High Voltage Electrical Installations

Business Name:	ABN:	
Business Address:		
Contact Person:	Phone:	Email:

THIS RISK ASSESSMENT IS APPROVED BY THE PCBU OF THE PROJECT

Under the Work Health and Safety Regulation (WHS Regulation), a person conducting a business or undertaking (PCBU) is required to ensure that a RISK ASSESSMENT is prepared before the proposed work starts.

Full Name:		
Signature:	Title:	Date:

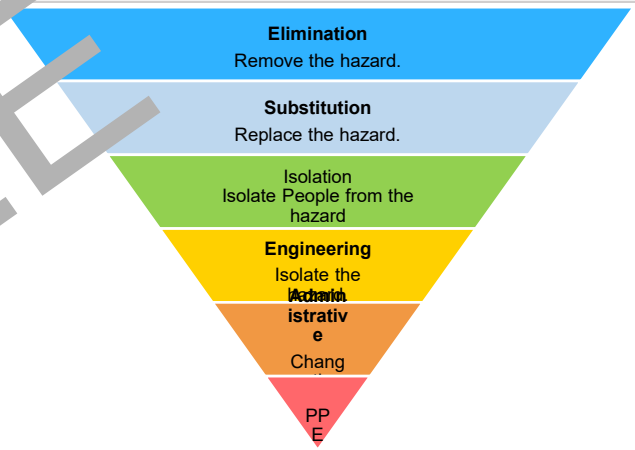
CLIENT OR PRINCIPAL CONTRACTOR DETAILS

Client:	SCOPE OF WORKS
Project Name:	
Project Address:	
Project Manager:	
Contact Phone:	
Date Risk Assessment supplied to Project Manager:	

RISK MATRIX

LIKELIHOOD	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC	SCORE	ACTION
ALMOST CERTAIN	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE	4 ACUTE		
LIKELY	2 MODERATE	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE	4A ACUTE	DO NOT PROCEED
POSSIBLE	1 LOW	2 MODERATE	3 HIGH	4 ACUTE	4 ACUTE	3H HIGH	Rev before work
UNLIKELY	1 LOW	1 LOW	2 MODERATE	3 HIGH	4 ACU	2M MO RATE	Ensure control measures in place.
RARE	1 LOW	1 LOW	2 MODERATE	3 HIGH	3 H	1L LOW	Monitor and keep records.

HIERARCHY OF CONTROLS



Risk Rating & Required Action:

4A	Stop work. The risk is intolerable. E inate the hazar redesign the activity before proceeding. A Safe Work Method Statement (SWMS) or hi er-level authorisati is required.
3H	Review and approve additional c rols b ask arts. Senior supervisor sign-off needed.
2M	Ensure all nominated controls are in ace and effe ive. Proceed with caution; monitor conditions.
1L	Proceed, following standard operating procedures Monitor and keep records.

Consequence Scale:

Consequence	People (injury/illness)	Project / Assets	Compliance / Reputation
Catastrophic	Fatality or permanent total disability	project shutdown	Significant regulator intervention; criminal prosecution
Major	Serious injury/illness (hospital > 5 days)	critical delay	Improvement notice; major media coverage
Moderate	Medical-treatment injury; lost-time > 1 day	moderate delay	Minor breach; adverse client comment
Minor	First-aid only, no lost time	negligible delay	Isolated non-conformance
Insignificant	No injury	no schedule impact	Deviation caught and corrected on site

Notes on Hierarchy of Controls:
Remember to apply controls in the preferred order shown by the coloured pyramid:

1. **Eliminate**
2. Substitute
3. Isolate
4. Engineering
5. Administrative
6. PPE

Always document **why** a lower-order control is accepted if elimination or substitution is not reasonably practicable.

aligned with Safe Work Australia's Managing the risk of fatigue at work *(2023) and ISO 45001:2018 clauses 6–8.*

