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

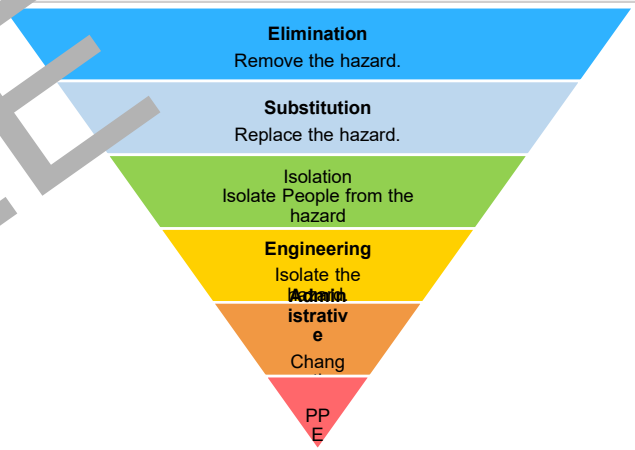
THIS RISK ASSESSMENT IS APPROVED BY THE PCBU OF THE PROJECT		
Under the Work Health and Safety Regulation (WHS Regulation), a person conducting a business or undertaking (PCBU) is required to ensure that a RISK ASSESSMENT is prepared before the proposed work starts.		
Full Name:		
Signature:	Title:	Date:

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, Legal Compliance and WHS Duties	• Failure to identify and comply with WHS Act 2011 and WHS Regulations duties in relation to cooling towers and associated plant • Absence of documented organisational policy for the management of cooling towers and associated water systems • Unclear allocation of PCBU, officer and worker responsibilities for cooling tower WHS risk management • Lack of due diligence by officers in ensuring adequate resources, processes and verification for cooling tower risk control • Failure to integrate cooling tower risks into the organisation's WHS management system and risk register • Poor contractor governance where cooling tower management is outsourced, leading to gaps in legal compliance • Inadequate consultation with workers and Health and Safety Representatives (HSRs) on cooling tower risks and controls	High	• Develop and endorse a cooling tower and water system management policy aligned with the WHS Act 2011, WHS Regulations, Public Health legislation and relevant Australian Standards (e.g. AS/NZS 3666 series) • Define and document roles, responsibilities and delegations for PCBUs, officers, facility managers, maintenance providers and workers with respect to cooling tower WHS risk management • Include cooling tower risk as a discrete item on the organisational WHS risk register, with defined risk owners, reviews and treatment plans • Ensure officers exercise due diligence by regularly reviewing cooling tower risk reports, audit findings, system performance indicators and resourcing requirements • Establish a documented legal and standards register specific to cooling towers, with scheduled reviews for regulatory and standards updates • Embed cooling tower governance requirements in service provider contracts, including clear scope, competence expectations, reporting obligations and performance KPIs • Implement structured consultation mechanisms (toolbox talks, WHS committee meetings, HSR engagement) that specifically address cooling tower risks, monitoring results and proposed changes • Require periodic independent WHS review or audit of cooling tower management systems, with findings reported to senior management and tracked to closure	Medium
2. Design, Engineering and System Configuration	• Poor system design leading to conditions conducive to Legionella and other microbiological growth (e.g. dead legs, stagnation zones, poor flow characteristics) • Inadequate separation from air intakes, public areas or workspaces enabling aerosol drift and exposure • Selection of cooling tower and auxiliary equipment not suited to local climate, process demands or water quality, increasing fouling and risk • Insufficient provision for safe access, inspection, sampling, cleaning and maintenance (e.g. lack of platforms, fixed ladders, anchor points)	High	• Engage competent mechanical and hydraulic engineers to design cooling tower systems in accordance with AS/NZS 3666, relevant building codes and manufacturer specifications • Specify designs that minimise stagnation, dead legs and low-flow sections, and that facilitate effective circulation, bleed-off and dosing • Ensure tower siting and orientation minimise aerosol drift to outdoor public areas, building air intakes, openable windows and frequently occupied workspaces • Incorporate engineered safe access solutions (permanent platforms, walkways, guardrails, fixed ladders, anchor points, lighting) to meet WHS and building access standards • Design in redundancy and fail-safe arrangements for critical controls such as biocide dosing, bleed-off, filtration and automated monitoring equipment • Avoid cross-connections between cooling tower water and potable systems; where unavoidable, provide appropriate backflow prevention devices and test regimes • Implement engineering controls to manage noise, over-spray and plume (e.g. drift eliminators, acoustic treatment, plume abatement features) based on risk assessment	Medium

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	• Inadequate redundancy or fail-safe features in dosing, bleed-off and monitoring systems resulting in uncontrolled water quality excursions • Poor segregation of incompatible systems (e.g. cross-connections between potable and cooling water) creating contamination risks • Lack of engineering controls to manage noise, drift, splash and plume, affecting workers and nearby receptors		• Document design intent, operating envelopes and critical design assumptions, and ensure these are accessible for future modification and management of change	
3. Procurement, Installation and Commissioning Governance	• Procurement of cooling towers and components that do not comply with relevant Australian Standards or regulatory requirements • Selection of installers, water treatment providers or maintenance contractors without verified competence in cooling tower WHS and Legionella control • Inadequate specification of WHS and performance requirements in procurement documents and contracts • Poor oversight of installation leading to deviations from design intent, undocumented changes and hidden defects • Lack of formal commissioning process to verify that systems, controls and alarms operate as intended before service • Failure to obtain and retain technical documentation (drawings, O&M manuals, certifications, warranties, test results) required for safe ongoing management	High	• Develop procurement standards that mandate compliance of cooling towers and associated plant with AS/NZS 3666 series, relevant plumbing standards and regulatory requirements • Include clear WHS, performance and Legionella management criteria in tender and contract documents, including specific requirements for water treatment regimes and monitoring • Pre-qualify and select contractors based on demonstrated competence, licensing, training and experience in cooling tower design, installation, commissioning and water treatment • Establish an installation inspection and hold-point regime to verify construction quality, conformance with design and adequate provision for access and safety features • Implement a formal commissioning protocol including functional testing of pumps, dosing equipment, automated controls, alarms and fail-safes, with results documented • Require delivery and controlled storage of all design drawings, schematics, O&M manuals, commissioning reports, compliance certificates and material safety data • Conduct a post-commissioning WHS review and sign-off involving engineering, WHS and facility management representatives before routine operation commences	Medium
4. Water Quality, Legionella and Microbial Risk Management	• Development and proliferation of Legionella bacteria and other pathogenic microorganisms within cooling tower water systems • Ineffective or inconsistent biocide dosing and water treatment regimes leading to loss of microbial control	High	[redacted]	Medium

