WELCOME

Total Water Quality Project Open House

March 2, 2016

WHITE ROCK
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WHERE OUR WATER SUPPLY ORIGINATES

WELL LOCATIONS IN WHITE ROCK

Typically, wells 1,2 and 3 supply the west side of the City; wells 6 and 7 supply the eastside, and well 5 supplies the low zone. Well 4 is a seasonal well that is used in the summer months only. However, this will vary due to fluctuations in water demand, well operation, system maintenance and repairs.

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MY CITY, MY WATER

Canadian drinking water supplies are generally of excellent quality. However, water in nature is never "pure." It picks up bits and pieces of everything it comes into contact with, including minerals, silt, vegetation, fertilizers, and agricultural run-off.

- Health Canada

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WATER QUALITY - TIMELINE

- August 2010
  - E. Coli confirmed at Merklin Reservoir Boil water advisory issued for entire City
  - EPCOR provides temporary water treatment at the Merklin Reservoir only
  - A small amount of chlorine is added to the system, which reacts with the naturally occurring ammonia in the water to form monochloramine
  - Fraser Health orders EPCOR to provide secondary treatment of the entire water distribution by June 30, 2016
- October 15, 2015
  - City staff conduct a public forum to discuss the purchase of the water utility, billing, operations and identifies high arsenic levels and future treatment options
- October 31, 2015
  - City purchases White Rock water system
  - The Fraser Health order to provide secondary treatment (disinfection) of the water system now applies to the City of White Rock

WATER QUALITY – TIMELINE

- December 14, 2015
  - Staff provide information report on secondary treatment options; chlorine vs. chloramination, with chloramination recommended by staff, EPCOR, engineers and technical experts based on water chemistry and aesthetics (odour, colour, taste)
- January 11, 2016
  - Dr. Murti, Medical Health Officer with Fraser Health Authority (FHA) attends city council meeting regarding secondary disinfection and their position regarding chloramination
  - Due to public feedback, City Council chooses to implement chlorination instead of chloramination for treatment of the water
  - City Council requests an extension from FHA to implement chlorination until arsenic treatment is installed

> *"Chloramination is considered a safe disinfection that has been used by many systems in North America."*
>
> *"FHA has no preference for the method chosen for disinfection; chlorine or chloramination, both are acceptable".*
>
> Dr. Michelle Murti, Chief Medical Health Officer, Fraser Health Authority

WATER QUALITY - CURRENT STATUS

- January 18, 2016
  - Fraser Health denies the City's request for an extension to postpone chlorination
  - Staff prepare a plan and begin laboratory testing to ensure the safe implementation of chlorination of the entire distribution system
- February 15, 2016
  - Staff provide presentation to council on water quality illustrating the potential colour, clarity and odour impacts as a result of adding chlorine
- March 2, 2016
  - Water quality open house
  - Staff continue with work plan to implement chlorination by June 30, 2016
  - Further testing and pipe sampling is required as chlorine cannot be added to the distribution system as quickly and efficiently as chloramine

TOTAL WATER QUALITY MANAGEMENT PROJECT

1. Disinfection of distribution system

- Fraser Health requires EPCOR/City to provide secondary disinfection by June 30, 2016

2. Increase storage capacity at Oxford and Merklin Sites

- The Oxford Site has been completed
- Seismic upgrade at Merklin site – removal of existing water tower begins February 29, 2016
- Additional supply to meet future demand in 2031

3. Arsenic removal if limit exceeds the Guideline for Canadian Drinking Water Quality (GCDWQ)

- Arsenic concentrations are within current limits which is 0.010 mg/L as set by Health Canada
- By December 31, 2018 Fraser Health requires the City to provide treatment if arsenic levels increase above existing levels

4. Manganese removal if GCDWQ establishes a limit for health effects

- Currently GCDWQ only has an aesthetic limit which is 0.05 mg/L as set by Health Canada

OXFORD SITE RENDERING

Completed

- The Oxford site construction is now complete. The new reservoir can hold up to 1.73 ML of water
- The new disinfection system upgrade allows the City to comply with the Fraser Health order to treat the water supply through secondary treatment (disinfection)
- Secondary treatment has not begun

MERKLIN SITE RENDERING

January 2016 – January 2017

- Construction on the Merklin site has begun. Currently Merklin High Tower is structurally deficient and will be demolished in late February 2016
- Once the tower has been demolished, construction on the new underground reservoir to hold 1.55 ML of water will begin
- The Merklin site has continuously provided secondary treatment, as required by Fraser Health, since 2010 as a result of the boil water advisory

