



Premise Plumbing in Vancouver Buildings: Enhanced Public Safety, Efficiency & Long-Term Resiliency Measures

BOMA QBT Session | May 1, 2019

Topics



1) Background

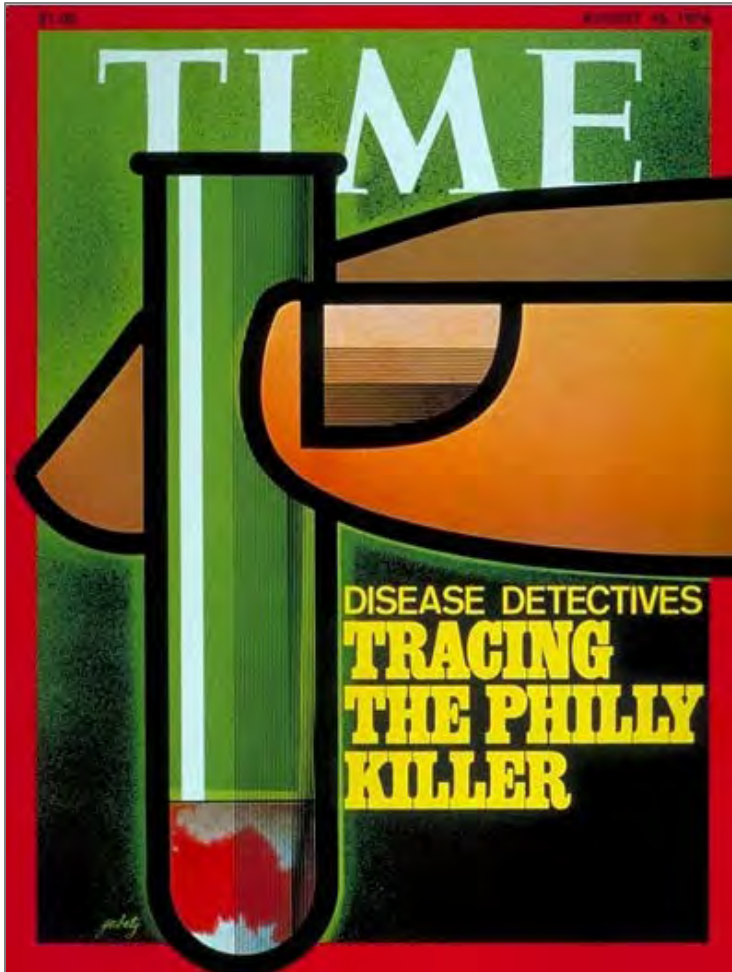


Image sources: August 16, 1976 cover of TIME, <http://time.com/3994453/legionnaires-disease-name-history-1976> and September 20, 2012 leading page of Le Soleil newspaper.

How *Legionella* affects building water systems and people

1. Internal and external factors can lead to *Legionella* growth in building water systems.

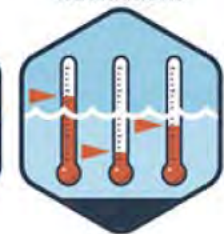
Construction



Biofilm



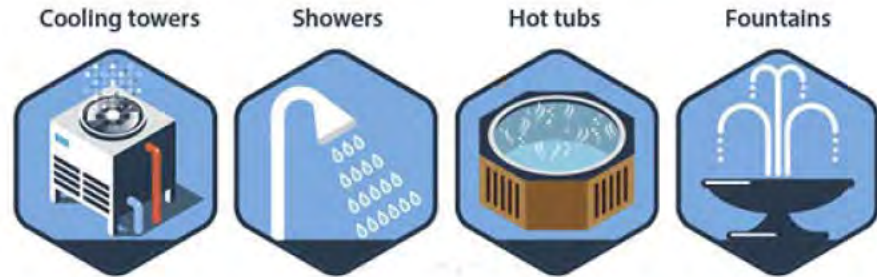
Water temperature fluctuations



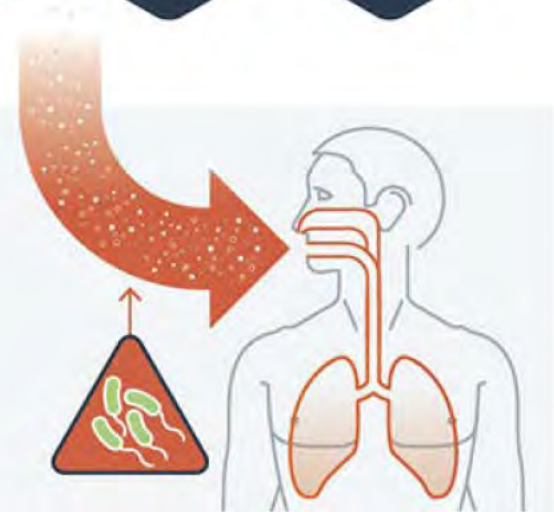
2. *Legionella* grows best in large, complex water systems that are not adequately maintained.



3. Water containing *Legionella* is aerosolized through devices.



4. People can get Legionnaires' disease when they breathe in mist or accidentally swallow water into the lungs containing *Legionella*. Those at increased risk are adults 50 years or older, current or former smokers, and people with a weakened immune system or chronic disease.