JOB STEP	POTENTIAL HAZARDS	IR	CONTROL MEASURES	RR
SPECIFIC WORK STEPS	HAZARDS THAT MAY ARISE	INITIAL RISK	SPECIFIC MEASURES TO BE PUT IN PLACE TO ELIMINATE OR CONTROL THE RISKS	RESIDUAL RISK
1. Governance, WHS Duties and Electrical Safety Compliance	• Lack of clear governance structure for high voltage (HV) electrical safety leading to unclear accountability for due diligence under WHS Act 2011 and relevant Electrical Safety legislation • Failure to identify and comply with applicable standards and codes (e.g. AS/NZS 3000, AS/NZS 3017, AS 2067, AS/NZS 4836, state/territory electrical safety regulations) for HV installations and operation • Inadequate integration of HV risks into the organisation's WHS management system, risk registers and consultation processes • Insufficient resourcing (budget, competent persons, time) for safe design, installation, testing, commissioning, operation and maintenance of HV switchgear and associated low voltage (LV) systems • Poor change management when introducing or modifying HV installations leading to uncontrolled new or changed risks • Lack of documented authority framework for HV system owners, controllers, and persons in control of business or undertaking (PCBUs)	High	• Establish and document a formal HV electrical safety governance framework that defines roles, responsibilities and accountabilities for PCBU officers, managers, electrical engineers, HV operators and contractors, aligned with WHS Act 2011 due diligence requirements • Develop, implement and periodically review an Electrical Safety Management Plan covering HV switchgear installation, operation, testing and maintenance, and integration with LV systems • Ensure a competent person completes a compliance obligations register mapping all applicable legislation, regulations, codes of practice and Australian/New Zealand Standards relevant to HV installations and keeps this register current • Integrate HV and LV electrical risks into the organisation's WHS risk management procedure, including formal risk assessments, risk registers, and regular review cycles (e.g. annually or following incidents or changes) • Implement a documented management of change (MoC) process for any modification, upgrade, extension or recommissioning of HV systems, including technical review by a competent HV engineer and WHS review prior to implementation • Require senior officers to receive periodic briefings and reports on HV electrical risk status, incidents, compliance issues and improvement actions to support informed due diligence • Ensure WHS consultation mechanisms (HSCs, HSRs, toolbox meetings) explicitly include HV topics where relevant, and that workers and contractors are consulted when changes impact HV risk • Maintain documented evidence of compliance (design certifications, inspection and test records, commissioning reports, safe work methods, training records) readily accessible for audit and regulatory review	Medium
2. System Design, Engineering and Integration of LV and HV Installations	• Inadequate HV system design leading to overvoltages, fault energy levels and arc flash hazards not being properly controlled • Poor coordination between HV and LV systems creating backfeed risks, touch and step potential issues, and unsafe fault clearing times • Lack of discrimination and protection coordination between HV switchgear, transformers and downstream LV protective devices, increasing likelihood of widespread outages and equipment damage	High	• Require all HV system design and modifications to be undertaken, reviewed and signed off by a competent HV electrical engineer with demonstrated experience in high voltage installations • Apply relevant design standards (including AS 2067 for substations and HV installations, AS/NZS 3000 for wiring rules, AS/NZS 7000 for overhead lines where applicable, and AS/NZS 4836 for safe working practices) as minimum design criteria • Conduct formal protection coordination studies and arc flash studies (where applicable), including fault level calculations, to set appropriate protection settings and define minimum approach distances and PPE categories • Ensure integrated LV/HV design review workshops are conducted, involving HV engineers, LV designers, WHS representatives and end users to identify interface risks, backfeed paths, and earthing interactions	Medium

