

Appendix 'E-3' – Issue Contributing Area Delineation Plans

Context

The following provides an overview of issues identified at each of the municipal residential intakes/supply wells and is a monitoring plan that is both general and preliminary in nature. The plan is to identify the issue contributing areas. Pending available funding, the plan will be refined through further research and consultation with drinking water treatment and wastewater treatment plant operators. Valuable input for the operators will realize a reduction in duplicate samples and ensure local knowledge is capitalized.

Brockville Water Treatment Plant

Issue: E. coli

Sampling will be carried out in the areas upstream from the intake in order to identify potential sources of *E. coli*. The issue was identified based on information at a monitoring site in Buells Creek, so emphasis in the research plan will lie in the upstream areas of that watershed, rather than in the St. Lawrence River. Although only a small reach of Buells Creek falls within Intake Protection Zone (IPZ) 2, it is expected that IPZ 3 will encompass the remainder of Buell's and Butlers Creeks. As such, the upper portions of these watersheds have been included in the plan for delineating the Issue Contributing Area (ICA).

The monitoring station where high levels of *E. coli* were detected lies in Buells Creek, near its outfall to the St. Lawrence River and downstream of its confluence with Butler's Creek. Butler's Creek flows through agricultural lands and multiple wetland areas north and east of the City of Brockville. Buells Creek flows from the vicinity of the Mac Johnson reservoir through the northern areas of the City of Brockville before joining with Butler's Creek just south of the intersection of County Road 29 and Front Avenue West. Previous flow monitoring efforts have indicated that Buells creek has higher midsummer flow than does Butler's creek and may therefore have a greater impact on water quality at the source. A mass balance will be produced to verify the contribution of each watershed area to the issue in the source.

Water quality sampling and concurrent flow monitoring will be conducted - over three years during the spring, summer and autumn seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

In addition to reference samples collected at the intake during the sampling period, sampling efforts to identify potential non-point sources of bacterial contamination will include:

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- Buells Creek downstream of confluence (PWQMN monitoring station);
- Buells Creek lower watershed (upstream of the confluence with Buells Creek at County Road 29 and Front Avenue West);
- Buells Creek upper watershed (Buells Creek at Centennial Road (outflow from the Mac Johnson Reservoir));
- Butler’s Creek lower watershed (upstream of the confluence with Buells Creek, at Brockville municipal office);
- Butler’s Creek mid-watershed (streamflow monitoring site on County Road 26);
- Butler’s Creek upper watershed (streamflow monitoring site on North Augusta Road).

At each site, during each sampling event, three samples for the issue-causing substance will be collected. Temperature, pH, dissolved oxygen and conductivity will be measured using a water quality probe (YSI) and discharge measurements will be taken. Using flow monitoring results, a rating curve will be produced for each surface water sampling location. A rating curve is the relationship between stream discharge and water level, established through measurements of stream geometry and velocity. This will allow the production of a mass balance, from which the contribution of that site to the contaminant in the source water at the intake may be estimated.

In the initial year of sampling, desktop research and a windshield survey will be carried out to identify possible point source inputs for *E. coli* into Butler’s Creek. Point source inputs include things like discharge from pipes and drains, storm sewer outfalls, poorly functioning septic tanks and spills related to human or animal waste. Potential non-point sources of *E. coli* may include runoff from agricultural areas or wildlife staging areas, residential lawns and roadways.

Fairfield Water Treatment Plant (Amherstview)

Issue: Total Coliform

Total coliform was detected, sometimes at high concentrations in untreated water at the Fairfield intake. Most of the high measurements occurred between July and October 2008. Possible sources of this contamination exist in a number of areas that may contribute water to the intake. Pending the availability of funding, these areas (outlined below) will be targeted in research to delineate the ICA for total coliform.

Water quality sampling and concurrent flow monitoring will be conducted over three years in spring, summer and fall seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

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In addition to reference samples collected at the intake during the sampling period, sampling efforts to identify potential point and non-point sources of bacterial contamination will include:

- Storm sewer outfalls serving the community of Amherstview. Three representative sites will be selected from (preferred sites are underlined):
 - Off the end of Fairfield Boulevard (IPZ 1)
 - East of Westfield Drive (IPZ 1);
 - East of Westfield Drive (IPZ 1);
 - Approximately 100 meters west of County Road 6 (IPZ 2);
 - West of Sherwood Avenue (IPZ 1);
 - Off the end of Speers Boulevard (IPZ 2); and
 - Swale between Kidd Drive and Clairton Place (IPZ 2).
- Collins Bay:
 - Mouth of Collins Creek;
 - Mouth of Highgate Creek; and
 - Offshore of Lemoine Point;
- Weather permitting, offshore from:
 - Nicholson’s Point;
 - Amherst Island; and
 - Three Brothers Islands.

Additional locations may be added if additional suspected sources are included in the delineation of IPZ 3.