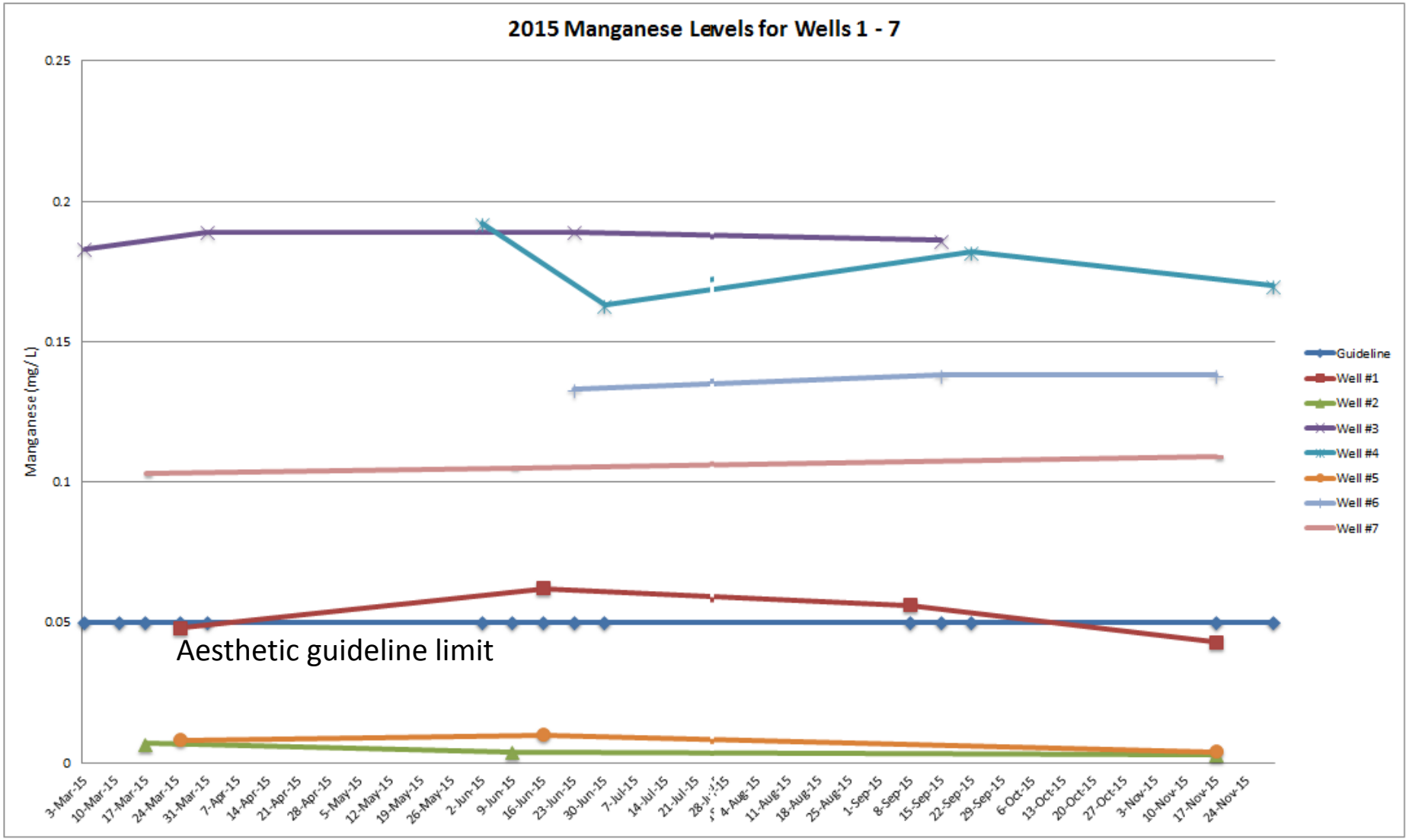
THE IMPACT OF MANGANESE

AN AESTHETIC OBJECTIVE ONLY

Manganese is an element that can be found in over 100 common salts, rocks and in the soils found on the floors of lakes and oceans. The aesthetic objective for manganese is 0.05 mg/L in the Guidelines for Canadian Drinking Water Quality set by Health Canada.

- Manganese is among the least toxic elements to mammals; only exposure to extremely high concentrations from human-made sources has resulted in adverse human health effects
- At levels exceeding 0.15 mg/L, manganese can stain plumbing fixtures and laundry and may cause an undesirable taste in beverages
- It is difficult to remove manganese to achieve concentrations below 0.05 mg/L. Therefore, for aesthetic purposes, the aesthetic guideline limit for manganese in drinking water is 0.05 mg/L
- Manganese at this recommended limit is not considered to represent a threat to health, and drinking water with much higher concentrations has been safely consumed. A maximum acceptable concentration therefore, has, not been set

Source: Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Manganese



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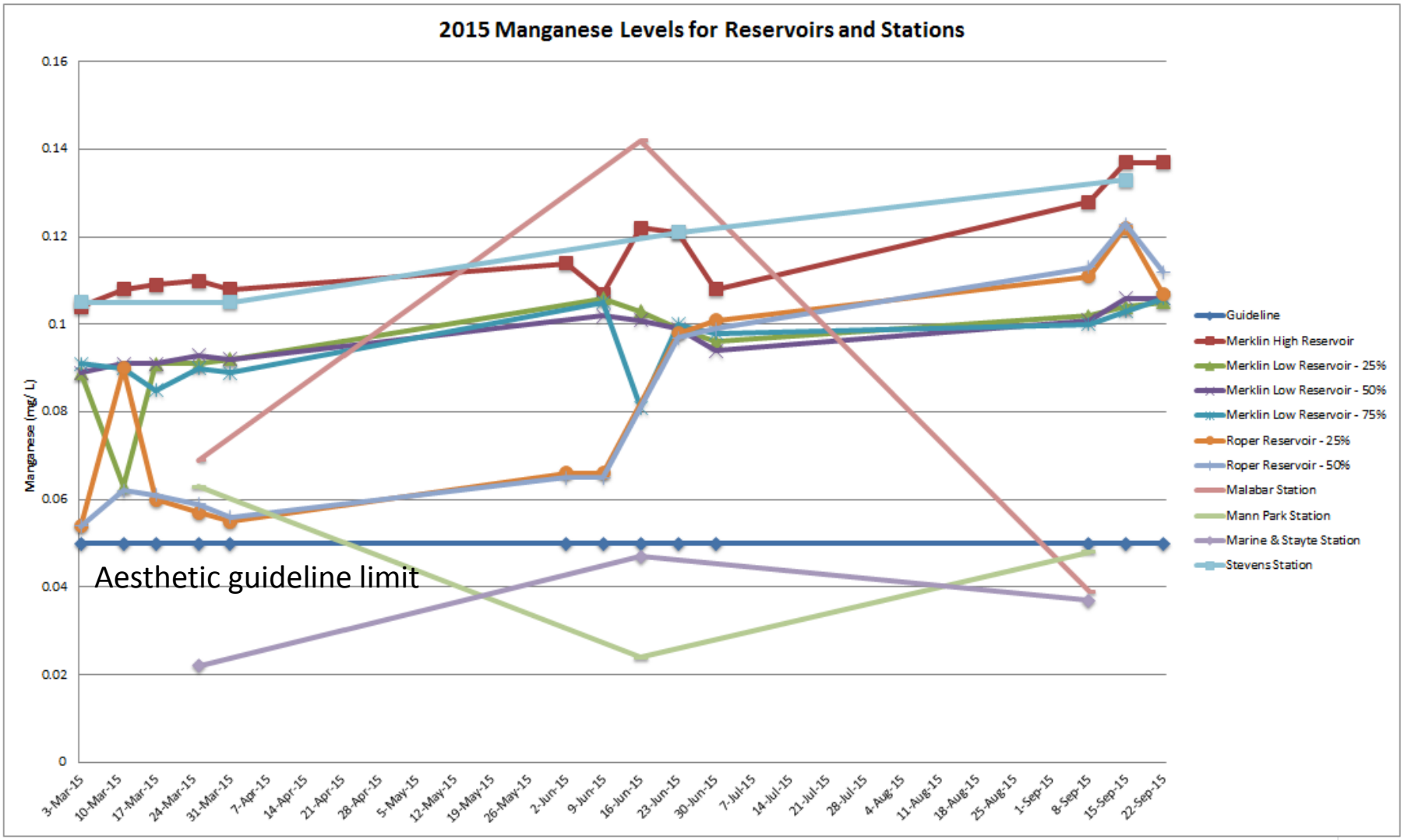

