final	* * Direct Direct
HV work	Electrical apprentices are prohibited from performing any role in a HV Work Group.	

* Note that an apprentice/trainee cannot, in the first 6 months of the apprenticeship/training program work:

- in the immediate vicinity of a live high voltage exposed part; or
- where there is a risk the training person could come into contact with a live low voltage exposed part.

Appendix B – Electrical safety observer requirements

Exclusion zone safety observer	Low voltage safety observer	High voltage safety observer
Should be hazard and risk aware.	Must be hazard and risk aware.	Must be hazard and risk aware.
Should be assigned to no other duties, other than as safety observer to observe, warn and communicate.	Must be assigned to no other duties, other than as safety observer to observe, warn and communicate.	Must be assigned to no other duties, other than as safety observer to observe, warn and communicate.
Should not observe more than one crane or plant at a time.	Should not observe more than one crane or plant at a time.	Not a requirement.
Should not be positioned in an elevating work platform basket.	Should not be positioned in an elevating work platform basket.	Must maintain a suitable position to observe the work.
Should be appropriately skilled in observing, warning and communicating effectively. Warns about: <ul style="list-style-type: none"> • approach to electrical apparatus • unsafe conditions. 	Must be appropriately skilled in observing, warning and communicating effectively. Warns about: <ul style="list-style-type: none"> • approach to electrical apparatus • unsafe conditions. 	Must be appropriately skilled in observing, warning and communicating effectively. Warns about: <ul style="list-style-type: none"> • potentially unsafe actions • lack of compliance with approved work documentation.
Should be able to stop the work being performed.	Should be able to stop the work being performed.	Must be able to stop the work being performed.
Must have completed accredited training in overhead electrical awareness and emergency response approved by the electrical supply authority (e.g. Energex)	Must be competent to help with the electrical work. The safety observer does not need to hold an electrical work license or do the work themselves. To 'help' is to assist or facilitate the work being performed.	Must be competent to perform the electrical work being performed. This means that the safety observer must be the holder of an electrical work licence.
	Must be competent in isolation techniques where appropriate.	Not a requirement.
	Must provide assistance in emergencies and be competent to: <ul style="list-style-type: none"> • rescue the person performing the work • provide resuscitation to the person performing the work (assessed in the last six months). 	Must provide assistance in emergencies and be competent to: <ul style="list-style-type: none"> • rescue the person performing the work • provide resuscitation to the person performing the work (assessed in the last six months).

