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DEFINITIONS

**Act** - means the Public Health Act 2010

**Air filter** - a device for removing particulate material from air

**Biocide** - a physical or chemical agent that kills bacteria and other microorganisms

**Clean** - that part of maintenance which has as its objective plant free from visible sludge, foam, slime (including algae and fungi), rust, scale, dirt, dust and any deposit or accumulation of impurities, or any other foreign material

**Commissioning** - a systematic and progressive process of putting the components of a system into operation, calibrating instruments and controls, and then making adjustments and checks to ensure that the total system is providing satisfactory operation and performance

**Competent person** - a person who has had appropriate training or practical experience (or both) in the subject, sufficient to provide safe and satisfactory performance

**Cooling tower** - a device for lowering the temperature of water by evaporative cooling in which atmospheric air is in contact with falling water, thereby exchanging heat. The term also includes those devices that incorporate a water-refrigerant or water-water heat exchanger

**Disinfection** - significant reduction of the population of micro-organism using chemical or physical means

**Installation** - mounting plant, equipment and controls, securing in position, connecting up to components of a system for subsequent commissioning of the plant and the associated system

**Legionnaires’ disease** - defined as any pulmonary (lung) infection in patients caused by Legionella species

**NATA accreditation** - National Association of Testing Authorities is an authority in Australia responsible for the accreditation of laboratories where calibration, testing, and inspection activities are carried out

**Outbreak** - usually means two or more disease cases linked by time and place

**Regulations** - means the Public Health Regulation 2012

**Thermostatic mixing valve** - (a type of warm water system) means a mixing valve in which the temperature from the mixed water outlet fixture is automatically controlled by a thermostat to a pre-selected temperature
1.0 PURPOSE

In the interest of providing a safe and healthy environment, the Legionella Management Plan is developed in accordance with the requirements of the NSW Department of Health which identifies appropriate processes for the management of Legionella within the city.

The purpose of the Legionella Management Plan is to prevent and minimise the risk of transmission of Legionnaires’ disease from the built environment to people and ensure Council meets its regulatory requirements which includes:

- All water-cooling systems and warm-water systems are registered in accordance with the Public Health Act 2010 and Public Health Regulation 2012.
- All water-cooling and warm-water systems shall comply with legislation in respect to installation, commissioning, operation and maintenance.
- Building owners and occupiers are aware of their responsibilities and understand the NSW Code of Practice for the Control of Legionnaires’ Disease (2nd edition) dated 2004.
- All water-cooling systems are audited at least annually and inspected to ensure legislative compliance.
- Environmental Health staff are adequately trained and equipped to fulfil the role outlined within the Legionella Management Plan.

2.0 SCOPE

This document will assist various stakeholders to ensure compliance with the regulatory requirements in order to minimise the potential for outbreaks of Legionnaires’ disease and includes:

- Developers
- Service contractors
- Architects
- Building owners/occupiers and managers
- Environmental Health Officers and
- Other government agencies

3.0 BACKGROUND

Within larger cities the built environment will contain water-cooling systems and warm-water systems for the purpose of cooling buildings and provision of warm water. In Wagga Wagga City there are approximately 48 cooling towers registered with Council at the point of writing this document. These systems can provide an ideal breeding ground for Legionella bacteria.

The Legionella bacteria transmitted through aerosols can cause a type of pneumonia (an infection of the lung), which can be fatal, known as Legionnaires’ disease and/or Pontiac fever (a mild flu-like illness). The disease has an incubation period from 2 to 10 days for the symptoms to develop after inhaling the bacteria.
Outbreaks of Legionnaires’ disease occur from time to time but are preventable. _Legionella_ bacteria can grow in poorly operated and maintained water-cooling systems and warm-water systems, particularly those systems which are not maintained in a clean condition and continuously treated with a biocide to control _Legionella_ bacteria, algae and bio-films. People may be potentially exposed to a health hazard on a daily basis if systems are not properly installed, commissioned, operated and maintained.