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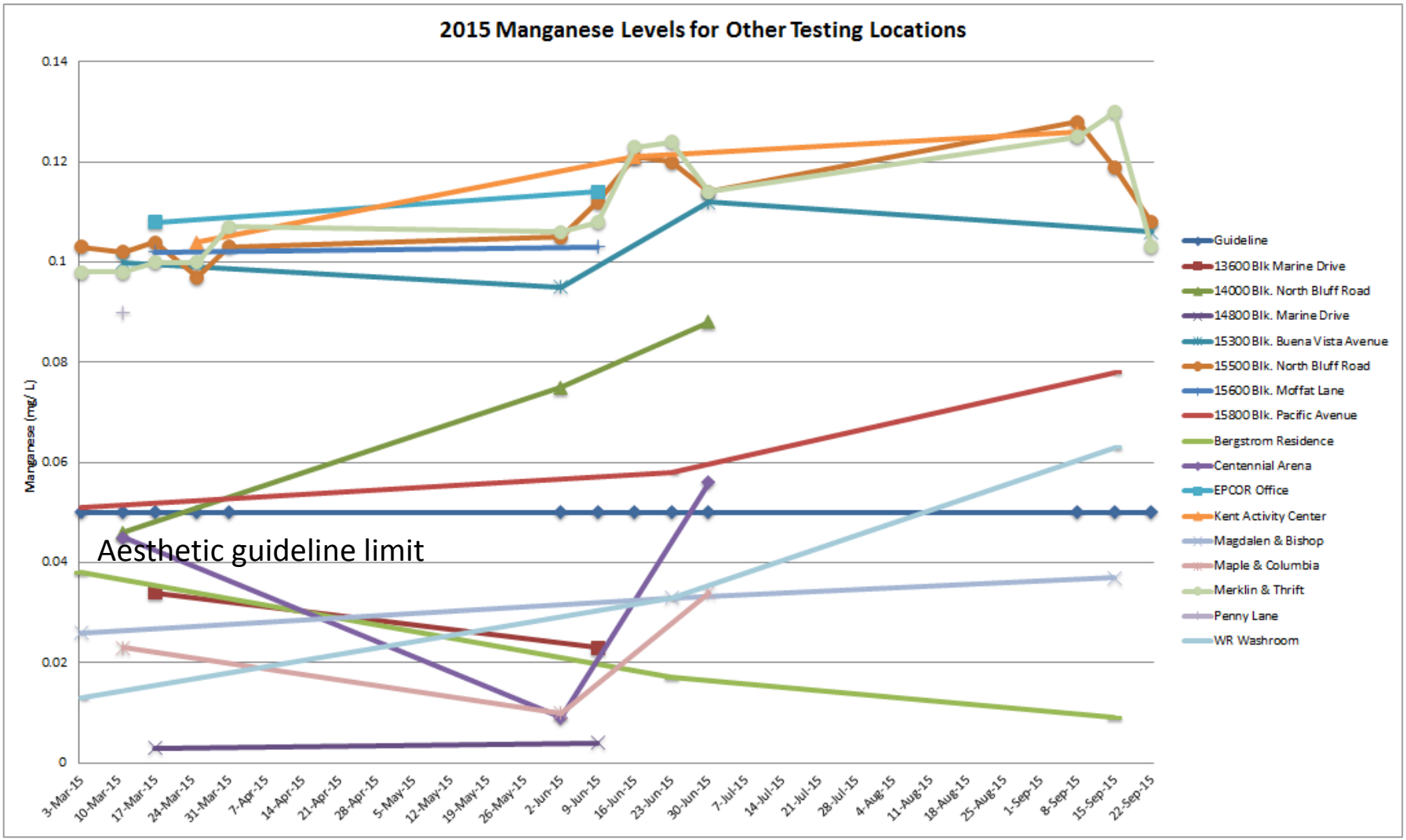

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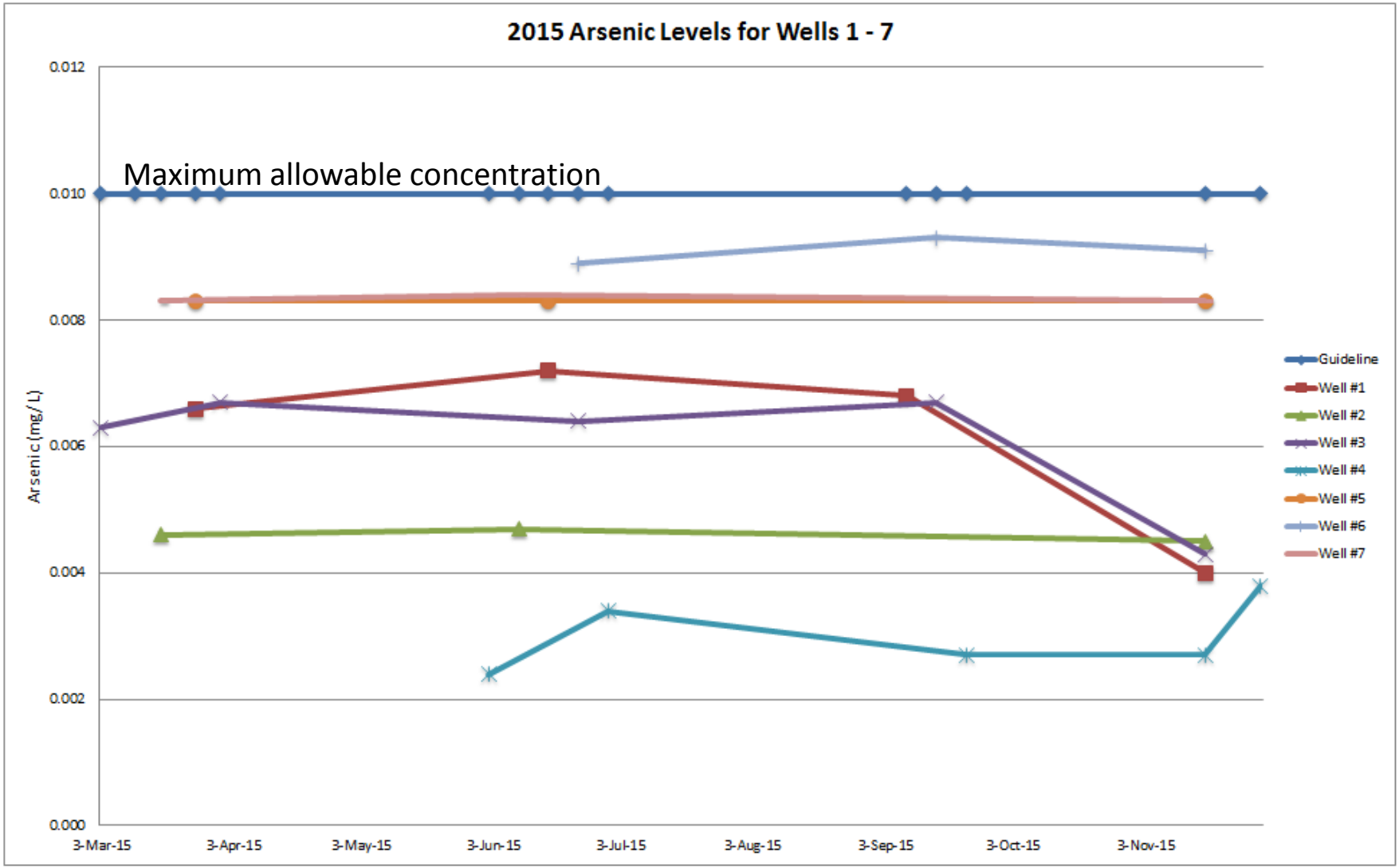
THE IMPACT OF NATURALLY OCCURRING ARSENIC