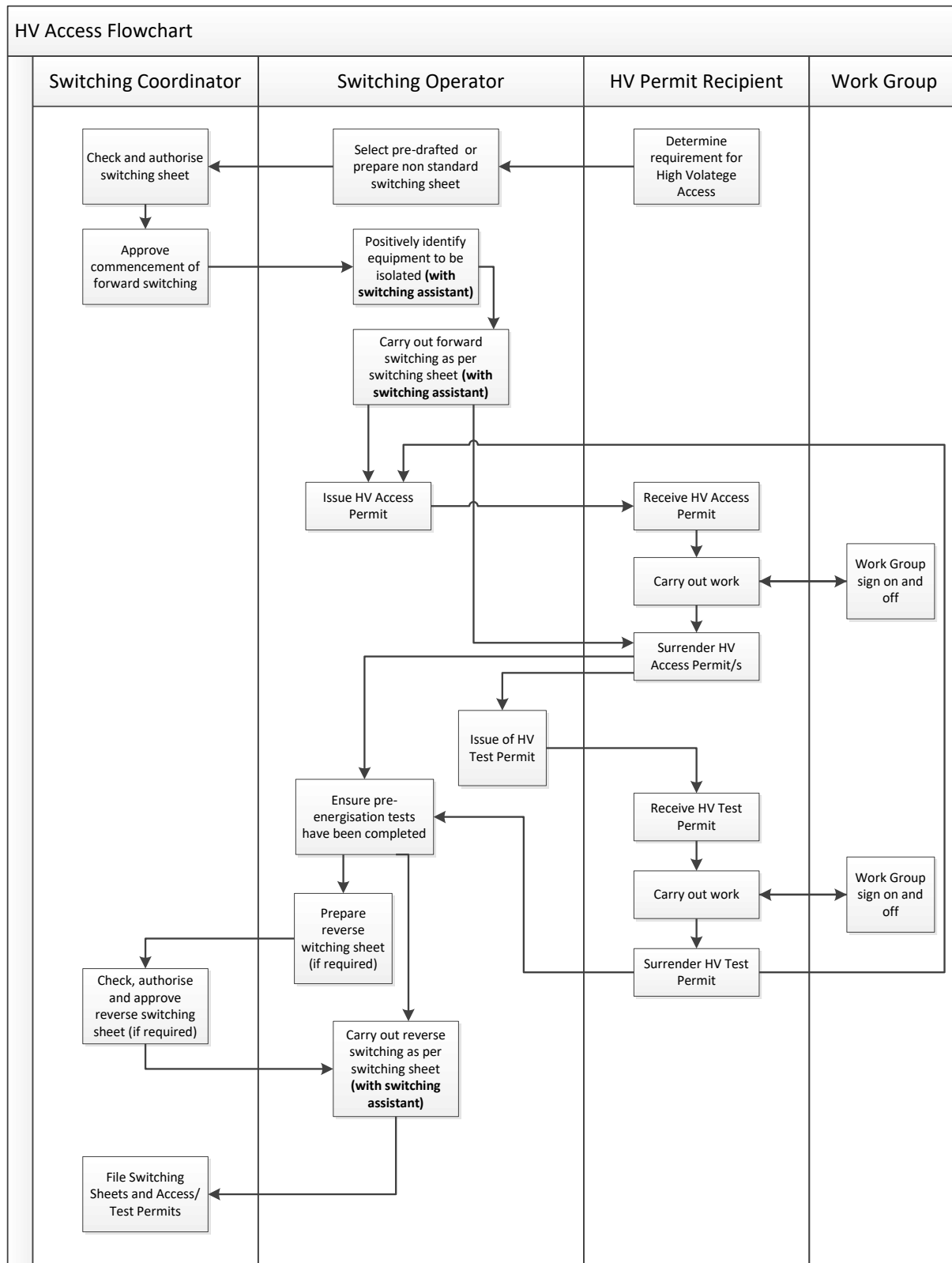
Appendix C – Test and Tag requirements

Location / Work Situation	Test Tag Requirement	Residual current devices (Note 1)			
		Push button Test (by User)		Operating Time and Current Test	
		Portable	Fixed	Portable	Fixed
Construction / Project Sites (Note 2)	3 monthly	After connection to a socket, and before connection to equipment	1 month	3 monthly	12 monthly
Operational Areas including: Water Treatment Plant, Dam Operations, Recreation & Catchments	6 monthly	Daily or before every use, whichever is the longer	6 monthly	12 monthly	
Administration Building and Offices (electrical equipment is subject to flexing in normal use or in a kitchen or bathroom area)	12 monthly	3 monthly	6 monthly	12 monthly	
Administration Building and Offices (electrical equipment is NOT subject to flexing in normal use and is NOT open to abuse and is NOT in a kitchen or bathroom area)	5 yearly	3 monthly	6 monthly	2 yearly	
Hire Equipment	3 monthly	Including push button test by hirer prior to hire		3 monthly	12 monthly
Repaired, serviced and second-hand equipment	After repair or service which could affect the electrical safety, or on reintroduction to service, refer to AS/NZS 5762				

Note 1: Portable Residual Current Devices shall be tested and tagged according to the location that the device will be used.