The Public Health Act 2010 (the Act) and the Public Health Regulation 2012 (the Regulation) control various water and air systems. These systems are known as “regulated systems” and include:

- Water-cooling systems
- Hot-water systems
- Thermostatic mixing valves
- Warm-water systems
- Air-handling systems

The purpose of the Act and Regulation is to ensure owners and occupiers of buildings comply with legislative responsibilities in order to prevent or prohibit the growth of micro-organisms in these regulated systems that are liable to cause Legionnaires’ disease.

The Regulation requires the compliance of certain regulated systems with the following Australian Standards:

- AS/NZS 3666.1:2011  Air-handling and water systems of buildings – Microbial control – Design, installation and commissioning
- AS/NZS 3666.2:2011  Air-handling and water systems of buildings – Microbial control – Operation and maintenance
- AS/NZS 3666.3:2011  Air-handling and water systems of buildings – Microbial control – Performance-based maintenance of cooling water systems

The NSW Code of Practice for the Control of Legionnaires’ Disease (CoP) published in 2004, compliments the Public Health Act 2010 and the Public Health Regulation 2012. The CoP assists, details and provides guidance to all those concerned with various aspects of microbial control in the various specific systems.

### 4.0 ALLOCATION OF RESOURCES/COST RECOVERY

Council’s are required to maintain a register of water-cooling systems in accordance with the Regulation. Resources must be allocated to this task to continually maintain and update the register in the required format. It is essential that Council continually search for new water-cooling systems through the development application process.
Council will audit all registered water-cooling systems at least once a year. The purpose of the audit is to monitor and ensure compliance with the legislation and that all required records are in place. Audits involve a physical inspection, checking manuals and maintenance details, with water sampling undertaken as part of the process. NSW Department of Health is responsible for auditing the systems in public health care facilities.

In accordance with section 608(3) of the Local Government Act 1993, Councils are able to recover costs of inspecting water-cooling systems and warm-water systems and sending off water samples to be tested. The fee for these inspections and water sampling is adopted by Council each year in accordance with Council’s Revenue and Pricing Policy for the current financial year.

5.0 COUNCIL ACTIVITIES

5.1 Register of Premises

The Public Health Regulation 2012 requires a local council to keep a register of water-cooling systems and warm-water systems installed on regulated premises in its area of jurisdiction.

Wagga Wagga City Council maintains such a register in electronic form with Property & Rating System. The entry in the register relating to each regulated system includes:

- the type of regulated system
- the address and telephone number of the premises on which the system is installed
- the name and contact details of the occupier of the premises (including residential address, e-mail address and home, business and mobile telephone numbers)
- the Australian Business Number (ABN) or Australian Company Number (ACN) (if any) of the occupier of the premises
- details of any inspections carried out by the local government authority for the purposes of the Act

All entries are arranged for rapid identification of the premises and occupier in the case of an outbreak. It is essential that contact with the occupier can be made outside normal business hours, particularly at weekends. The electronic register is linked to Council’s mapping system.

5.2 Locating Unregistered Water-cooling Systems

Across NSW, a significant number of unregistered water-cooling systems have been implicated in clusters of Legionnaires’ disease. Where unregistered water-cooling systems have been discovered it is usual to find that the building owner or occupier is unaware of their obligations under the Act and Regulation. This can result in the water-cooling system often not operated or maintained properly and is therefore a higher risk to public health.
Unregistered water-cooling systems may be located using a combination of the following mechanisms:

- Checking aerial photography of the central business district buildings, and commercial and industrial buildings; and
- Canvassing the owners/occupiers of all central business district buildings, and commercial and industrial buildings for which there is no registration of a water-cooling system.

5.3 New Installation and Modifications

As new developments occur within the city, installation of cooling towers will be identified through Councils Development Application process and added to the register. Authorised Officers will focus on the principles of Legionella control when dealing with new installations, modification or renovations to ensure compliance in accordance with AS/NZ Standard 3666.1:2011.

5.4 Notification to Council

Where it has been decided that a water-cooling system is maintained using a risk assessment and performance based monitoring approach the Council must be notified in writing.