- Arsenic is a naturally occurring metal found in mineral deposits or rocks throughout the Earth's crust. Arsenic may enter lakes, rivers or underground water sources when the mineral deposits containing arsenic dissolve
- In 2007, the GCDWQ lowered the maximum allowable concentration (MAC) from 0.025 mg/L to 0.010 mg/L
- The level of samples taken from 2010 to 2015:

Year	Samples Taken	% Over MAC
2015	129	0%
2014	209	0%
2013	278	1%
2012	*	0%
2011	*	0%
2010	311	0.3%

** Information not provided from EPCOR*

- Although the MAC for arsenic is set at 0.010 mg/L, levels should be kept as low as reasonably achievable



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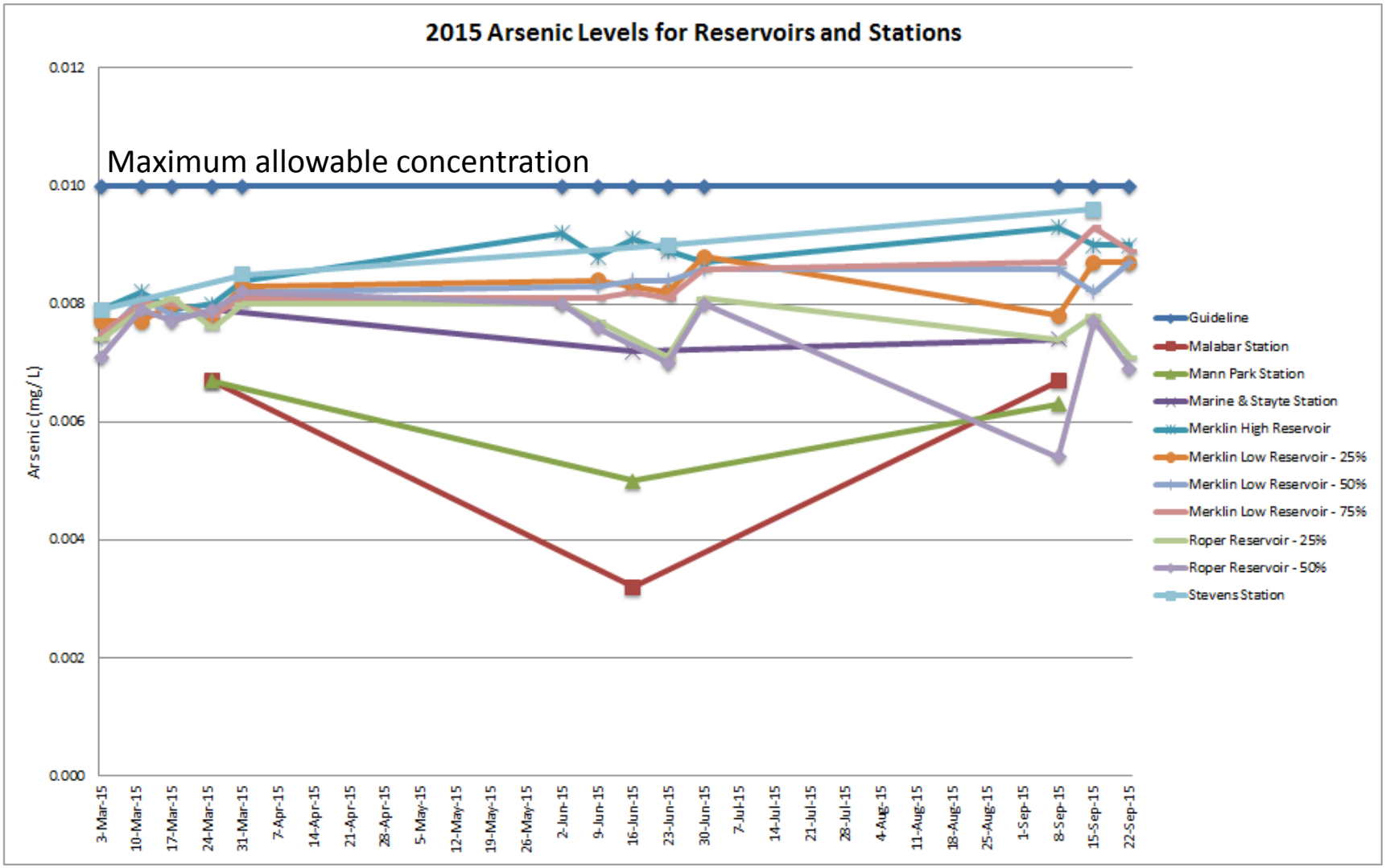