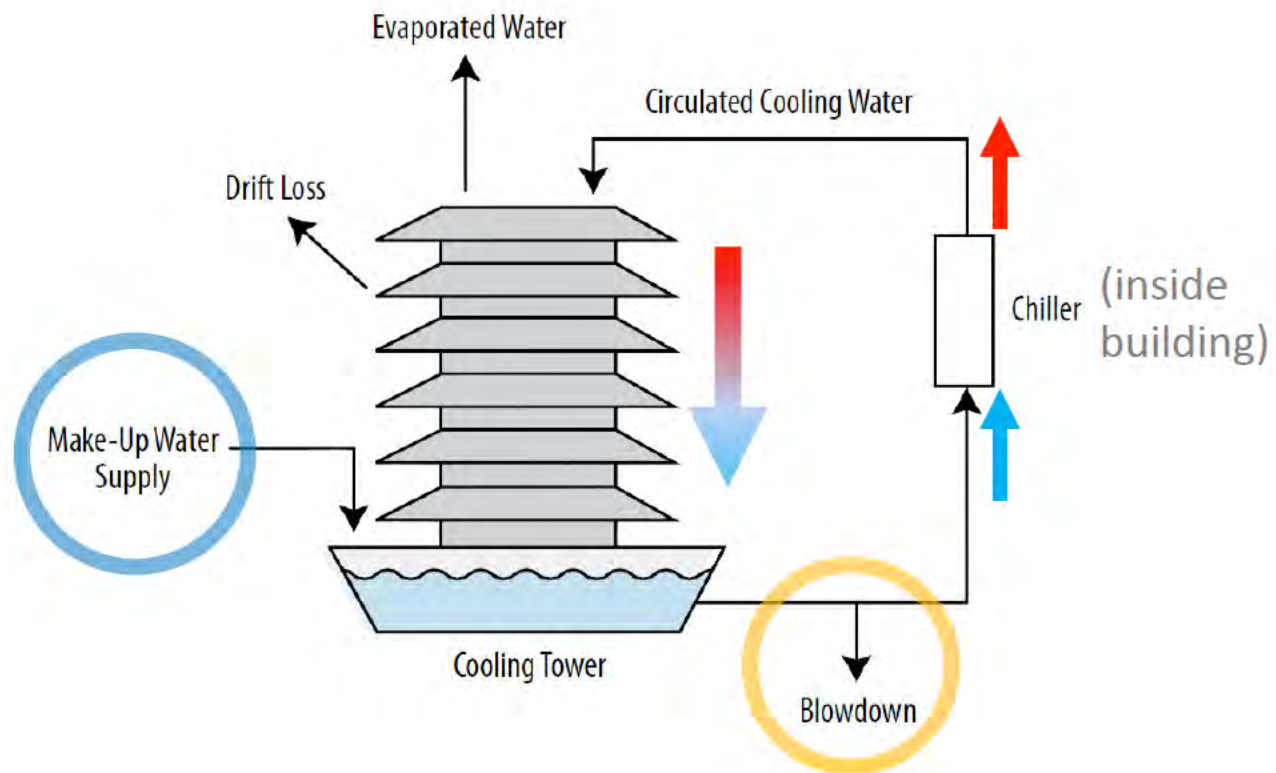


www.cdc.gov/legionella

01/12/2018

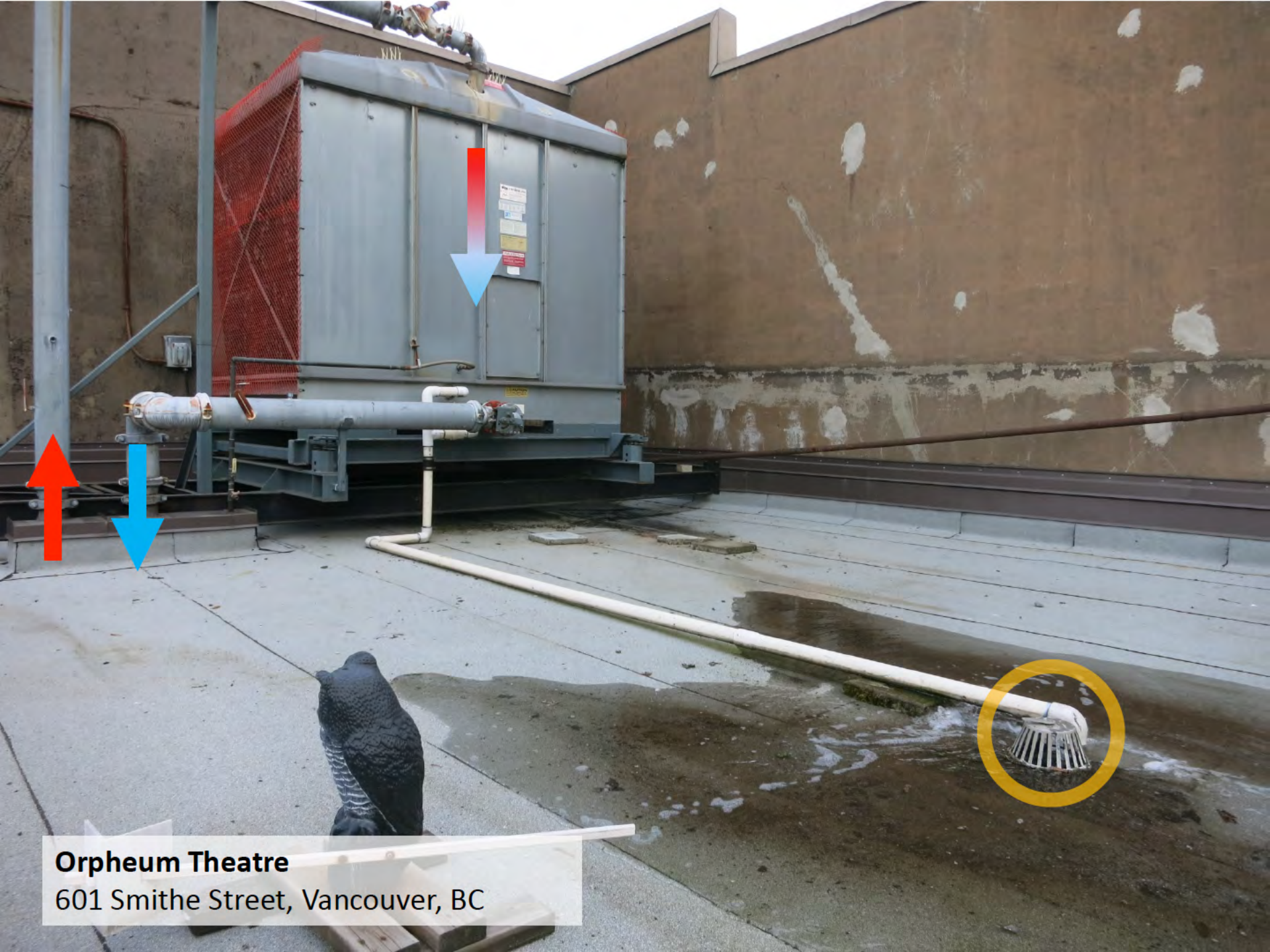
Topics





EPA WaterSense at Work (2012)

epa.gov/watersense/watersense-work-0



Orpheum Theatre
601 Smithe Street, Vancouver, BC



Orpheum Theatre
601 Smithe Street, Vancouver, BC

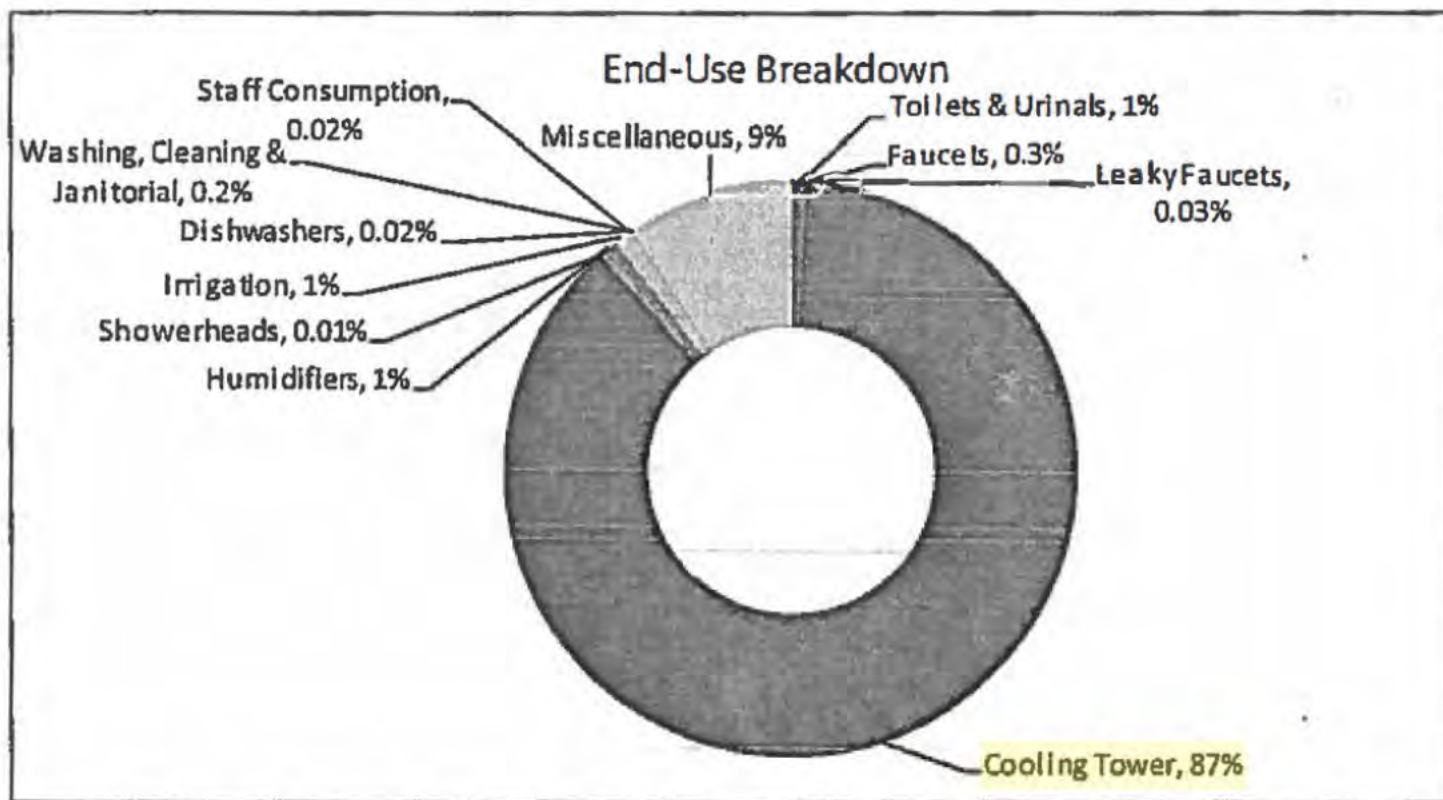


Hyatt Regency Hotel

655 Burrard Street, Vancouver, BC

2) Cooling Towers

- **20-50%** of a building's water use



Data courtesy of the City of Toronto.