At each site, during each sampling event, three samples for the issue-causing substance will be collected. Temperature, pH, dissolved oxygen and conductivity will be measured using a water quality probe (YSI) and discharge measurements will be taken (where applicable). Using flow monitoring results, a rating curve will be produced for each surface water sampling location. A rating curve is the relationship between stream discharge and water level, established through measurements of stream geometry and velocity. This will allow the production of a mass balance, from which the contribution of that site to the contaminant in the source water at the intake may be estimated.

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In the initial year of sampling, desktop research and a windshield survey will be carried out to identify other possible point source inputs for total coliform to the intake protection zones for the Fairfield Water Treatment Plant. Emphasis will be placed on identifying any potential changes in surrounding land use or sampling protocol that have occurred since 2008 that may explain the sudden increase in total coliform counts. Point sources for total coliform include things like discharge pipes, storm sewer outfalls, leaking septic tanks and spills. This investigation will include a search of Health Unit records for the age and type of septic systems in the area (where available) and bacterial beach counts for Collin’s Bay Pier, Lemoine’s Point and Rotary Park. Municipal data will also be reviewed where it relates to locations of discharge pipes from storm sewers and industrial facilities.

Bath Water Treatment Plant

Issues: Organic Nitrogen and E. coli

Organic nitrogen and *E. coli* were both detected at the intake at concentrations exceeding the issue benchmarks.

Pending the availability of funding, sampling will be carried out in the areas upstream from the intake in order to identify the contributing areas for organic nitrogen and *E. coli*. Details on the locations of sampling are included below.

Water quality sampling and concurrent flow monitoring will be conducted over three years in spring, summer and fall seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

In addition to reference samples collected at the intake during the sampling period, sampling will be carried out at the following locations in order to identify potential point and non-point sources of is issue causing contaminants:

- The outfall of the Bath Water Pollution Control Plant;
- Bath Creek at the following locations:
 - Main street, Bath ON;
 - County Road 22;
 - Townline Road;
 - Upstream and downstream of a site where discharge to the creek from a neighbouring land use has been noted.
- Tributary east of the town of Bath near Fairfield Street;
- Loyalist Cove;

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- Swale located at end of Heritage Drive at Bayshore Drive.

Additional sampling sites may be added once IPZ 3 has been delineated if it is believed that they may contribute to the organic nitrogen or *E. coli* issues.

At each site, during each sampling event, three samples for the issue-causing substance will be collected. Temperature, pH, dissolved oxygen and conductivity will be measured using a water quality probe (YSI) and discharge measurements will be taken (where applicable). Using flow monitoring results, a rating curve will be produced for each surface water sampling location. A rating curve is the relationship between stream discharge and water level, established through measurements of stream geometry and velocity. This will allow the production of a mass balance, from which the contribution of that site to the contaminant in the source water at the intake may be estimated.

In the initial year of sampling, desktop research and a windshield survey will also be carried out to identify possible point and non-point source inputs for organic nitrogen and *E. coli* to the source water at Bath. This investigation will include a search of Health Unit records for the age and type of septic systems in the area (where available), a review of bypass records for the Bath Water Pollution Control Plant and review of all data relating to the locations of discharge pipes from storm sewers and industrial facilities.

Non-point sources of contamination may include runoff from agricultural areas or wildlife staging areas, residential lawns and roadways. Point source inputs include things like discharge pipes, storm sewer outfalls, poorly functioning septic tanks and spills.

Cana Well Supply

Issues: Sodium, Chloride, Total Coliform and E. coli

Pending the availability of funding, sampling will be carried out in the areas surrounding the well in order to identify the contributing areas for sodium, chloride, total coliform and *E. coli*. Details on the locations of sampling are included below.

Water quality sampling and concurrent flow monitoring will be conducted over three years in spring, summer and fall seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

Because existing data are not sufficient to identify an issue contributing area at this time, the water quality in private wells will be tested within the vulnerable area. Where no such wells exist, or where access cannot be obtained, new monitoring wells will be established. Sampling will be carried out semi-annually, particularly after or during the spring freshet. By comparing concentrations of issue-causing substances in different areas of the vulnerable area, the ICA will be identified.

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Landowners with wells in the vulnerable area will be contacted by mail and telephone (where possible) to request their participation in the project. In exchange for allowing Conservation Authority staff to sample their well water at the tap, landowners will be offered access to test results for all analyses done on water from their own wells. An initial screening will be carried out to ensure that the most relevant wells are selected. Selected wells will be in appropriate areas, of good integrity (based on a visual inspection), free from obvious local sources of contamination, and have sufficient information is available on their depth, age and construction (well drilling records). The likelihood that the landowner will commit to the duration of the project may also be taken into consideration if uptake in the community is high.

In addition to reference samples collected at the supply well during the sampling period, sampling sites will be sought in the following areas in order to identify potential point and non-point sources of sodium, chloride and bacterial contamination will include:

- South of Highway 401 (up-gradient);
- North of Highway 401 (down-gradient);
- North of Highway 15 (down-gradient).