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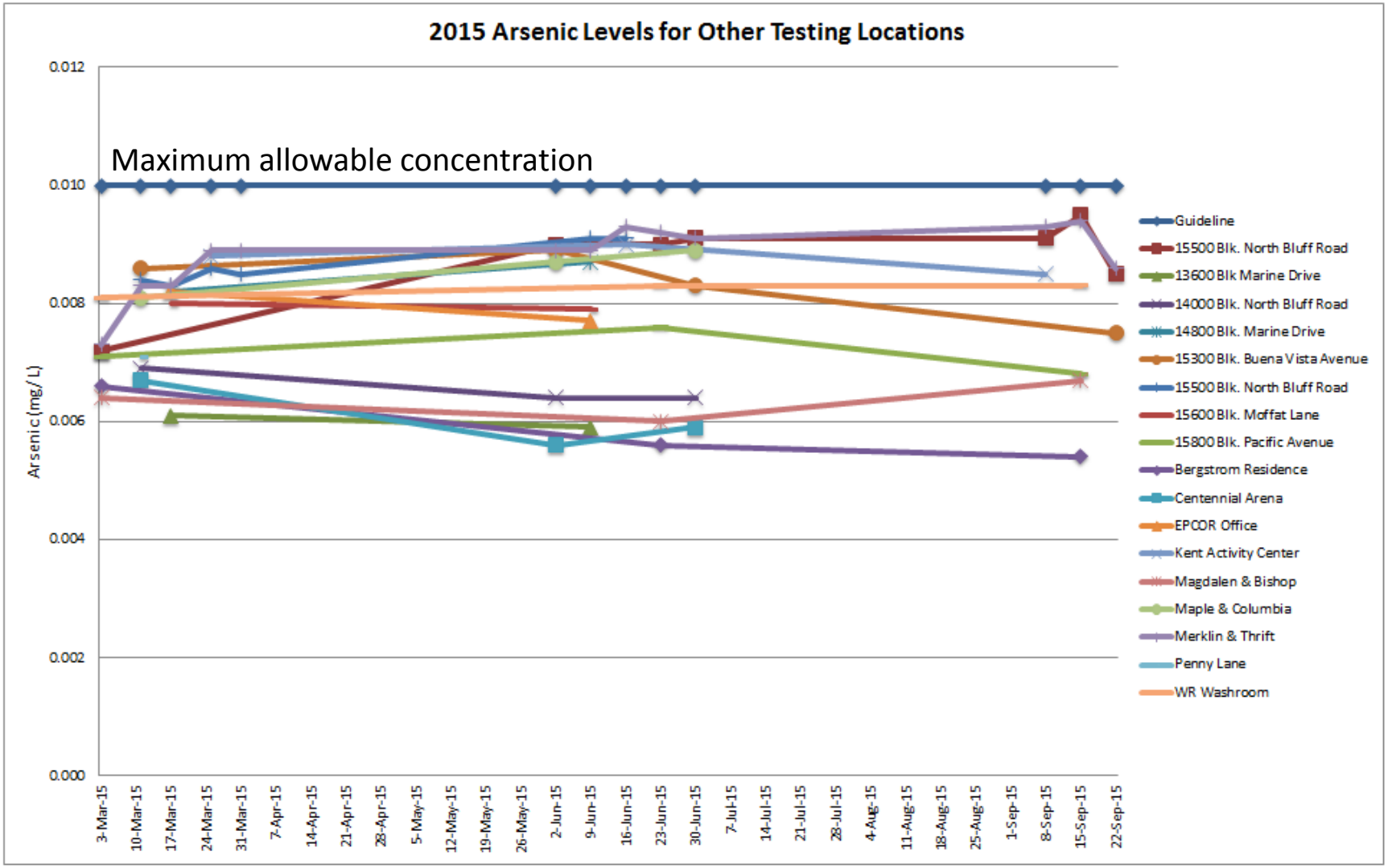

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WAYS TO LIMIT ARSENIC EXPOSURE

While arsenic is naturally occurring and currently below maximum allowable concentration limits, there are ways to limit exposure.

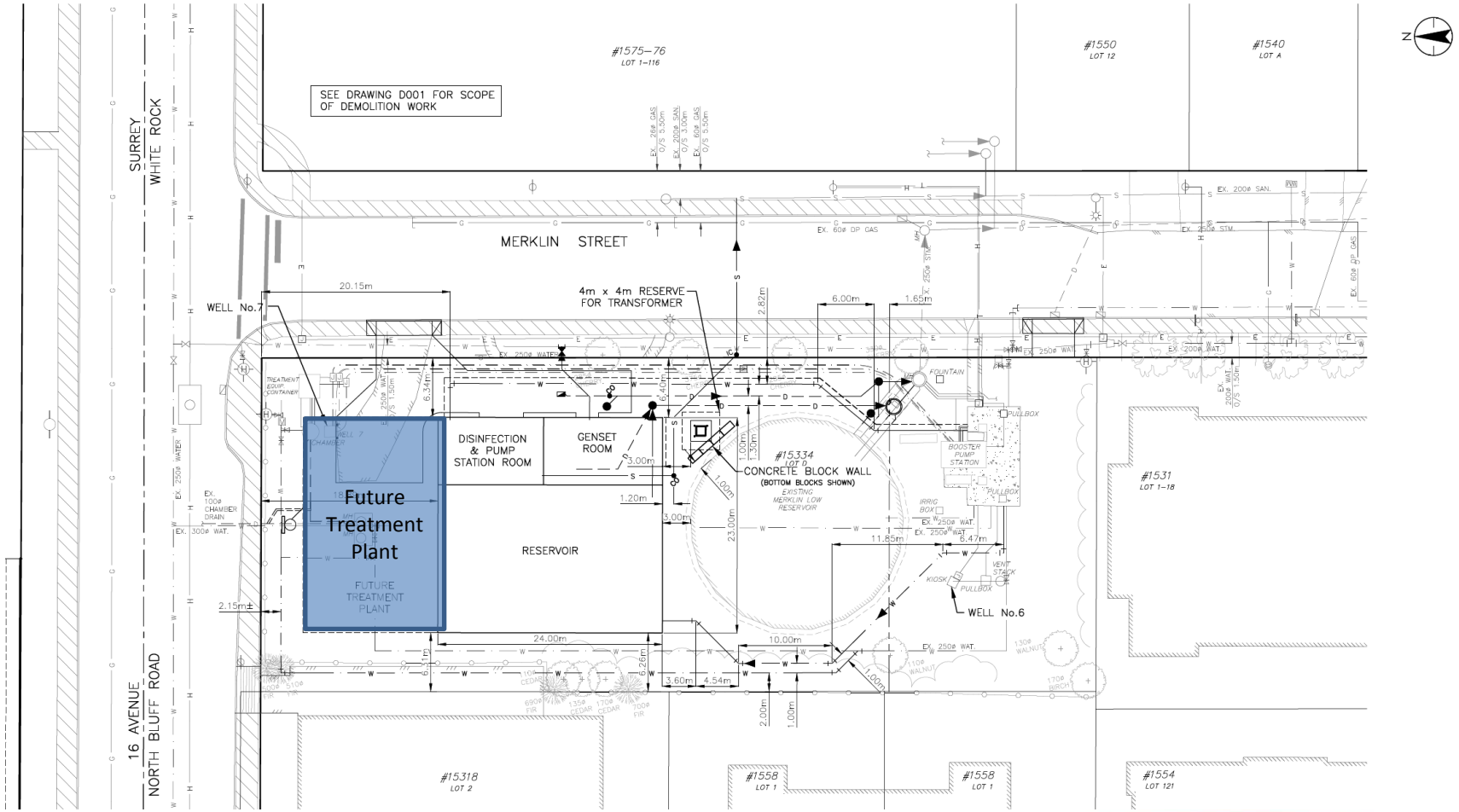
Arsenic Treatment Options for Homeowners: Purchase a in-home water treatment device