- Utility **rate increases** → operational costs

2) Cooling Towers

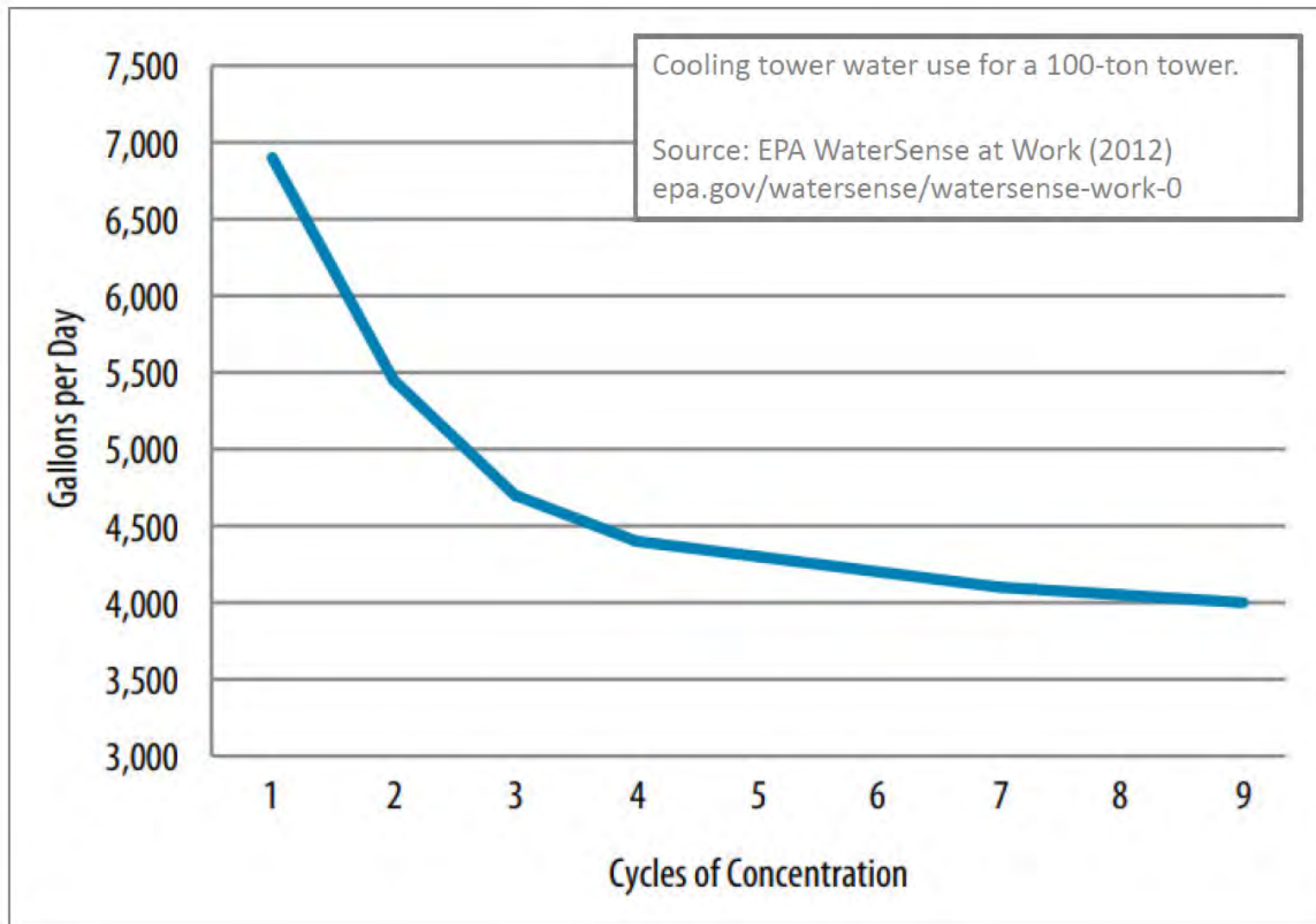
Water & Sewer Rate Outlook (Vancouver)

Year	% Change ¹	
	Water	Sewer
2019	9.7	11.0
2020	9.8	11.0
2021	9.8	11.0
2022	9.6	10.0
2023	9.8	10.0

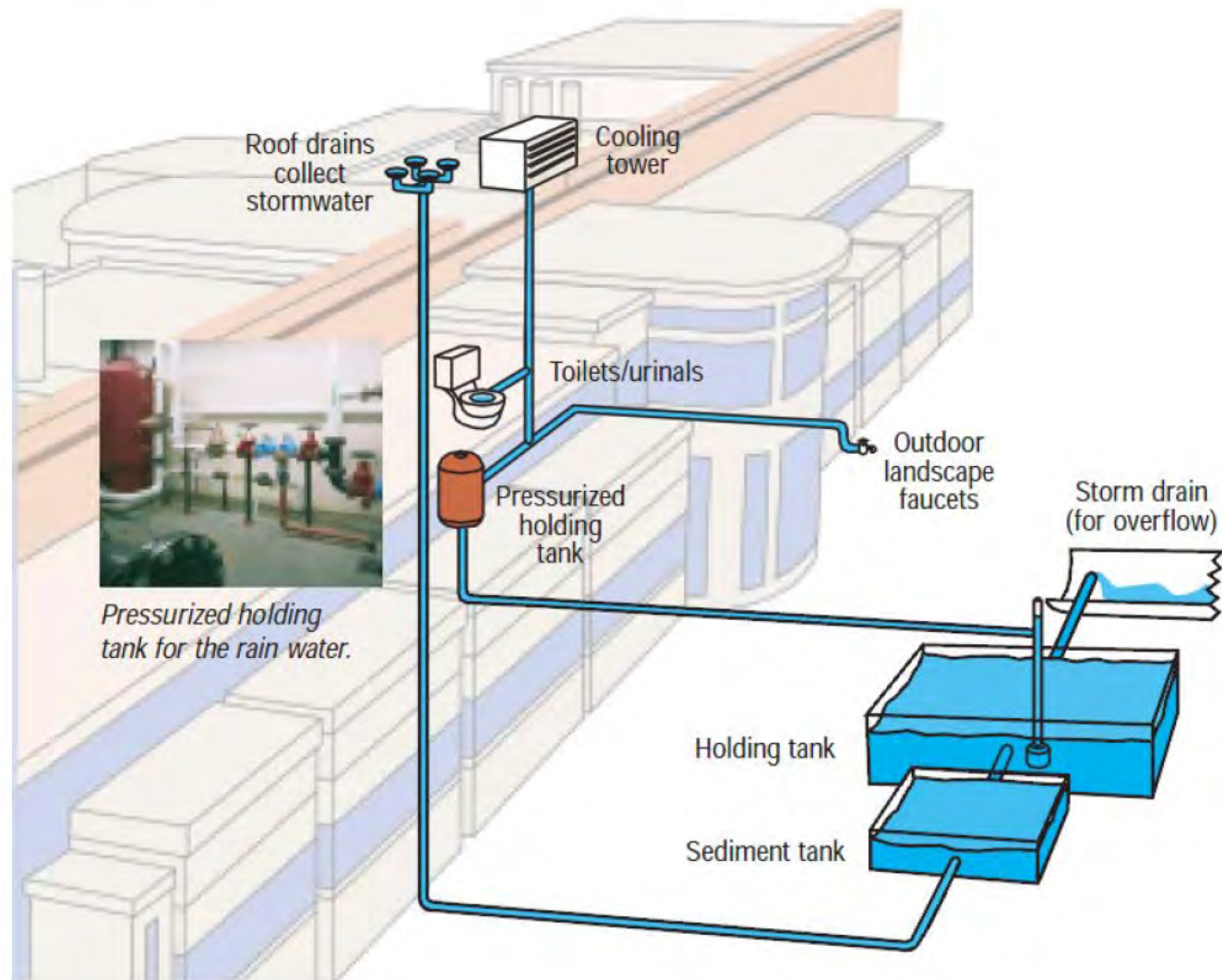
¹ Projected Vancouver rate increases (Dec. 11, 2018 Council meeting)

Source: City of Vancouver 2019 Annual Reviews of Water and Sewer Rates
council.vancouver.ca/20181211/documents/spec1a.pdf
council.vancouver.ca/20181211/documents/spec1b.pdf

2) Cooling Towers



2) Cooling Towers



Source: US EPA Sustainable Facilities Practices Branch (May 2003).
Case Study of the Kansas City Science & Technology Center. EPA-200-F-03-001.

2) Cooling Towers

7.8 ONGOING ADJUSTMENT WHERE LESS THAN 85% OF WATER IS DISCHARGED - FOR METERED PROPERTIES ONLY

(1) Application to City Engineer for Ongoing Adjustment

Where

- (a) an owner or occupier of a property has received a retroactive adjustment pursuant to Section 7.7 and in the City Engineer's opinion, the circumstances giving rise to the retroactive adjustment are likely to be of a continuing nature, or
- (b) the owner or occupier of a water metered property has not received a retroactive adjustment pursuant to Section 7.7 but anticipates that less than 85% of the water delivered to a water meter will ordinarily be discharged into the public sewer system,

the owner or occupier of the property may apply to the City Engineer for an ongoing adjustment to the rates set out in Section 7.3 and Part V of Schedule A of this By-law on the basis of actual wastewater volumes as opposed to the amount of water delivered.