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	• Inadequate segregation and insulation between HV and LV components, creating inadvertent contact hazards for LV workers • Insufficient consideration of earthing and bonding design for combined LV and HV systems leading to hazardous touch voltages and ineffective fault current paths • Failure to design for safe access, test points, isolation points and working space around HV switchgear and associated control panels • Design not adequately considering future expansion, resulting in unsafe ad-hoc additions or overloading of existing HV and LV equipment		• Design HV switchgear rooms, yards and kiosks with adequate clearances, access paths, emergency egress, lighting, ventilation and physical barriers to meet standards and enable safe isolation and testing • Develop and maintain accurate single line diagrams, schematics and layout drawings for HV and LV systems, including normal and alternate supply paths, and ensure these are controlled documents kept up to date • Incorporate clearly labelled, lockable isolation points, test points, earthing points and visible break devices in the design to support safe operation and testing practices • Design and document a comprehensive earthing and bonding system for HV and LV equipment (including earth grids, rods, bonds and equipotential grading) verified by calculation and/or testing • Include provisions in the design for future load growth and system expansion (spare ways, bus capacity, transformer sizing) to avoid later unsafe or non-compliant modifications	
3. Procurement, Selection and Commissioning of High Voltage Switchgear and Equipment	• Procurement of non-compliant or unsuitable HV switchgear, protection relays, cables or test equipment that do not meet Australian standards or site requirements • Insufficient specification of performance, insulation level, fault rating and environmental protection (IP rating) for HV equipment resulting in accelerated degradation or failure • Lack of manufacturer documentation, type test certificates and instructions making safe installation and operation difficult • Inadequate factory acceptance testing (FAT) and site acceptance testing (SAT) of HV switchgear and integrated control/protection systems • Failure to verify compatibility between new HV switchgear and existing HV/LV infrastructure (e.g. fault level, control voltages, communication protocols) • No formal commissioning procedure leading to inconsistent testing, inadequate functional checks and incomplete safety verifications	High	• Develop detailed technical procurement specifications for HV switchgear, transformers, cables, protection relays and test equipment that reference relevant Australian and international standards and clearly define ratings, environmental conditions and safety features • Include mandatory compliance requirements in contracts (certificates of conformity, type test reports, IP and insulation ratings, arc fault containment where required) and verify prior to acceptance • Require suppliers to provide complete documentation including OEM manuals, wiring diagrams, protection setting guides, maintenance schedules and recommended spare parts lists • Implement a structured FAT and SAT process for HV switchgear and protection systems with documented test procedures, acceptance criteria and involvement of competent HV engineers and client representatives • Ensure compatibility checks are undertaken prior to procurement to confirm fault levels, control and communication interfaces, earthing requirements and mechanical fit with existing LV and HV systems • Establish a formal commissioning plan covering electrical testing, functional and interlock testing, protection setting verification, earthing checks and HV/LV interface validation, with sign-off by a competent person • Maintain commissioning records (test results, protection settings, non-conformance reports and rectification actions) as controlled documents forming part of the plant safety file	Medium

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4. Installation, Construction Management and Contractor Control	• Installation work carried out by persons without appropriate HV competencies, licences or authorisations, leading to unsafe terminations, clearances and earthing • Poor coordination between multiple contractors (civil, mechanical, electrical, controls) resulting in damaged cables, compromised segregation, or mislabelled equipment • Inadequate site supervision and quality assurance during installation of HV switchgear, cables and earthing systems • Deviation from design specifications, drawings and standards during installation without proper engineering assessment and approval • Uncontrolled energisation of partially installed or untested HV equipment during construction or upgrades • Insufficient management of construction-phase haza[illegible] HV/LV interfaces, such as te[illegible]porary supplies, backfeeds and byp[illegible]sses	High	[redacted]	Medium
5. HV and LV System Documentation, Labelling and Information Management	• Outdated or inaccurate single line diagrams and schematics leadin[illegible] incorrect assumptions ab[illegible]pply sources, isolation points and fault levels • Inconsistent or missing labelling on HV switchgear, transformers, LV boards, cables and earthing points causing confusion for operators and testers • Lack of readily accessible operating manuals, switching programs and test procedures for HV equipment • Poor document control causing obsolete procedures, drawings and protection setting files to remain in circulation	High	[redacted]	Low

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	• Inadequate recording of protection settings, relay configurations and test results leading to difficulty in verifying performance or investigating incidents		[redacted]	
6. Competency, Licensing, Authorisation and Training for HV and LV Personnel	• Unqualified or inadequately trained personnel performing HV switching, testing, installation or fault response activities • Lack of a formal authorisation system for HV operators, switching officers, test officers and electrical safety observers • Insufficient understanding of HV and LV interaction hazards such as induction, backfeed, capacitive coupling and step/touch potential • Inadequate training on organisational procedures, permit switching programs and emergency response related to HV installations • Competency not maintained over time due to infrequent exposure to HV tasks or system changes	Hig	[redacted]	Medium
7. Operating Procedures, Switching Programs and Access Control	• Uncontrolled or ad-hoc switching of HV switchgear leading to energisation of equipment where people are working or where plant is not ready • Lack of standardised operating procedures for normal, abnormal and emergency operations of HV and LV systems	High	[redacted]	Medium