In the Cana Subdivision Wellhead Protection Area Study, Golder Associates recommend the installation of three or more new monitoring wells in order to resolve data gaps in groundwater flow direction. Should this work be carried out, the new monitoring wells will be phased in, replacing private wells, for use in the delineation of ICAs.

Non-point sources, such as road salt application, are suspected to be the primary source for sodium and chloride to the Cana well supply. Water softeners and run off from snow storage may also contribute these issues.

In the initial year of sampling, desktop research and a windshield survey will also be carried out to identify possible point and non-point source inputs for sodium, chloride, total coliform and *E. coli* to the Cana Well Supply. For the investigation into inputs of sodium and chloride, a review of road salting and snow storage practices as well as an investigation into the number and type of water softening systems in the area will be conducted.

Miller Manor Apartments Well Supply

Issues: Sodium, Chloride, Nitrate, E. coli and Total Coliform.

Pending the availability of funding, sampling will be carried out in the areas surrounding the well in order to identify the contributing areas for sodium, chloride, nitrate, *E. coli* and total coliform. Details on the locations of sampling are included below.

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Water quality sampling and concurrent flow monitoring will be conducted over three years in spring, summer and fall seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

Because existing data are not sufficient to identify an issue contributing area at this time, the water quality in private wells will be tested in areas within the vulnerable area around the Miller Manor supply well. Sampling will be carried out semi-annually, particularly after or during the spring freshet, and protocols will mirror health unit protocols for testing of private wells (sampling from tap, without purging the well).

Landowners with wells in the vulnerable area will be contacted by mail and telephone (where possible) to request their participation in this project. In exchange for allowing Conservation Authority staff to sample their well water at the tap, landowners will be offered access to test results for all analyses done on water from their own wells. By comparing concentrations of issue-causing substances in wells representing different areas of the vulnerable area the ICA will be identified.

Approximately eight accessible wells, representing wells in different areas within the vulnerable area, will be sought for this project. An initial screening will be carried out to ensure that the most relevant wells are selected. Selected wells will be in appropriate areas, of good integrity (based on a visual inspection), free from obvious local sources of contamination, and have sufficient information available on their depth, age and construction (e.g. well drilling records). The likelihood that the landowner will commit to the duration of the project may also be taken into consideration if uptake in the community is high.

Non-point sources, such as road salt application, may be sources for sodium and chloride to the Miller Manor well supply. Septic systems, water softeners and run off from snow storage may also contribute these issues. Poorly functioning septic systems may also contribute *E. coli*, total coliform and nitrate to the supply well.

In the initial year of sampling, desktop research and a windshield survey will also be carried out to identify possible point and non-point source inputs for sodium, chloride, nitrate, *E. coli* and total coliform to the Miller Manor well supply. This investigation will include a search of Health Unit records for the age and type of septic systems in the area (where available), a review of prevalence and types of agriculture-related activities in the vulnerable area, a review of road salting and snow storage practices, and investigation into the number and type of water softening systems in the area.

Lansdowne Well Supply

Issues: E. coli and total coliform.

Pending the availability of funding, sampling will be carried out in the areas surrounding the well in order to identify the contributing areas for *E. coli* and total coliform. Details on the locations of sampling are included below.

Water quality sampling and concurrent flow monitoring will be conducted over three years in spring, summer and fall seasons. The final analysis and delineation of issue contributing areas will be included in an updated edition of this *Assessment Report*.

Because existing data are not sufficient to identify an issue contributing area at this time, the water quality in existing monitoring wells within the vulnerable area around the Lansdowne supply well will be tested. There are five monitoring wells for the Lansdowne municipal well source. These wells are located near the sewage treatment lagoons (MW 1, 2, 3, 4) and approximately 100 meters east of Prince Street (MW 5). A municipal council resolution and agreement from Ontario Clean Water Association (OCWA) will be sought to secure future use of existing monitoring wells. At the present time, no monitoring wells exist to the north, south, or west of the supply wells. The establishment of new monitoring wells representing these regions of the wellhead protection area will therefore be required.

Specific areas where permission to install new monitoring well sites will be sought (or relevant private wells sampled, if available) include:

- School yard on King Street West;
- Northwest corner of municipal property containing baseball diamonds;
- Residential property on Outlet Road;
- Commercial property on Centre Street.

Sampling will be carried out semi-annually, particularly after or during the spring freshet. By comparing concentrations of issue-causing substances in different areas of the vulnerable area, with consideration for surrounding land uses and the direction of groundwater flow, the area(s) contributing to the issues will be identified.

In the initial year of sampling, desktop research and a windshield survey will also be carried out to identify possible point and non-point source inputs for *E. coli* and total coliform to the Lansdowne well supply. This investigation will include a review of records for the age and type of septic systems in the area (where available), municipal sewage treatment, agriculture-related activities.

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Agriculture-related activities, sewage treatment and poorly functioning septic systems may contribute *E. coli* and total coliform to the supply well. It is important to note, the majority of the village is connected to the sewer system, but there are some septic systems on properties north of the wells and agricultural-related activities present including the horse track at the fairgrounds and nearby stables.