2) Cooling Towers

- “*Legionella* continues to be the **most frequently reported etiology** among drinking water-associated outbreaks.” (USA 2013-2014)
Benedict *et al.* (2017) *MMWR* **66**: 1216-1221
- “Cooling towers were implicated or suspected in ...
60% outbreak-associated deaths ...” (2006-2017)
Hamilton *et al.* (2018) *Curr Environ Health Rep* **5**: 263-271
- “... residential proximity to a [cooling tower] may account for
19.6% of sporadic community-acquired cases.” (England & Wales 1996-2006)
Ricketts *et al.* (2012) *J Epidemiol Community Health* **66**: 618-623
- “... LD dispersed from cooling towers ... can be found to extend up to **12 km.**”
White *et al.* (2013) *Epidemiol Infect* **141**: 789-799
- “Our findings ... suggest that decontaminated [cooling towers] ... can be
potentially recolonised by contaminated aerosols from other [cooling towers].”
Wüthrich *et al.* (2019) *Euro Surveill* **24**(4)



Seniors' Complex
Capital Regional District, BC

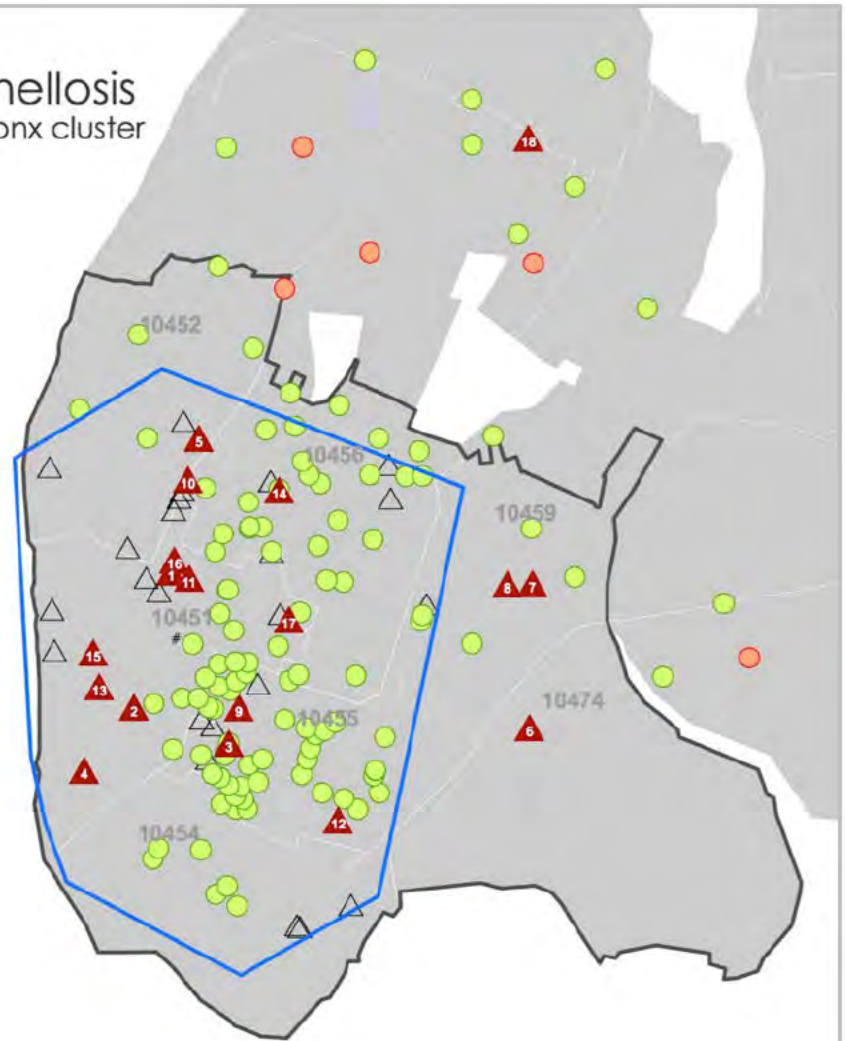
2) Cooling Towers

Cooling towers and legionellosis case-patient residences near South Bronx cluster

- Epi-linked
- Not Epi-linked
Event Dates 7/8/15-8/18/15

Buildings with Cooling Towers
Updated 8/18/15 9:00 AM

- ▲ Positive
- △ Negative
- × Pending
- Impact Zone





Services

News

Government

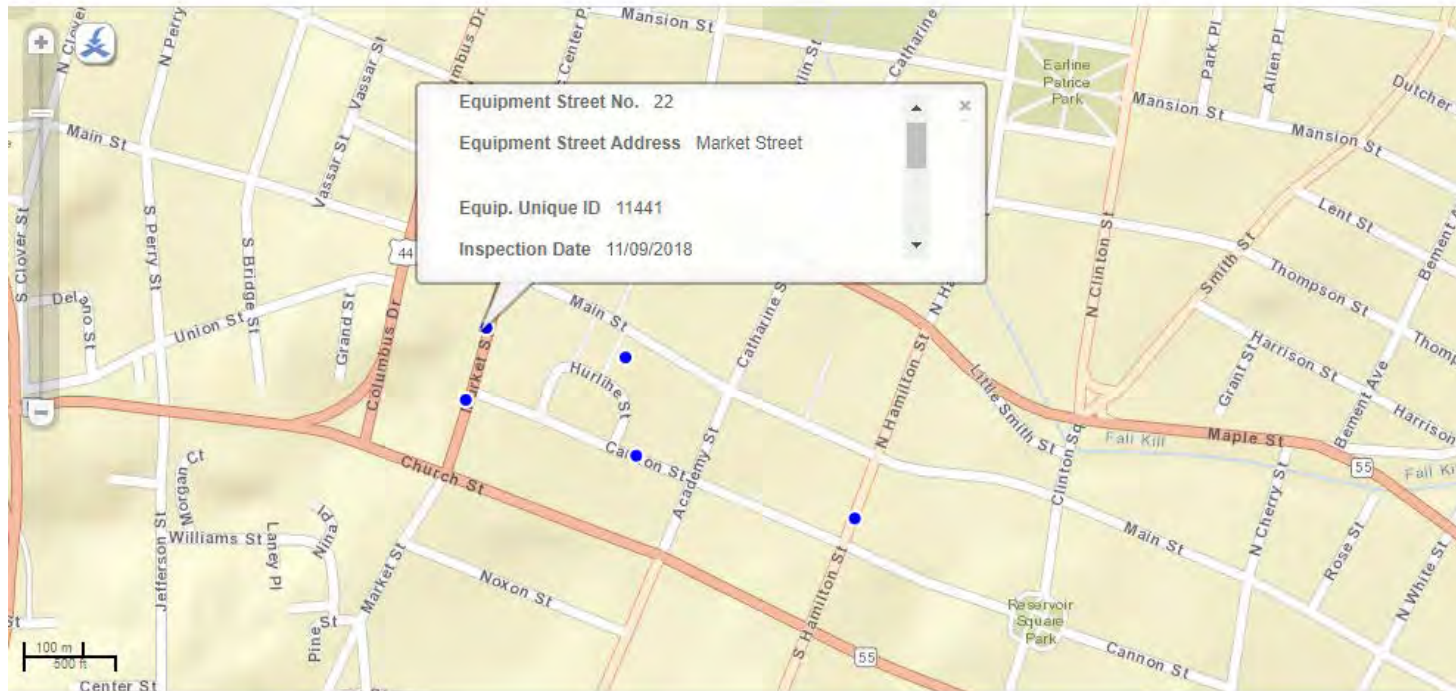
Local

HEALTH DATA NY ▼ DATA.NY.GOV DEVELOPERS ▼ HELP ▼ ABOUT ▼

Registered Cooling Tower Map

Based on [Registered Cooling Tower Map](#)

This map displays information about registered cooling towers within New York State. The data is self-reported by owners/property managers of cooling towers in service in New York State. In August 2015 the New York State Department of Health released emergency regulations requiring the owners of cooling towers to register them with New York State, in addition the regulation includes requirements: regular inspection; annual certification; obtaining and implementing a maintenance plan; record keeping; reporting of certain information; and sample collection and culture testing to protect public health. All cooling towers in New York State, including New York City, need to be registered in the NYS system. Registration is done through an electronic database found at: www.ny.gov/services/register-cooling-tower-and-submit-reports. For more information, check <http://www.health.ny.gov/diseases/communicable/legionellosis/>. The "About" tab contains additional details concerning this dataset.