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	• Poor communication during switching activities leading to misunderstandings about plant status and isolation points • Unauthorised access to HV switch rooms, kiosks, substations and restricted LV areas, increasing risk of inadvertent contact or tampering • No clear procedures for managing parallel feeds, alternative supplies, and LV backfeed when operating HV equipment		[redacted]	
8. Isolation, Lockout, Tagout and Earthing Systems	• Failure to achieve effective isolation of HV circuits prior to work, resulting in exposure to live conductors or unexpected energisation • Inadequate lockout and tagging systems leading to rem[illegible]bypass o isolations without pr[illegible]er verification • Incorrect or abse[illegible]application [illegible] portable or fixed ea[illegible]ing [illegible] equipment and conduct[illegible]rs resulting hazardous induced or stored energ[illegible] • Complexity of LV and H[illegible]ces causing overlooked sources of energy such as backfeed through transformers, UPS systems or generators • No consistent process for testing for de-energised status and verifying earthing before access is granted	High	[redacted]	Medium
9. High Voltage and Low Voltage Testing and Commissioning Management	• Inadequate control of HV testing activities (e.g. insulation resistance, pressure tests, primary/secondary injection, hi-pot tests) leading to exposure to dangerous voltages	High	[redacted]	Medium

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	• Poor coordination between testing personnel and operations, resulting in energisation conflicts or inadvertent testing on live or incorrectly isolated systems • Use of inappropriate or uncalibrated test equipment that does not meet the voltage or category rating required • Insufficient procedures for testing LV systems connected to HV equipment (e.g. control circuits, protection relays, metering) creating risks of incorrect configuration • Lack of clear test boundaries and test status indication leading to other workers entering hazardous test zones		[redacted]	
10. Inspection, Preventive Maintenance and Asset Management	• Deterioration of HV switchgear, insulation, cables, transformers and LV interfaces due to ageing, moisture, contamination or mecha[illegible]amage • Failure of protecti[illegible]devices, interlocks or control systems[illegible]ot being det[illegible]ed prior to a fault or s[illegible] • Lack of systematic inspection and maintenance program leading to unplanned outages, equi[illegible]ilure and increased electric shock or arc flash risk • Spare parts unavailability or use of incorrect/obsolete components compromising equipment integrity and safety • Maintenance activities not adequately planned with respect to system configuration, resulting in unsafe operating conditions or overloading of remaining assets	High	[redacted]	Medium
11. Arc Flash, Electric Shock and Step/Touch	• Exposure of workers to arc flash energy due to switching faults,	High		Medium

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Potential Risk Management	equipment failure or incorrect operation of HV or LV switchgear • Electric shock from direct contact, indirect contact or induced voltages in LV and HV equipment and structures • Hazardous step and touch potentials around earthing systems during fault conditions • Lack of systematic assessment of arc flash and shock risks across the integrated LV and HV network		[redacted]	
12. Emergency Preparedness, Incident Response and Recovery	• Inadequate emergency response capability for electric shock, arc flash, fire or HV equipment failure incidents • Lack of clear procedures for isolating HV and LV supplies during emergencies to protect responders and other workers • Poor coordination with external emergency services regarding HV installations and associated hazards • Insufficient incident reporting and investigation processes leading to missed learning opportunities	High	[redacted]	Medium

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			[redacted]	
13. Contractor, Visitor and Third-Party Interface Management	• Contractors performing HV or LV work without being adequately briefed on site-specific systems, procedures and hazards • Visitors or non-electrical workers entering HV or restricted LV areas without understanding the risks and required controls • Third-party network operators, customers or neighbouring facilities making changes that impact shared HV or LV infrastructure without coordination • Inconsistent standards and work practices between PCBUs on multi-employer sites	High	[redacted]	Medium
14. Monitoring, Audit, Review and Continuous Improvement	• Degradation of co[redacted]ectivenes over time if HV and LV safety systen are not periodically monitored and reviewed • Systemic issues in incident trends not being detected due to poor data collection or analysis • Non-compliance with legislation, standards or internal procedures remaining unidentified and unaddressed • Failure to incorporate lessons from industry incidents and technological advances into the organisation's HV and LV safety management	Medium	[redacted]	Low

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			[redacted]	

EMERGENCY RESPONSE – CALL 000 FOR EMERGENCIES

Ensure to have an Emergency Management Plan in place as well as adequate numbers of trained first aid staff with easy access to fully stocked first aid kits, rescue equipment, material safety data sheets, adequate access to emergency communication equipment and fire-fighting equipment suitable for all classes of fire and ignition sources.