- Look for treatment devices that have been certified by an accredited certification organization meeting the appropriate NSF International (NSF)/ American National Standards Institute (ANSI) drinking water treatment unit standards for removing arsenic
- Make sure you follow the manufacturer's instructions regarding their use and maintenance
- For more information about arsenic please see the link on the City's Water Quality web page

Arsenic Treatment Options for the City

1. Build two treatment plants to treat arsenic: Merklin Site & Oxford Site (2-3 year timeframe)
    - Estimated capital cost of $13 million for 80% reduction of arsenic concentrations
    - Annual operating and maintenance costs ($100k to $300k depending on type of treatment selected)
2. Connect to Metro Vancouver (3-4 year timeframe)
    - Estimated capital cost of $27.1 million
    - Annual cost to supply water of $1.5 million
    - Loss of operational control

Proposed Arsenic Treatment Plant at Merklin



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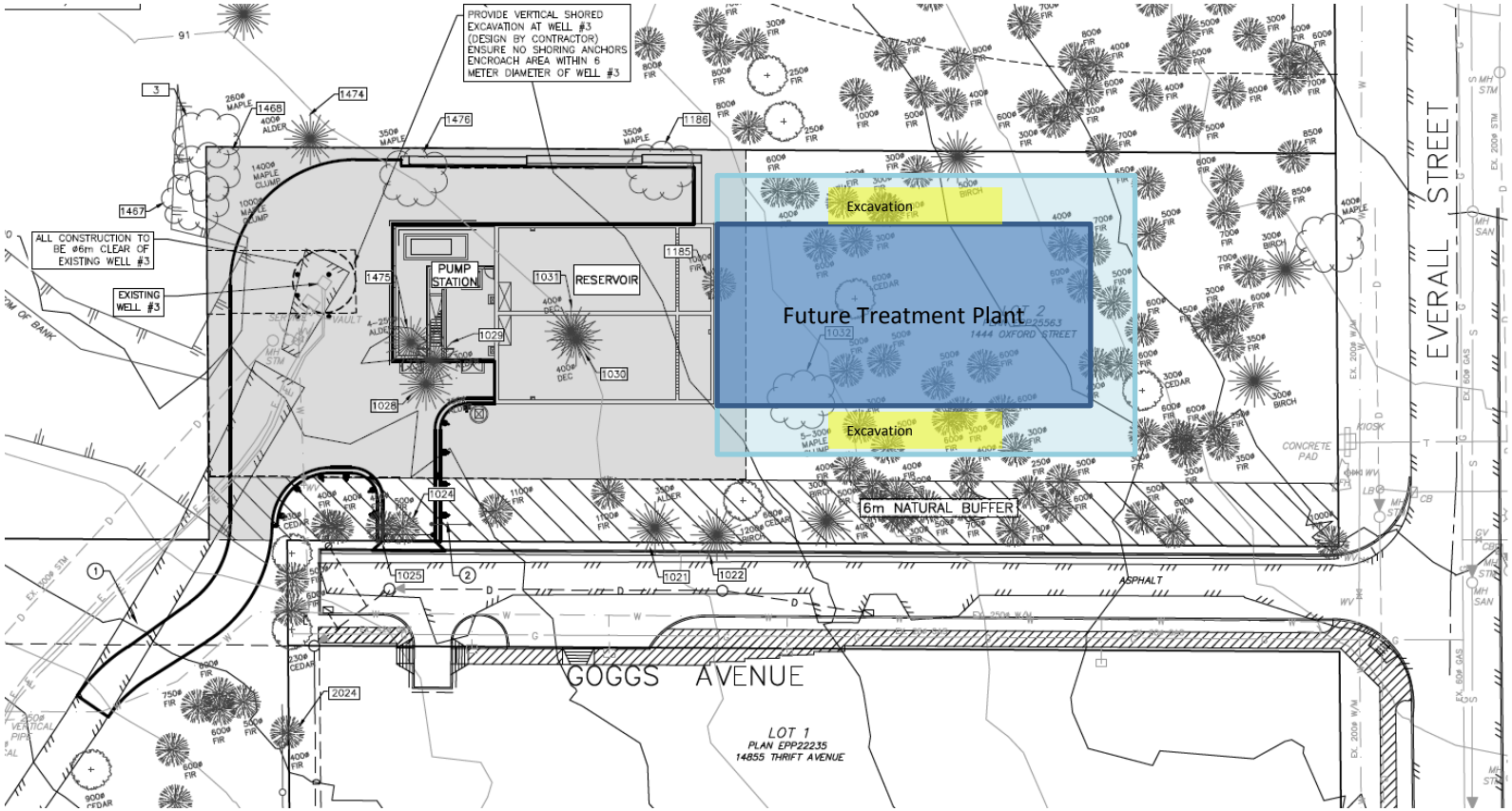
Proposed Arsenic Treatment Plant at Oxford



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METRO VANCOUVER

CITY OF WHITE ROCK WATER SUPPLY ANALYSIS

In March 2013 the City of White Rock approached Metro Vancouver to investigate options for joining the Greater Vancouver Water District (GVWD) water supply.

The following new GVWD facilities would need to be installed to join Metro Vancouver water supply:

- A pump station adjacent to Sunnyside Reservoir to boost the pressure of the water being sent to the White Rock area;
- Approximately 1.5 km of water main from Sunnyside Reservoir to the intersection of 148 Street (Oxford Street) and 16 Avenue (North Bluff Road). From this point, the water main would split with one water main going south to the Oxford Wells area and one water main going east to the Merklin High Tower Reservoir;
- A 0.4 km water main connecting to the White Rock Water System in the area of the Oxford Wells;
- A 1.2 km water main connecting to the Merklin High Tower Reservoir on the White Rock Water System.