2) Cooling Towers

- Prevalence: 700 systems within Vancouver (estimate).
- As of **January 1, 2020**, all new & existing cooling towers and evaporative condensers require an *operating permit*.
 - www.vancouver.ca/operating-permit
 - Locations published on the public VanMap (GIS-based).
 - *Chief Building Official* to be notified within 30 days of changes.
 - If removed or permanently discontinued, must be drained, sanitized and disconnected from the make-up water line.
- Subject of the Bulletin:
“Discharge from Cooling Tower Drains”
(City of Vancouver Bulletin 2018-002-PL, bulletins.vancouver.ca)
- BC Building Code 2018: Water treatment requirements for new cooling towers
(Book I, Division B, Sentence 6.3.2.15.(4))

2) Cooling Towers

Next steps:

- Encourage local laboratory capacity for *Legionella* testing (ISO & ELITE certification; with assistance of VCH & BC CDC).
- Continued site visits, review of standards & consultation.

Selected references:

- Crown-owned buildings
(MD 15161-2013 Standard,
www.tpsgc-pwgsc.gc.ca/biens-property/documents/legionella-eng.pdf).
- General water management plans
(ASHRAE 188-2018 Standard + CDC toolkit,
www.cdc.gov/legionella/wmp/toolkit/index.html;
free training, www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html).
- Maintenance standards and protocols
(NSF P453-2017; ASHRAE Guideline 12: being revised;
ASHRAE 514 (former NSF 444): under development).



3) Decorative Features

[Home](#)[News](#)[Weather](#)[Investigations](#)[Entertainment](#)[LIVE TV](#)

64°

[Connect](#)

Third Person Dead From Legionnaires' Outbreak in Chicago Hotel

Officials tie outbreak to main fountain in lobby of JW Marriott hotel

Published Aug 31, 2012 at 5:46 PM | Updated at 6:41 PM CDT on Sep 1, 2012



The Chicago Department of Health on Friday said a third person had died following an outbreak of Legionnaires' Disease at a downtown Chicago hotel.

3) Decorative Features

Design
Office of Facilities Planning
Department of Veterans Affairs

Facilities Standards Service
Office of Construction & Facilities Management

CFM

ALERT

INDOOR WATER FEATURES, DECORATIVE FOUNTAINS: RECOMMEND NON - USE

ISSUE:
Incidents of healthcare-associated infection by *Legionella* bacteria, the causative agent of Legionnaires' disease, have been linked to contaminated interior water features. Patients, visitors, and staff who are immunocompromised are particularly vulnerable and, if infected, can have a high mortality rate ^(1,2,3,4,5).

DISCUSSION:
Recently published articles highlight the risk of indoor water features in healthcare facilities. In one report, an indoor water feature in the lobby of a mid-west US hospital was linked to 8 cases of Legionnaires' disease; none of the 8 cases were inpatients at the facility at the time of exposure and some were visitors that likely just passed by the water feature on their way through the lobby ^(6,7,8). In another report, 2 immunocompromised inpatients developed Legionnaires' disease after exposure to a contaminated water feature in a radiation oncology suite ^(9,10). The fountain had been shut down for 5 months and then operational for 4 months prior to the disease cluster. In both situations, routine maintenance, cleaning and disinfection procedures did not prevent *Legionella* contamination or growth.

CONCLUSION:
Indoor fountains and other water features present a risk in healthcare facilities ^(11,12) and should not be included in new VA healthcare interior design solutions. Where these features are currently installed, adaptive reuse of the space for another form of positive healing environment reinforcement should be considered.

ACKNOWLEDGEMENTS:
This Design Alert was developed by a mutual collaborative effort which included the following Participants:

- CFM-Office of Facilities Planning, Facilities Standards Service
- National Infectious Diseases Service (NIDS)
- National Center for Patient Safety

FOR ADDITIONAL INFORMATION:
Contact Zoltan John Nagy, AIA-NCARB-AAH, Facilities Standards Service at Zoltan.Nagy@va.gov.

(continued)