LEGISLATIVE REFERENCES

RELEVANT LEGISLATION AND CODES OF PRACTICE. DELETE THE LEGISLATIVE REFERENCES FOR ANY STATE THAT ARE NOT APPLICABLE

Queensland & Australian Capital Territory
Work Health and Safety Act 2011
Work Health and Safety Regulations 2011
Legislation QLD: https://www.worksafe.qld.gov.au/laws-and-compliance/work-health-and-safety-laws
Codes of Practice QLD: https://www.worksafe.qld.gov.au/laws-and-compliance/codes-of-practice
Legislation ACT: https://www.worksafe.act.gov.au/laws-and-compliance/acts-and-regulations
Codes of Practice ACT: https://www.worksafe.act.gov.au/laws-and-compliance/codes-of-practice

New South Wales
Work Health and Safety Act 2011
Work Health and Safety Regulations 2025
Legislation NSW: https://www.safework.nsw.gov.au/legal-obligations/legislation
Codes of Practice NSW: https://www.safework.nsw.gov.au/resource-library/list-of-codes-of-practice

Northern Territory
Work Health and Safety (National Uniform Legislation) Act 2011
Work Health and Safety (National Uniform Legislation) Regulations 2011
Legislation NT: https://worksafe.nt.gov.au/laws-and-compliance/workplace-safety-laws
Codes of Practice NT: https://worksafe.nt.gov.au/forms-and-resources/codes-of-practice

South Australia
Work Health and Safety Act 2012 (SA)
Work Health and Safety Regulations 2012 (SA)
Legislation for SA: https://www.safework.sa.gov.au/resources/legislation
Codes of Practice for SA: https://www.safework.sa.gov.au/workplaces/codes-of-practice#COPs

Tasmania
Work Health and Safety Act 2012
Work Health and Safety (Transitional and Consequential Provisions) Act 2012
Work Health and Safety Regulations 2012
Work Health and Safety (Transitional) Regulations 2012
Legislation for TAS: https://worksafe.tas.gov.au/topics/laws-and-compliance/acts-and-regulations
Codes of Practice for TAS: https://worksafe.tas.gov.au/topics/laws-and-compliance/codes-of-practice

Details of permits, licenses or access required by regulatory bodies (add or delete as required):

- Permits from local council
- Authorisation to commence work
- Any required documents.

Victoria
Occupational Health and Safety Act 2004
Occupational Health and Safety Regulations 2017
Legislation VIC: https://www.worksafe.vic.gov.au/occupational-health-and-safety-act-and-regulations
Codes of Practice VIC: https://www.worksafe.vic.gov.au/compliance-codes-and-codes-practice

Western Australia
Work Health and Safety Act 2020
Work Health and Safety Regulations 2022
Legislation Western Australia: https://www.commerce.wa.gov.au/worksafe/legislation
Codes of Practice WA: https://www.commerce.wa.gov.au/worksafe/codes-practice

Safe Work Australia Links
Law and Regulation (All States): https://www.safeworkaustralia.gov.au/law-and-regulation
Model Codes of Practice: https://www.safeworkaustralia.gov.au/resources-publications/model-codes-of-practice

Model Codes of Practice

- Managing noise and preventing hearing loss at work
- Confined spaces
- Labelling of workplace hazardous chemicals
- Managing risks of hazardous chemicals in the workplace
- Welding processes
- First aid in the workplace
- Managing the risk of falls at workplaces
- Hazardous manual tasks
- Managing the risk of falls in housing construction
- Managing electrical risks in the workplace
- Demolition work
- Excavation work
- Work health and safety consultation, cooperation and coordination
- Managing the work environment and facilities
- How to manage work health and safety risks
- Managing risks of plant in the workplace
- Construction work