5.5 Monitoring Program

Council have legislated powers to inspect premises with regulated systems. Council undertakes a monitoring program with the focus on ensuring existing and new installations comply with relevant legislation, Codes of Practice and Australian Standards. Safe and easy access to a regulated system for the purpose of inspection must be provided. Audit and inspection procedures of regulated systems are carried out in accordance with Council’s Standard Operating Procedures for the Inspection of Regulated Systems. Every registered water-cooling system in the Wagga Wagga Local Government Area is inspected annually. The inspection involves:

- Reviewing on-site operational and maintenance manuals
- Confirming certification of the process designed to control microbial growth
- Checking cleaning, routine service and maintenance records
- Checking compliance of routine water analysis results by a NATA accredited laboratory
- Taking water samples where records are non compliant, not up-to-date with periodic testing or not made available at the time of inspection
- Checking the clarity of the water
• Checking for automated dosing system to ensure effective management of corrosion, scaling, fouling, particulate matter and microbial growth
• Checking for changes in the local environment e.g. local building demolition or construction that may cause increased entrainment of particulate matter into the cooling tower
• Checking for leaks & chemical spills
• Notifying owners if *Legionella* bacteria counts are high and advise of immediate decontamination procedures;
• Advising Department of NSW Health of any positive results found in Wagga Wagga through sampling process; and
• Providing advice and educational material to owners and occupiers of the building with regulated system.

During inspections and audits, defective and poorly maintained systems will be required to be remedied immediately.

### KEY PERFORMANCE INDICATORS: Prescriptive approach

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Cooling Tower</strong></td>
<td></td>
</tr>
<tr>
<td>Certification for the Process of Disinfection</td>
<td>annually</td>
</tr>
<tr>
<td>Routine service records</td>
<td>monthly</td>
</tr>
<tr>
<td>Routine cleaning records</td>
<td>not exceeding six (6) month interval</td>
</tr>
</tbody>
</table>

Building Owners and occupiers must ensure that water-cooling system are equipped with a disinfection procedure that is in operation at all times and that is designed to control microbial growth so that:

(a) the level of Legionella in the system is not more than 10 colony-forming units per millilitre, and

(b) the heterotrophic plate count in the system is not more than 100,000 colony-forming units per millilitre

### KEY PERFORMANCE INDICATORS: Performance based monitoring

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Cooling Tower</strong></td>
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<tr>
<td>Routine service records</td>
<td>monthly</td>
</tr>
<tr>
<td>Routine cleaning records</td>
<td>not exceeding six (6) month interval</td>
</tr>
<tr>
<td>Water analysis test results for Legionella</td>
<td>Monthly interval</td>
</tr>
<tr>
<td>Water analysis test results for heterotrophic Colony Counts</td>
<td>Monthly interval</td>
</tr>
</tbody>
</table>

### 6.0 RISK FACTORS FOR COOLING TOWERS

The main risk factors for an outbreak of the disease are:

- The presence of Legionella bacteria in high concentrations
- Conditions suitable for multiplication of the organisms: suitable temperature (20°C to 50°C) and a source of nutrients such as sludge, scale, rust, algae and other organic matter
• A means of creating and spreading breathable droplets, such as the aerosol generated by a cooling tower, shower or spa pools
• Exposure of susceptible people to these aerosols.

6.1 Controlling the risk of microbial growth

By addressing the following critical risk factors the potential for Legionella growth in cooling water systems will be minimised. Critical risk factors and resultant infection of people include:

• **Stagnant water** - A lack of circulation will allow solids in the water system to settle out as sludge. This sludge is implicated in the growth of Legionella and also causes corrosion.

• **Nutrient availability** - The amount of nutrients in the water has a significant effect on the ability of bacteria to grow rapidly and therefore needs to be controlled. The more nutrients there are in the water, the more 'food' there is for bacteria.

• **Poor water quality** - Poor quality of water supports the growth of Legionella concentration, heterotrophic bacteria, protozoa and algae.

• **Deficiencies in the cooling tower** - These include deficiencies in the physical design, condition and maintenance of the system.

• **Location of the cooling tower system** - A poorly located tower can be subject to environmental contamination, for example, from building sites. This can increase the level of nutrients and with it, the number of bacteria, including Legionella.

6.2 On-site Operational and Maintenance Manuals

A person installing a system is required to provide an operating manual for the system prior to handing over to an occupier for operation. The operating manual should incorporate the water treatment process and include:

• Physical details (drawings),
• Operating procedures, and
• Shut down & start up procedures.