Note2: Specified equipment for the purpose of manufacturing work must be connected to a fixed RCD (Qld *Electrical Safety Regulation 2013* Section 108)

Appendix D – HV access flowchart



Appendix E – HVIA access requirements

Table 1: HVIA access requirements

HV access requirement	Switching Coordinator requirement	Switching Operator requirement	Recipient requirement	Switching assistant requirement
1. Direct contact high voltage access. (electrical contact)	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer intimate with site ##.	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer.	^ Must be authorised, HVIA trained or authorised by Switching Coordinator to perform a specific task.	Must be competent electrical safety observer with understanding of HV process and attend HVIA training.
2. High voltage operational switching	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer intimate with site ##.	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer.		Must be competent electrical safety observer with understanding of HV process and attend HVIA training.
3. Non-contact high voltage access	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer familiar with site.	Must be authorised HVIA competent electrical fitter mechanic or electrical (power) engineer.	Not required, Seqwater tag out lock out system applies.	Must be competent electrical safety observer with understanding of HV process and attend HVIA training.

Table 2: Non HVIA access requirements

Access requirement	Type of access	Switching coordinator requirement	Switching Operator requirement	Recipient requirement	Switching assistant requirement
1. Process Isolation	E.g. Normal shutdown, low risk cleaning near high voltage equipment (no immediate hazard exists). If hazard exists, refer to non-contact HV access above.	<p>The person in control of the electrical equipment using the Seqwater energy isolation system performs control isolation. If hazards exist, refer to non-contact HV access above.</p> <p>Note: A hazard exists if the person or any equipment worked on is within three metres of an exposed high voltage part.</p>			

Definitions

Term	Explanation
High Voltage Operational Switching	Where load shifting, blustering of HV equipment is required and there is no possibility of direct High Voltage contact or intrusion into High Voltage zones. Does not include normal day-to-day operational activity of stop/start of High Voltage equipment.
## Intimate with site	A person with the specified training and qualifications who has in-depth local knowledge of the HV installation and is competent to authorise non-standard Switching Sheets.
^ Switching Coordinator	May authorise a service provider on a temporary basis to perform a specific task or testing function required. It is the Switching Coordinator's responsibility to confirm the service provider is competent to receive an HV Access Permit or Test Permit.

Appendix F – Guide to selection of Personal Protective Equipment

GUIDE TO THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT			
TASK	CURRENTS UP TO AND INCLUDING 100 A	CURRENT EXCEEDING 100 A AND UP TO AND INCLUDING 400 A	CURRENTS EXCEEDING 400 A
Work (isolated and verified)	Footwear Protective clothing (if required) Eye protection (if required) Gloves (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)	Footwear Protective clothing (if required) Eye protection (if required) Gloves (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)	Footwear Protective clothing (if required) Eye protection (if required) Gloves (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)
Switching, isolating, removing fuses or links	Footwear Protective clothing Eye protection Gloves (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)	Footwear Protective clothing Eye protection Gloves Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)	Footwear Protective clothing Eye protection Gloves Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)
Isolation verification, testing or fault finding	Footwear Protective clothing Eye protection Gloves Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)	Footwear Protective clothing* Eye protection Gloves Arc flash suit and hood (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required) Face shield (if required)	Footwear Protective clothing* Eye protection Gloves Face shield Arc flash suit and hood (if required) Hearing protection (if required) Safety helmet (if required) Respiratory protection (if required)
Live electrical work	Footwear Protective clothing* Eye protection Insulating gloves Arc flash suit and hood (if required) Flame-resistant gloves (if required) Face shield (if required) Safety helmet (if required) Hearing protection (if required) Respiratory protection (if required)	Footwear Protective clothing * Eye protection Safety helmet Insulating gloves Arc flash suit and hood (if required) Flame-resistant gloves (if required) Face shield (if required) Hearing protection (if required) Respiratory protection (if required)	Footwear Protective clothing * Eye protection Insulating gloves Flame-resistant gloves Arc flash suit and hood Hearing protection Respiratory protection (if required)
(if required): Determined by the risk assessment. * Collar up, top buttons done up and sleeves down.		Bracelets, rings, neck chains, exposed metal zips, watches, and other conductive items shall not be worn while working on or near exposed energized conductors or live conductive parts.	