April 19, 2012
003C2B-DA-138

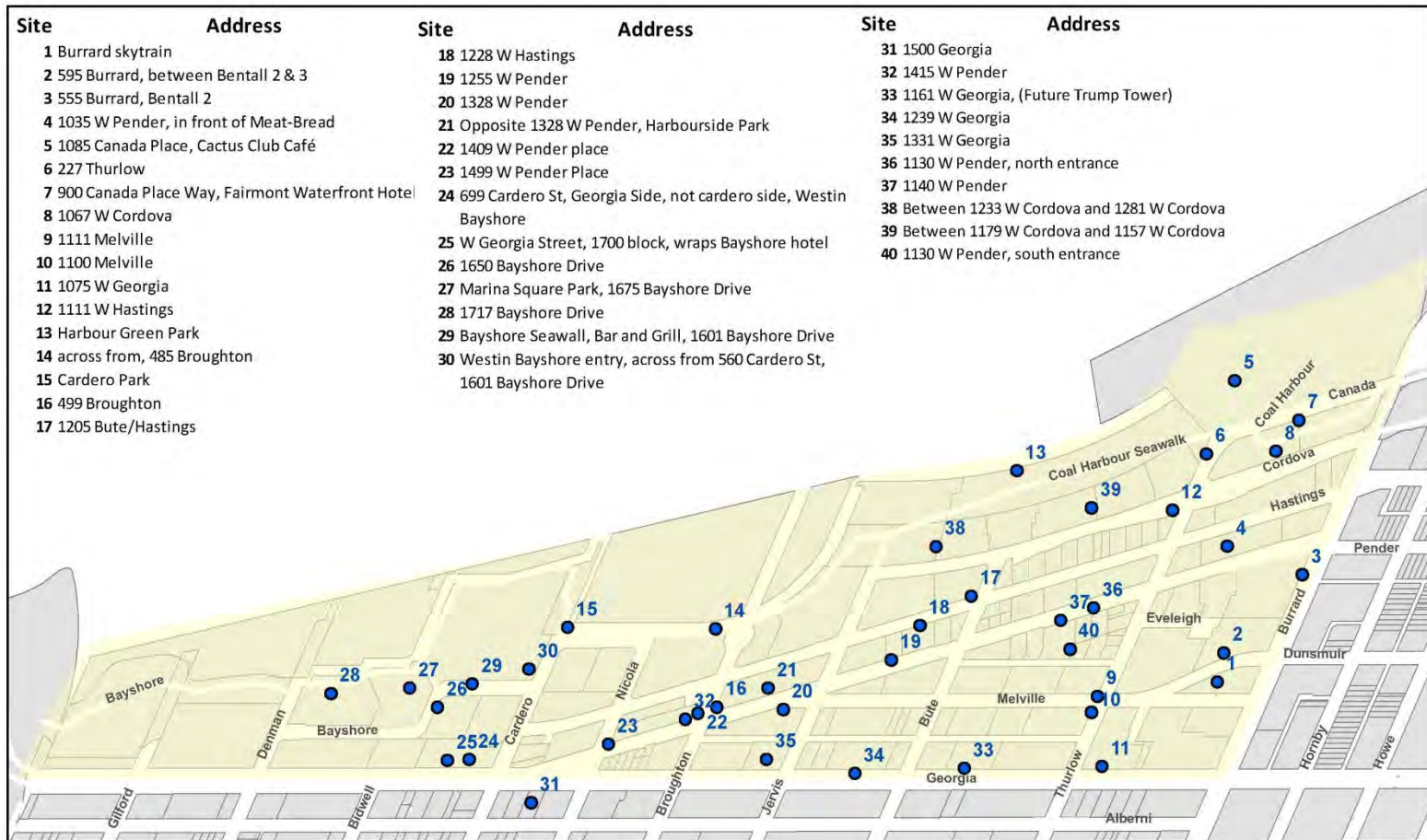


O'Loughlin et al. (2007) *BMC Infect Dis* 7: 93



Haupt et al. (2012)
Infect Control Hosp Epidemiol 33: 185

3) Decorative Features



Legend

- Approximate Fountain Location
- Study Area
- Property Lines

0 130 260 520 Meters

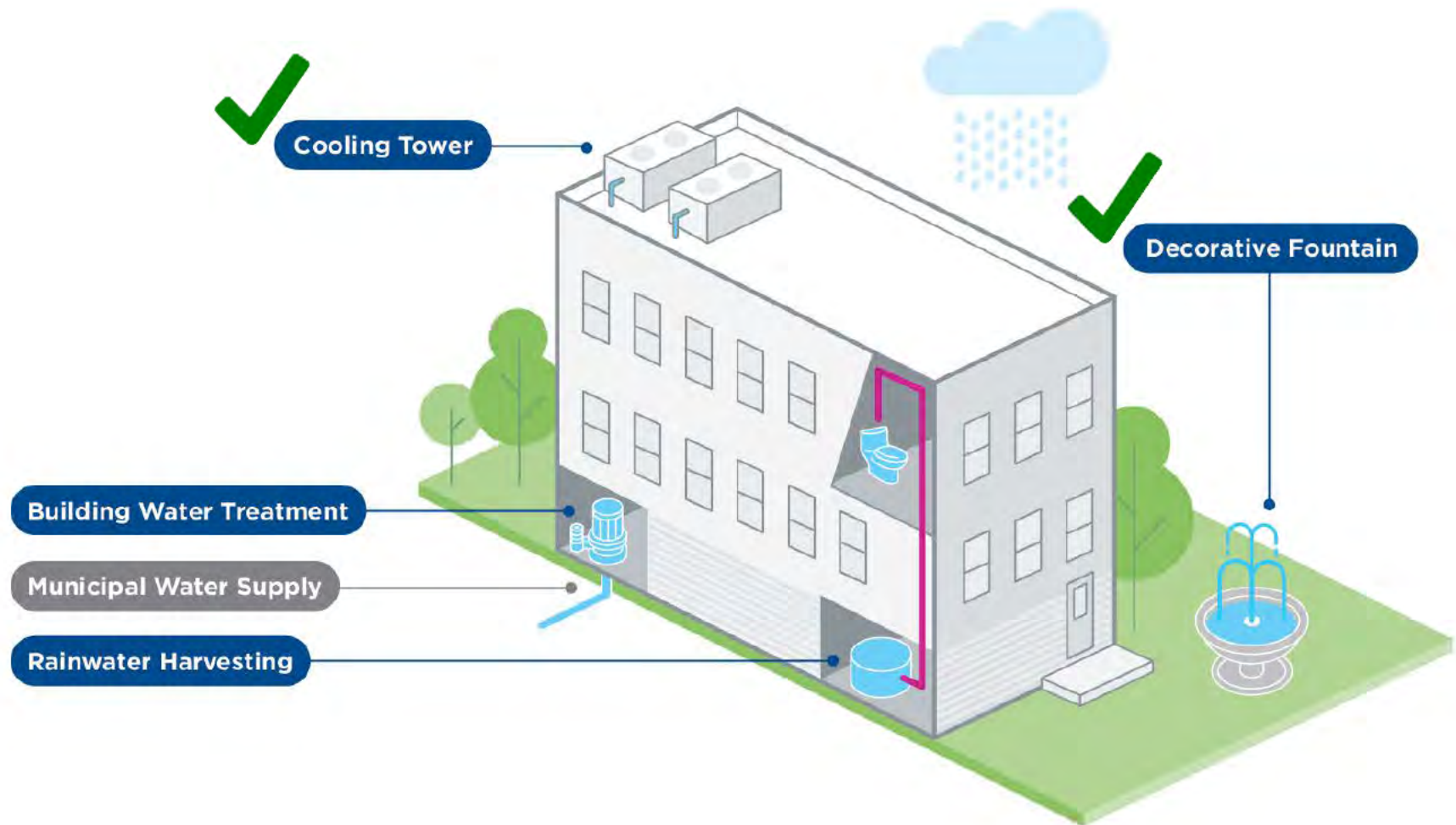
Source: Laura Hosokawa

Author: Darren Perrett

Date: 6/21/2016

3) Decorative Features

- As of **July 1, 2020**, all new & existing decorative water features require an *operating permit*.
 - www.vancouver.ca/operating-permit
 - Includes indoor and outdoor features and green walls.
 - Exempt: single/dual family homes, triplexes, fourplexes.
 - Locations published on the public VanMap (GIS-based).
 - *Chief Building Official* to be notified within 30 days of changes.
 - If removed or permanently discontinued, must be drained, sanitized and disconnected from the make-up water line.