The 2013 report from GVWD estimated the capital costs to connect to the GVWD water system at $27.1 million as illustrated in the following table(estimated costs):

Improvements for Metro Vancouver	Estimated Costs
Facilities to connect White Rock to GVWD Sunnyside Reservoir	$ 12,000,000
Improvements required to GVWD facilities upstream of Sunnyside Reservoir	$ 13,100,000
Additional costs – twinned pipes from Sunnyside Reservoir to White Rock	$ 2,000,000
Total Estimated Connection Cost	**$ 27,100,000**

In addition to the capital costs outlined in the above table, the GVWD water supply option would require the City to pay for bulk water supply costs every year at approximately $1.5 million to maintain the demand for water in White Rock.

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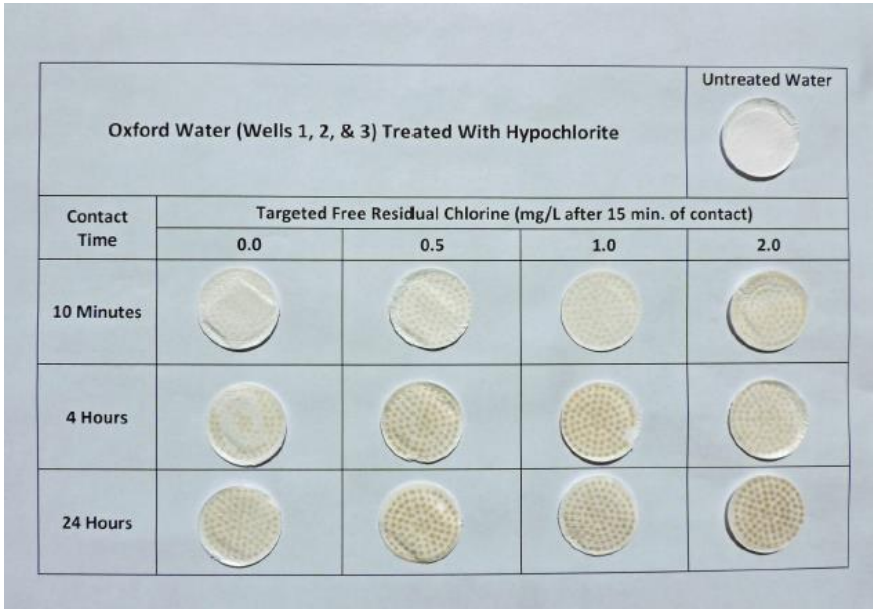
THE IMPACT OF CHLORINATION

Sodium hypochlorite (chlorine) is concentrated bleach, which will react with the materials in the water and pipes and cause the following issues:

- Chlorine smell in the water
- Turn the water cloudy
- Turn the water to a slightly yellow colour
- Reacts with any materials that are adhered to the inside of the pipes
- Staining of laundry and plumbing fixtures
- Increase the flushing and maintenance of the reservoir and distribution network since manganese will settle in the pipes and reservoirs



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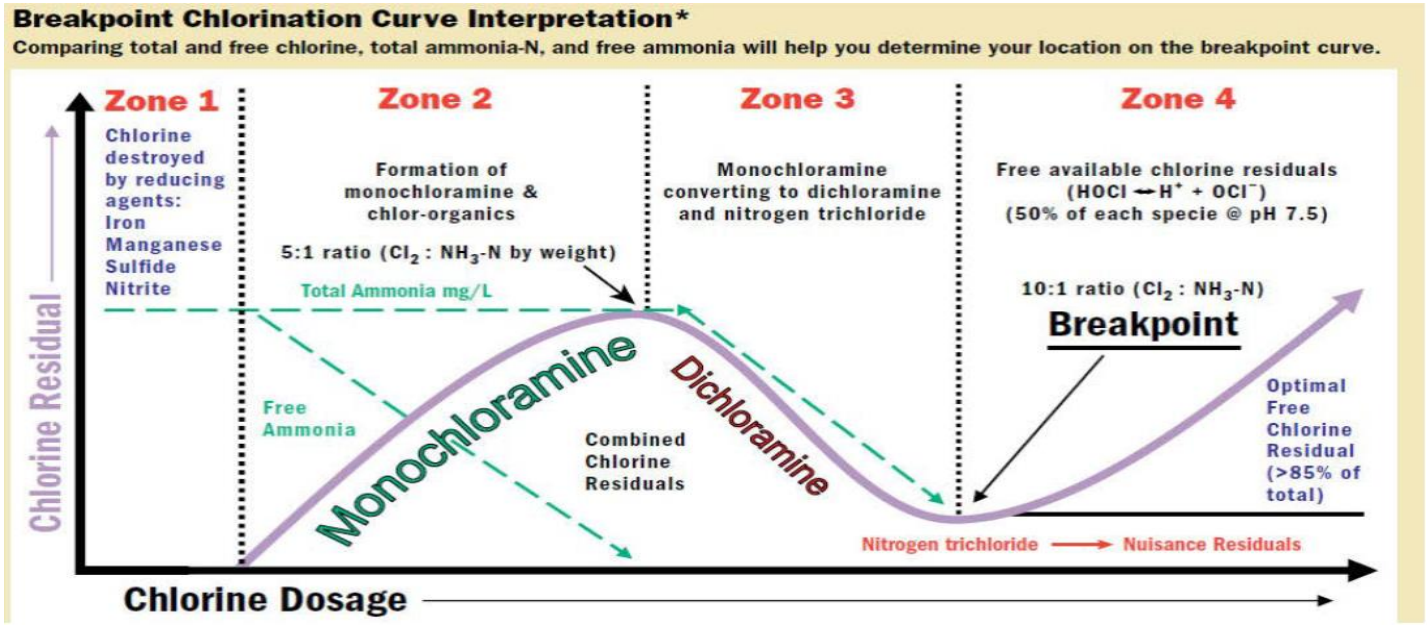
Chlorination Bench Scale Testing

	No Chlorine	12 Hours after Chlorine Added	24 Hours after Chlorine Added
Turbidity	0.11 NTU	0.42 NTU	0.74 NTU
Free Chlorine Residuals	0 mg/L	0.39 mg/L	0.29 mg/L
Comments	• Clear • No odour	• Cloudy • Increase in chlorine smell	• Cloudy • Increase in chlorine smell