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	• Inadequate system monitoring and trending resulting in unrecognised water quality deterioration • Failure to act promptly on adverse microbiological or chemical test results • Use of incompatible or poorly controlled treatment chemicals creating corrosion, scaling, or hazardous by-products • Insufficient integration of water treatment system alarms and failures into broader WHS and emergency response processes		[redacted]	
5. Operation, Monitoring and System Performance Management	• Lack of a defined operational strategy leading to inconsistent operation and unplanned system shutdowns or stagnation • Inadequate routine monitoring of plant performance indicators (flows, temperatures, bleed-off, dosing rates, drift eliminator condition) • Over-reliance on contractors without internal oversight or verification of performance data and recommendations • Failure to identify and respond to abnormal operating conditions, including unexpected temperature or load variations • Uncontrolled short-term shutdowns or seasonal lay-up leading to stagnation and microbiological proliferation • Ineffective integration of cooling tower alarms and status information into building management systems and WHS reporting	High	[redacted]	Medium
6. Planned Maintenance,	• Inadequate planned maintenance resulting in deterioration of critical	High		Medium

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SPECIFIC WORK STEPS	HAZARDS THAT MAY ARISE	INITIAL RISK	SPECIFIC MEASURES TO BE PUT IN PLACE TO ELIMINATE OR CONTROL THE RISKS	RESIDUAL RISK
Inspection and Asset Lifecycle Management	components (fill, drift eliminators, basins, fans, pumps, dosing systems) • Absence of a structured inspection regime to identify corrosion, scaling, biofilm, leaks, structural fatigue or access defects • Reliance on reactive repairs rather than proactive asset management leading to unexpected failures and elevated WHS risk • Poor management of asset lifecycle, including operation of plant beyond design life without appropriate assessment • Failure to document and track maintenance activities, findings and rectification actions for trend analysis and compliance evidence		[redacted]	
7. Competency, Training and Supervision	• Inadequate competency of personnel involved in cooling tower operation, monitoring, maintenance and water treatment • Lack of awareness am[redacted]rkers, supervisors and ma[redacted]gers about Legionella risks, W[redacted]S duties and control measures • Insufficient supervision of new or inexperienced staff working around cooling towers and chemicals • No formal verification of contractor training, licences or qualifications relevant to cooling tower management • Failure to provide refresher training leading to knowledge drift and non-compliance with current standards and procedures	Medium	[redacted]	Low
8. Documentation, Records and Information Management	• Incomplete or inaccurate documentation of policies, procedures, drawings and system descriptions relating to cooling towers • Poor record-keeping for water quality monitoring, maintenance, inspections	Medium	[redacted]	Low

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	and incident reports, limiting traceability and compliance evidence • Obsolete or conflicting documents in circulation leading to inconsistent practices and confusion about current requirements • Lack of ready access to critical information for workers, contractors, regulators or emergency responders		[redacted]	
9. Contractor and Supplier Management	• Unclear delineation of responsibilities between the PCBU and contractors for cooling tower safety and compliance • Engagement of contractors without adequate WHS systems or experience in cooling tower and Legionella risk management • Inadequate monitoring of contractor performance, leading to unchecked non-conformances or unsafe practices • Poor communication of site-specific hazards, procedures and emergency arrangements to contractors • Fragmented supply chain (e.g. different providers for water treatment, mechanical maintenance and cleaning) resulting in gaps and overlaps in controls	High	[redacted]	Medium
10. Health Surveillance, Exposure and Public Health Interface	• Unrecognised exposure of workers, building occupants or members of the public to Legionella-contaminated aerosols from cooling towers • Lack of protocols for identifying, reporting and investigating suspected Legionellosis cases potentially linked to the site • Poor coordination between workplace WHS systems and public health authorities in the event of an outbreak or suspected link • Insufficient communication to potentially affected workers or tenants	High	[redacted]	Medium

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	during elevated risk or investigation periods		[redacted]	
11. Emergency Planning, Incident Management and Business Continuity	• Lack of defined response procedures for critical cooling tower incidents such as major contamination, structural failure, loss of treatment or chemical spills • Inadequate integration of cooling tower scenarios into broader emergency plans and drills • Failure to consider business continuity impacts of taking cooling towers offline for safety reasons • Delayed or ineffective communication with regulators, public health authorities, workers and occupants during an incident	Medium	[redacted]	Low
12. Change Management, Decommissioning and Continuous Improvement	• Uncontrolled modifications to system design, operation, treatment regimes or occupancy patterns leading to new or increased risks • Decommissioning, removal or replacement of cooling towers without appropriate planning for residual contamination, structural risk or chemical hazards • Failure to learn from incidents, near misses, audit findings or regulatory updates, resulting in repeated issues • Lack of systematic review of the effectiveness of the cooling tower WHS management system	Medium	[redacted]	Low

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