Manuals should be periodically reviewed by site owners/occupiers to incorporate amended legislation, standards, codes and industry practices.

Manuals shall be kept on site adjacent to the regulated systems or in a clearly identified location in proximity to the installation. A person in charge of the facility must be familiar with the location of these manuals.
Manuals must be readily available to Council’s Environmental Health Officer for inspection.

6.3 Maintenance Records

The Public Health (Act) and (Regulation) adopted the AS/NZ 3666.2.2011 and 3666.3.2011 as the standards to which the maintenance of the regulated systems must comply. In accordance with AS/ NZ 3666.2.2011 records must be kept whenever maintenance is performed. This includes the date, details of maintenance and the name of the employer. The person carrying out the work needs to review the documentation and to sign the record document.

Any person carrying out maintenance work on systems shall complete a maintenance report. Records shall be kept on site adjacent to the regulated systems or in a clearly identified location in proximity to the installation. A person in charge of the facility must be familiar with the location of these records. Manuals must be readily available to Council’s Environmental Health Officer for inspection.

6.4 Process Designed to Control Microbial Growth

In a water-cooling system, *Legionella* can only be controlled by the installation of a process designed to control microbial growth. Written certification of the process of disinfection shall be supplied by a competent person and kept on site and updated annually.

Certificates shall be kept on site adjacent to the regulated systems or in a clearly identified location in proximity to the installation. A person in charge of the facility must be familiar with the location of the current certification.

6.5 Heterotrophic Colony Count (HCC) and Legionella Count

Monitoring of the cooling tower water for the presence of bacteria is an important tool in verifying if control strategies for the critical risk factors are effective. Such monitoring should include both:

- Heterotrophic Colony Count (HCC) is a test measuring the total bacterial load in the sample of water. It is reported as the number of colony forming units per millilitre (CFU /mL).

- Legionella Count is an estimate of the number of viable units of *Legionella pneumophila* and a range of other *Legionella* species per millilitre of water. Regular Legionella testing should be implemented as part of the water treatment management system.
However, a high HCC level (greater than 100,000 CFU/mL) is an indicator that effective microbiological control is not being maintained and that the system may support Legionella growth unless action is taken to bring the system back under control.

The testing of the water samples shall only be undertaken by laboratories accredited by NATA for technical competence in the performance of the bacterial analytical method.

### Indicative Water Quality Target Ranges

<table>
<thead>
<tr>
<th>Bacteria</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Legionella</td>
<td>Not detected (&lt;10CFU/mL)</td>
</tr>
<tr>
<td>HCC</td>
<td>Less than 100,000 CFU/mL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solids</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total dissolved solids</td>
<td>Less than 1000 ppm</td>
</tr>
<tr>
<td>Conductivity</td>
<td>Less than 1500 µS/cm</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>Less than 150 ppm</td>
</tr>
<tr>
<td>Calcium hardness</td>
<td>Less than 180 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pH</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (for bromine compounds)</td>
<td>7 - 9</td>
</tr>
<tr>
<td>pH (for chlorine based compounds)</td>
<td>7 - 8</td>
</tr>
<tr>
<td>Total alkalinity</td>
<td>80 – 300 ppm</td>
</tr>
</tbody>
</table>

### Action recommended at various populations of total *Legionella* in water systems where a sample has been taken

<table>
<thead>
<tr>
<th>Population</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>Effective maintenance practices.</td>
</tr>
<tr>
<td>Up to 100</td>
<td>Maintenance practices may not be satisfactory. Rectify. Monitor and perform follow up testing.</td>
</tr>
<tr>
<td>100 to 1,000</td>
<td>Potentially hazardous situation. Re-evaluate maintenance procedures including Current disinfection process. Rectify and perform follow up testing.</td>
</tr>
<tr>
<td>Greater than 1,000</td>
<td>Serious situation. Shut down the system promptly and decontaminate. Return to service and perform follow up testing.</td>
</tr>
</tbody>
</table>
7.0 REPORTING REQUIREMENTS

NSW Department of Health may request reports on the number of systems registered and related details as part of overall programs for ensuring prevention and preparedness for outbreaks.