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How We Communicate Water Quality

- Every month different water quality parameters are tested throughout the City:
  - Weekly laboratory testing
    - In-house testing for conductivity, pH, turbidity, free chlorine, total chlorine and temperature
    - Microbiological testing for Total Coliforms and Escherichia Coli
  - Monthly laboratory testing
    - Metal testing for arsenic at the Merklin Site only
  - Quarterly laboratory testing
    - Metal testing for arsenic, copper, lead, iron and manganese
    - Organic testing for Trihalomethane (THM) and Haloacetic Acids (HAA)
  - Yearly laboratory testing
    - Inorganics including: antimony, arsenic, barium, boron, bromate, cadmium, chloramines, chromium, cyanide, fluoride, lead, mercury, nitrate, nitrite, selenium, uranium, aluminum, ammonia, calcium, chloride, copper, hardness, iron, magnesium, silver, sodium, sulphate, sulphide, organic carbon, xylenes and zinc

Once these parameters are tested all of the test results are uploaded to the White Rock website for viewing
Please visit whiterockcity.ca/MyWater

NEXT STEPS

City to receive approval from Fraser Health on the chlorination implementation plan.

Implement chlorination of the distribution system by June 30, 2016.

Continue to monitor and report the levels of arsenic in the distribution system.

Report any exceedance of the MAC Guideline Drinking Water Quality.

POSSIBLE NEXT STEPS

Issue an Request for Proposal to hire an engineering firm to:

- Select the appropriate technology for arsenic removal.
- Determine most economical plant design.
- Design the arsenic treatment plant.

Review potential federal/provincial funding opportunities.

Construct an arsenic treatment plant.

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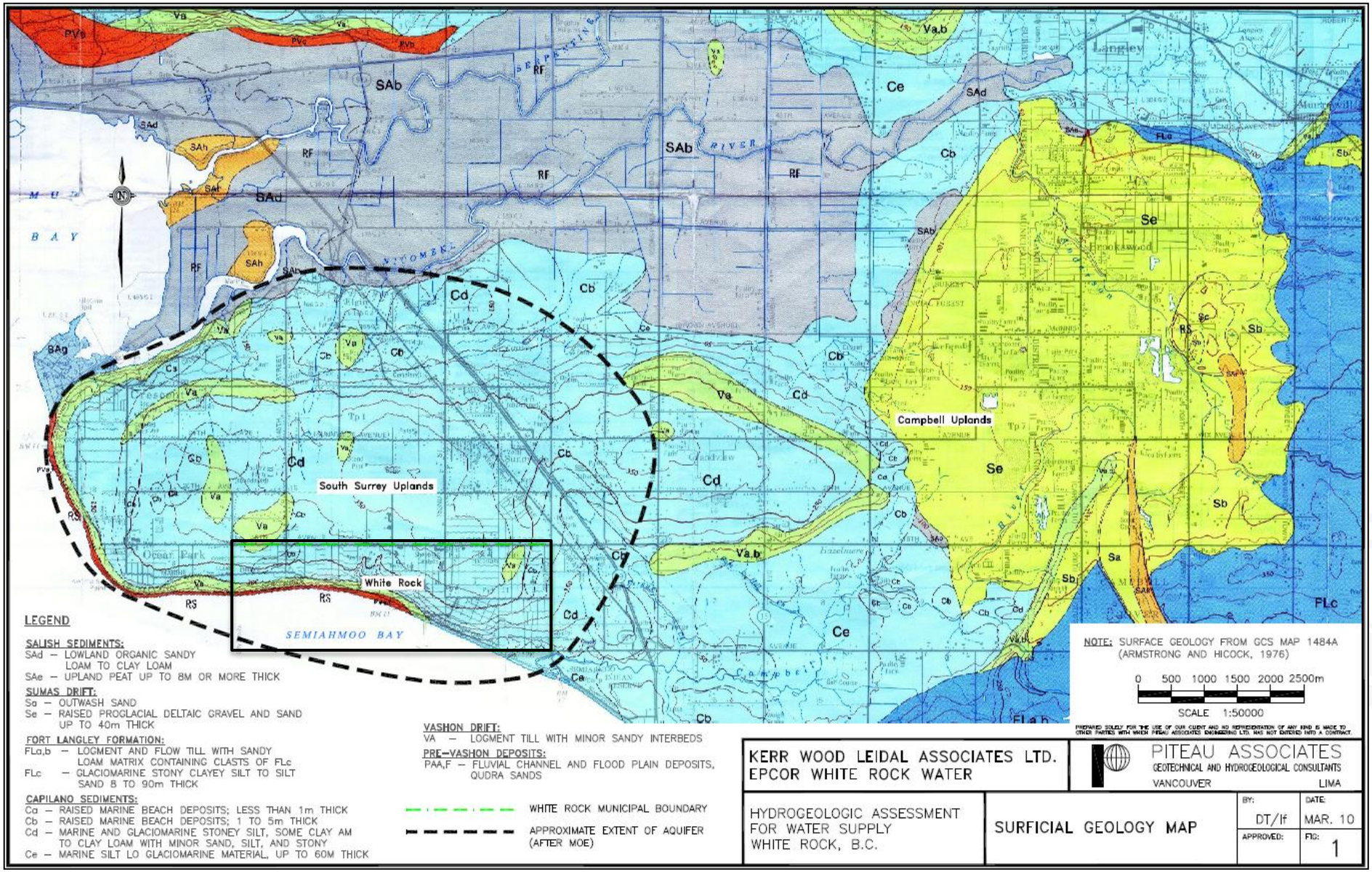
WHERE OUR WATER SUPPLY ORIGINATES

HYDROGEOLOGICAL ASSESSMENT FOR WATER SUPPLY



BACKFLOW PREVENTION DEVICE

What are they?

A backflow prevention device is a mechanical apparatus that allows water to flow in only one direction. An unprotected or untested backflow prevention device can cause a public health hazard. The owners or occupants can be held liable for damages.

Who needs them?

- The most common residential cross-connections occur with lawn irrigation and fire sprinkler systems.
- Cross-connections with commercial properties can be found from carbonated beverage machines, ice makers and fire sprinkler systems.

Annual testing & reporting is required by a licensed backflow tester

The results of the inspection must be submitted to BSI Online. Customers with known devices will receive a notification and reminder directly from BSI Online that testing is due. Once the annual inspection is complete, the testing company will enter that information directly into BSI's online reporting system.

BSI Online also has a customer portal: https://www.bsionlinetracking.ca/customer