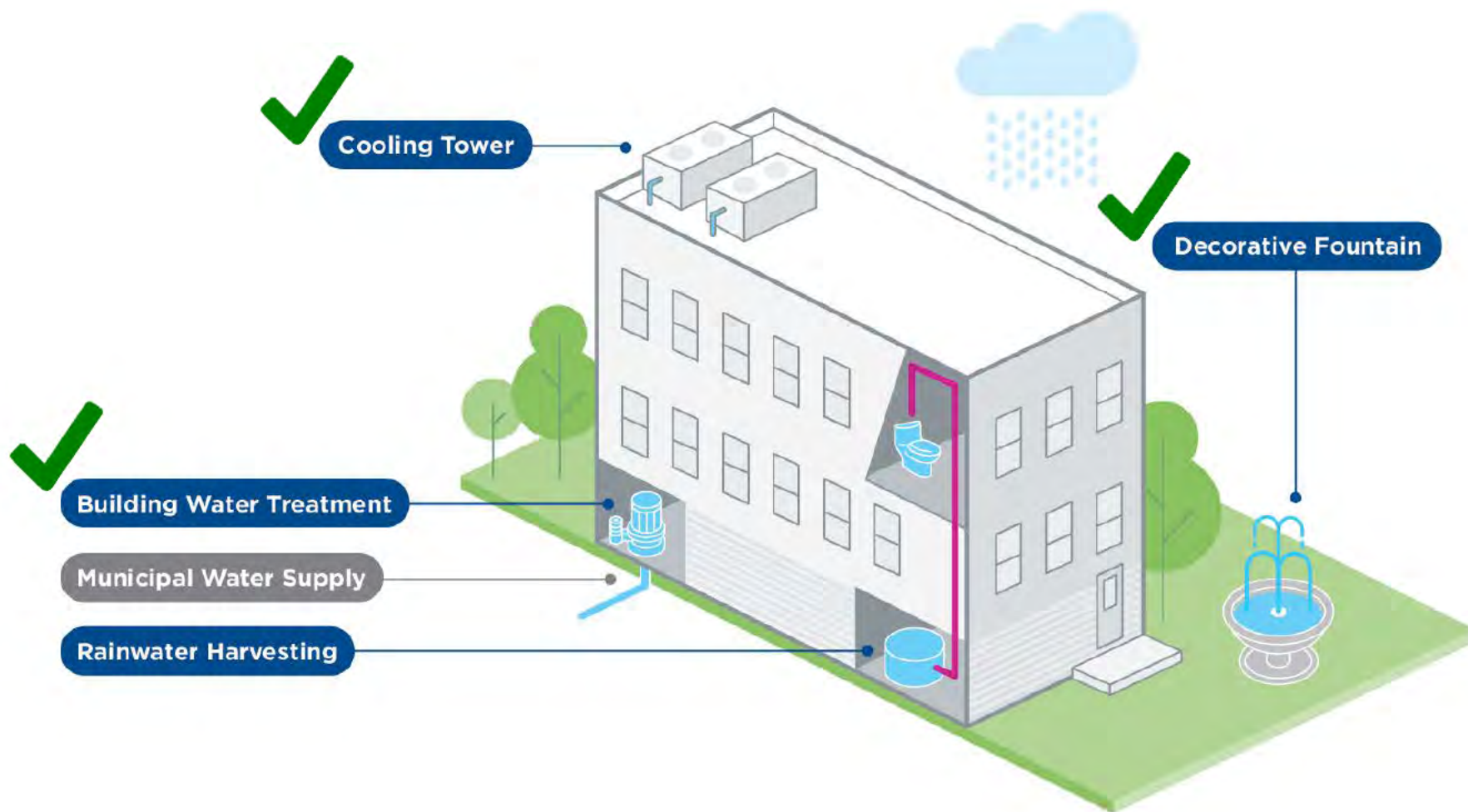


4) Building Water Treatment Systems

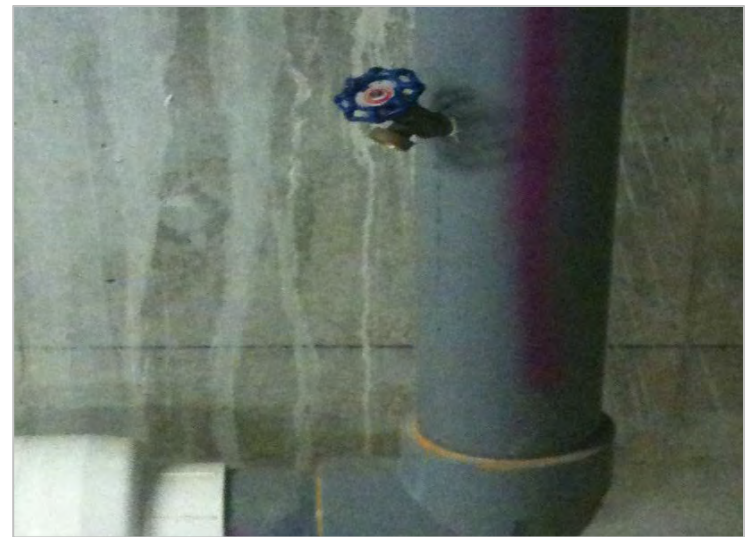


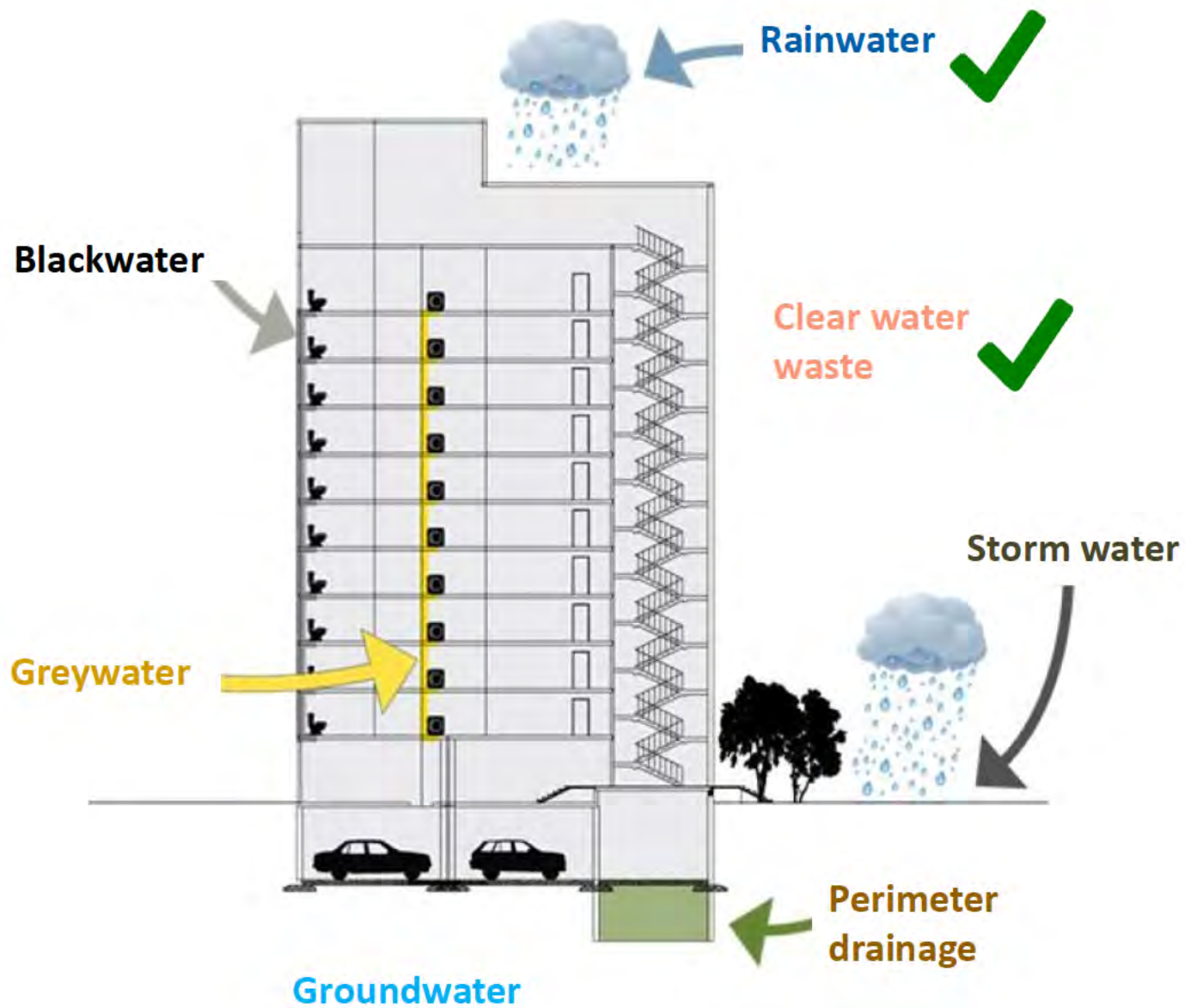
4) Building Water Treatment Systems

- Configuration: Chemical-feed system injects into a building's potable water:
 - Corrosion inhibitor (typically: phosphoric acid 30-60%; zinc chloride 10-30%)
 - pH adjustment (typically: sodium carbonate (soda ash) 5-10%)
- Prevalence: 700 systems within Vancouver (estimate).
- Subject of the Bulletin:
“Water Treatment Devices – Protection from Contamination”
(City of Vancouver Bulletin 2016-001-PL, bulletins.vancouver.ca)
- As of **June 3, 2019**, all new & existing building water treatment systems will require an *operating permit*.
 - Subject to regular inspection.
 - *Operating permit* number to be affixed.
 - Locations published on the public VanMap (GIS-based).
 - *Chief Building Official* to be notified within 30 days of changes.
 - Exempt: single/dual family homes, triplexes, fourplexes.



5) Alternate Water Systems





5) Alternate Water Systems (reference slide)

- Terminology avoided in Vancouver:
“recycled” and “reclaimed” can mean treated wastewater.
- Municipal Wastewater Regulation (B.C. Reg. 87/2012):

Reclaimed water means municipal wastewater that is

- a) treated by a wastewater facility, and
- b) suitable for reuse in accordance with this regulation

- Vancouver Building By-law definitions:

Storm water means water that is discharged from a surface as a result of rainfall or snowfall.

Perimeter drainage water means water collected from the foundation of a structure.

Groundwater means a freestanding body of water in the ground.

5) Alternate Water Systems (reference slide)

- Vancouver Building By-law definitions (continued):

Greywater means waste water from all sources except **blackwater** and **clear-water waste**.

Blackwater means waste water from water closets, urinals and other sanitary fixtures designed for carrying human waste, kitchen sinks, utility sinks, medical sinks, laboratory sinks, and industrial processes, but does not include **clear-water waste**.

Clear-water waste means waste water with impurity levels that will not be harmful to health and may include cooling water and condensate drainage from refrigeration and air-conditioning equipment and cooled condensate from steam heating systems, but does not include **storm water**.

5) Alternate Water Systems

As of **January 1, 2019**, all new & existing systems:

- Require:
 - *An operating permit*
 - Quarterly reporting
 - Water quality testing
 - Cross connection control tests
- Must meet water quality standards:
 - *E. coli* < 100 CFU / 100 mL (as reported by an accredited laboratory)
 - Turbidity < 10 NTU
 - Temperature < 20 °C
- Exceedance: Must switch to potable water and notify the *Chief Building Official*.
- Exempt: single/dual family homes, triplexes, fourplexes, and rain barrels < 500 L cumulative capacity.