7.1 Notifying NSW Department of Health of Failures or Potential Risks

NSW Department of Health has an overarching role in monitoring Legionella in the population through the Public Health Surveillance System. It is not envisaged that the Department would be notified of minor failures, however Council will notify the Department of NSW Health when multiple failures occur or when a water-cooling tower has been unregistered.

7.2 Facilitating Improvement

Council will introduce initiatives and strategies to provide a basis for improvement in procedures and preparedness to address Legionella control and outbreaks, including:

- Identifying systems which are not registered
- Writing to local maintenance contractors and building owners and occupiers
- Implementing an annual inspection program
- Including relevant information on Council’s mapping system and web page
- Collecting data on the age and condition of water-cooling systems; and
- Ensuring older installations are improved and updated as soon as possible with emphasis on safe and effective microbial control, and critical defects being remedied immediately.

### Action recommended at various populations of total Heterotrophic organisms in water systems where a sample has been taken

<table>
<thead>
<tr>
<th>Population</th>
<th>Action Required</th>
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<tbody>
<tr>
<td>Less than 100 000</td>
<td>Effective maintenance practices.</td>
</tr>
<tr>
<td>Greater than or 100 000</td>
<td>Investigate problem. Review water treatment program. Take remedial action including immediate disinfection.</td>
</tr>
<tr>
<td>Greater than 5 000 000</td>
<td>Investigate problem. Review water treatment program. Take remedial action including immediate disinfection.</td>
</tr>
</tbody>
</table>
7.2 Education and Training of Council Staff

Environmental Health Officers have a key role in auditing premises and assisting NSW Department of Health in outbreak investigations during which local knowledge is essential. Council will support the attendance of relevant staff at training courses.

8.0 DISEASE MANAGEMENT AND OUTBREAK RESPONSES

8.1 Definition of an Outbreak of Legionnaires’ disease

An outbreak of Legionnaires’ disease is an event whereby:
- Two or more probable notifications are linked in time and place, and
- They have a history consistent with Legionnaires’ disease.

8.2 Responsibility

NSW Department of Health are responsible for coordinating case investigation and outbreak responses under relevant notifiable disease protocols. An outbreak usually means two or more disease cases linked by time and place.

8.3 Legionnaires’ Disease Notification

Legionnaires’ disease is notifiable, that is, known cases and laboratory isolations must notify cases of Legionnaires’ disease to the Director-General of the NSW Department of Health.

8.4 Environmental Investigation

Council will be requested to assist NSW Department of Health with environmental investigation and other local responses in the event of a single case and an outbreak. Local authority is to keep the necessary contact list as required by the Legionnaires Disease Guidelines for Public Health Units.

The contact list should nominate appropriate council personnel (and their business and after business hours contact details) who would be involved in the investigation of a cluster of Legionnaires’ disease cases. Council’s Environmental Health Coordinator functions as part of functional Support Area under The Local Emergency Management Committee.

In some instances where buildings may be owned or managed by Council it is important the investigative processes be transparent. Although the same regulatory processes apply to Council premises there
can be some circumstances where there may be a perceived ‘conflict of interest’. Where these concerns are detected, Council’s Environmental Health Officers will call on the NSW Department of Health for assistance.

**Related Documents**

- Legionnaires Disease Guidelines for Public Health Units
- NSW Code of Practice for the Control of Legionnaires’ Disease 2nd Ed, 2004
- The standards Australia Handbook SAA/SNZ HB 32:1995
- Guidance for the Control of Legionella, National Environmental Health Forum Monographs, water series NO 1

**Associated Legislation**

- Local Government Act 1993
- Public Health Act 2010
- Public Health Regulation 2012

**Version History**

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<th>Person (s)</th>
<th>Change</th>
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<tr>
<td>1</td>
<td>12/08/2010</td>
<td>Manager Environment and Recreation Services</td>
<td>Original version</td>
</tr>
<tr>
<td>2</td>
<td>1/10/2014</td>
<td>Manager Environment and Recreation Services</td>
<td>4 year review</td>
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**Date of Next Review**

Four year review - 2018