5) Alternate Water Systems

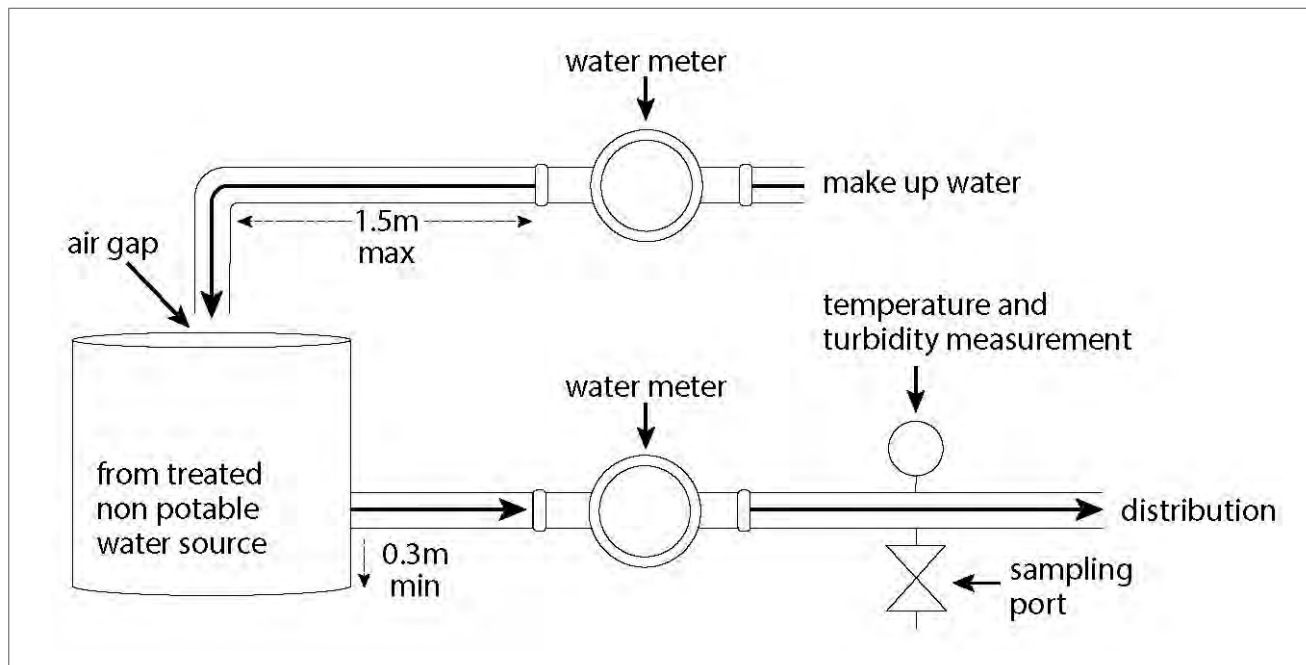
As of **January 1, 2019**, all new systems (not applicable to existing systems) must:

- Use rainwater (above grade, no vehicular traffic, no fertilizer use, and no hazardous materials stored) and/or **clear-water waste**.
 - Not permitted for use: **storm water**, **perimeter drainage water**, **groundwater**, **greywater** or **blackwater**.
- Connect to toilets, urinals & trap primers (mitigate sewer gas release from drains).
 - Optional uses: irrigation (non-food purpose plants), make-up for boilers & cooling towers.
 - **Other uses prohibited**, including potable uses.
- Install **purple piping** (NSF rw, NSF/ANSI Standard 14) & multi-unit residential buildings must use the specified sizing method (IAPMO: iapmo.org/water-demand-calculator)
- Obtain an *operating permit* to obtain an *occupancy permit*.

5) Alternate Water Systems

As of **January 1, 2019**, all new systems (not applicable to existing systems) must:

- Remain operational (written approval required to discontinue).
- Include sub-meters, inline monitoring and a sampling port:



5) Alternate Water Systems

As of **January 1, 2019**, all new systems (not applicable to existing systems) must:

- Include an *operating manual* stamped by a *registered professional of record* and containing:
 - Contact details for system designer.
 - Process flow diagram & schematics.
 - Instructions (O&M, inspection frequency, corrective actions).
 - Safety data sheets.
- Maintain a *maintenance log* with:
 - 24 months of inspections and maintenance records.
 - Water quality test results & corrective actions.
 - Details of system changes.

6) Single Pass Systems

Water cooled (OTC)
condensing unit



Air cooled
condensing unit



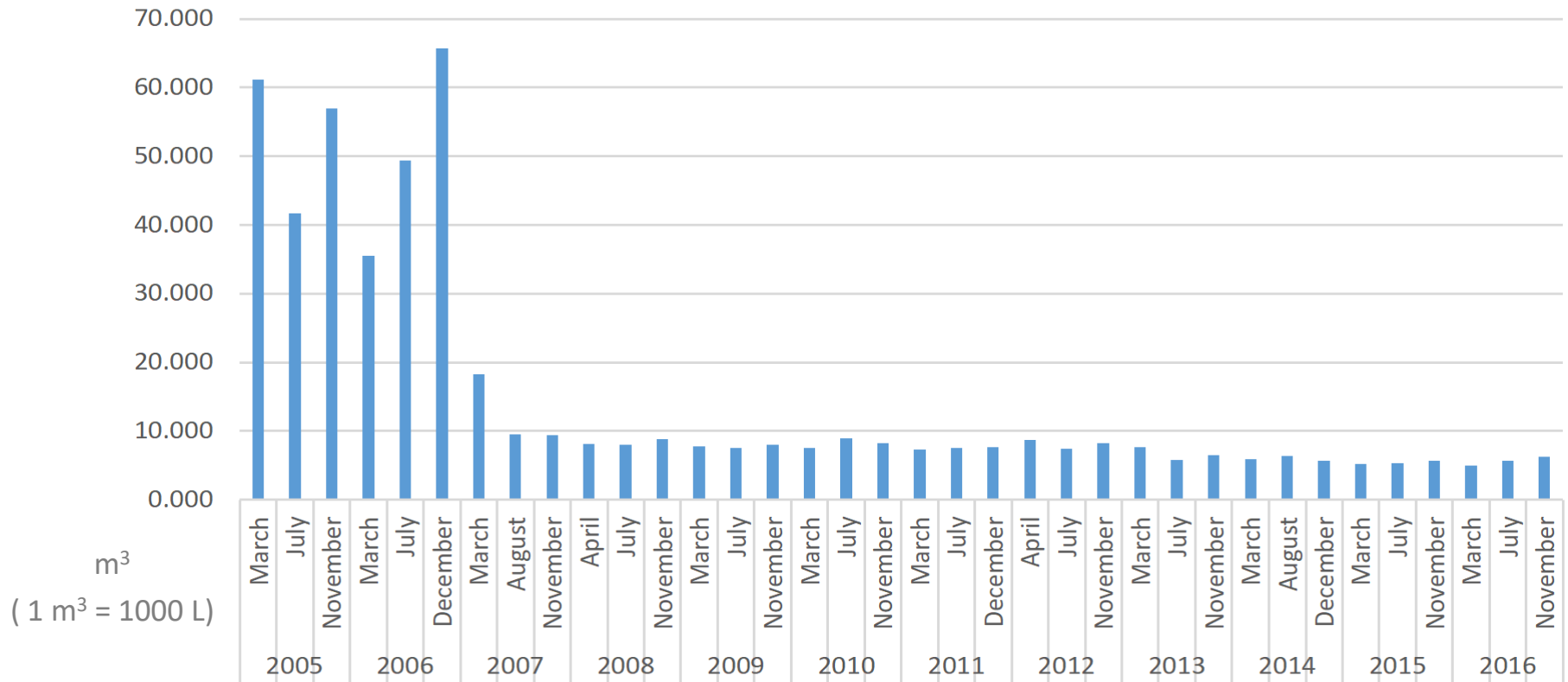
Bulletin 2018-003-PL
bulletins.vancouver.ca

Photographs courtesy of the Capital Regional District, British Columbia
Photo Credits: Derek Ford Studios

6) Single Pass Systems

Billing Data: Restaurant

Pre- and post-retrofit of once through cooling



Courtesy of the Capital Regional District, British Columbia

7) Summary

www.vancouver.ca/operating-permit

- May 2, 2017: No new installations of single pass systems.
- January 1, 2019: Alternate water systems need an **operating permit**.
- June 3, 2019: Building water treatment systems need an **operating permit**.
- **Operating permits:**
(alternate water systems & building water treatment systems)
 - No fee
 - 2019: Fee review
 - 2020: Cost-recovery basis

7) Summary

www.vancouver.ca/operating-permit

- January 1, 2020:
 - All existing single pass systems must be disconnected.
 - Cooling towers need an **operating permit**.
- July 1, 2020: Decorative fountains need an **operating permit**.
- **Operating permits:**
(cooling towers & decorative fountains)
 - No fee
 - 2019-2020: Ongoing consultation

Additional Information



LEGIONELLA CONFERENCE 2019

BUILDING WATER SYSTEMS: THE SUSTAINABILITY & PUBLIC HEALTH NEXUS

September 11-13, 2019
Westin Bonaventure Hotel & Suites
Los Angeles, CA

legionellaconference.org



Presented by NSF International and the National Environmental Health Association

Questions?

www.vancouver.ca/operating-permit

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